DEVELOPMENT OF MEASURES TO MITIGATE IMPACTS OF MINING INDUSTRY: LESSONS LEARNED FROM THE LOWER KLITY CREEK, KANCHANABURI PROVINCE

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ภาสนันทน์ อัศวรักษ์: การพัฒนามาตรการเพื่อลดผลกระทบจากอุตสาหกรรมเหมืองแร่: บทเรียนจากลำห้วยคลิตี้ล่าง จังหวัดกาญจนบุรี. (DEVELOPMENT OF MEASURES TO MITIGATE IMPACTS OF MINING INDUSTRY: LESSONS LEARNED FROM THE LOWER KLITY CREEK, KANCHANABURI PROVINCE) อ.ที่ปรึกษาวิทยานิพนธ์หลัก: อ. ดร.นฤมล อรุโณทัย, อ.ที่ปรึกษาวิทยานิพนธ์ร่วม: รศ.ดร.ดาวัลย์ วิวรรธนะเดช, 165 หน้า.

การพัฒนามาตรการเพื่อลดผลกระทบจากอุตสาหกรรมเหมืองแร่: บทเรียนจากลำห้วยคลิตี้ล่าง จังหวัดกาญจนบุรี มีวัตถุประสงค์เพื่อศึกษาผลกระทบและความเสี่ยงต่อชุมชนจากการทำเหมืองแร่โดยใช้ชุมชน คลิตี้ล่างเป็นกรณีศึกษา นอกจากนี้ยังเพื่อวิเคราะห์การบรรเทาปัญหาและการช่วยเหลือจากภาคส่วนต่างๆ ที่เกี่ยวข้อง และเพื่อถอดบทเรียนจากกรณีนี้เพื่อนำไปสู่การพิจารณาเรื่องสิ่งแวดล้อม การพัฒนา และความยั่งยืน ในบริบทของเหมืองแร่และชุมชนท้องถิ่น วิธีวิจัยที่ใช้คือการศึกษาเอกสาร การสัมภาษณ์ การสังเกต และการร่วมประชุมสัมมนาเรื่องเหมืองแร่และชุมชน จากนั้นจึงวิเคราะห์สังเคราะห์ข้อมูลเพื่อถ่ายทอดออกมาในเชิงพรรณา การทำเหมืองตะกั่วส่งผลให้เกิดการปนเปื้อนในลำห้วย ซึ่งชาวบ้านที่ชุมชนคลิตี้ล่างนั้นเป็นชนพื้นเมืองกะเหรี่ยงโปว์ที่จำเป็นต้องพึ่งพาลำห้วย ไม่เพียงแต่เป็นแหล่งน้ำและอาหารแต่ยังผูกพันกับวิถีชีวิตในมิติอื่นๆ ด้วย การที่ชาวบ้านได้รับพิษตะกั่วส่งผลให้เกิดอาการป่วยทั้งทางร่างกายและจิตใจ โดยเฉพาะในเด็ก ผลกระทบที่เกิดขึ้นก่อให้เกิดมาตรการและปฏิบัติการบรรเทาปัญหาจากหลากหลายองค์กร อย่างไรก็ตาม มาตรการเหล่านั้นไม่ประสบผลสำเร็จนักเนื่องมาจากการขาดการติดตามผลการดำเนินงาน การขาดแผนและงบประมาณระยะยาว การขาดความเข้าใจในวิถีชีวิตชาวบ้าน อีกทั้งการขาดบูรณาการระหว่างหน่วยงานและภาคส่วน แนวคิดที่ใช้ในการทำความเข้าใจปัญหาของกรณีคลิตี้คือ 1) แนวคิดความมั่นคงของมนุษย์ ซึ่งพบว่ามาตรการบรรเทาปัญหาไม่ได้พิจารณาถึงหลากหลายมิติของความมั่นคงของมนุษย์ ในขณะเดียวกัน กรณีของคลิตี้ล่างก็ชี้ให้เห็นว่า การวิเคราะห์ผลกระทบต่อวิถีชนพื้นเมืองทำให้เราต้องขยายความหมายและความครอบคลุมของมิติความมั่นคงของมนุษย์ให้กว้างขึ้น 2) อีกแนวคิดหนึ่งที่ใช้คือความเสี่ยง ซึ่งพบว่าความเสี่ยงในสังคมนั้นมักจะกระจุกตัวในกลุ่มชายขอบ ทำให้เข้าใจได้ว่าความเสี่ยงเป็นสิ่งประกอบสร้างทางสังคม และในการพัฒนาอุตสาหกรรมนั้น ความเสี่ยงมักถูกผลักออกไปให้สังคมโดยเฉพาะผู้คนชายขอบ คนยากจน คนที่ไร้สิทธิเสียง ความเสี่ยงจากสารพิษหรือสารปนเปื้อนต่อสิ่งแวดล้อมและสุขภาพมนุษย์ยังสะท้อนให้เห็นถึงความซับซ้อนของปัญหา ซึ่งคาดการณ์และควบคุมได้ยาก 3) แนวคิดความยั่งยืนที่หลากหลายและมีพลวัต (dynamic sustainabilities) ทำให้เข้าใจถึงความซับซ้อนหลากหลายและเกิดการท้าทายมุมมองเดิมๆ รวมทั้งการเปิดรับมุมมองอื่นๆ โดยเฉพาะในกระบวนการปรับปรุงนโยบาย ส่วนแนวทางที่จะป้องกันผลกระทบจากเหมืองแร่ต่อชุมชนนั้นจะต้องมีการปรับเปลี่ยนวิธีการคิดในการบริหารจัดการเพื่อแก้ไขปัญหา การผลักดันให้เกิดกระบวนการประเมินผลกระทบสิ่งแวดล้อมเชิงยุทธศาสตร์ การปรับเปลี่ยนเชิงระเบียบกฎหมายและมาตรการเชิงเศรษฐศาสตร์ รวมทั้งมาตรการเชิงรุกเพื่อสร้างให้เกิดการมีส่วนร่วมในการติดตามตรวจสอบและเยียวยา

สาขาวิชา สิ่งแวดล้อม การพัฒนา และความยั่งยืน ลายมือชื่อนิสิต .....

ปีการศึกษา 2555 ลายมือชื่อ อ.ที่ปรึกษาวิทยานิพนธ์หลัก .....

ลายมือชื่อ อ.ที่ปรึกษาวิทยานิพนธ์ร่วม .....

5187849420 : MAJOR ENVIRONMENT DEVELOPMENT AND SUSTAINABILITY

KEYWORDS : MITIGATION MEASURES/ MINING INDUSTRY/ LEAD MINE/ KAREN/ LOWER KLITY CREEK

PASSANAN ASSAVARAK: DEVELOPMENT OF MEASURES TO MITIGATE IMPACTS OF MINING INDUSTRY: LESSONS LEARNED FROM THE LOWER KLITY CREEK, KANCHANABURI PROVINCE. ADVISOR: NARUMON ARUNOTAI, Ph.D., CO - ADVISOR: ASSOC. PROF. DAWAN WIWATTANADATE, Ph.D.165 pp.

Development of Measures to Mitigate Impacts of Mining Industry: Lessons learned from the Lower Klity Creek, Kanchanaburi Province aims to collect and analyze data about impacts and risks from upstream mining activities by using Klity community as a case in point. In addition, it aims to analyze past mitigation measures and assess whether they responded to the local needs or not. This study also extracts lessons learned from Klity case and proposes a new way to view development, environment and sustainability with reference to mining and local communities. The methods used are documentary research, interviews, observation and participating in related meetings and seminars.The data were synthesized, analyzed, and presented in descriptive form.The mining activities resulted in lead contamination in the Klity creek. The villagers there are indigenous Pwo Karen who rely on the creek not only as their main food and water source but as cultural and spiritual part of their life. Lead contamination resulted in both physical and mental illnesses, especially in children. After the impacts were publicized, mitigation measures from various agencies were carried out but with little success. This is due to inconsistency in operation and lack of long-term follow-up or maintenance, lack of planning and budgeting for environmental and health recovery and rehabilitation, and lack of understanding of the villagers' traditional ways of life, and lack of integration work among agencies. The concepts used for the analysis of Klity case are 1) human security, it is found that mitigation measures did not really consider different dimensions of human security, and in turn, the case of Klity indicates that assessing impacts on indigenous way of life calls for a more extensive and comprehensive approach in human security dimensions; 2) risks, it is found that risks are usually concentrated among marginalized groups, so understandably they are socially constructed, and in industrial development, risks are externalized mostly towards the marginalized, the poor and the voiceless. Risks from contamination points to the issue of complexity, unpredictability, and uncontrollability; 3) dynamic sustainabilities represent a concept that bring more understanding to the complexity and dynamism of the problems and challenges conventional interlocked way of approaching and resolving them. There is a call for newer approaches and methods, especially in engaging in policy processes. As for Klity cases, the lessons learned pave ways for recommendations on restructuring of state administration to be able to better respond to the problems, pushing for Strategic Environmental Assessment, improving legal procedure and economic measures, and developing proactive measures to build greater participation in monitoring and rehabilitation.

Field of Study : Environment, Development and Sustainability Student's Signature .....

Academic Year: 2012 Advisor's Signature .....

Co-advisor's Signature .....

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CHAPTER I

INTRODUCTION

1.1 Background and importance of the study

The post World War II era of development offered a promise of bringing economic growth and prosperity to independent nation-states and enabling "mass consumption" society to elevate the standard of living. Yet the definition of development has been a major area of controversy, not only is it difficult to find a single development definition that covers the whole content (Sumner and Tribe, 2008), but those existing definitions are also challenged and often criticized.

In the beginning of the development era, the industrialized and democratic countries like the United States of America and Western European countries became the model countries that transferred their experiences to "underdeveloped" Third World. Stages of economic development were laid out and propelled through national scheme, with the support from international financial agencies. The early modernization process started with extracting natural resources, building physical infrastructure, increasing industrialization and market expansion through investment and the use of capitalist mechanism. Development with the narrow goal of increasing economic volumes through production and consumption resulted in the crises of progress. Thus, crises are often seen as normal part of development (Pieterse, 2010). Critics of conventional development like Arturo Escobar (1994) suggests that development is driven by a top-down, ethnocentric and technocratic process and "the discourse and strategy of development produced its opposite: massive underdevelopment and impoverishment, untold exploitation and oppression" (Escobar, 1994).

In Thailand, development through modernization process has officially started since the 1st National Economic Development Plan (1961-1966). The main purpose of the 1st Plan was to raise the standard of living through the construction of numerous physical infrastructures such as roads, electric power plants and dams.

(Office of the National Economics and Social Development Board: NESDB, 2009). The first period of development focuses solely on economic development, as demonstrated by the popular slogans at that time, like “flowing piped water, enough lighting, good roads, available jobs” and, “work is money, money is work, leading to happiness” which implies that the more production and consumption, the better the quality of life for Thai people (Sanguanchartsornkrai, 2002).

The development of extractive industries in Thailand started in early Rattanakosin period, especially tin mining industry in the southern provinces of Phuket and Phang-nga. With rapid industrialization during modernization era, different kinds of mineral especially base metal are needed for boosting up various industries and construction. Mining is among major industries which not only made a huge amount of profit but also the symbol of national pride and technological progress. As an upstream industry, it is deemed to be very important for creating a more secured future for the midstream and downstream domestic industries

Though mining industry remarkably helped with economic growth, it also caused environment degradation (Ministry of Natural Resources and Environment, 2008, p.4), migration and social change, and inequality as well. The type of development which emphasizes solely on economy has resulted in environmental problems not only in Thailand but in other countries as well (NESDB, 2009). Therefore, environmental deterioration has been a common phenomenon not only in developing countries but worldwide. The United Nations initiated a move in recognizing the problems. Stockholm Declaration (1972) and Brundtland Report (1983) were the two significant documents coming out of the environmental awareness movement at that period. The former focused on the quality of life for future generations as well as the present ones, and the latter placed more concerns over the environmental issues over the economic ones. One decade later, Rio Earth Summit (1992) resulted in a report on progress towards sustainable development which is known as Agenda 21, and Johannesburg World Summit on Sustainable Development (2002) made an emphasis

on improving the living conditions together with ensuring environmental sustainability (United Nations, 2008).

Following the international effort to redirect the development under sustainability principle, different countries come out with legislative structure in supporting sustainable development and lay out rules and regulations to control environmental and social impact from large scaled development projects. Over the last two decades, there have been several Multilateral Environmental Agreements (MEAs) for protecting the environment and community, some of the examples are the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES).

In Thailand, the 7th National Economic and Social Development Plan or NESDP (B.E. 2535-2539 or A.D.1992-1996) took a more interest in environment (Ministry of Natural Resources and Environment, 2008, p.54, NESDB, 2009). During the period, two significant Acts relating to the environment protection and public health were issued which are the Enhancement and Conservation of National Environmental Quality Act B.E. 2535 (1992) and Public Health Act B.E. 2535. From the 8th NESDP (1997 on) to 11st NESDP (present plan, from A.D. 2012-2016), the aims of the plans are shifting from economic growth to human-centered development and sufficiency economy (The National Economic and Social Development Board of Thailand, 2012). The balancing among economics, environment along with society are taken into account in order to develop the country.

The constitution of the Kingdom of Thailand 2007 clearly indicates state's imperative in protecting environmental quality in Chapter 5 Directive Principles of Fundamental State Policies, part 8, and section 85 (5) :

> *"…to promote, maintain, and protect the quality of environment on the principle of sustainable development; control and eliminate the pollution that is hazardous to health, sanitary, safety, and quality of life of the people, which people, local communities, and local*

administration organizations shall participate in directing the operation plan…"

In spite of the clear directive principles, supporting laws are not legislated and enforcement is weak leading to further victimization of environmentally affected communities. In addition, though the current Constitution of the Kingdom of Thailand attempts to protect the environment and community, plethora of toxic cases have been known long before the constitution is enacted, and curing mechanism has not been effective as in the case of Klity Karen community in Kanchanaburi province. So despite all this legislative structure, the reality of affected communities stands as a testament of the failure to solve the problems and to rehabilitate the environment and the community.

Klity lead mining plant started its operation in 1967 upstream from the lower Klity community. Gradually lead toxic seeped into the creek which is the mainstay for food and water for the Karen people around the area. The effect is apparent during 1992-1993 (over 20 years later) when some villagers became ill, livestock was found dead, and a few infants and young children have lower than average physical growth and mental development. The government issued a mine closure order, and later the villagers, with the help of civil society groups, filed a court case against the company and the Pollution Control Department.

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 for the villagers. Up until now, the issue of contamination has not been resolved and the government has yet to determine how to rehabilitate the stream and compensate for the social loss. Within the past years, there has been overlapping help and support to the village, yet the villagers' life, health, and traditions remain under threat.

The case of Klity has grown in importance in light of recent years due to an increasing public awareness on mining industry and the potential impact on local environment and communities. The local people in several areas throughout Thailand

organized themselves as “Network of People Affected by Mining”, and protests against mining industry have been more frequent. There seems to be dichotomous views towards mining industry – either pros or cons, and that presents a great potential for future conflict. Therefore, the case of Klity will be used here as a lesson of how we should view and manage development, environment and sustainability in a more balanced and peaceful way.

1.2 Objectives of the study

The objectives of this study are:

1.2.1 To collect and analyze data about impacts and risks from upstream mining activities by using Klity community as a case in point.

1.2.2 To analyze past mitigation measures and assess the past support and help operated by different sectors in alleviating the problems of lead contamination in Klity community.

1.2.3 To extract lessons learned from Klity case and propose a new way to view development, environment and sustainability with reference to mining and local communities.

1.3 Research questions

To fulfill the above objectives, research questions and methods have been designed. The main questions in this study are:

1.3.1 What are the impacts from upstream mining activities on Klity community? What are the risks towards the people and the natural resource base that the local people rely upon? How did the villagers cope with the problems or adapt themselves to avoid the impacts?

1.3.2 After the discovery of lead contamination, what has been done? What are the past mitigation measures and forms of support for the community? Do the measures and support correspond with the reality? Do they help alleviating problems? What does the community truly need in order to normalize their lives?

1.3.3 From the analysis of Klity case, how can we balance development, environment and sustainability especially in the context of mining industry? How should the policy be directed to guarantee that effective mitigation measures will be in place?

1.4 Scope of the study

1.4.1 **Study area** – the study focuses on Lower Klity Community in Thong Pha Phum and Si Sawat District, Kanchanaburi province. The village consists of 65 households with the population of 287. Although the mining impact mainly concentrated on Lower Klity Community, the study also covered the mining area of Upper Klity Village and the stream which stretches from Lam Khlong Ngoo National Park, passing Upper Klity Village, down to Lower Klity Village, and eventually flows down to Sri Nakharin Reservoir.

1.4.2 **Content** – the study focuses on impacts from upstream mining activities on Klity community, the past mitigation measures, and the development of policy direction to guarantee effective mitigation measures with reference to local communities and mining industry.

1.4.3 **Timeframe** – the study investigated the change in the Klity community since the discovery of lead contamination around 1993-1994, then followed the situations to the present time, with mitigation measures and support provided to the community since 2000.

1.5 Expected outcome

The expected outcome from this study is as followed:

1.5.1 The analysis and documentation of impacts of upstream mining activities on Klity community and the risks towards the people and the natural resource base that the local people rely upon.

1.5.2 The assessment of past mitigation measures and forms of support for the community and the evaluation whether measures and support correspond with the local reality.

1.5.3 The recommendation on how to balance development, environment and sustainability in the context of local communities and mining industry, and how to direct the policy to guarantee effective mitigation measures.

1.6 Framework of the study

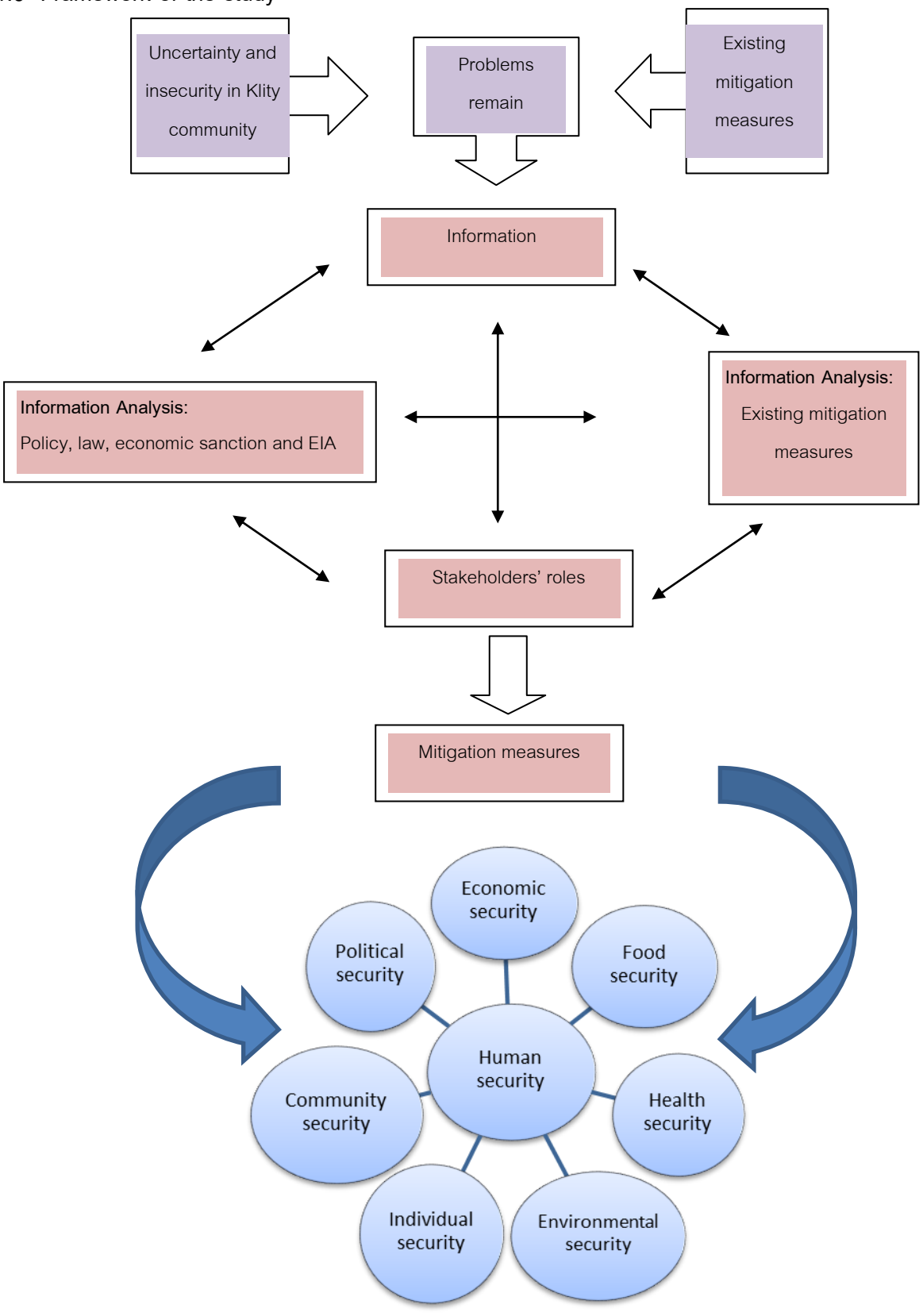


Figure 1 Framework of the study

Figure 1 - the framework of the study can be explained as followed – the starting point is after the mine company released lead discharge into the Klity creek, this has greatly affected villagers both in direct and indirect ways. Lead toxicity creates human insecurity in terms of health and social well-being, so the villagers are faced with uncertain situations. Their way of life has dramatically changed, for example, they were used to rely on themselves and nature, but they are nowadays depending very much on external factors such as food from vendors outside community, medical treatment from hospitals, legal supports from attorneys, etc. This study then explores existing mitigation measures and identifies how they did not correspond with the needs of the people, and several attempts already failed.

Thus, this study aims to understand the impacts of mining activities on the local community, to identify the cause of failure to mitigate these impacts, to understand the root cause of the problems holistically, to suggest more effective mitigation measures, and to recommend the policy direction in order to ensure that development takes into consideration environmental and social components. From this study, stakeholders play important roles not only for addressing and understanding the problem from various points of view but also for participatory improvement of Klity situation. The mitigation measures that correspond with the local reality should restore different dimensions of human security as appeared in Figure 1 (Please see human security concept related to mitigation measures in Chapter 2).

1.7 Research methods

The methods used in this study are mainly from qualitative approach as follow:

1.7.1 **Documentary research** -- the study reviewed various forms of documents (books, papers, reports, etc.) and electronic media from academic, government, and civil society sources, both in Thailand and internationally, to understand about

- Concepts and theories related to development, modernization, conflict, risks that are relevant in the context of mining industry and local communities.
- Past and present situations of Klity community with regards to mining impact. Mitigations measures that were implemented in the community. The local movement for legal pursuit and the outcome of court cases.
- Policies, laws and regulations as well as the actual enforcement involving mining and mitigation measures.

1.7.2 **Interviews** – interview approach is chosen to understanding the situations from different viewpoints. Data is gathered from multiple sources from local villagers to professionals in the field related to Klity health and environment, from affected people to government officers to civil society leaders. The interviews are conducted at various time points during 2010 to 2012. One young female adult and one young male adult in the community who graduated from Kanchanaburi Rajabhat University became research assistants and helped with data collection in the community by using guideline questions (please see appendix). That is the reason why I was able to collect “local voices” from 50 villagers.

Informants selected for this study were village leaders, villagers, lawyers, health expert, engineer, biotechnologist and government official as seen in the table 1.

Table 1 Persons and number of interviews

	Persons/ specializations	Purpose of interviews/relevance to research	Number
1	Village leaders -- who brought Klity case to public attention, cooperated with external network and pursued court case against mining company and Pollution Control Department (PCD)	to understand Klity situations, past mitigation measures and outcome, situations faced by villagers, coping strategies, movement for legal trial, hope and expectation of villagers.	4 (2 adults and 2 younger leaders)
2	Villagers -- who have been affected from mining company in direct or indirect ways.	to understand the way of life of Klity villagers, the impact of lead contamination on different aspects of their lives, their views on past mitigation measures, their future hope and expectation.	50 (15 adolescents, 30 adults and 5 elderly
3	Lawyers -- who are in charge of Klity lawsuit (two civil cases and one Administrative Court case).	to collect data about environmental law and regulation and the application on Klity case, the information on court trials and the outcome, the gaps in rules and regulation, and opinions on filling in these gaps.	2
4	Health expert -- who is a medical doctor on toxicity and is familiar with Klity case.	to collect data about health impact from lead contamination, public health services for affected groups, and suggestions for health surveillance in the context of mining and local communities.	1
5	Engineer -- who is familiar with Klity case and keen on theory and practice of sustainable mining for at least 10 years.	to collect data about possible ways to rehabilitate Klity environment especially contaminated stream, and to collect opinions about how to balance development and sustainability in the context of mining industry and local communities.	1

	Persons/ specializations	Purpose of interviews/relevance to research	Number
6	Biotechnologist -- who is an expert on living organisms and toxicity and has worked in this field for at least 10 years.	to collect data about toxic substance in creek and suggestion for mitigation measures.	1
7	Governmental official from Pollution Control Department (PCD) -- who is an executive of Waste and Hazardous Substance Management Bureau.	to understand Klity situation, mitigation measures implemented by various governmental agencies and suggestions for mitigation measures.	1
Total			60

1.7.3 **Field observation** -- observation was carried out in the Klity community during my two field trips that lasted 10 days in March 2010 and August 2011. During the two trips, I collected information about the impact from mining on Klity community and continued risks towards the individual, community, and environment. Going in and participating in community activities also allow for detailed observation of everyday lives and I could see and feel how the villagers perceive lead contamination threats, and their perspectives on past mitigation measures are also revealed through actions. The obstacle of the field data collection is that some of villagers cannot communicate in Thai language, therefore local interpreter was used.

1.7.4 **Participating in related meetings and seminars** -- to collect data and to understand the situations, suggestions, and solutions from different perspectives. There were several meetings and seminars about Klity and other mining impact cases. The biggest seminar and exhibition about Klity case was held at the Bangkok Art and Culture Center in Pathumwan during July 7-17, 2011, to designate 13 years after the case was

publicized. In addition, as a member of the Committee working on Identifying Solutions for the Health and Well-being of Lower Klity Community (hosted by Social Research Institute, Chulalongkorn University), I participated in the meetings, contributed ideas, and also gained understanding of the ongoing situations.

The qualitative data from documentary research, interviews, participant observation, and participating in meetings were triangulated, synthesized and analyzed. Data from interviews were coded according to keywords derived from preliminary analysis of concepts on risks, and human security dimensions. The outcome is presented in the form descriptive report as seen in the following chapters.

CHAPTER II

LITERATURE REVIEW

This chapter will present a summary of literature review which can be divided into 3 parts – 1) the review of concepts of sustainable development, risks and risk management, and human security, especially in the context of mining industry and local communities, 2) the review of interesting cases of mining impacts on local communities and mitigation measures, which serves as an example of various related issues found in other countries, and 3) the review of researches and related works on Klity case. The first part reviews concepts that are useful for the analysis of Klity case which will appear in the following chapters, the second part deals with sample cases where mining activities have caused environmental and social impacts, and in most cases, mitigation measures have been developed and implemented, and the third part shows that Klity case has gained interest among academics after it was publicized in late 1990s. There have been several theses in various disciplines written on or referred to Klity case.

2.1 Review of concepts of sustainable development, risks and risk management, and human security

2.1.1 Sustainable development and mining

Sustainable development received a hallmark attention since the United Nations Conference on Environment and Development held in Rio de Janeiro in 1992. Nevertheless, the issue of connection between environment and development impact goes back further than Earth Summit at Rio de Janeiro. In 1962, Rachel Carson conducted the research on the danger of pesticides toward human and animal health, then 8 years later, the first Earth Day began in 1970. The idea of Polluter Pays Principle was initiated in 1971. Regarding the question of growth-oriented development, the Club

of Rome published Limits to Growth in 1972. As for grass-root effort, Chipko movement was born in India in response to deforestation and environment degradation in 1973.

The formal principle of sustainable development was first mentioned in the final report titled "Our Common Future" by the World Commission on Environment and Development (WCED) in 1987. WCED defines the concept of sustainable development as *"development that can meet the needs of the present generation without compromising the ability of future generations to meet their own needs"*. Since then, it has been one of the most often referred to principle. The principle of sustainable development enlightens the significance of logical connection between the three perspectives which are social, economic and environment. Each component is given an equal attention for the purpose of acquiring sustainable development outcome. In terms of putting it into application, sustainable development is about maximizing economic, social and environmental benefits subject to a set of constraints. That is to say ***economic*** objectives should not be maximized without satisfying environmental and social constraints, correspondingly, ***environmental*** benefits should not necessarily be maximized without satisfying economic and social constraints, and along the same line, ***social*** benefits should not be maximized without satisfying economic and environmental constraints as well. (Peter P. Rogers et al., 2008). Not only does it propose an interrelation of the three components, but it also places a great concern over the connection between actions and effects that could put the next generations at risk.

More recently, the UN Conference on Environment and Development at Rio de Janeiro reached important agreements such as Agenda 21, the Convention on Biological Diversity, the Framework Convention on Climate Change and the Rio Declaration on Forest Principles. In 2002, the World Summit on Sustainable Development was held in Johannesburg, South Africa. This is a further step since Rio conference. Another widely accepted goal in the circle of international development is Millennium Development Goals (MDGs) which also put the emphasis on ensuring environmental sustainability as one among the eight major goals. The most recent

World Summit on Sustainable Development or Rio+20 in 2012 addressed on sustainability and mining in "The future we want" as, *"Mining activities should maximize social and economic benefits, as well as effectively address negative environmental and social impacts*." (Please see appendix).

Nowadays, sustainable development becomes even more important because of a series of negative effects resulted from boosting economic growth. It is important to recognize that economic growth is not a negative thing in itself, but economic growth that creates social and environmental injustice should not be defined as an engine for sustainable development. A more reasonable approach to economic development should be to determine its performance -- how it increases "*the standard of living of the poor, which can be measured in terms of increased food, real income, education, health care, water supply, sanitation, and only indirectly concerned with economic growth at the aggregate*." (Barbier, 1987).

To put it in the context of mining industry and local communities, the principle verifies that there is a need to minimize environmental and social consequences of development. But in the situation where economic values are absent when talking about the environment like land water and air, these are then considered as free goods, and pollution or environmental degradation is not added to the equation. Globally, anti-mining industry has been on the increase because, "*The mining and minerals industry faces some of the most difficult sustainability challenges of any industrial sector" and for it to "continued 'social license' to operate, the industry must respond to these challenges by engaging its many different stakeholders and addressing their sustainability concerns*." (Azapagic 2004: 639).

Mining industry is considered to be unsustainable for many people due to the fact that minerals are non-renewable resources. Extracting these minerals usually creates impact on landscape and biodiversity in the area, in addition, it also causes liquid and/or solid waste, and the process and transportation involves heavy use of energy. In many cases such as that of Klity, contamination of toxic substances is apparent. This is often irreversible and the rehabilitation or clean up of environment

requires a large amount of money, high technology, and a long period of time. The risk also lies in the use and disposal stages, as in the case of asbestos and uranium.

Despite endless controversies over mining industry and the principle of sustainability, the concept of "sustainable mining" has been around for over 20 years. There has been an effort in developing guidelines for sustainable mining practices. Internationally, there is also an Annual Global Sustainable Mining Summit, and the second summit will be held again this year (2013). Sustainable mining does not only cover environmental aspects, social aspects are included in terms of

1) employment and labor management (decent work, health and safety, education and training, freedom of association, etc.)

2) product responsibility (customer's health and safety, etc.)

3) larger society (impact on local communities, stakeholders involvement, etc. – please see below).

Table 2 Categories of social indicators for sustainable mining

Categories of social indicators

	Indicator category	Provides information on/ measures	Social issue(s) addressed	Stakeholders directly affected/interested
Society	Local communities	The approach to caring for local communities	Relationship with local communities and wealth distribution	Local communities and authorities, national governments, NGOs, shareholders, creditors
	Stakeholder involvement	The level of commitment to external stakeholder involvement	Stakeholder involvement	All external stakeholders
	Bribery and corruption	The approach to avoiding bribery and corruption	Bribery and corruption	Local communities and authorities, national governments, creditors, NGOs
	Political contributions and lobbying	Contributions to political parties	Business ethics	National governments, NGOs

Source: from Adisa Azapagic 2004: 657

This study focuses only on mining industry and local communities and in minor parts, on stakeholders involvement. The other two aspects, namely employment, labor management, and products, are beyond the scope of this study. Although the two aspects will not be analyzed here, it is important to recognize that they consist of secondary and tertiary stakeholders whose rights and well-being will have to be protected as well. In addition, Adisa Azapagic suggested two other categories of social indicators focusing on business ethics, like avoiding bribery, corruption, and lobbying, and this calls for the principle of transparency.

Together with the effort for "sustainable mining practices", there is also an effort to create a new standard and mechanism to monitor transparency in the management of mining industries. Stakeholder involvement is also an important component of this monitoring. In the past, the benefit from these industries was usually funneled to influential persons or groups. Not only does it create social, economic and environmental injustice, it also increases suspicion and conflict. The well-known international effort for setting up a new standard is "Extractive Industries Transparency Initiative (EITI)" which stemmed from cooperation among governments, businesses and civil society.

Figure 2 Extractive Industries Transparency Initiative (EITI)

EITI focuses on monitoring extractive industries, mainly oil and gas drilling where transparency is the biggest issue. However, the issue in mining industry is sustainable development incorporating environmental and social issues. So the questions remain whether such concept as "sustainable mining practices" can really be implemented, and what kind of mechanism will support or enforce such practices.

Figure 3 shows the approach of how the value chain is seen as paving the road map to sustainability, transparency and accountability across the whole chain.

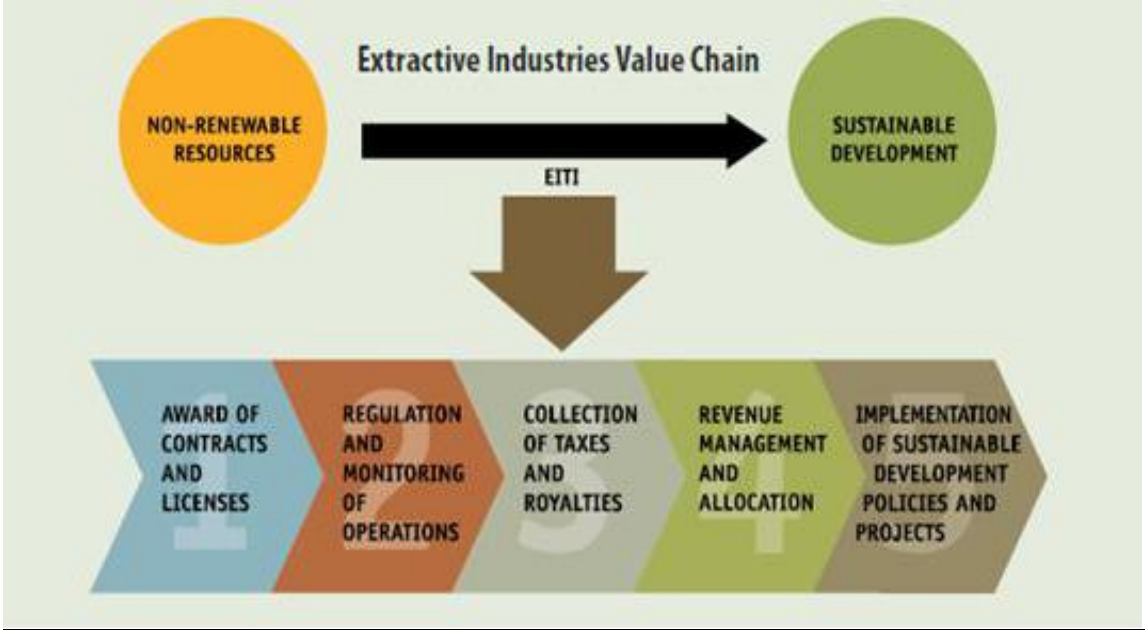


Figure 3 Road map to sustainability, transparency and accountability across the whole chain

Source: Christopher Sheldon, Manager, Oil, Gas and Mining Unit, Sustainable Energy Department, The World Bank, from http://www.globaldialogue.info /New%20Directions%20on%20Mining%20at%20the%20World%20Bank%20%20Christopher%20Sheldon.df

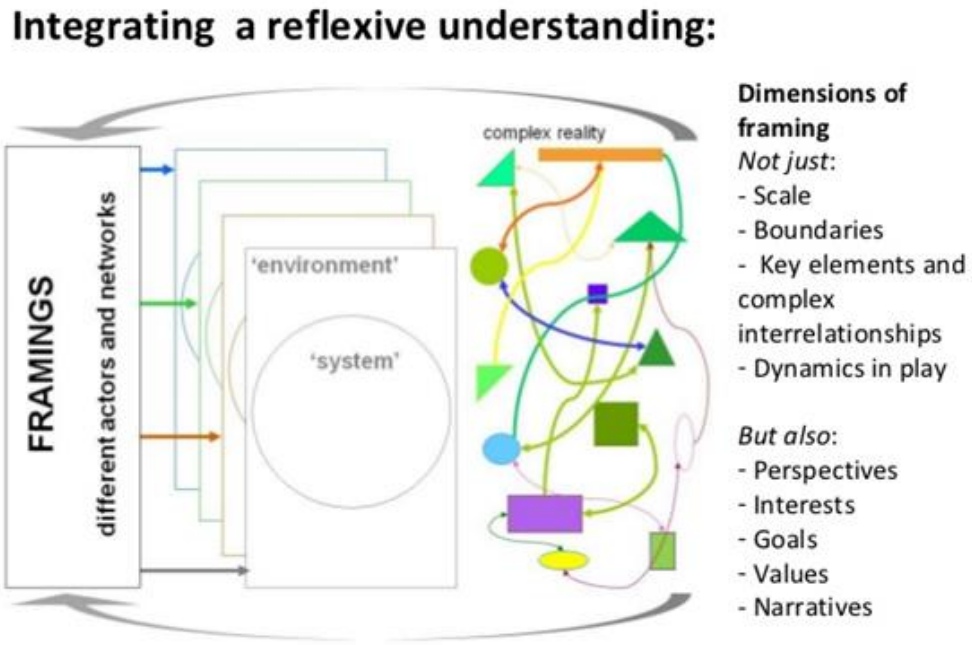
With regards to the third and fourth steps of collection of taxes and royalties and revenue management and allocation in the diagram above, this year's report on Resource Governance Index (2013) written by Revenue Watch Institute should be considered. The Institute measures the quality of governance in the oil, gas and mining sectors annually. This year it collected information in 58 countries around the world (Thailand not included), and found that only 11 out of 58 countries "have satisfactory standards of transparency" (www.revenuewatch.org/rgi).

It can be argued that revenue transparency precludes other forms of sustainability issues, such as environmental impact, social impacts, and participation of interested stakeholders, Yet this only serves to reiterate that mining businesses and industries are required to follow several "golden rules", not only on sustainability, but also on governance, transparency, participation, and so on.

In RIO + 20, Intergovernmental Forum especially among Ministries that take charge of environment and mining were held to discuss about "sustainable development in mining activities". Despite the effort in bringing mining industry into the discussion of sustainable development, there are people who totally refuse to accept the term "sustainable mining", for example, "*The term sustainable mining is an oxymoron. Mining cannot be sustainable as ore bodies are finite and non-renewable. Even the best-managed mines will have environmental impacts."* Chandra Bhushan (2008:8), and "*Indigenous peoples clearly propose that mining is incompatible with sustainable development. In the Andes, particularly, imposing mining on indigenous territories is a major source of social conflict"* (An announcement by Coordinadora Andina de Organizaciones Indígenas or CAOI in June 2012 from http://www.iwgia.org/news/search-news? news_id=554).

A concept which may be useful for the analysis of this tension is "dynamic sustainabilities". This concept grows out of the realization that in this world of interconnected change, there are situations filled with complexity and uncertainties. Furthermore, different perceptions, framing, and representing "reality" make this even more complex. Because of this inherent dynamism and uncertainties of the situations and multidimensional framings, the call for technical and managerial solutions is practically impossible. Risks and uncertainties cannot be easily controlled or resolved and stability is hard to achieve especially through compartmentalized arrangement of governmental bureaucracy. The key point of "dynamic sustainabilities" concept highlights dynamism, complexity and uncertainty, along with differing narratives and different values-based aims of sustainability. So instead of calling for more advanced technological solutions or better managerial styles, revolutionary approach and methods

are needed. This includes acknowledging, accepting, and engaging styles of knowledge making, knowledge communication, and forms of political engagement. The proponents of the concept illustrated it by using real case studies from several countries (Leach et al. 2010).



Framing : Different ways of understanding/representing complex system dynamics and change

Multiple possible pathways to different sustainabilities (which functions and values, for whom)

Normative agendas (What is "good change"? which pathways, to where?)

Reflexive attention to framings/narratives of different actors/researchers in development

Figure 4 Complex reality is recognized only with integrating a reflexive understanding

Source: Leach et al., 2010

2.1.2 Risks and risk management in the context of mining industry and local communities

Risks and hazards

As for the concept of risk, it has been widely accepted that to understand risk, the perspective of hazard and vulnerability will have to be incorporated. Therefore, several risk analyst have agreed to this qualitative equation of, *"Risk = (Hazards x Vulnerability) / Capacity*". According to the well-known sociologists, Ulrich Beck and Anthony Giddens, risk is a major part of transition to modernity, there are two different kinds of risk, first, an external risks which are risks 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*" (Kaly, 2002).

Hazard is a closely related concept to "risk". Hazard is a condition that harms life and environment. Hazards can stem from two different sources or the combination between the two sources -- natural and man-made. In the case of Klity, toxic waste may be regarded as man-made hazard. Although there is an argument that the areas have a high lead potential, and toxicity may be somewhat natural, this study will make a short analysis on that point later in Chapter 5.

Toxicity is a significant issue because it can cause tragic impact on environment, health, economics, and way of life. In Klity community, the creek is contaminated by lead, and lead poisoning causes damage to the function of human brain, blood and central nervous systems, and kidney. For child development, poisoning effect includes lowered IQ and reduced growth, causing problems to memory and hearing. Pregnant women exposed to lead may have babies born

prematurely and having low birth weight as well as neurological effects (Public Health – Seattle and King County, 2008). Besides health problems, lead poisoning could damage community security, environment and community economy.

In Klity community, lead poisoning can be regarded as a hazard; the community vulnerability, however, relies on several factors such as immune system, economic status as well as way of life. Capacity here means how Klity villagers cope with lead problems and how efficiency government, NGOs and civil society are able to solve the problem in Klity area. In the case where community has low vulnerability but high capacity, it means the risk is low in this area. On the other hand, having a high vulnerability to lead poisoning and low capacity could cause risk at high level (as the equation mentioned above). The Klity village faces a high level of risk due to the creek being contaminated. At the same time, villagers have a low capacity to cope with this situation, simultaneously, the mitigation measures from various organizations are inefficient and there is no plan to restore the creek.

Risk management

As for the concept of risk management, heavy toxic metal such as lead could have harmful effects on the environment, ecosystem and dangerous to human life. Thus, risk management should be urgently carried out by many actors, government agencies, local governments, scholars, NGOs as well as local people. Klity community, indigenous knowledge and modern knowledge should be integrated and implemented in risk management.

Risk management consists of three major elements: risk perception, risk evaluation and risk management (Böhm et al, 2001). Mass media is a significant source to inform facts or news to the public and could shape public emotion and environmental awareness. The news selection is crucial for management of the risk due to the fact that it builds up public concern so as the government is more likely to spend the budget on selected hazards. Simultaneously, no news or less frequent report will lead the government and public to ignore existing hazards. This view is supported by Josef Nerd

et al. (2001) who published a paper describing that media reports have an influence on risk management. Such communication has an effect upon people's perception and feeling of "fact." In Klity case, the problem was ignored in the beginning. Concerned individuals and later on civil society joined in the effort to help informing about this problem. When the media started to release news about Klity in both Thai and English, then the public was informed about their story. Afterwards, the government began to pay attention and made some attempt to alleviate the problems.

Risk perception

Risk perception includes social and cultural values, politics, as well as roles of media in building cognition and shaping emotion, thus, it is not about "fact" alone. Individual perceives and interprets risk in different ways based upon their own experiences, socialization and cultural values. Barbara Göbel (2001) demonstrated that the indigenous people and Western expert who work in the same area had different perceptions about risk. They had dissimilar concern and different kinds of risk management. In the case of Klity, differences in risk perception exist between government sector and community as well as within the government agencies themselves. Risk management failure also stems from inability to recognize these different "versions" of risk perception, including local risk perceptions and local socio-economic context.

Risk perception can be analyzed from discursive perspective. The case of publicizing lead poisoning "risk" from noodle soup pot (หม้อก๋วยเตี๋ยว) reflects how the public, the media, and the Ministry of Health reacted very quickly after the issue became a public concern. The case of Klity villagers who live, drink, and bathe in the stream may actually bear a more serious threat than the noodle soup pot matter, but since the situation occurred among the marginalized group in a marginalized area, then the perception on the matter is not categorized as public risk.

According to J. Richard Eiser (2001), belief system and previous learning could oppose the new information. Furthermore, bias and distortion plays a

major part in the forming of attitude, decision and perception. In Klity case, lower Klity villagers are ethnic Karen, so the public may feel they are different from the majority because they have different language, belief and way of life. More to the point, ethnic groups in Thailand are often viewed in a negative way. Therefore, the public may have ethnocentric bias to Klity community and choose to ignore their problems. On the contrary, mining industry brings about high GDP which leads the country to the path of "economic development", so the people who are affected by mining activities usually become "those who sacrifice for development". However, the past attempts by civil society and the media helps increasing risk perception among the public, although public interest increases and decreases according to media portrayal and other related factors.

2.1.3 Human security

The concept of human security emphasizes the importance of protecting individuals. The United Nations Development Report, the New Dimension of Human Security indicated that "Human security" is a concept that focuses on people (people-centered), that is, human life, relationships, social opportunities and the freedom to choose. In addition, it should be assured that the opportunities the people receive today will not disappear tomorrow (UNESCO 2008: 3, Terminski 2012 online, see references below). This study takes the environment and natural resources into consideration to address the concept of human security. Human Development Report (UNDP 1994) has proposed seven pillars of human security as follow: economic security, food security, health security, environmental security, individual security, community security and political security.

Development projects and certain industries across the world often result in decreasing the conditions of human security, not only in those countries but also in other places. This is the fact and reality of globalization era. Local communities living in affected area may suffer, several communities have to be relocated and resettled. Extractive industries tend to have a reputation of creating more damage than promoting human security in the local areas. An article on "Applying the Concept of Human

Security to Research on the Consequences of Mining-Induced Displacement and Resettlement“ (Terminski, 2012) reviewed different dimensions of human security within the context of mining industry.

The review of cases from different countries (in the next part) and the Klity case can also add to the understanding of connection between the threat on human security and the development of mining industry as follow:

2.1.3.1 Economic security

Economic security focuses on employment and assured income. Creating and expanding economic opportunities are the key outcome of mining industry. On one hand, mining industry generates jobs and income by unleashing and developing the potentiality of natural resources. There are, however, cases where resource-rich countries experience a paradoxical state called “resource curse”, that is, without good governance and appropriate management, the wealth of these resources slow down economic performance. So, on the other hand, though mining brings economic opportunities, the wealth from mining resources may benefit only a small exclusive group of people rather than creating genuine social and economic development.

Smaller groups, especially the marginalized people, who happened to have settlement or make a livelihood in the resource rich area, are the one whose economic security is threatened. Subsistence livelihood depends on natural resource bases, so even with new jobs and economic opportunities, those come with the cost on resource bases. In this sense, the concept of economic security is too narrow as it put too much emphasis on employment with income, and not subsistent livelihood based on direct appropriation of natural resources

In the case of Klity community, the local people do not get the profit from extraction of resources, they only got to use rice mill, had occasional rides on the truck, and enjoyed a more connected life with other villages and towns through dirt road. In brief, not all the people receive equal share of the benefit, and creating a more economic security for the larger society may mean that these groups have to sacrifice

their home, livelihood and community security for inadequate remuneration or compensation.

2.1.3.2 Food security

According to Food and Agricultural Organization or FAO, food security means that all people at all times have both physical and economic access to basic food. Mining development may have an impact on the decline in the food security of the surrounding community. One of the most important problems for those communities is resettlement which could implies that the local communities have less arable land and loss of access to community natural resources such as forests, meadows and river. Those factors are critical to food security. Water and air pollution as well as soil degradation results in the decrease of ecosystem services and consequently affect quantity of food sources for the local people. Mining industry that causes water pollution has tremendous impact on agriculture and the decline of fish and other aquatic animals. It also leads to the loss of economic network, commercial exchange and the maintenance of family cooperation, etc. Large mine usually requires a large number of workers, so the area often ends up with rapid population growth from in-migration. This may lead to pressure on food sources, and could finally result in conflict between new comers and old residents.

2.1.3.3 Health security

Health security means to lead a life that is healthy and to have access to health services or protection against diseases. Mining activities may cause significant negative impact on community health. Large open pit mining on land or mountain creates risk in polluted surface run-off to the lowland areas. Vulnerable groups who tend to be more affected are women, children and indigenous peoples. Besides, the impact of toxic substances from mining and stress may also induce other mental or psychological health problems such as alcoholism and mental illnesses. Therefore, health assessment will have to consider all these possible impacts in the long run.

Health security also implies adequate medical services and active health surveillance system. In Thailand, health monitoring system is based on passive surveillance, and this is only appropriate for epidemics or other illnesses that are not very complicated. Environmentally related illnesses need to be diagnosed by experts, and such illnesses are usually the outcome of long-time accumulated exposure, so the cause of these illnesses may not be easily identified, as will be illustrated in the case of Klity patients.

2.1.3.4 Environmental security

Environmental security requires that natural physical and biological environment remains in healthy state. Globally, the greatest concern over mining industry is environmental impact. The study on mining and local opinions in Kyrgyzstan conducted by the University of Eastern Finland (2012) reveals that among the reasons for mining protest, environmental reason takes priority (see the chart below). The three most crucial environmental impacts that have often been mentioned are first—contamination in air, water and soil, second -- the loss of biodiversity and third – soil erosion. These environmental problems are affecting economic security, food security as well as health security of local communities especially those living in developing countries.

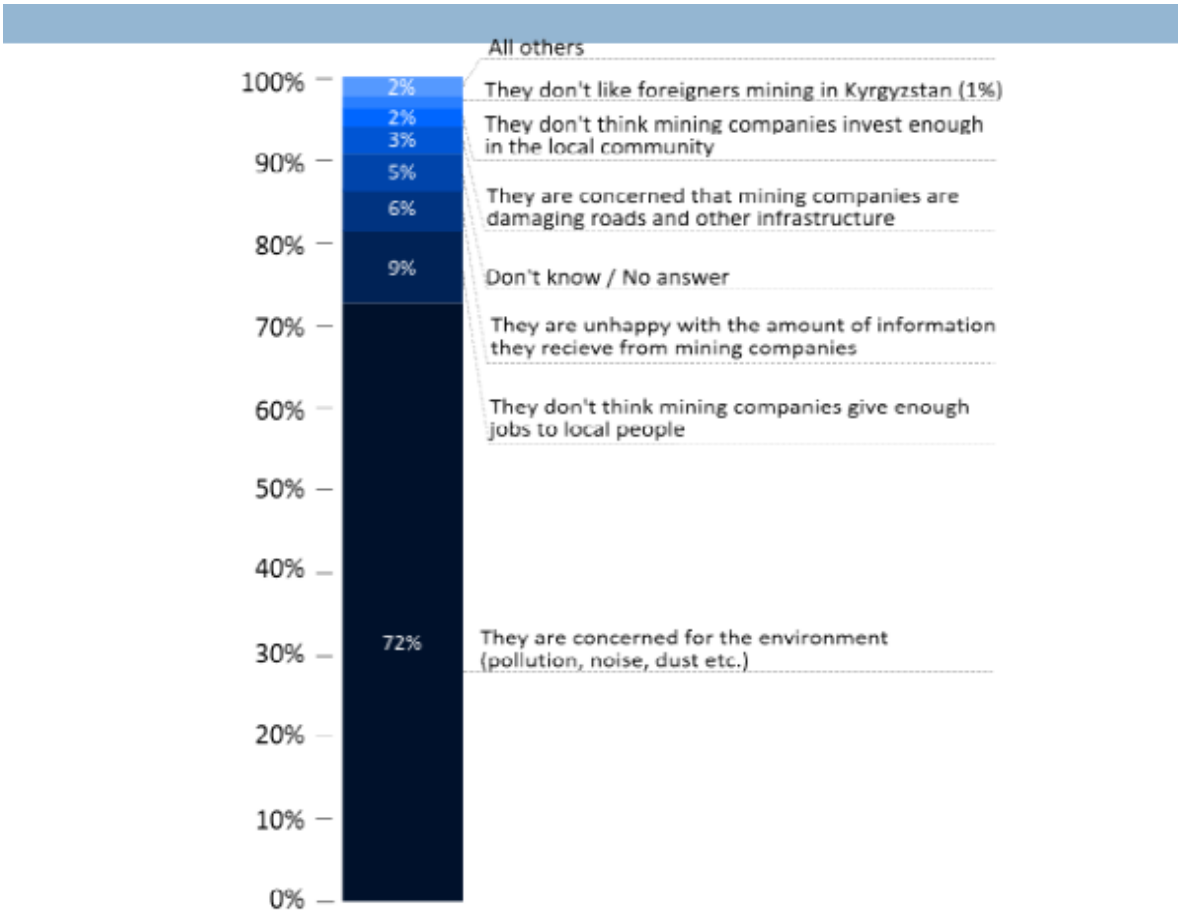


Figure 5 Reasons for Anti-Mining Protests

Source:http://www.uef.fi/documents/1336630/1336649/Rinne_20121127.pdf/0f387e55-bb8c-449b-96cb-eb847b24bd33

2.1.3.5 Individual security

The basis for individual security or personal security is the protection of individuals from physical harm and violence in various forms and from different sources. The development of mining industry sometimes requires resettlement of local communities or brings in outside workers. This can cause tension, conflict, and violence such as confrontation with police or conflict between local communities and new comers. It is usually difficult for the affected individuals in local communities to have political voice to negotiate or to access justice system.

Within this individual security realm, security for vulnerable individuals like women is very important. Mining has a significant impact on women. Loss of land from mining expansion is associated with the loss of access to natural resources, as a consequent, this reduces women's economic and social roles. Additionally, women's general health and reproductive health may be affected from the impact of mining.

2.1.3.6 Community security

Community security means the protection from the loss of family, group or community relationships and values, and from extreme ethnic discrimination which may lead to violence. Mining can pose a threat to community security as it may create impacts at different levels -- family, group, community, etc. Smaller communities do not usually have power nor capacity to prevent, negotiate, or react against the authority who make the decision whether the local communities should move or stay. With unequal power relations, local communities often have to accept low compensation (compared to their loss), and this is the factor that pushes them to become more socially and economically marginalized. Some communities become dependent on outside helps after the development of mining industry in the area. In certain cases, conflict and division in the community regarding mining industry poses a great threat for community security and cohesion.

2.1.3.7 Political security

Political security ensures that people can live in the society that supports basic human rights and human dignity. In discussing the impact of mining industry, two main issues of human rights are apparent – the issue of labor protection in mining activities and the issue of impact towards local communities in the area. Countries with infrastructure for human rights support may be better off, but the concern over the dominance of large businesses or state-owned companies over the small affected groups and other related stakeholders is still valid. The figure below illustrates 7 dimensions of human security as reviewed.

Figure 6 The 7 dimensions of human security

In addressing sustainable development, the concept of human security is very important because "social sustainability" is among the three perspectives or components. "*As a concept, human security refers not only to security from physical violence, but also to food security, livelihood security, environmental security, health security and energy security*" (O'Brien and Leichenko, 2006). Human security in traditional and indigenous communities mostly relies on community security because of social bonding and interdependency (collective solidarity). In addition, traditional and

indigenous communities have close ties with nature and environment not only in terms of livelihood but also aesthetically and spiritually. Anyway, mining industry is able to cause human insecurity, especially, among indigenous communities that mostly rely on community as mention above. There are numerous affected communities that become a victim of mine industry such as Ashio in Japan, the Aboriginal Waanyi communities in Australia, Kabwe mine in Zambia, Amungme's and Kamoro's the indigenous landowners in Indonesia.

2.2 Review of case Studies: mining impacts on local communities and mitigation measures

The Encyclopaedia of Environmental Health (2011, Pages 788–802) describes the importance of mining activities and potential impacts as follow:

> "*Mining is one of the oldest activities in human civilization. Mining industry is a vital economic sector for many countries, but it is also one of the most hazardous activities, both occupationally and environmentally. Mining operations comprise a series of stages involving the discovery and extraction of mineral lying under the surface of the earth. During these processes, several toxic wastes are produced and released into the surrounding environment causing pollution of air, drinking water, rivers and soils, changes in topography, hydrogeology, and chemistry of terrestrial and aquatic ecosystems. Mining activities cause several health impacts in miners and communities living near the mine site that may continue to be experienced even when the mine has gone. Abandoned mines are one of the most important issues as they pose a real or potential threat to human safety and health, and an environmental hazard. Numerous initiatives have been made to reduce risk and maximize benefits but much more needs to be done. Laws and regulations need to be improved to better protect the health and safety of people working in, living near, and those otherwise impacted by historic, current, and proposed mines*."

Several cases studies of mining and impacts on local communities have been reviewed. In some cases, mining companies were able to make an improvement over their operation and make an agreement with the people, thus contribute to local economy and well-being of the communities, in other cases, mining activities were terminated or the companies were bankrupted or closed, leaving negative environmental, health, and social impacts behind. There are also cases where mining activities were operated without causing any problems to the communities until natural disaster struck, so the issues of natural and human-made risks are really crucial in understanding potential mining impacts. These cases are selected from all the continents – America, Europe, Africa, Asia-Pacific

2.2.1 Cases from American Continent

The United States of America

The Iron Mountain Mine in California, United States of America, had its operation from 1860 until 1963 to extract several kinds of base metal like copper, iron, silver, gold, zinc and pyrite. According to one assessment, the mine site discharged the most acid waste ever reported (D. Kirk Nordstrom, Charles N. Alpers, 1999). Although mining activities were discontinued, large amount of contamination still remained. The contamination spread into important water sources at Keswick Reservoir and Sacramento, which directly affected aquatic animals and plants. Different principles, regulations and enforcement were used in this case, including Polluter Pays Principle, Comprehensive Environmental Response, and Compensation from Liability Act. Generally, mine companies are required to pay tax called “Superfund” to ensure there is enough funding should there be a restoration of contaminated areas where the government cannot find responsible companies or where the companies become bankrupted. In 1982, the Iron Mountain Mine Company could not rehabilitate the entire contaminated site, therefore, the government had to use “Superfund” to resolve the environmental problems (Ministry of Natural Resources and Environment, 2008).

Peru

La Oroya is the area in Peru where several mining sites are located, started with copper smelter in 1922, lead smelter in 1928, and the zinc refinery in 1952. These mining operations produced severe air pollution and created wastes affected many Peruvian towns. The study of the Peruvian Ministry of Health in 1999 found that the children in these Peruvian towns between the age of 6 months to 10 years had lead in their blood up to the level of 33.6 micrograms per deciliter, while the World Health Organization sets a standard of lead level in children at the maximum of 10 micrograms per deciliter. High lead levels in blood also found in newborn babies (Blacksmith Institute, 2011).

The quality of air sampled around these towns indicated 41 times more cadmium, 85 times more arsenic, and 13 times more lead than the normal safety level (Hugh O'Shaughnessy, 2007). The Doe Run Peru Corporation held a responsibility for cleaning up the pollution and for monitoring lead, arsenic and cadmium level in the environment. In 2008, the corporation claimed that La Oroya environment and the quality of life in communities improved because remediation measures such as building and using water treatment plant and ensuring a more efficient management in disposing waste with acid and lead (Doe Run Peru, 2008). In terms of public health, several programs were implemented to rehabilitate the affected groups, and health surveillance was in place, like carrying out blood testing for these groups twice a year.

2.2.2 Case from European Continent

Romania

The case of Baia Mare area in Romania indicates that mining activities may not affect the local communities during the operation, but risk and uncertainty involves natural forces. In 2000, unusual heavy rain caused waste mining dam called the state regie Remin to collapse near Baia Mare area. This disaster resulted in sudden contamination of heavy metal waste (copper, lead, and cadmium) in water and soil. Eventually, this affected villagers' health and environment (Miclean et al, 2000). The contaminated water with heavy metal flowed into the natural water sources and affected the entire ecosystem. The people did not have an access to clean water. Farming and fisheries were in distress. The government tackled the problem by declaring closure of hazardous areas and providing necessary information for the local people. Emergency reliefs were sent to the areas, risk communication center was set up so the people knew what to do. The areas were then under rehabilitation and regular monitoring, the government continuously measured the quality of water and ensured that rehabilitation brought the communities and environment back to the normal condition (Ministry of Natural Resources and Environment, 2008).

2.2.3 Case from African Continent

Zambia

Kabwe mine (known as Broken Hill) in Zambia was regarded as one of the world's largest copper production during 1960-1970 (Berkeley Mineral Resources, 2012). Kabwe mine began its operation in 1904 by privatized Zambia Consolidated Copper Mines. Mining activities continued for 90 years and finally terminated in 1994. Nevertheless, the mine left a large amount of deposit with hazardous waste of lead and other heavy metal. Without proper management, contamination was gradually found in the water and soil. The United States Centers for Disease Control conducted blood sample tests and found that the level of lead concentration in Kabwe's children became as high as 300 micrograms per deciliter, while the average lead concentration in blood

level record ranges between 60 and 120 micrograms per deciliter (Mundu Mwila, 2010). Some mitigation measures were implemented by Zambian government, Zambia Consolidated Copper Mines and international and local environmental groups with support from the World Bank. The Copperbelt Environmental Project (CEP) assessed the level of lead contamination in the area and evaluated the situation. In 2003, the government suggested 2,000 Katondo residents be relocated in order to dredge the clogged waterway, but the people refused to move. The measure that has been done so far was to provide information about the problems and ways to avoid lead contamination (MAC: Mines and Communities, 2005).

This Zambian case is a good example that shows how the mining business gained the benefit from mining operation over a long period of time. After the company left the mining site, they also left contaminated deposit and the local communities were faced with environmental and health impact. Rehabilitation plans also cause disruption to the people's settlement and livelihood. Therefore, the "workable" solution has not been found in this case.

2.2.4 Cases from Asia-Pacific Continent

Australia

In 1990 in Australia, Century Zinc Limited (CZL) plan to operate in the area where the Aboriginal Waanyi communities have lived for uncountable generations. The Aboriginal people were really concerned, not only because the mining activities would be organized nearby their communities, but also because part of the land is cultural landscape with great significance for traditional ritual purposes. Waanyi people organized to claim for traditional land ownership in 1994 and the High Court of Australia accepted their claim. After serious negotiations between the mining companies and the communities, the company was able to operate only in limited area. The Waanyi Aboriginal people and CZL signed the agreement in 1997, guaranteeing Aboriginal people employment and provision of funding to support communities and their activities (Harwood, 2002).

Japan

In Japan, Ashio is the area where copper mining activities have started since 1880. After an operation expanded, Zaibatsu Group produced toxic fumes of sulfur dioxide, heavy metals such as lead, cadmium, arsenic and zinc which contaminated soil, air, and water. The local environment along with the communities were badly affected. The government ordered the villagers to move out. After that, the government used robots to plant trees and used helicopters to deploy plant seeds in the area. However, this effort was a complete failure because high toxic contamination cannot be alleviated in a short period of time. Ashio's legacy lived on as the place has been regarded as "the birthplace of pollution in Japan" (Alier, 2001).

Indonesia

In 1967, a copper and gold mine at Freeport in Indonesia drained 200,000 tonnes of tailing daily into the Aghawaghon River. The place is home for the Amungme and Kamoro, the indigenous landowners of the area. Amungme's and Kamoro's cosmology narrates the mountain as mother and river as mother's milk. The amount of tailing has a great impact not only on the river and riverine resources, but also the land and nearby forest ecosystem. The communities were seriously affected and the Amungme and Kamoro struggled for their living.

Eventually they appealed to several bodies including the Indonesian civil society and government, the United Nations, the United State courts and Freeport shareholder. Fortunately, their effort was fruitful. In 1974, the Amungme and Kamoro received "January Agreement" which ensures the rights over the land used by indigenous peoples. In 2000, Freeport authority endorsed a Memorandum of Understanding (MOU) that came out from the involvement of different stakeholders. The mining company agreed to contribute 28 Million US dollar to the communities and continued to donate 1 Million US dollar annually (Abrash and Kennedy, 2002).

Thailand : Songkhla and Tak Province

In Thailand, there are numerous cases of mining activities that have caused negative environmental and social impacts. The National Human Rights Commission of Thailand (NHRC) regularly receives petitions on such cases, and investigation needs to be carried out. The case in Songkhla Province demonstrates how the company has to develop and implement mitigation measures after the impacts were disclosed and proved to be true. This is similar to the case in Tak Province where the company sets up some measures for mitigation and initiates a foundation to support local communities. However, the Tak case remains unresolved and

The Khu-ha rock quarry in Songkhla Province began in 1999 by private rock mining company. Since its operation, the mine was in conflict with the nearby communities regarding the issues of pollution and renewal of the concession. There were negative effects derived from the mining activities like dust from drilling and explosive blasting of large rocks. Water sources and soil were contaminated with dust and small particles from drilling and blasting.

The local people could not use water sources and some community members got some illnesses associated with respiratory disease and allergies. Quarry excavations created noise pollution to the residents. However, serious conflict between the villagers and the mining company has led to the development of better environmental management system. Landscape improvement project was carried out, pine trees were planted, ditches were dug to divert water in control areas, sprinklers were installed to spray water in the area and to minimize dust, and waste water was treated before being discharged into public water sources. The company also established funds to provide educational scholarships and health care services to the communities. Eventually, the company has received outstanding environmental management award (Department of Environmental Quality Promotion, 2011).

In Tak Province, the Thai Zinc Mining Company has gained concession for zinc smelting in Mae Tao areas in 1972. Later it was taken over by Padang Industry Company and started to extract zinc alloy to be used in the production of metal. Since

1998, continuous surveys have shown a high level of cadmium contamination in rice fields around the area. The surveys were conducted by the Department of Agriculture and International Water Management Institute, the Pollution Control Department as well as the Department of Mineral Resource. It was found that rice fields and agricultural activities around the area used the water from Mae Tao creek, and the creek has been contaminated with cadmium. It is widely known that cadmium poses a high risk for human health and may result in kidney disease and bone marrow toxicity.

Health mitigation measures were implemented by Mae Sot Hospital and Tak Provincial Public Health Office. Health officers began to examine and evaluate risk of cadmium poisoning in vulnerable groups. In 2004, Mae Sot Hospital issued an identification card that specified "cadmium-poisoning alert" for high risk individuals. This group was also exempted from paying medical expenses. Apart from health risk, the people also faced with economic risk as rice production is really crucial for their livelihood. The government encouraged the local people to switch from rice agriculture to cane growing, and ensured the sale of cane for ethanol production. In addition, compensation for “crop change” was given to the people. However, the government failed to realize that rice farming is not only an occupation but a subsistence-based lifestyle filled with cultural traditions and pride. Although health situation and economic security has been improved, long-term community and cultural security remains uncertain.

As a larger effort to support the area of Mae Tao, the government proposed Mae Tao River development plan which included remediation of contaminated areas, setting up Mae Tao watershed management plan with stakeholders’ participation, boosting up local economy, and providing better quality of life for the people. In 2007, the mine itself has established Padang Foundation to improve the lives of local people (Ministry of Natural Resources and Environment, 2008). The comparing mitigation measures from selected cases is shown in table 3

Table 3 Summary of mitigation measures and results in sample cases

Mine Area	Mitigation Measures	Results
1. The Iron Mountain Mine in California, United States of America	- polluter pays principle - comprehensive environmental response - compensation from liability act - superfund	the Iron Mountain Mine Company could not rehabilitate the entire contaminated site
2. La Oroya is the area in Peru	- cleaning up and monitoring the pollution - building and using water treatment plant -carrying out blood testing twice a year	environment and the quality of life in communities improved
3. Baia Mare area in Romania	- declaring closure of hazardous areas - providing necessary information for the local people - emergency reliefs were sent to the areas - risk communication center was set up - the areas were under rehabilitation - regular monitoring of the quality of water	the communities and environment were brought back to the normal condition
4. Kabwe mine in Zambia	- assessing the level of lead contamination in the area and evaluating the situation - the government suggested 2,000 Katondo residents to relocate but they refused to move - providing information about the problems and ways to avoid lead contamination	“workable” solution has not been found
5. Aboriginal Waanyi communities and mine in Australia	- negotiations between the mining companies and the communities - guaranteeing Aboriginal people employment - provision of funding to support communities and their activities	company not only operates in limited area but also provide funding to communities
6. Ashio community in Japan	- the government ordered the villagers to move out - using robots to plant trees and used helicopters to deploy plant seeds in the area	all the efforts were a complete failure

Mine Area	Mitigation Measures	Results
7. Aghawaghon River in Indonesia	- receiving “January Agreement” - the mining company agreed to contribute 28 Million US dollar to the communities and continued to donate 1 Million US dollar annually	Amungme and Kamoro have a power to negotiate with mining company which brings about better quality of their lives
8. The Khu-ha rock quarry in Thailand	- landscape improvement project was carried out - pine trees were planted - ditches were dug to divert water in control areas - sprinklers were installed to spray water in the area and to minimize dust - waste water was treated before being discharged into public water sources - establishing funds to provide educational scholarships and health care services to the communities.	company has received outstanding environmental management award
9. Mae Tao areas in Thailand	- Mae Sot Hospital issued an identification card that specified "cadmium-poisoning alert" to patients - switching from rice agriculture to sugar cane growing, and ensured the sale of cane for ethanol production - establishing Padang Foundation to improve the lives of local people - the government proposed Mae Tao River development plan	the areas are still contaminated and several illness cases
10. Klity in Thailand	- putting up a sign on banning water use - examining blood to identify the blood lead level -providing related medical services -providing medical services (Chelation) - building fish ponds	the creek is still contaminated and villagers health are at risk

Mine Area	Mitigation Measures	Results
	- installing water filter - installing piped water - burying contaminated soil - building check dams to trap sediment - providing information about contamination to villagers through posters - training villagers on how to make soy protein - publicizing and updated Klity situations	

2.3 Reflections from Sample Cases

Among the ten cases, the only case that the community was able to negotiate about mining operation and provision is Australian case with the Waanyi Aboriginal people and the mining company. The other cases represented environmental and social impacts that the communities need to bear. A striking case at Baia Bare in Romania points out that unforeseen risk was not accounted for in the usual impact assessment. Even with the best assessment and safety precaution, the age of climage change poses various forms of threat and unpredictability. Under such condition, a great risk may be unwrapped from several cumulative smaller risks.

The case of Freeport mine in Indonesia and the Century Zinc Limited mine in Australia reflects the indigenous people's rights to request mining companies for the restoration of contaminated sites. The power of negotiation tends to be higher where the communities are strong and organized, and are able to mobilize help from network and allies. The case of Baia Mare area in Romania reflects the issues of efficiency and timeliness in resolving the pollution problem, and this resulted in communities' less exposure to toxic.

The cases of Ashio mine in Japan and Kabwe mine in Africa demonstrated that long mining operation and delay in rehabilitation leads to toxic

accumulation. Areas affected by mining activities are now difficult to restore and finally left abandoned. In the case of Iron Mountain Mine in the United States of America, the government used “Superfund” for restoring the area, but that requires advanced well-set regulation, enforcement, and management. In the cases of La Oroya mine in Peru, Khu-ha rock quarry and Padang mine in Thailand, though mitigation measures were in place, there is still much complexity in managing existing impacts, let alone finding ways for operating with minimized environmental, social, and cultural impact in the future.

Some of the important mitigation measures found in the sample cases are as follow:

1) ***Effective communication*** is the first tool for public awareness to notice, understand, and avoid of toxins.
2) ***Environmental legislation and agreements*** to provide justice to the community and sustain environment.
3) ***Compensation*** is a short term for alleviated the problem, nevertheless, it help to increase choices in life.
4) ***Health care measures*** must be implemented immediately.
5) ***Mitigation measures should be multidimensional*** involving health, social, economic, and environment.
6) ***Local participation*** which is crucial in all the measures. In case, government suggests the local people to evacuate, it must take community way of life and their culture into account. The new place must ensure that quality of life will be improved and ***people must get involved*** in the selection and decision-making.
7) ***Rehabilitation fund*** should be established for solving the problem immediately.

2.4 Researches and related works on Klity case

Researches and related work on Klity case can be categorized into four themes which are lead contamination and measures or efforts to solve the problems, epidemiology and illnesses, community rights and socio-cultural movements, and litigation process and legal review.

In 2001, Patwajee Srisuwan wrote an article titled “Lead contamination in Klity creek” in the book “Pollution, the record of nine critical cases in risk society” which is considered as an early documentation of Klity case. The article discusses lead contamination and solutions with the focus on health issue. In the same book, Nattaya Vaewweerakup wrote an article, “Visiting the lead people" and mentioned general problem of Klity community after lead exposure. This article brings the readers closer to the people as the problem is presented in a way that is not only environmentally-oriented but also involves human sufferings and the courage to live on amidst the problems.

In 2003, Thailand Development Research Institute or TDRI organized a seminar on human security and one of the sessions was on lead contamination in Klity area. The seminar proceedings provided a view on economic analysis of the situation like cost and benefit including guidelines to prevent further environmental and health impact. In the same year, Anong Paijitprapapon mentioned about Klity case in the book titled, “Lead contamination in the environment around lead mining site, Thong Pha Phum district, Kanchanaburi province”. This book is one of the early pieces of work by the Department of Mineral Resources that mentioned the impact of mining in Klity area.

In 2005, Jeerawan Buntowtook wrote a thesis on “Coping with environmental change affecting health from a gender perspective: a case study of Karen village at lower Klity, Kanchanaburi province”. The thesis focuses on how villagers have been affected by lead contamination, how they defined these illnesses in their own terms and how they learned to cope with the situations by using social and cultural instruments. Jeerawan used gender perspective and the analysis of women’s roles in describing Klity situations. In the same year, Wanchai Tantiwitthayaphithak compiled and edited several articles on environmental impacts on local communities

called “Disappearing truth: from Khlong Dan to Chiang Dao.” The article about Klity community mentioned the history and development of mining activities and health problems caused by lead contamination.

Another thesis about Klity community is written by Pakorn Lertsatienchai (2006) who wrote, “The shaping certain etiology of lead poisoning symptoms: Klity creek as a contaminated place” and analyzed the relationship between Klity patients and medical professionals who have conflicting knowledge of lead poisoning. Along the same line of argument, Malee Sitthikriengkai (2007) wrote a dissertation on “Suffering, healing, and the contestation of power and knowledge: a case of lead contamination in Klity Lang Village, Kanchanaburi Province”. She brought up the difficulty and complexity in defining and determining “illnesses” of Klity villagers and she used Foucault’s concept of power and knowledge to analyze how medical professionals produced both the “docile body” and “resistance” from villagers.

In 2007 the book titled “Klity: stream, community, and lead toxicity” is written by Kuemetha Ruekpornpipat and edited by Sukran Rojjanaphraiwong. It provides a background to the problem, starting from the development of mining to the environmental and social impact and the movement for justice by the community together with civil society. The book used a holistic view for the analysis of the case. Later, the study by Pattarawut Muneerat focused on assessing mitigation measures by government sector to reduce lead pollution by lead mining in Thong Pha Phum district, Kanchanaburi.

The book that describes Klity court case and the process of legal litigation is “Niti-Thammachat” written by Environmental Litigation and Advocacy for the Wants or ENLAW. The first volume of “Niti-Thammachat” deals with other major cases like gas pipeline in southern Thailand. The second volume covers the stories of Cobalt-60 and Klity case, titled, “Karen way of life, way of fighting, and litigation process of Lower Klity community in Kanchanaburi province. It describes difficulty in judicial process for the villagers. Although the case in the Administrative Court has been over, civil court cases are still ongoing. The cases have occasionally occupied columns in

the newspapers like Prapart Pintobtang's article, "Community rights of Klity villagers" in his regular weekly column called, "When people's politics collapses". Prapart analyzed Klity case by relating it to Thailand's structural problems.

The review of literature on Klity found that most researches and documents focused on lead contamination in terms of environment, health, and legal process. Although there are mitigation measures and different forms of help and supports, these have not been thoroughly documented and analyzed. In addition, existing literature are written by government agencies and the views have been compartmentalized according to their specific mandate. Therefore, this study will fill in the gap and reflect how and why the mitigations are not necessarily responding to the needs and reality in the local community.

2.5 Filling in knowledge gaps in existing literature

The review of literature on Klity found that most researches and documents focused on lead contamination in terms of environment, health, and legal process. Although there are mitigation measures and different forms of help and supports, these have not been thoroughly documented and analyzed. In addition, existing literature are written by government agencies and the views have been compartmentalized according to their specific mandate. Therefore, this study will fill in the gap and reflect how and why these mitigations did not necessarily respond to the needs and reality in the local community.

There has not been any past attempt to apply certain useful concepts to understand the case of Klity. The concept of human security brings to light that different dimensions of human security were neglected along with integrated plans in implementing these mitigation measures. On the other hand, the case of Klity may help to enhance our understanding of human security dimensions approach.

Some existing literature addressed complexity and uncertainty in Klity situation and used concepts like the politics of policy process to explain why problems have not been solved. This study will further the understanding on Klity complexity and

uncertainty by using the concepts of risks and dynamic sustainabilities. The two concepts will bring to light the limitation of conventional interlocked way of approaching and resolving problems.

CHAPTER III

The Klity Community and Impacts from Mining Activities

This chapter presents Klity community settings, describes the development of lead mining activities and the following impacts from upstream mining activities on lower Klity community. Past impacts and potential risks towards the people will be analyzed, together with how the villagers tried to cope with the problems or to adapt themselves in order to avoid the impacts. The local movement for legal pursuit and the outcome of court cases is also presented in this chapter. The information here will be important for the understanding of complex ongoing problems and for serving as an empirical basis of further analysis in the later Chapters.

3.1 The Study Area

The lower Klity community is located in Thong Pha Phum district, Kanchanaburi province in western Thailand. The location of Klity community is shown in figures 7 and 8. At present, Klity village is home to the total of 82 houses with 327 people, most of whom are Pwo Karen. Their main occupation is farming corn and rice, and their main source of their protein food is fish, and animals in the creek and in the forest.

The community has been around for over 160 years, the original location was about 7 kilometers away from the current site. The villagers moved to the current site due to the belief that the old site was no long suitable for settlement, nevertheless, they have settled in the new site for over 100 years. The settlement stretches along Klity creek, and cluster of houses based on kin relation are found throughout this stretch.

The name “Klity” derives from the Karen word “Keethee” meaning lone tiger, which shows how the areas were abundant with wildlife. Traditionally, the Karen here engaged in rotational farming where rice is grown along with different vegetables like sour cucumber and melon for consumption, but nowadays, corn, bean and cassava have been introduced and became major commercial crops.

This area is a major potential source of lead ore, and in the past, the villagers extracted lead by using traditional knowledge learned from the Lawa who live in the Thung Yai Naresuan area. They melt lead in order to make bullets for their forest hunting. A lead mining company began its operation in 1967 in the upper Klity area. Infrastructure was built to facilitate mining and related activities like dirt road, health service station, and rice mill. The relationship between the mine company and the community was good in the beginning. The villagers could use the rice mill for free, or sometimes they asked for a ride on the mine's trucks (Rerkpornpipat, 2007). It should be noted that mining operation does not require environmental assessment at the time, so preventive measures of potential impacts were absent.

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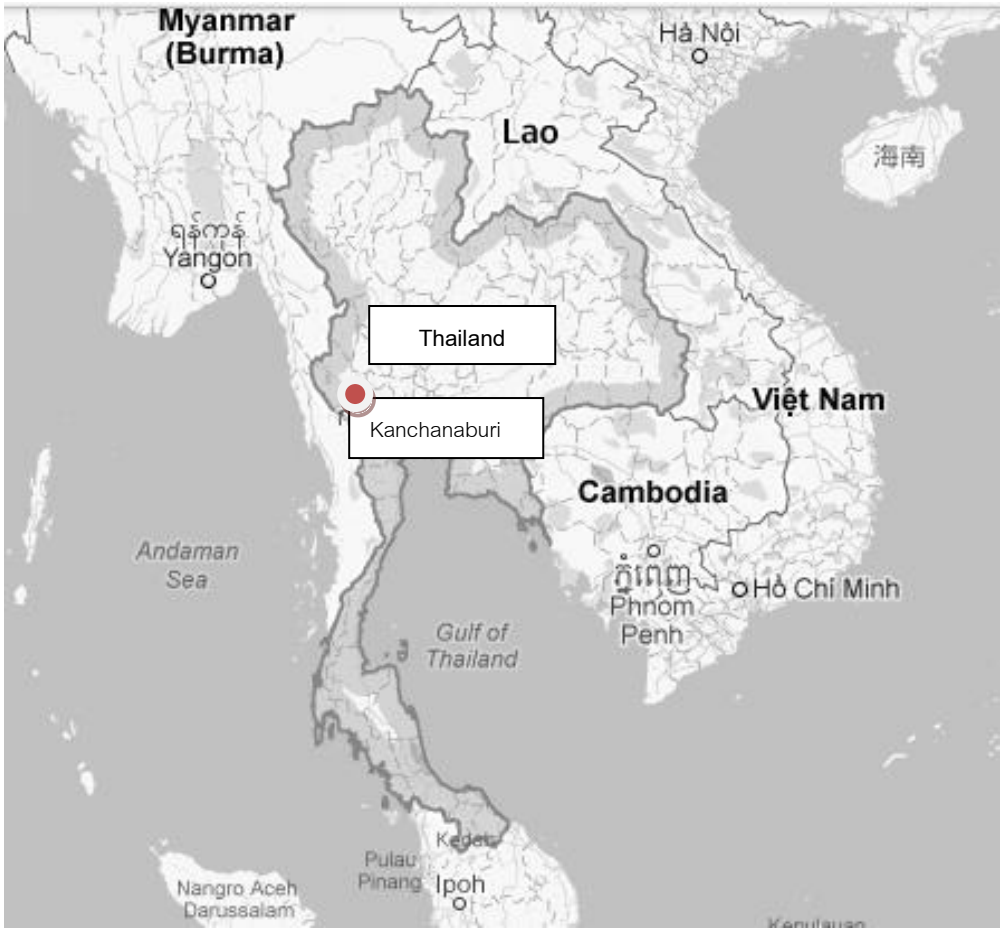

Figure 7 Kanchanaburi province in western Thailand

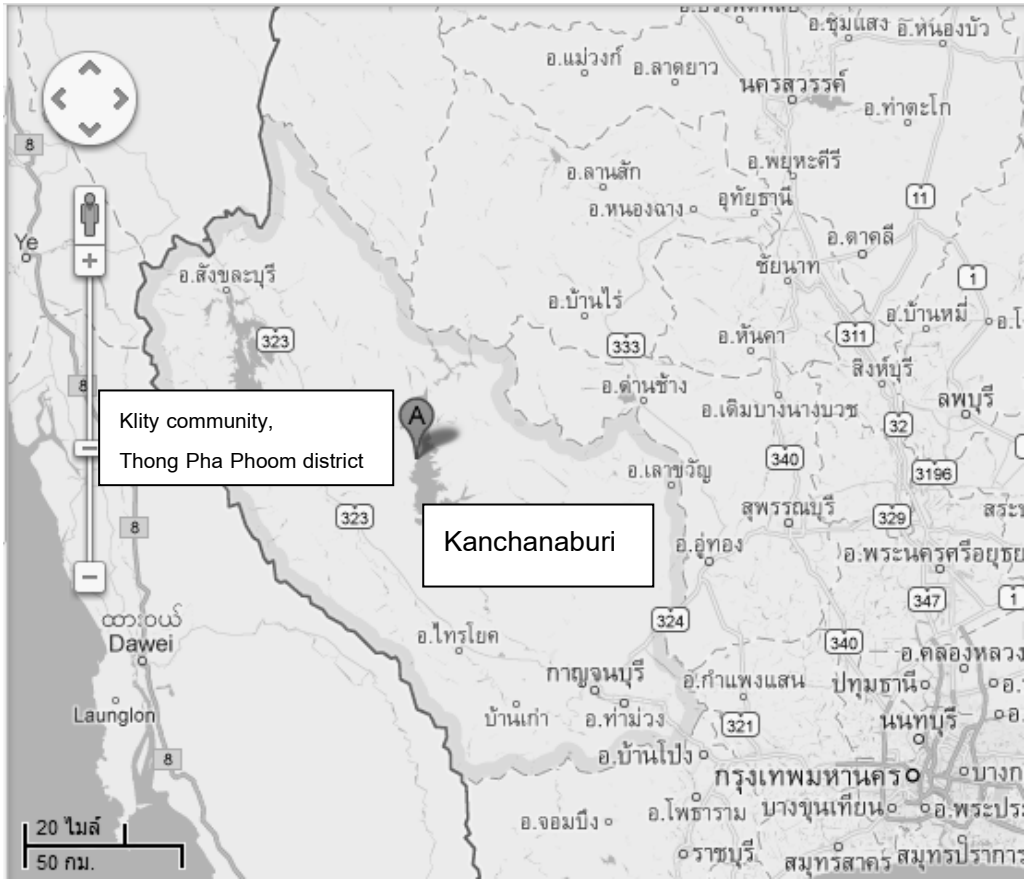

Figure 8 Klity community, Thong Pha Phum district

3.2 Early observation of mining waste and discharge

The villagers in the lower Klity community observed some change in the water quality since early 1980. Not only did the water become turbid, but fish and other animals that live in or near the creek also died. Villagers' cattle became sick and some died, some villagers started to get ill around 1989. In 1990s some members of this community have developed physical and mental disabilities, and some have frequent headaches and stomach aches. A few children were born with different disabilities and several young children suffer from illnesses (Ministry of Natural Resources and Environment, 2008).

"After the water starts turbid and smelly, fish began to die. At first I did not know why the fish die. Soon, we started to get sick" villager, male, 42 years old

"No one told me what happened to my village, we found out about creek contamination when we already got sick and no one took responsibility for it." villager, female, 38 years old

"I have headache and pain throughout my body. I suffer a lot, I have been to the hospital, but never recovered. Now, when I have headache, I always take painkiller." villager, female, 32 years old

At that time, the villagers suspected that mining activities were the cause of this problem, and they asked the mine company to stop releasing the discharge into the creek. When they started this request, the company denied any responsibility and the villagers could do nothing. Eventually the relationship between the mining company and the people got worse.

"*When I know about contaminated water, my friends and I went to the mining company and talked with them. We used to be good friends with the company people, but after we wanted them to clean up the creek, then they turned their back on us."* Head villager, male, age (39)

In April 1998 some individuals who are familiar with Klity community realized that the only way to deal with the problem is to publicize the situation, so they invited news reporters in. At the same time, villagers filed a complaint to Pollution Control Department, Ministry of Natural Resources and Environment, requesting to examine the water in Klity creek. The mainstream media such as Bangkok Post, Matichon and Khaosod newspapers began to publicize the Klity sorrowful story. This is an important matter because mainstream media gave public space to the marginalized people like Klity villagers. After the story appeared in the news, then the public and government agencies began to pay attention.

In the same year, the villagers filed a request to Kanchanaburi Public Health Office for villagers health examination, and one year later, the Department of

Health, the Ministry of Public Health examined villagers' blood and found that the level of lead in their blood exceeded safety standard level. The Office then put up the sign for "stop using the water and stop consuming fish and animals from the creek."

Civil society group like the Karen Studies and Development Center along with Seub Nakhasathien Foundation filed a complaint to the Director-General of the Department of Mineral Resources to withdraw mine concession operated by Lead Concentrate Company. In 1998, the mine was closed due to order of Department of Mineral Resources, and all the mine activities were permanently terminated in 2001. In 2002, Krienkravia Public Health officers again put up the sign for temporary ban on fishing and drinking water in the creek (Enlaw, 2012).

The contaminated creek did harm to local ecosystem and biodiversity as well, for instance, fish, shrimp, and plants have been affected by the toxic substances. The consumption of fish and other aquatic animals in the creek has been prohibited, so the villagers have to choose between *eating contaminated fish and vegetables* or *having nothing to eat*.

"I know the fish has lead poison we have no choice. Actually, I am glad that my husband can catch fish because now the fish is hard to find and we do not have money to buy food " villager, female, 42 years old, (note: she cooked the fish for her husband, children and daughter in-laws who is pregnant)

In terms of economic loss, there is less subsistence resources for living. Furthermore, sickness and disabilities lead them to inefficient work, family problems, and chronic health problems. An access to medical care is costly and very difficult especially during the rainy season. Nowadays, the villagers still inevitably depend on the contaminated creek so that their health is getting worse. Though various mitigation measures have been implemented by governmental organizations, the problems still remain.

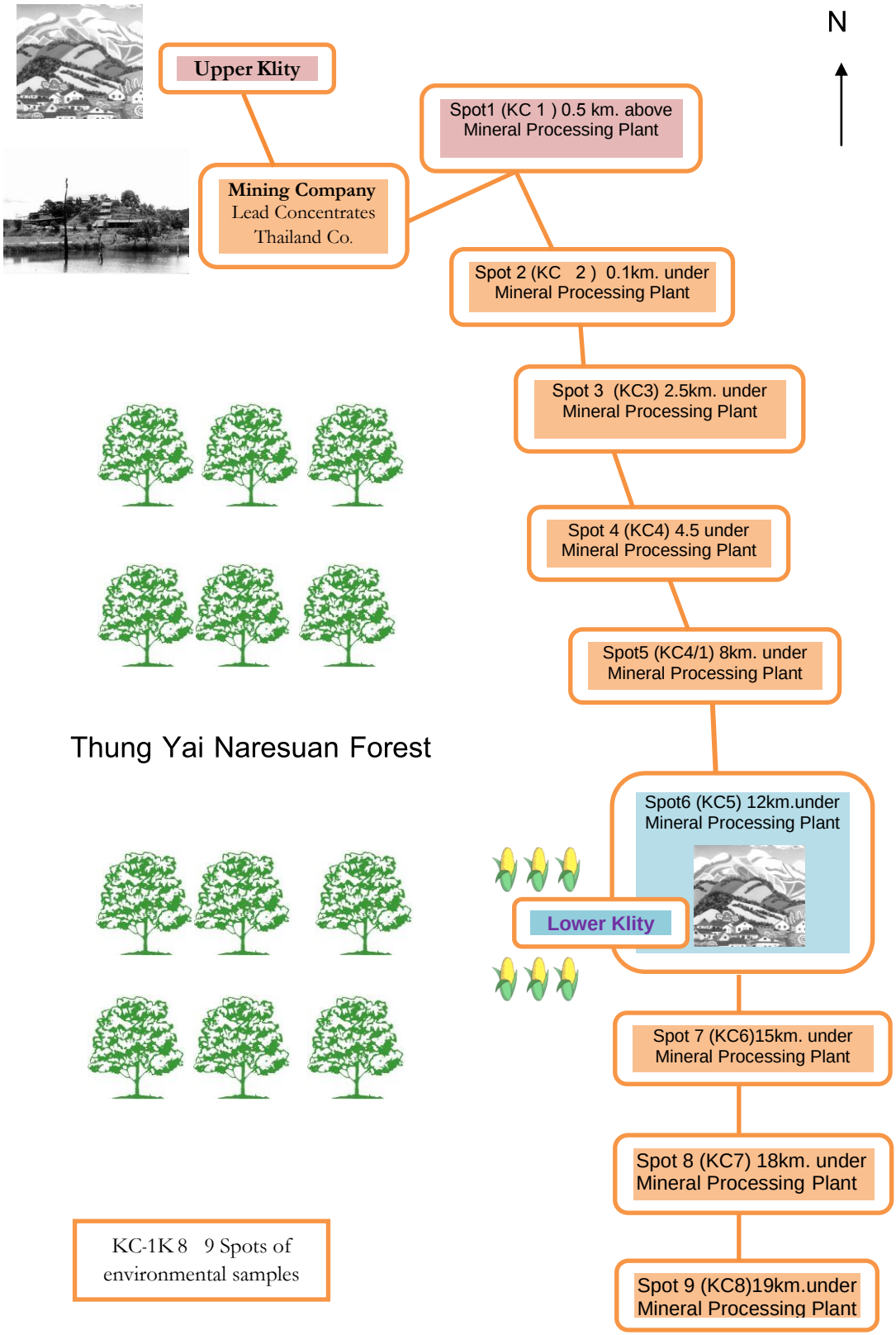

Figure 9 Different spots for checking water quality in the Klity Creek

(This 8 spot check is carried out by Pollution Control Department)

Figure 9 illustrates that the mine is located on the upper part of the creek; hence, discharge and contaminated water was released and carried down to the village situated in the lower part.

3.3 Lead contamination – the impacts on the local environment

The Pollution Control Department collected data on lead contamination in the water reservoir, in the creek sediment, and in living creatures, and found the amount of lead in living creatures in the creek decreased from 1998, but still higher than the standard level. For example, fish had 1.65 to 8.85 milligrams of lead per kilogram (liquid). In 2008, the total amount of lead in water reduced to <0.005 mg/L, but the amount was higher during the rainy season because lead contaminated substances was released along with the run-off and because of disturbed river-bed sediment. The amount of lead in the creek sediment was still as high as 105,943 mg/kg. Lead contamination in the water reduced but the figure was still higher than the safe standard level. For example, in 2008, fish contained lead contamination at the level of 0.4-8.85 mg/kg of body weight (Pollution Control Department, 2009).

The Table 4 shows that lead contamination in the water reservoir is decreasing; simultaneous, lead contamination in fish is also decreasing but still higher than the safety standard. Lead contamination in the creek sediment, however, was not decreasing.

Table 4 Lead contamination in Klity environment

Year	Lead Concentration		
	In water reservoir (mg/L)	**In creek sediment** (mg/kg)	**in living creatures** (mg/kg fish)
1998	0.005-0.55	5,870 - 65,771	5.8 - 81.8
1999	0.025 - 0.08	26,131 - 68,920	N/A
2000-2003	<0.00045 - 0.256	102,574	N/A
2004-2007	<0.005	143,097	1.65 to 8.85
2008	<0.005	105,943	0.4-8.85

The summary of Pollution Control Department (PCD)'s survey report is as follow:

- In 1998, 0.005-0.55 milligrams per liter (mg/L) of lead was found in the water reservoir. This amount of lead exceeded the quality standards for surface water that requires not higher than 0.05 mg/L. The survey also revealed that lead concentration in the creek sediment was as high as 5,870 - 65,771 mg/kg where the standard is less than 750 mg/kg. Meanwhile, lead content in fish was found to be 5.8 - 81.8 milligrams per kilogram (mg/kg) which is higher than safe standard level (<1 mg/kg).
- In 1999, lead concentration in the water reservoir was reduced to 0.025 - 0.08 mg/L, while the lead content in creek sediment was still high at 26,131 - 68,920 mg/kg.
- From 2000-2003, lead concentration in the water reservoir was found in the range of <0.00045 - 0.256 mg/L, while the lead concentration in the creek sediment was still at the level of 102,574 mg/kg.
- From 2004- 2007, the total lead in the water decreased to <0.005 mg/L. Nevertheless, the lead contamination level increased during the rainy season due to strong current and increasing water mass causing the dispersion of river sediment. As for the creek sediment, lead contamination was at 143,097 mg/kg.

3.4 Lead contamination – the impacts on individual's health and the community

The Ministry of Natural Resources and Environment identified 8 villages affected by lead contamination in the area -- Lower Klity, Upper Klity, Thung Nang Khruan, Tipuye, Huay Sua, Kruengkrawea, Tha Dindang, and Sapan Lao. The population at risk numbers to 6,176 people, and 551 people categorized under high risk group as shown in the Table 5.

Table 5 The size of risk group

Source of risk	The size of risk and high risk group			
Lead contamination in Thong Pha Phum district, Kanchanaburi province	**Risky area**	**No. of risk group**	**No. of high risk group**	**Percentage of high risk group**
	- Lower Klity, Upper Klity, Thung Nang Kruan, Tipuye, Huay Sue, Kruengkrawea in Cha Lae Sub District - Tha Dindang is in Parung Phe Sub-District - Sapan Lao is in Sahakorn Nikom, Thong Pha Phum District	6,176	551	8.92

Source: Data from the Ministry of Natural Resources and Environment, 2008, put into Table by researcher

The table 6 shows the size of the illness villagers, it's found that there was no deceased case (see also discussion of the lead poisoning case on p. 60-61) and there were 161 patients. The amount of damage per year was 5,186,586 Baht (Ministry of Natural Resources and Environment, 2008 p. 258). The causes of the pollution are from mining and nature.

Table 6 The number of patients and the amount of damage in Baht

Source of risk	Impact				
Lead contamination in Thong Pha Phum district, Kanchanaburi province	The number of deceased case	The number of the patients	The amount of damage (Baht/year)	Study on the cause of problem	The source of contamination
	0	161	5,186,586	none	From natural sources and from mining

Source: Data from the Ministry of Natural Resources and Environment, 2008, put into Table by researcher

The amount of lead in Thailand's safety standard is 200 ppm (parts per million) but along downstream Klity creek, the level of lead is as high as 165,720 - 552,380 ppm. The Pollution Control Department revealed that lead in the blood stream of 39 children in the Klity village was found to be nearly twice the level to cause permanent brain damage. Medical tests in 1999 revealed that villagers' blood contained 110 times lead contamination found in an average person (World Rainforest movement, 2008).

According to Table 7, the measurement result of lead concentration in Klity villagers' blood in 1999 and 2000 found that lead concentration was higher than the standard level, especially among the children aged between 7 to 15 years old. This group had lead concentration in blood with an average of 28.3 micrograms per deciliter and the children aged between 0 to 6 years old had lead concentration in blood with an average of 23.56 micrograms per deciliter.

The two tables below indicate that children in the Klity village are vulnerable to lead toxic. Lead contamination level in blood was higher than 25 micrograms per deciliter. This means that the children are in dangerous condition and must be treated urgently.

"I often have an upset stomach. In the past, a lot of people came here test my blood. I did not like it at all. It was hurt and no one came here again to cure me" young villager, female, 14 years old

Table 7 Measurement result of lead concentration in Klity villagers' blood

Measurement result of lead concentration in Klity villagers' blood by Ministry of Public Health in 1999 and 2000					
Year	Age (years old)	Lead Concentration (µg / dL)	Average (µg / dL)	Number (villagers)	Note
1999	0 - 6	13.56 – 36.04	23.56	39	32 villagers (82%) have high lead in their blood (higher than 20 micrograms per deciliter)
	7 - 15	21.08 – 33.05	28.30	8	
	> 16	8.58 – 41.36	26.31	72	3 villagers have high lead in their blood (higher than 40 micrograms per deciliter)
2000	0 - 6	12.56 – 48.80	26.45	37	
	7 - 15	17.13 – 35.09	27.04	11	
	> 16	17.55 – 48.60	29.35	54	5 villagers have lead in their blood (higher than 40 micrograms per deciliter)
Note 1) Standard blood lead level (BLL) must be less than 40 micrograms per deciliter for adults. 2) Standard blood lead level (BLL) must be less than 25 micrograms per deciliter for children. 3) A study of Occupational Health in the years 1995 and 1996 reported that the average blood lead level (BLL) of the Thai people is 4.92 micrograms per deciliter.					

Source: Department of Health, Ministry of Public Health

Table 8 Effects of lead concentration on children and pregnant women at different levels

Effects of lead concentration on children and pregnant women at different levels			
Lead levels in blood (µg / dL) U.S. Department of Health and Human Services	**Effects of lead concentration**	**Lead levels in blood (µg / dL) Center for Disease Control, U.S.**	**Effects of lead concentration**
< 5	In the long run, children are born with hearing and growth disorders.	> 10	Preterm infant. Birth weight decreased. Reduced learning skill.
5 – 10	Long-term effect on central nervous brain system, children may be mentally retarded or have brain deficiency. The IQ test of children in this group is significantly reduced compared with children with lead levels near zero micrograms per deciliter.	15-25	IQ and growth decreased
10 - 15	U.S. Department of Health suggested that children and pregnant women should have less than 10 micrograms of lead per deciliter. High level of lead will cause hearing problem, low IQ, preterm infant with low birth weight.	> 40	Hemoglobin decreased
20	Hazardous to physical and mental health. Data collecting in US medical from the year 1974 – 1980 stated that	> 50	Drop in peripheral nervous conduction.

	13.0 micrograms of lead per deciliter in blood can cause serious toxicity to the body, especially to the nervous system.		
25	Extremely dangerous condition and immediately need to detoxify.	> 70	Severe abdominal pain, severe symptoms in gastrointestinal tract, neurological and kidney.

Source: Adapted from U.S. Department of Health and Human Services, 1983 cited in Rerkpornpipat, 2007 and Center for Disease Control, United State of America, 1983 cited in Natural Resources and Environmental Policy and Planning Office. Ministry of Natural Resources and Environment, 2008.

Figure 10 indicates that during 1985 – 2001, mortality rate of Klity children climbed from 1 to 3 in 1990, then peaked to 6 in 1991 and remained from 1-3 in the following years. Documentary research and interviews with the local people reveals that the hospitals did not identify the cause of death as lead poisoning. However, there is a group of lead poisoning symptoms in a few cases, such as one 3-month-old baby diagnosed as dead from choking on milk but the autopsy found a white line (Pb) in bone, and a case of 12 years old child who had edema, and autopsy showed that kidney disease may also be the cause of death.

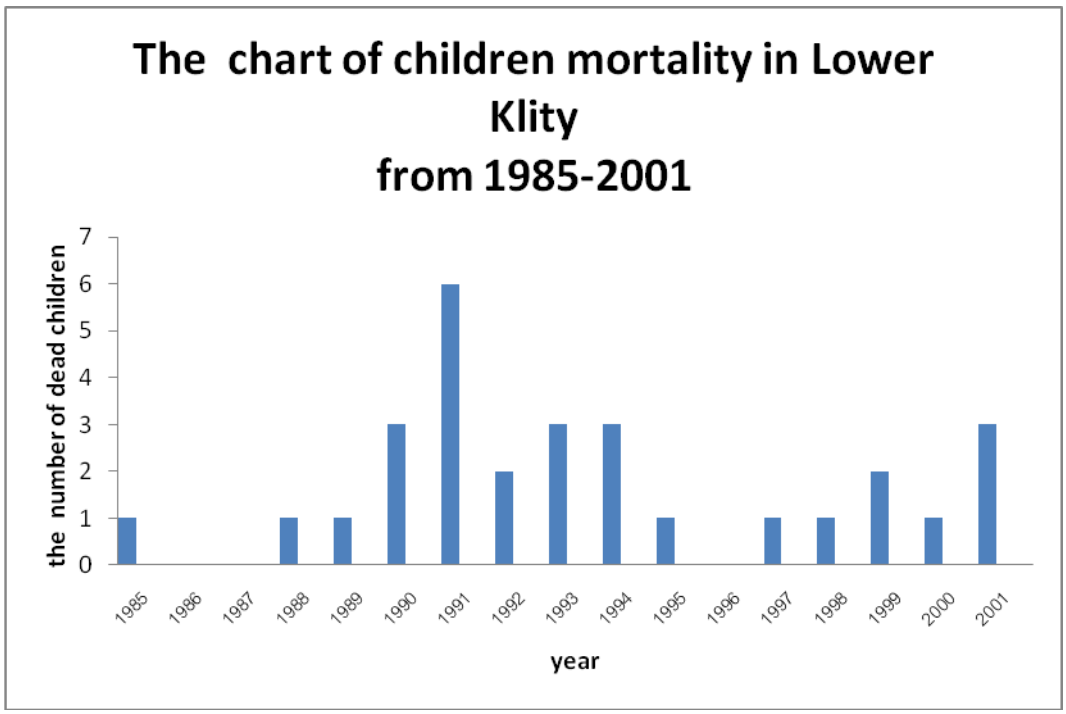

Figure 10 Klity children' mortality

Source: Buntowtook, 2004

It is still debatable whether edema, low IQ, numbness, certain disability or even the inclination to commit suicide are partly due to lead poisoning or not. The Department of Medical Services in collaboration with Kanchanaburi Public Health Office examined the physical health of Klity villagers during November 2000 - January 2001, and reported that there were no lead poisoning symptoms in Klity villagers. The report titled "A framework for the study of policies and practices to prevent and resolve environment and health: a case study of the mineral resources" written by the Office of Natural Resources and Environmental Policy and Planning, the Ministry of Natural Resources and Environment (2008: 258) stated that there were no Klity villagers who died of lead poisoning, but there were 161 people who had illnesses. Modern medical diagnosis is rather problematic as it usually focuses on the diseases rather than the causes or sources of illnesses. Klity patients whose limbs or bodies were swollen would be diagnosed in relations to kidney problem rather than investigating further to the cause of kidney problem. Klity villagers who committed suicide may be identified as

having problem with depressive order, but there is no attempt to examine whether lead poisoning has something to do with that or not. It is still debatable whether medical diagnosis without investigation into the root cause will be useful or fair for the people or not. Different medical opinions are acceptable, but sharing of information or further discussion is needed in order to come up with applicable solutions.

Several Karen villagers, particularly at Lower Klity village, have died from lead contamination, while many dozens of people, particularly women and children, suffered from acute lead poisoning because of their daily activities such as drinking, fishing, washing, and bathing in the Klity creek. A number of cattle died (World Rainforest movement, 2008). The subsistence resources, such as fish, shellfish, and shrimp are continually loss due to negative effect on food chain. There is an increasing concern about sickness related to toxicity.

"I have lived here for a long time, I saw so many changes. In the past, we can eat anything. Everything is free and clean. Now, when we eat fish, we are vulnerable to death. It is painful. Anyway, we have bond with the creek, so, it is hard to avoid using it." villager, the elderly, male 61 years old

The problems that Klity villagers faced can be summarized in Figure 11

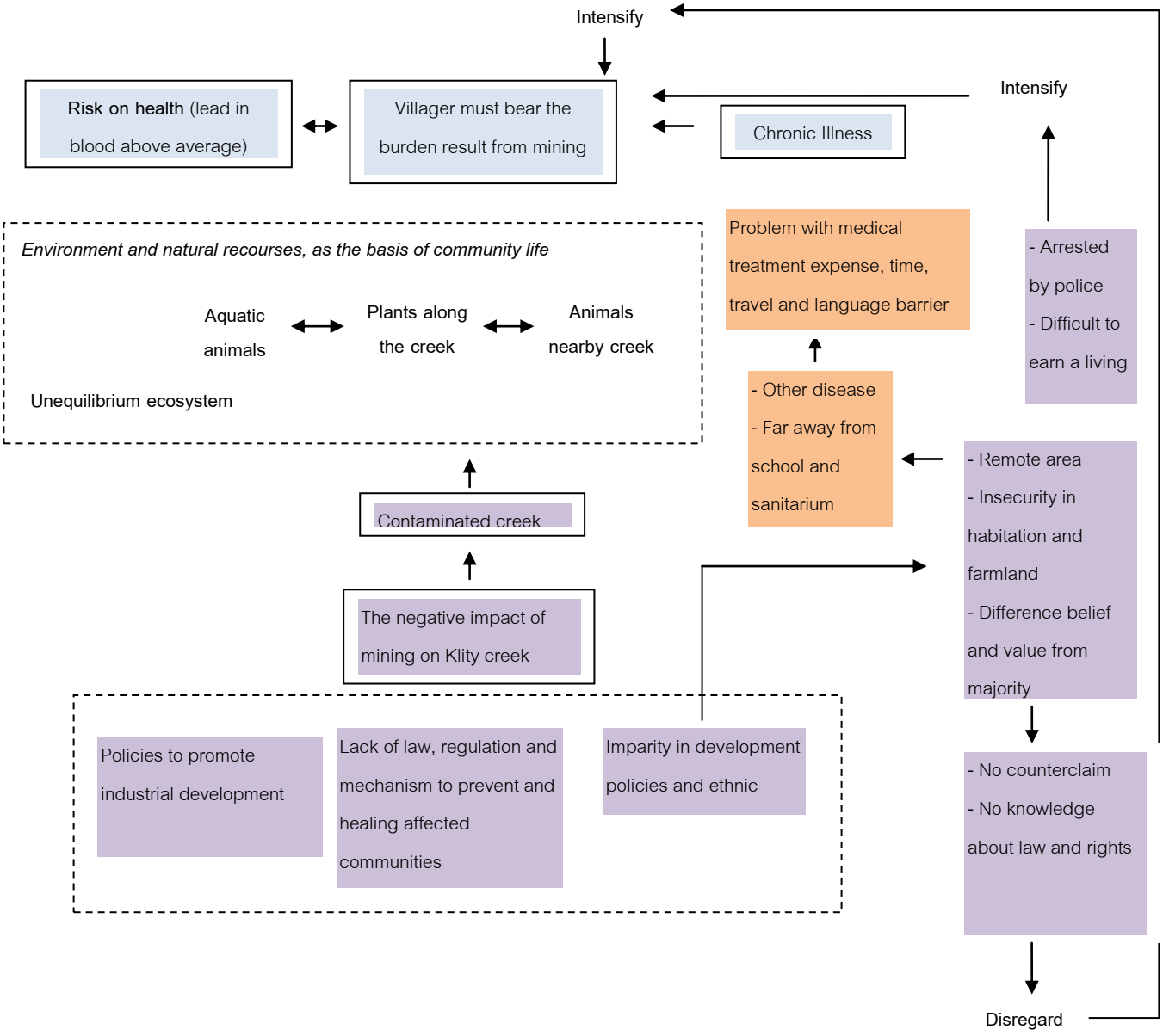

Figure 11 Tree analysis of the Klity village problem

3.5 Klity villagers and their ways of coping with the problems

Klity community is considered to be geographically and socially marginalized. It is very difficult for the people to raise their voice and ask for the remedy which is beyond their capacity. The stories of Klity villagers suffering from the mine activities began to be published in the newspapers in 1998. In 2000, ITV (Independent Television) - the television channel which is considered as the mainstream media broadcasted the stories of Klity village several times. After receiving media attention, the community became widely-known and started to receive help and support. The villagers felt that they were not alone in the struggle, and this encouraged them to move forward.

Later, the company gave the villagers 1,000,000 baht but refused to call it “compensation”. Though it seems to be a large amount, it is far from adequate to compensate for environmental degradation, health problems and local economic loss. From 1998 to the present, lead contaminated sediment does not decrease. Fresh water animals and plants absorb lead contamination and transfer to villagers when they consume these animals and plants. The villagers are aware of lead contamination in the water, yet they have no other choice but to use the water and to fish and catch animals in the creek for their food. In addition to food, the villagers also use the creek in daily activities such as washing clothes and bathing. Therefore, they are prone to high risk of lead exposure. Their health and quality of life remains uncertain.

The villagers have received support from governmental agencies, civil society, and private sector. The next chapter will review these mitigation measures and help efforts. As for daily food needs, some villagers still catch fish and other animals in the creek, but many choose to buy food from vendors from outside the village. Their expenses are increasing, and some of the processed food is not really healthy nor fresh like traditional food. The creek used to be an important part of Klity life, but now some villagers try to avoid using the water from the creek. Many houses are connected to piped water from a further away stream. However, there are problems like broken or

leaked pipe, dirt clogging the pipe, and during the dry season, the amount of water is not enough for the village demand.

The hardest thing for the villagers to cope is illnesses, death, and disability. Klity village is far away from public health services. The nearby health station is about half an hour away, and the provincial general hospital takes at least 5-6 hours to reach, or even longer in bad weather.

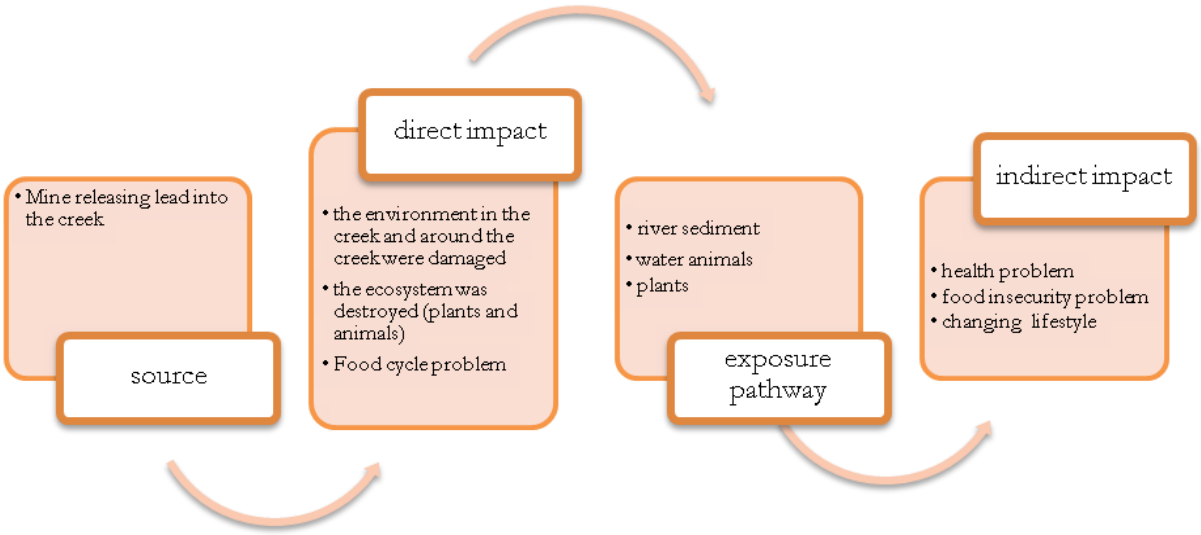

Figure 12 From polluted source to other negative impacts.

Table 9 Klity community timeline

Year	Main occurrence
Over 160 years ago	The villagers settled down at a site 7 kilometers away from the current site.
Over 100 years ago	The villagers move the settlement to this current site.
1967	Lead Mining Company started its operation
1989-1998	The villagers began to notice that the mine company discharged wastewater into the creek, causing environmental and health problems. The villagers faced with severe health problems. Some of them passed away.
1998	Mainstream media began to publicize the Klity story.
	The villagers filed a request to Kanchanaburi Public Health Office for health examination.
	The Karen Studies and Development Center along with Seub Nakhasathien Foundation filed a complaint to the Director-General of the Department of Mineral Resources to withdraw mine concession.
1999	The villagers had the blood tested in the first time by Public Health Office of Kanchanaburi and found that lead in blood was higher than safety standard. The Public Health Office of Kanchanaburi then put up the sign for “stop using the water and stop consuming fish and animals from the creek”
2000	The mine company paid an amount of money for the villagers.
2001	The mine was closed permanently. The Pollution Control Department examined water, sediment, and aquatic animals’ samples and found high levels of lead contamination, particularly, around the area downstream from the mine.
2003	The villagers sued mine company.
2004	The villagers sued the Pollution Control Department through the Administrative Court.
2011	The Pollution Control Department proposed the design and survey project for improve dam (to trap sediment) because the existing dam already collapse.
2012	Klity creek and nearby areas remain contaminated and villagers have health problems. The lawsuit still continues in court. The Administrative Court has a verdict and 22 villagers won the lawsuit against the Pollution Control Department.

Nowadays, the creek is still contaminated and since 2003 the villagers attempted to seek justice through lawsuit. This can be considered to be a way to cope with the problems.

3.6 Lawsuit as a way to cope with the problems and to seek justice

With the help from civil society, especially the organization that is familiar with environmental issues like Environmental Litigation and Advocacy for the Wants (EnLAW), the villagers are able to take their case to court and become more familiar with judicial mechanism.

Klity community lawsuit consists of three cases - two civil cases and one Administrative Court case as shown in the Table 10. The first civil lawsuit started with 8 villagers who filed a case against the mine company, the second civil lawsuit brought together 151 villagers who sued the mine company board for contaminating the creek with lead tailing, in the Administrative Court case, 22 villagers filed the case against the Pollution Control Department or PCD for the delay in rehabilitating the creek.

Table 10 Klity's lawsuit

Lawsuit	Court of First Instance	Appeal Court	Supreme Court
Civil lawsuit 1 in 2003 with 8 villagers as prosecutors	In 2006, the court held a verdict and the mine company had to pay 4.26 million baht to Klity villagers.	In 2007, the Appeal Court affirmed the decision that the mine company was guilty and had to compensate 8 villagers with 29 million baht.	The mine company continued to appeal to the Supreme Court and at present, the case is in the process.
Civil lawsuit 2 in 2007 with 151 villagers as prosecutors	In 2010, the court convicted the mine company board and they have to compensate 151 villagers with 36 million baht. The company board appealed.	In 2011, the Appeal Court convicted that company board have to compensate the same amount as the Court of First Instance's verdict.	The company board continued to appeal to the Supreme Court and at the present, it is in the Supreme Court process.
Administrative Court case	**Central Administrative Court**	**Supreme Administrative Court**	
In 2004, 22 villagers sued the PCD	In 2008, the court convicted PCD for the delay in creek rehabilitation. PCD has to compensate 33,783 baht for each villager, with the total of 743,226 baht. But the court did not order PCD to restore the creek.	In 2013, the court convicted PCD and ordered it to compensate 177,199.55 baht for each villager, totaling to 3,898,390 baht. The court ordered PCD to set up creek restoration plan, to monitor water quality, to collect and test samples of vegetables and fish in the creek at least once in every season until lead level comes back to the normal level.	

Source: Adapted from Environmental Litigation and Advocacy for the Wants (EnLAW) data

Civil lawsuit 1

In 2003, 8 villagers sued Lead Concentrate Company Thailand for compensation and treatment expense as well as creek rehabilitation. In 2006, the court had a verdict that the mine company has to pay 4.26 million baht to Klity villagers. After the verdict, the company appealed so the villagers have not yet receive the compensation. In 2007, the Appeal Court convicted mine company and ordered it to compensate 8 villagers for 29 million baht. Lead Concentrate Company Thailand continued to appeal to the Supreme Court.

Civil lawsuit 2

In 2007, 151 villagers sued company board as polluters. Three years later, the court convicted the board for polluting the creek and ordered it to compensate 151 villagers for 36 million baht. The board then appealed to the Appeal Court. In 2011, the Appeal Court convicted the board and ordered it to compensate the same amount as the Court of First Instance's verdict. However, the court did not order the company to restore the creek.

Administrative Court case 1

In 2004, 22 villagers raised a case against PCD for the delay in creek rehabilitation. Four years later, the court convicted PCD and ordered it to compensate 33,783 baht for each villager, totaling to 743,226 baht for compensation. In 2013, the Supreme Administrative Court convicted PCD and ordered it to compensate 177,199.55 baht for each villager, totaling to 3,898,390 baht for compensation. With reference to restoration, the court ordered PCD to develop creek restoration plan. Also, PCD has to monitor water quality and analyzes samples of water, vegetables and fish in the creek at least once in every season until lead contamination is gone.

Chapter 3 describes the study area, demonstrates the impact of the mining towards community, especially since the early observation of mining waste and discharge, then the environment and the villagers are at risk and they developed ways of coping with the risks. The Chapter also highlighted the roles of civil society and the media in publicizing the situation, and eventually lawsuits turns out to be a way of coping with the problems. Next Chapter will investigate the past mitigation measures and make a critical assessment on those efforts.

CHAPTER IV

Assessment of Past Mitigation Measures

After the discovery of lead contamination in Klity area, government agencies and civil society groups went in to provide help for Klity community. This chapter presents an assessment of past mitigation measures and past supports given by different sectors in alleviating the problems of lead contamination in Klity community.

4.1 Identifying responsible bodies and agencies: coordination or confusion?

After the Klity case became well known, there were meetings among relevant government agencies. Below is the summary of information about the outcome of the meetings and decision made about Klity creek rehabilitation and other mitigation measures. The information shows that there are several agencies involved, but the planning, implementation and enforcement of measures was rather haphazard and confusing. This is because governmental administration channels specific mandates and responsibilities to certain offices or agencies, so each has a silo-ed or narrow view of their own work and coordination becomes difficult.

In 1998, the **Pollution Control Department** (PCD) examined the water, sediment and aquatic animals in the lower Klity creek about 8 kilometers from the mining site for the first time after lead contamination was publicized. In the same year, PCD arranged for meetings with relevant organizations including **Department of Mineral Resources**[I], **Royal Forest Department**[II], **Department of Health** (under the Ministry of

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[I] The Department of Mineral Resources (DMR) used to be under the Ministry of Industry and used to be the only agency that took charge of mineral resources, including the issuance of mining permit, but after the formal restructuring of Thai public administration agencies in 2002, then mining businesses have been transferred to be under the direction of a new department called the Department of Primary Industries and Mines (DPIM) under the Ministry of Industry. Under such restructuring, DMR becomes under the Ministry of Natural Resources and Environment.

Public Health), **Office of the Natural Resources and Environmental Policy and Planning**[III] and the mining company. After the meetings, it was decided that the mining company should conduct a study and survey the contaminated area in order to find ways to restore the creek.

The Department of Mineral Resources, as a government agency that was mandated for the issuance of mining permit and monitoring mining businesses, ordered the mining company to stop mining operations and to follow PCD's order to dredge up contaminated sediment from the creek. One year later (1999), the company followed the order and dredged up 3,753 tons of contaminated sediment and prepared to build rock check dam. In 2000, PCD examined the sediment and found a high level of lead contamination. The company then paid 1 million baht to Klity villagers in the following year (2000).

The next meeting among relevant agencies in 2001 reached the conclusion that the mining company had to build semi-permanent dams to trap sediment. In 2002, the company built 2 rock check dams, the first dam situated 4.5 kilometers downstream from the mining site and the second one 8 kilometers from the mining site. The delay for building check dam was due to the fact that PCD had to request a permission from the Royal Forest Department in order to carry out such activity in Forest Reserve area. Since then, the company no longer put any more effort in rehabilitating the creek.

In 2004, 2006 and 2008, PCD had several meetings with experts about creek restoration and finally claimed that "natural approach", or to leave contaminated area to rehabilitate itself, has been an acceptable method worldwide. From 2009 to 2011, PCD had meetings for sediment management because the contaminated sediment dredged up by the mining company has leaked into the creek. In 2011, PCD proposed redesigning the check dam for trapping sediment due to the fact that the

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[III] The Department was under the Office of the Prime Minister and then changed to be under the Minister of Natural Resources and Environment in 2002.

existing ones have been malfunctioned. However, the sediment management plan including the redesigning of the dam has not yet been implemented (Enlaw, 2012).

From the summary of the early attempts to solve the problems, it is apparent that government administration has become part of the problem rather than providing timely solution. The fact that PCD could not work directly with the Royal Forest Department in requesting for permission to dredge and rehabilitate the creek is a good example of problematic governmentality. Klity's problems seem to be neglected amidst all these governmental regulations and formalities. On the contrary, relevant government agencies have been quite weak in the enforcement of regulations on "polluters".

Despite this problematic administration, some of the attempts for solving the problems have been done. The Department of Natural Resources and Environment already collected data regarding the contamination, monitored the quality of the water in the area, and gave warning to the local people regarding lead contamination. Meanwhile, there are measures that have not been carried out, like identifying the root cause of health problems and providing health surveillance, planning for the comprehensive rehabilitation in the area, promoting actual participation in the development of mitigation measures, designating the area as under pollution control with integrated mitigation measures, and setting up formal remedial fund for the community. The table 11 shows measures which have already been done and those which should have been done.

Table 11 The instrument and measures to solve the problem

Instrument and measure for solving problems	
Collecting data and monitoring the quality of the environment in the area	/
Identifying the root cause of health problem and providing health surveillance	x
Planning for the comprehensive rehabilitation in the area	x
Promoting actual participation in the development of mitigation measures	x
Designating the area as under pollution control, with integrated mitigation measures	x
Taking the case to court and suing for economic damage	/
Setting up formal remedial fund for the community	x

Source: adapted from the data by Ministry of Natural Resources and Environment, 2008

The Ministry of Natural Resources and Environment has examined six case studies to analyze problems of mining impacts and extract lessons learned. Case studies include Arsenic contamination in Ronphiboon district, Nakhon Si Thammarat province, lead poisoning in Thong Pha Phum district, Kanchanaburi province, cadmium and mercury contamination in Mae Sot district, Tak province, sulfur dioxide and dust in Mae Moh district, Lampang province, and dust in Chalermprakieat district, Saraburi province. The study described limitations and failure in trying to solve environmental and health problems.

Table 12 A summary of analysis on limitations and failure to solve problems

Limitations and failure	Suggestion for future action
1. Lack of baseline data on areas with mineral potential and existing natural contamination.	- Collecting data and develop baseline data or database
2. Lack of baseline data and further research on mining impacts prior to identifying solutions and mitigation measures/mechanism	- Develop baseline data or database - Integrate databases from different governmental offices/departments and other sectors (research institutions and some private sector) - Establish central committee overseeing baseline data/research and planning consisting of relevant stakeholders
3. No demarcation of polluted or affected area for future mitigation and management. This is problematic in the cases where affected area extends outside mining concession area, like Klity case	- Demarcate contaminated area through zoning system, categorized by levels of impact and nature of impacts. The affected area may be larger than mining concession area. - Develop planning for mitigation measures suitable in each area - Develop regulations for polluters pay which cover a wider area
4. Lack of coordination among government offices/agencies due to conservational administration. Lack of unity in solving the problems. Lack of the continuity in policy and budget.	- Set up and delegate power to “Task Force” team consisting of representatives from government agencies, civil society, and local communities - Provide budget and specify the duration for planning/operation
5. Mistrust among stakeholders. Government offices cannot gain trust from the public and local communities.	- Set up and delegate power to “Task Force” team with strong participation from different stakeholders - Work on “best practices” and “good examples” - Put emphasis on participation, communication and transparency
6. Lack of financial mechanism which is fair and effective.	- Set up emergency fund or remedial fund for medical bills, travelling to hospitals, lawsuit expense, etc.

7. Centralized and silo-ed administration slows down actions. Local organizations cannot take charge.	- Provide capacity building and sufficient resources for local and regional organizations - Encourage communication and information transfer

Source: Adapted from Ministry of Natural Resources and Environment, 2008, pp. 256-263, citing data from Thailand Development Research Institute, 2008, with additional analysis by researcher.

4.2 Past mitigation measures

Measures to help reducing the impacts of mining and other supports from the government, public sector and mining company covered several aspects: health, environment, and food/water security. These measures ranged from providing information to building infrastructure as seen in the Table 13. Figure 13 shows a sign by Klity creek banning the consumption of aquatic animals for only “temporarily”.

Figure 13 Klity creek banning the consumption of aquatic animals

Source: http://www.greenworld.or.th/library/environment-popular/1090

Table 13 Mitigation measures from various sectors

Government with direct responsibility			
Ministry	Department/Office	Measures	Duration
Ministry of Public Health	Public Health Office of Kanchanaburi	Put up a sign on banning water use and consuming animals from the creek	1999
	Public Health Office of Kanchanaburi	-Examined blood to identify the blood lead level (BLL) (monitoring) -Provided related medical services (not related to lead poisoning)	From 1999 on
	Paholpolpayuhasaena Hospital		
	Thung Sue Tone Health Station		
	Rajavithi Hospital	Provided medical services (Chelation)	
Ministry of Agriculture and Cooperatives	Department of Fisheries	Built fish ponds	2000
Ministry of Natural Resource and Environment	Pollution Control Department	Installed water filter	2009
Military		Dug up large ponds as alternative water sources and for raising fish	
Local Government	TAO, sub-district council	Installed piped water (from other water source)	
Private Sectors – "polluter"			
Mining company	Gave one million baht to the villagers		2000
	With an order from Pollution Control Department	Buried contaminated soil	2001
		Built dams to trap sediment	2001
University and research institutes			
Office of The Higher	Chulalongkorn University, Naresuan University,	Provide information about contamination to villagers	2002

Education Commission	Silpakorn University, Chiangmai Univeristy, etc.	through posters and other means	
Civil society –individuals /foundations/ organizations			
Private individuals and foundations	Karen Studies Center EnLAW Greenworld Foundation Seub Nakasathien Foundation Etc.	-Helped with court cases -Provided platforms for expression and discussion -Publicized and updated Klity situations -Gave donations	1998 - present
Private individuals	Volunteers	Trained villagers on how to make soy protein	1999

4.2.1 Mitigation measures in the aspect of health

4.2.1.1 Blood testing -- The Public Health Office of Kanchanaburi, by the order of the Ministry of Public Health, has conducted blood tests and physical health check-up for the people of Klity village since 1999. The villagers were only occasionally informed about the test results, sometimes the results were not disclosed to the villagers and the Office did not have a concrete plan for health rehabilitation. As a consequent, the villagers have not been very cooperative in blood testing in recent years.

"*They came to check whether the level of lead in our blood is increasing or decreasing. However, they do not have medical treatment plan. They wanted only information*." villager, female, 31 years old

"*They came but not regularly. Some officers told us about the result, and some didn't."* villager, male, 42 years old

4.2.1.2 Providing medical services -- Many villagers went to the hospitals because of various symptoms like headache, nausea, joint pains, etc. However, there was no attempt to prove whether these are related to lead contamination or not. The doctors usually treated these patients by prescribing medication to relieve each symptom.

The villagers who are in high risk group were admitted to Poison Control Center, Rajavithi Hospital for the treatment of lead poisoning. They received treatment, medication and prescriptive therapy according to their symptoms. Chelating agents were used in the villagers with high blood lead level (BLL) and showed symptoms such as severe abdominal pain and numbness, and having dark blue line in the gum area. The World Health Organization set the standard of BLL in adults for up to 25 micrograms per deciliter and in children for up to 10 micrograms per deciliter. For Thailand, the standard is lower, up to 40 micrograms per deciliter for adults and up to 25 micrograms per deciliter for children.

Expenses for hospitalization and travelling to hospitals are from private donation as well as from 1 million baht given by the mining company, this amount was divided into two parts: 500,000 baht for medical expenses and another 500,000 baht for a loan to promote local entrepreneurship. At present, the budget for medical expenses has been depleted.

4.2.1.3 Putting up information and warning signs -- Another measure related to health was to put up a warning sign and provided information about lead contamination. The posters indicating the level of lead contamination in the creek, and plants and animals that may be contaminated were put up in the village. This is the information to assist the villagers in deciding whether to use the water from the creek or to catch fish and other aquatic animals from the creek or not. However, a number of villagers cannot read Thai and even those who can read did not find the information very useful.

"*I read it but I did not understand what it said. I saw the figures and numbers but it did not tell me whether it was too dangerous to eat or whether it was safe enough to eat*." villager, male, 46 years old

"*A few villagers are interested in the posters. Many of us can't read.".* villager, female, 27 years old

The information that will be more useful to the villagers are lead poisoning symptoms or signs that show if the body has received lead in the quantity that is dangerous to health. Such important information does not appear in the posters and no one has informed the villagers about this so far.

Figure 14 Posters containing information about lead contamination and effect on health

4.2.2 Mitigation measures in the aspect of environment

4.2.2.1 Burying lead contaminated soil and sediment and building check dams -- As a measure to reduce lead contamination in the creek, the Pollution Control Department (PCD) ordered the mining company to dig up and to bury lead contaminated soil and sediment 100 meters away from the creek, but what really happened was that the mining company buried the contaminated soil right by the creek. In addition, the mining company had to build small check dams to filter and trap the sediment in the upstream area of Klity village. However, with strong current and lack of regular maintenance, the dams collapsed. At present, neither the mining company nor governmental agencies take the responsibility to fix the dam.

"*At first the dams might be useful for trapping lead sediment, but they were not strong and couldn't withstand current. Now they were broken and nobody comes to fix them yet*." villager, male, 44 years old

4.2.2.2 Identifying and testing lead absorbing plants -- At present, there is a research conducted by Naresuan University on growing plants that could absorb lead. This research is still in the trial or experimental stage to determine the type of plants which can effectively absorb lead and, at the same time, create benefit or income for the villagers. However, there is an argument that the plants that absorb lead may pose risks and may cause further dispersion of lead contamination. So this may not be a practical lead removal solution. The villagers are still doubtful.

"Growing trees or plants to absorb lead should not work especially during the rainy season when the creek has a strong current and the water overflows. Other villagers are not keen on planting trees near the creek." villager, male, 44 years old

4.2.3 Mitigation measures in the aspect of water and food security

4.2.3.1 Installing piped water -- The project in building water reservoir and connecting water pipes to deliver water to houses (ประปาภูเขา or piped water from mountain source) was initiated by the sub-district council in 1996. This project connected the water pipes from the reservoir and the mountain stream. At that time, all 40 houses were connected to the piped water system and the water supply was sufficient.

At present, there are additional 40 houses due to population growth. These new houses are not connected to the piped system, so they have to rely on the water from the creek. Also, the older houses with piped system are facing problems as the amount of water is insufficient (except in rainy season) and the pipes started to clog up due to limestone particle in the water. Houses located on higher area often gets no water. Some parts of the pipes are also damaged. The pipe system has not been 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 repair. Right now there are about 82 households and many need to rely on the creek, especially in summer when water is more scarce. Another problem with water from the mountain stream is that it contains limestone particle and may cause gallstone in the kidney if the villagers use it continuously for a long time.

4.2.3.2 Installing water filter

To solve the problem of lead contaminated water from the creek and the mountain piped water that has limestone particle, the villagers asked for a large water filter connected with piped water system. PCD only granted them a small water filter installed at a site near the village temple. Although the village is not very big, but the area has hills and slopes, so it is inconvenient for the villagers to fetch the water there. Right now, no one uses the filter, even households living nearby, and it is left deserted.

"*I did not use that water filter. It is too far away from my house. They should have asked us first before installing the filter."* villager, male ,age 44 years old.

Figure 15 Water filter

4.2.3.3 Building fish ponds – As fish and aquatic animals in the creek may be contaminated, Department of Fisheries thus built fish ponds with plastic sheet covered on the bottom of the pond to prevent lead contamination. This project aimed to promote food security so the villagers would not have to risk their health by catching and consuming fish in the creek. However, the fish ponds did not work, and the catfish raised in the ponds died within the first two weeks due to the lack oxygen as water did not circulate. The ponds were also situated far away from water source. And even if the fish survived, it would be difficult for the villagers to find food for the fish.

"*The ponds did not work either. In the beginning I could raise and eat catfish but then there was not enough water as the ponds were far from water source*." villager, male, 46 years old.

Figure 16 Fish pond with plastic covered the bottom

Eventually, some villager go back to eat fish from the creek while many others spent an amount of money for buying fresh food from outside the village or from vendors who regularly come to village twice or three times a week. Once there were volunteers who came in the village to teach the villagers to make soy protein, but the activity did not continue.

"*I paid more than 1,500 baht per month for buying food from outside but it is not enough. My family and I have to eat fish from the creek and the creek is still our main source for food and water."* villager, male, 42 years old.

"*My family eat rice with salt and chilli to save the cost of having to buy food from vendors, we eat fish from creek from time to time*." villager, female, 35 years old

4.3 Suggested mitigation measure – relocation and resettlement

Along with the suggestion to use "natural approach" to environmental rehabilitation of Klity creek, there was also a suggestion to relocate the village. The villagers rejected the idea because they are culturally attached to the land as the settlement is over 100 years old. Their livelihood security used to be guaranteed in this forest in which they have carried on a balanced and self-sufficient life through generations. Klity villagers value their forest and creeks. Before the unfortunate incident of lead contamination, Lower Klity villagers have not much expense. Though they do not

earn much, they live happily and never regarded themselves as poor people. They realize that they have the prosperity of natural resources. They have natural food which is available throughout the year. The Lower Klity villagers did not regard their surrounding nature as resources that can be easily exploited and commodified, instead, they respect nature and are spiritually attached to sacred sites around their village. Therefore, they do not want to leave their “home”. Although the creek has been contaminated, resettlement will never be a valid option for the villagers.

The Karen indigenous beliefs are very different from neo-liberal thinking. With state control over natural resources, the principle of sustainability seems to be at stake. The basic principle that the state-owned mining (theory of the state's right) within the territory of that State demonstrates the right over mineral resources. Therefore, the state has the authority to control, manage and exploit mineral resources (Somreutai, 2005). The definition of mineral resources used in Thailand nowadays allows the government to exert power and control on such resources.

The Universal Declaration of Human Rights adopted by the United Nations General Assembly, article 25 states that everyone has the right to a standard of living adequate for the health and well-being of oneself and of one's family, including food, clothing, housing, medical care and necessary social services, and the right to security in the event of unemployment, sickness, disability, widowhood, old age or other lack of livelihood in circumstances beyond one's control.

The Constitution of the Kingdom of Thailand 2007, Chapter 5 Directive Principles of Fundamental State Policies, part 8, section 85 (5) clearly indicates that State shall promote, maintain, and protect the quality of environment on the principle of sustainable development; control and eliminate the pollution that is hazardous to health, sanitary, safety, and quality of life of the people, which people, local communities, and local administration organizations shall participate in directing the operational plan.

The case of Klity village proves that neither the Universal Declaration of Human Rights nor the Constitution of the Kingdom of Thailand could guarantee community rights to livelihood and clean environment. The community has suffered for

over two decades now. Mining activities have created a tremendous impact on lifestyle, health and the environment. Resettlement is the very last choice because it means other mitigation measures already failed to solve the problems.

4.4 Lessons learned from the past mitigation measures

In this chapter, we see that past mitigation measures and forms of support for the community did not put much consideration on the lifestyle and the limitation in the community, therefore, it did not quite correspond to the real needs of the people. The measured were mainly planned and implemented based on the agencies' mandate and specialization, and there was little coordination among agencies and between agencies and the local community. The past mitigation measures clearly indicate that temporary reliefs were provided, but the root cause of the problems were not solved. The National Human Rights Council of Thailand investigated cases of mining and industrial impacts on local communities in 2006-2007 and concluded that even after attempts were made by companies or governmental agencies to alleviate the problems, most attempts could not eradicate the root cause of the problems. The communities were usually left to bear the impact while waiting for "better" solutions (Thailand National Human Rights Commission, 2007).

Major lessons learned from past mitigation measures in Klity community are as follow:

4.4.1 Inconsistency in operation and lack of long-term follow-up or maintenance

Several measures were operated with inconsistency and there was no long-term plan. For example, blood checks were carried out but there was no further attempt for health rehabilitation or treatment plan. The villagers were not always informed about their BLL (blood lead level), so several refused to have their blood checked at the later stage. Dam construction to trap lead sediment is another example of failed maintenance and the lack of precaution. The two check dams were built to withstand regular water flow but there was no extra attempt to ensure their strength and durability during the rainy season when the creek usually overflows and the current is

much stronger. Furthermore, there was neither risk communication nor emergency plan after the check dams collapsed. The condition of pipe water system also shows how long-term maintenance plan is lacking. Several of these measures, along with the good intention behind them, failed to achieve their goals and the budget has unfortunately been wasted.

4.4.2 Lack of planning and budgeting for environmental and health recovery and rehabilitation

Several measures are only temporary and offer immediate relief. Apart from inconsistency in operation and lack of long-term follow-up or maintenance, there was no plan nor budgeting for environmental and health recovery and rehabilitation. The past attempts focused on activity-by-activity or project-by-project type of work. Furthermore, there has been no participatory lessons-learned platform for relevant stakeholders. So without reflexive thinking and extracting lessons learned from the past effort, sensible long-term planning is almost impossible.

4.4.3 Lack of understanding of the villagers' traditional ways of life

It is important to take the villagers' ways of life into consideration before planning on mitigation measures. Some of the measures showed how the importance of indigenous Karen way of life has been neglected, for example, discouraging the villagers from catching fish from the creek without providing alternative and culturally-appropriated ways for food security, building fish pond without considering whether water would be sufficient or not and without considering appropriate and locally available fish feed, or using posters with formal language that the villagers cannot understand.

As already mentioned, the past mitigation measures and implementation of each agency or organization was rather specific and did not cover the over-all picture of the problem. Most of the measures thus became clusters of scattered jigsaws and failed to achieve a bigger or more holistic picture. Moreover, the lack of

cooperation, coordination and integration causes repetition in work procedures. Therefore, mitigation measures brought little relief or benefit for the local community.

Hence, the suggestions for workable mitigation measures for the Klity creek case must consider the possibility of real implementation and practice, put great consideration on the indigenous Karen ways of life and their needs, and promote cooperation and coordination among agencies and stakeholders. Suggestions for further mitigation measures are divided into two parts, the first part is **short-term measures** which focus on reducing exposure to lead by reconstructing pipe water system, providing health services and rehabilitation, and setting up health and remedial fund; the second part is **medium-term measures** which focus on building knowledge network and platforms, reactivating different task forces that oversee mitigation planning and implementation of Klity case and propose lessons learned that are useful for considering policy direction for mining and local communities. The **longer-term plan** will not be limited to mitigation measures of the Klity case, but to use the concept of risks and dynamic sustainabilities to propose for alternative and pluralistic paths to sustainability as will be elaborated in Chapter 6.

4.5 Recommendations for future mitigation measures

4.5.1 Short-term measures

Measures to reduce exposure to lead by reconstructing pipe water system

A major lead exposure for Klity villagers stems from drinking and using the water from the creek. Building water storage and pipe system aims to make the villagers less dependent on the creek. At present, Kilty village has the water pipe system connected to a stream in the upper part of the mountain. The system was in put in place in 1996 but some parts of the pipelines are already broken and clogged. Also, a number of (newer) houses in the village are not connected to the system, so these villagers still use water from the creek. The possible short-term measure is to reconstruct the pipe water system and include these new houses in the system. Large water filter can be installed near the mountain stream and the filtered water runs into storage tank. The water is then channeled through the pipe system to individual houses, and each household is responsible to maintain the pipe around their area. Klity households should take turn to clean the large storage tank and to maintain the overall pipe system. Planning and implementation can be done through the work of village committee and budget requested from Sub-district Administrative Organization.

Providing health services and rehabilitation

After continual lead exposure, Klity villagers are in need of healthcare services and many of them suggested there should be a health station in the village with an objective of providing holistic healthcare services. At present, the villagers have to travel to Thung Sue Tone health station which is 12 kilometers away and the entire route to the health station is made of gravels. Moreover, some villagers found that when they arrived at the station, there was no health officers on duty there. It is not possible to make an appointment or call for detail as the villagers do not have home telephone and there is no network coverage for mobile telephone either. When the villagers become ill, it is then impossible to get to the doctor in a short time.

Setting up health and environmental remedial fund

Setting up health and environmental remedial fund is urgently needed because many villagers are already ill and the environment around the creek contaminated. In the U.S., there is federal laws called Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) which is the fund for clean up uncontrolled hazardous site, generally known as “Superfund”. Financing for Superfund is collected from tax on petroleum and chemical industries so called “Hazardous Substance Response Trust Fund”. When the communities face with environmental problems caused by industry, local communities together with United States Environmental Protection Agency (EPA) can use Superfund to cope with the insecurity situation. Community involvement is part of Superfund process in engaging and collaboration with stakeholders. Superfund is not only the matter of clean up hazardous waste sites but also regard as the waking up of environmental justice due to the fact that its mitigate contamination as well as protect communities. The Love Canal and Times Beach disaster are the example cases that use Superfund to response to the problems.

In Thailand, this kind of funding does not exist. Therefore, the local people have to struggle and have to wait for donation or court compensation. In 2000, the villagers received one million baht from the mining company, however, the money is already gone as it was spent on medical expenses, travel, and food for patients and relatives who need to go to general hospitals far away from the village.

In 2013, the villagers received compensation from the Pollution Control Department in the amount of 3,898,390 baht, yet this cannot cover for their loss and will not bring their health and environment back to the normal condition. Civil society and friends of Klity people usually donate money or organize fund raising activities like religious event of giving money to offer robes to monks. There needs to be a more secured funding for healthcare and hospitalization, and the program like Superfund should be considered for Thailand in order to ensure that there will be at least financial means to take care of toxicity and hazardous waste problems and their consequences.

4.5.2 Mid-term measures

Building knowledge network and platforms

Klity is a small remote village in the forest, yet the tragedy there serves as lessons to be learned and to be corrected in many ways. This can be done by creating a network for people who work on and are interested in the Kilty issue. The objective of the network and platforms is to promote information exchange and the development of knowledge base by using various forms of communication, brainstorming, and creating data bank or data warehouse for common use.

At present, quite a number of people are interested in Klity case but they do not have sufficient contacts. Working is 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 is a good opportunity to bring those who are working to solve the Klity problems to exchange data, exchange knowledge in different fields and exchange experiences, as well as facilitating a fast and easy channel for communication. Apart from creating Klity network, developing a database or data bank on similar cases is also important. This will serve as a source to develop a body of knowledge on mining and impacts on community health and well-being. At present, the data about Klity and related cases are scattered in the public sector, private sector, civil society, universities and websites. The Ministry of Natural Resources and Environment also proposed database development in their guidelines (see page 68-69). Building knowledge network and platforms will also encourage stakeholder involvement and the pooling of knowledge resources.

Reactivating different task forces for Klity

PCD already set up a committee overseeing Klity problems, yet the meetings are not held regularly. A study on policy process and decision reveals that it is very much dependent on politics and negotiating powers of different parties. Without sound and solid public policy, the decision and actions made were sporadic and stemmed from either political or public pressure at the time. Therefore, neither decision nor actions were based on actual determination to solve the problems (Rerkpornpipat, 2007).

It is important to reactivate different task forces on Klity case. The task force team should consist of relevant stakeholders who are from governmental agencies, mining company, local village, and there should also be human rights lawyers, environmentalists, and academia in the team. The guidelines of the Ministry of Natural Resources and Environment also mention similar arrangement (see page 68-69).

This chapter summarized major mitigation measures and analyzed whether they really responded to the needs of the villagers and helped improve their quality of life or not. There has not been any calculation about the amount of money, time, and other resources invested in these efforts. Although they were all out of good intention, the result bore the mark of how “prevention” is better than (misdirected) “cure”.

CHAPTER V

THE ANALYSIS OF KLITY CASE: LESSONS TO BE LEARNED ABOUT RISKS, THREATS TO HUMAN SECURITY AND STATIC SUSTAINABILITY

This chapter will extract lessons learned from Klity case, analyzed how it brought to a better understanding of risks, threat to human security and static sustainability. Then the chapter will propose a new way to view development, environment and sustainability with reference to mining and local communities.

5.1 Lessons to be learned from Klity case

Klity case is an example of pre-Environmental Impact Assessment requirement with mining company that did not have appropriate waste management plan and implementation. In addition, the mining company denied responsibility in finishing environmental rehabilitation. The measures to control and eliminate pollution along with rehabilitation by the government offices are too late resulting in heavy damage to Klity community and environment. Currently, there are several communities facing similar problem to Klity. So the “tragedy” happened at Klity should serve as a big lesson learned to avoid future damage for other communities and local environment.

5.1.1 Lessons to be learned about the threat to human security

The analysis of the impacts of mining and lead contamination on Klity community helps to extend our understanding about human (in)security. Because Kility village is an indigenous marginalized community, its particular socio-cultural features require a greater depth of understanding than general rural communities affected by mining industry. The seven dimensions of human (in)security of Klity case have been discussed below.

Economic security

The case of Klity helps us to understand the extent of economic security. For the Karen people in Klity village, economic security is not limited to secured income or employment. They lived a sufficiency life and the natural environment provided them with four basic necessities of food, clothing, housing, and (traditional) medicine. Even though they earned very little or no income, they never regarded themselves as poor people because of this natural prosperity -- fertile soil, clean water, abundant forest, and yielding rice fields. Employment and income does not guarantee economic security, but contaminated and degraded natural resources would surely deprive Klity's economic security.

The Klity people become poor because they now need more money to buy outside food and to go to the hospitals to seek medical care for their illnesses. Donated money from different sources and court compensation can only fill in the gap for a while, but cannot compensate for the loss of economic security.

Food security

Food insecurity is very apparent after the creek became contaminated. Aquatic animal and plants or vegetables along the creek, and clean drinking water that used to nourish Klity villagers for more than one century have reduced in quality and quantity. Although there was a ban on drinking the water and consuming aquatic animals from the creek, the villagers who cannot find alternative food sources still depend on the creek. Therefore, it is not only an issue with food security, but also food safety. On the other hand, the villagers who turn to depend on outside village food sources find that the food is usually lower in quality, as many items are processed and canned food. So the issue of food quality and food sovereignty are also relevant in this case.

Health security

The most obvious impact of contamination on human security in Klity is health security. Many villagers started to develop symptoms as already discussed in earlier chapters. There are cases of retarded children, and children with leukemia. The impact of contamination is apparent on physical health, yet stress from the conditions of insecurity and uncertainty also brought about mental strain. There are also cases of mental disorder in the community.

As a consequence of food insecurity, health conditions may become deteriorated from malnutrition, and this poses a serious threat to children's overall health and growth. Those who depend more on processed and canned food may experience other form of health risks. Different dimensions of human security are closely related and one may affect the others as shown in the inter-relations between environment, food, health, and economic life.

Environmental security

In Klity case, environmental insecurity is the major cause that interlinks other dimensions of human insecurity. In many cases of toxic impact, it is claimed that the area has been "environmentally insecure" in the first place due to natural contamination of toxic substances.

It is still debatable whether the environment in Klity area has been "contaminated" at a certain level even before the development of mining industry due to its rich deposit of lead and other minerals. However, the fact that the Karen have settled in this village for over a century means something. According to the Karen beliefs and traditions, village or settlement will be moved when the site is considered to be unsuitable. The signs of illness, death, and other unnatural or unusual occurrence make the Karen realize that it is time to move to other site. In the old days, the Karen occasionally migrated, so they were relatively free to select appropriate site for their settlement. Lower Klity village has been settled for several generations, and that is a proof of "environmental security" of the area.

Klity environment is not just a physical surrounding or natural resources for use for the Karen. The villagers hold that natural environment is "sacred ecology" (Berkes 2008), and the definition of environmental security for the Karen is much more profound and incorporates spiritual aspects. Even after the creek contamination, the Karen still hold that it is the source of life and organize the ritual of renewing life of the creek every year.

Individual security

The basis for individual security or personal security is the protection of individuals from physical harm and violence in various forms and from different sources. In Klity case, individual and household security has been threatened. When family members become ill, the entire family worries and suffers. Women and children tend to be more vulnerable. There is a family which loses its "human resource" because two of their boys became retarded. The experience of individual insecurity is especially difficult for the Karen as they are marginalized minority with little political voice to negotiate.

Community security

As mentioned in the review of community security concept, "human security" in traditional and indigenous communities relies on community security because of social bonding and interdependency or collective solidarity. The suggestion on resettling the village in a safer area comes out of good intention, yet it neglects the social basis of Karen community. There are other cases where mining development come with resettlement plan, and that usually creates displacement, disruption, alienation, and exploitation. The problem of mining-induced displacement and resettlement is a global problem which is found in every continent (Terminski 2012). As mentioned, smaller communities do not usually have power nor capacity to prevent, negotiate, or react against the authority who make the decision whether the local communities should move or stay.

Political security

Thailand has some infrastructure for human rights support, yet the dominance of large businesses over the small affected groups has become a commonplace. The impact of mining on Klity was publicized by mass media through the facilitation of civil society groups. Therefore, civil society and environmental non-governmental organizations play major roles in this case.

5.1.2 Lessons to be learned about risks

The Klity case also attests to risk in the modern world. It reflects the three problems of risk from pollution or contamination, as explained in Brown, Kroll-Smith and Gunter (2000: 10-13), those are the problem of uncertain science (unidentified illnesses and symptoms of Klity villages), the problem of class and race (the village is marginalized geographically, socially, culturally and economically) and the problem of organizational deceit (identifying responsible bodies or agencies, and enforcing the cleaning up of contamination).

The risk from toxicity on human health and natural environment is quite unpredictable and thus not yet well explained due to diverse and complex variables like exposure state and level, the amount of toxicity, and the cumulative effect. Another important issue about risk is that it is socially constructed. The concept of "environmental racism" came out of the realities that the poor, less educated, disadvantaged, and marginalized people are the group that usually bear environmental risk from large development projects. Many studies conclude that there is a correlation between environmental quality and racism, in other words, geographical correlation is found between environmentally degraded area and ethnic or marginalized communities.

As mentioned, Klity is not an isolated case. From the blood test results of risk-prone villagers who live in the eight villages near the mining site, several villages also share the risk of lead contamination. The eight villagers are Upper Klity, Lower Klity, Thung Nang Kruan, Tha Din Daeng, Huay Sue, Kruengkawia, Tipuye and Saphan Lao. It was found that during 1998-2004 the villagers have very high level of lead in their

blood (BLL) and the level gradually decreased in later years. The data of BLL in the risk areas during 1998-2004 is shown in the Table 14.

Table 14 Blood lead level of lead in the villagers' blood in the risk areas during 1998-2004

Year	Number of Samples	Result from the blood tests of children under 15 years old			Result from the blood tests of the population who are 15 years old at least		
		Number Of Children	More than25 micrograms per deciliter		Number of adults	More than25 micrograms per deciliter	
			Number	Percentage		Number	Percentage
1998-2001	170	68	41	60.29	102	5	4.90
2002-2003	2,505	1,558	235	15.10	947	83	8.80
2004	558	465	125	26.88	93	3	3.23
2005	947	806	124	15.38	141	2	1.42
2006	1,194	1,012	70	6.92	182	1	0.55
2007	1,547	1,393	91	7	181	1	0.55
Total	6,921	5,302	568	11.05	1,646	95	5.77

Source: Final report, Project for studies to determine the policy framework and guidelines to prevent and resolve problems affecting the environment and health, 2008.

5.1.3 Lessons to be learned about static sustainability

As mentioned in the concept review, there has been a critique of viewing sustainability as linear and static. This fresh phenomenological look at sustainability starts around a decade ago when diverse perspectives were acknowledged and analyzed instead of being put aside. Cowell et al. (1999) focused on the analysis of how sustainability has been interpreted for the primary extraction industries. The views towards the industries range from seeing them as necessary to sustainable development to seeing them as a big threat to sustainable development. The article by Cowell et al. pointed to the underlying assumptions behind these different views, for example, "assumptions about the acceptability of trade-offs between different societal goals; attitudes towards uncertainties in scientific analysis and the reliability of management systems; and the perceived appropriateness of system boundaries at different conceptual scales" (Cowell et al. 1999:277).

Javier Auyero and Debora Swistun (2008) made an ethnographic study and archival research on one contaminated shantytown in Argentina to examine the "social production of environmental uncertainty". They found diverse perceptions, even erroneous views on toxic contamination, and concluded that they are the result of "relational anchoring" of risk perceptions and the "labor of confusion" generated by powerful outside actors. The major implication from this study is, "cognitive psychology and organizational sociology can travel beyond the boundaries of self-bounded communities and laboratory settings to understand and explain the collective production and reproduction of ignorance, uncertainty, and error" (Auyero and Swistun 2008:479)

Along the same line of argument proposed by Cowell et al. (1999) and Auyero and Swistun (2008), "sustainability" should not be seen as singular static state, but dynamic process which is regularly contested and reinterpreted. This is in accordance with what Melissa Leach et al. (2010) called "sustainability challenges", and these challenges should prompt us to refresh our understanding about sustainability. The term used in Leach et al. is "dynamic sustainabilities". Instead of insisting on aiming for a linear path to the singular goal of sustainable development, we should take

into consideration the diverse ways of understanding, recognizing multiple possible goals and value contestation, thus coming into grip of "politicized perspective on sustainability" (Leach et al. 2010), in other words, to understand the social construction of "sustainability."

This approach requires moving beyond risk to recognize wider dimensions of "incomplete knowledge", and moving beyond stability and control to adopt new strategies that are more ready to respond to ongoing change. In doing so, there is a room to challenge dominant narratives and to open up alternative narratives. The recognition of politics of sustainability will enable us to see the possibility of civic mobilization, network building, broader engagement in policy processes and to address the interests of vulnerable groups.

To apply the concept to Klity case, different dimensions of incomplete knowledge are mapped out in the Figure below. The top left-hand quadrant specifies the "conventional definition of risk" where potential harms can be calculated and forecasted. In Klity case, the potential risks that have been calculated are the apparent toxicity in the environment such as water (lead contamination in the water was measured) and in the residents (BLL of the villagers was measured). Physical illness and phychological disorder could also be diagnosed, although not necessarily pinpointed to the lead contamination sources. This is a significant point because under normal legislation, relationships between environmental risk of toxicity and health impact of victims are difficult to prove in court (Mythen, 2004).

In Klity case, risk is associated with drinking the water from the creek and consuming contaminated aquatic animals. This all seems to be a perceptible cause and effect, and the consequence or effect is already apparent. In this way, the knowledge about likelihoods is not so problematic and not very difficult to forecast. On the other side of (calculable) risks, the diagram shows "incomplete knowledge" consisting of ambiguity, uncertainty and ignorance.

The lower left quadrant is "unknown probabilities of potential harm." According to the theory of de Finetti, this may be referred to as "probability does not

exist" (Leach et al., 2010). The analysis of various threats to different dimensions of human security (in the early part of this Chapter) in Klity context clearly shows that the impact from lead contamination to traditional Karen life especially in the abstract aspect like "spiritual well-being" turns out to be "unknown probabilities of potential harm". The ways that Klity villagers have coped with changing environment and how they will adapt in the future to cope with contamination also falls in this quadrant of "unknown probabilities of potential harm."

The upper right quadrant is "unknown probabilities" where the outcomes are problematic. At present, there is disagreement on the issue of toxicity between science knowledge and lay knowladge. These unknown probabilities and problematic outcomes not only come from the innate complexity of environmental contamination, but also from diverse perceptions, some of which have been confused by different narratives of various actors (Auyero and Swistun, 2008). The issue of Klity creek rehabilitation also falls in this quadrant.

In the lower right quadrant, the knowledge about outcomes and the knowledge about likelihoods is most problematic. This is characterized as "ignorance" or what Wynne referred to as "*we don't know what we don't know*" (Wynne, 2002), and for this reason, the narrow definition of risk could cause unforeseen impacts. John Hannigan stated that, "*the risk frames (what people see, what they don't see, what they know and what they don't know) are socially produced but this production is hardly a cooperative creation*". (Auyero and Swistun, 2008). The incomplete knowledge in relations to Klity case is illustrated in the Figure 17:

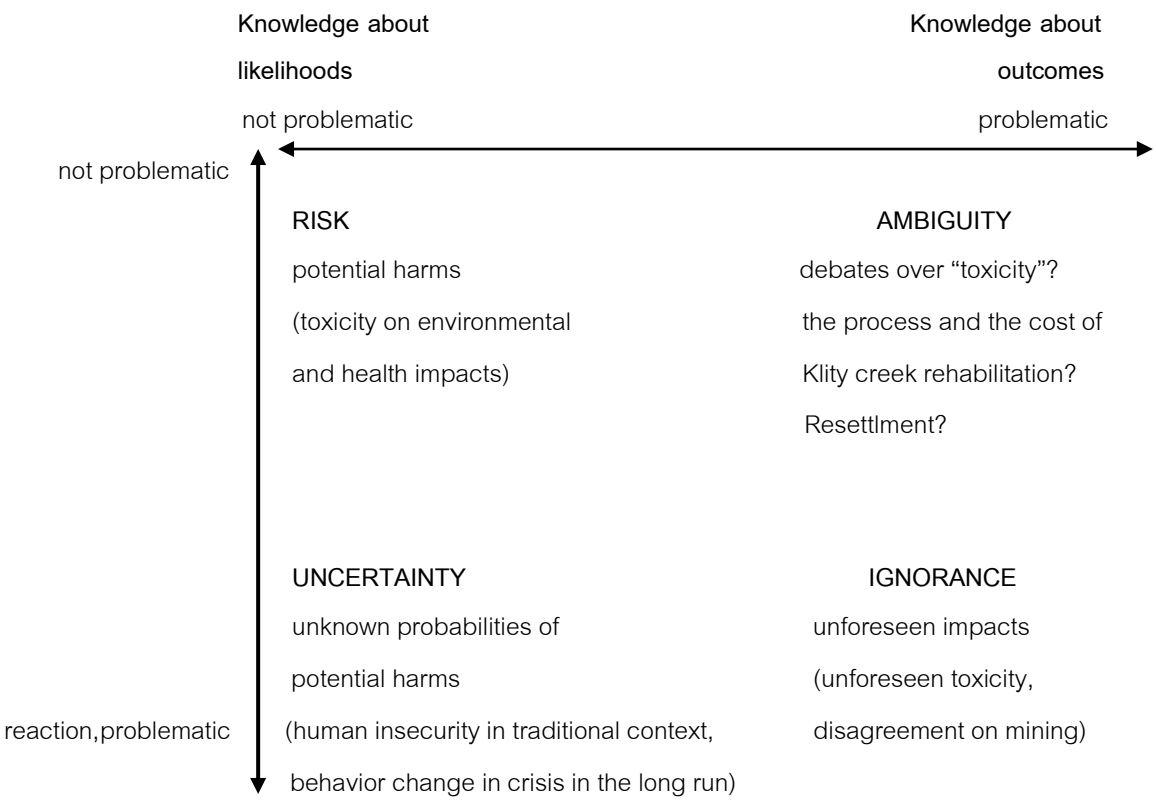

Figure 17 The incomplete knowledge in relations to Klity case

Source: Adapted from Melissa Leach et al., 2010

Looking beyond "static sustainability" and exploring the concept of dynamic sustainabilities helps broaden our view and enables us to understand the underlying assumptions, including pre-assumptions and mis-assumptions, behind different positions. Chapter 3 description and assessment of mitigation measures indicates how solutions were based on agencies' specific mandate. This silo-ed approach of government agencies can be understood though the governmentality concept where subjects are labeled and disciplined, and certain narratives are justified and become interlocked with powerful pathways. After recognizing how "sustainability" has been politicized, then there is a chance to look for alternative pathways which focus on "dynamic sustainabilities" that address wider implications of dynamics and interests of neglected groups (Leach et al. 2010).

To understand the concept of dynamic sustainabilities, one needs to reflect on Charles Wright Mills "sociological imagination" -- that we usually view social outcomes as taken, instead, such have always been influenced, shaped or framed by social norms, values, motives, context, etc. Only when we realize the powerful "social construction" of everyday life, then we could learn to appreciate "reflexivity" and gain capacity to shift between diverse and often differing perspectives or framings, thus breaking away from the condition of "ignorance".

The earlier Chapters have traced how lead contamination from mining industry has caused a great negative effect on ecological system and Klity villagers' health. In this Chapter, we see that the end of ecological issue is the begining of political issue. The relationship between social construction of risk and power is related to risk establishment. The members of racial and ethnic minorities are routinely dismissed and discredited by the risk establishment, and this line of critique has been developed into environmental justice movement (Hannigan, 2006).

5.2 Moving forward from these lessons learned

The analysis of Klity case by using the concept of human (in)security brings to a more understanding about the situation of mining impacts on local communities, and vice versa, the case also broadens understanding and meaning about human (in)security. The concept of risks and risk perceptions also brings more light to an understanding about environmental racism and environmental justice and call to question the usefulness of the concept of sustainability that is linear, singular, and static.

Leach et al. (2010) pointed out the inherent dynamism and uncertainties of the situations and multidimensional framings which make up complex realities. As reviewed in the earlier Chapters, the key point of "dynamic sustainabilities" concept highlights dynamism, complexity and uncertainty, along with differing narratives and different values-based aims of sustainability. Although revolutionary approach and

methods are needed in order to achieve progressive engagement in building "sustainability/ies", it is unlikely that all key stakeholders or actors will be equally convinced on using these approach and methods soon.

In this study, the middle-range approach will be used in order to come up with recommendations for balancing development with environmental sustainability in the context of mining industries. It is true that the call for technical and managerial solutions has been challenged. However, it is also important to recognize that risks and uncertainties cannot be easily controlled or resolved and stability is hard to achieve especially through compartmentalized arrangement of governmental bureaucracy. Therefore, restructuring of state administration to be able to better respond to the problems should be among several recommendations that came from extracting lessons learned. Other recommendations will also be presented in the following Chapter.

CHAPTER VI

CONCLUSION AND RECOMMENDATIONS

This concluding chapter suggests how to balance development with environmental sustainability in the context of mining industries by proposing the restructuring of state administration to be able to better respond to the problems, moving from Environmental Impact Assessment to Strategic Environmental Assessment, developing a consensus or agreement on sustainable mining and monitoring, improvement of legal procedure and lawsuit regarding environmental cases, developing other economic measures like economic sanctions and enforcing polluter pays principle, and balancing development, environment and sustainability in the context of local communities and mining industry. Some of the recommendations may focus on mitigation, others go beyond the immediate concern and solution of the problems but projecting the possibility of alternative ways of framing, working, and motivating.

6.1 Restructuring State administration to be able to better respond to the problems

Though several agencies and organizations become interested in Klity case, but the attempts to solve the problem have not been so successful and the major problem of lead contamination still remains. The knowledge about proper rehabilitation is very limited and still controversial. Investing in technological rehabilitation is very costly. Setting up committees to resolve the problem is problematic in itself because of the compartmentalized approach of governmental offices or departments and because of frequent rotation of officials.

Klity area is adjacent to World Heritage Site of Huay Kha Khaeng, and there used to be a decision from Thailand National World Heritage Committee in 1998 to cancel all the mining concession in the area. However, there are still attempts to have mining activities because of high mineral potential. Therefore, it is obvious that there is a lack of national common vision in the issue of development (mining) and conservation. The lack of coordination and cooperation among organizations or agencies cause

ineffective and impractical work. Therefore, there needs to be a restructuring of State administration to be able to better respond to the problems and to coordinate in overseeing difficult cases. In the context of mining development, the definition of mineral resource should be redefined in order to shift from absolute state-owned mining to a more participatory natural resource management, with public involvement in making decisions about renewing mining concession.

Restructuring State administration does not need to be the task of the central government or those in high administrative power. The meaning is similar to what Leach et al. (2010) called “opening up governance processes”, which requires an understanding and influencing of policy processes, then exploring ways in which citizen action and social movements can affect change. Newman (2005) called this “remaking governance” and stressed the new patterns of coordination, the shift from government to networked and multi-level processes of governance, and the emergence of new government that values participation of empowered citizens.

6.2 Moving from Environmental Impact Assessment to Strategic Environmental Assessment

Environmental Impact Assessment (EIA) is a technical management for assessed the value and costs in term of economic, environment and society as well as study the feasibility of the project. The starting point of EIA was from the National Environmental Quality Act 1975, that gave the authority to National Environmental Board to be able to give opinion on the project that may result in environmental damage.

Nowadays, EIA was adopted under the Enhancement and Conservation of The National Environmental Quality Act, B.E.2535 (1992), Chapter 2 Part 4. Section 46- 51 (see appendix). EIA is a process to study, research, analyze, synthesize and predict the feasibility and impacts of the project before construction and implementation. In Klity case, mining company started to operate in 1967 before the enactment of such laws.

Extracting lessons learned from Klity case, we see that lead contamination has a long cumulative effect. The mining company started in 1967, but the villagers started to notice the effect about 20 years later. Therefore EIA will have to specify this point and put the emphasis on regular health surveillance on possible impacted area.

The screening process for the projects that require EIA has a weak point due to the fact that small-scale industries do not required EIA. In case where several small-scale industries are clustered in one site, it could also lead to both combinative and cumulative impact. The emission or waste discharge from an individual industry or factory may not exceed the standard level, but together, they may create critical pollution. In addition, combined cumulative indirect effect may result in greater damage than a single direct effect assessed in EIA. These indirect impacts are usually difficult to predict and estimate, therefore, preventive measures are needed, but effective mitigation measures in a timely manner should also be ensured. The Klity case demonstrates that such measures are not in place and “human security” of Klity villagers have been threatened in most of the dimensions.

EIA should not be a rubber stamp for the approval of the project. The Department of Primary Industries and Mines must enforce mining company to comply

with EIA and be able to revoke mining license in case where mining company ignores mitigation measures. In addition, public participation in hearings must truly involve diverse stakeholders. It must be recognized that EIA is but one among several mechanisms to ensure environmental sustainability and human security.

EIA can be a measure to ensure that development does not cause negative impact for the local environment and communities, but it is done on a project basis so it does not use systematic or holistic approach to development. Strategic Environmental Assessment or SEA is the environmental assessment at the strategic level. SEA and EIA are the tools for decision making process, however, SEA is explicitly different from EIA at the level of analysis. EIA aims to assess a single project while SEA considers the policy, planning and practice. SEA is consistent with sustainable development as a determining the pattern of development, economic and environmental policies. It is also a comprehensive analysis of the mega project impacts.

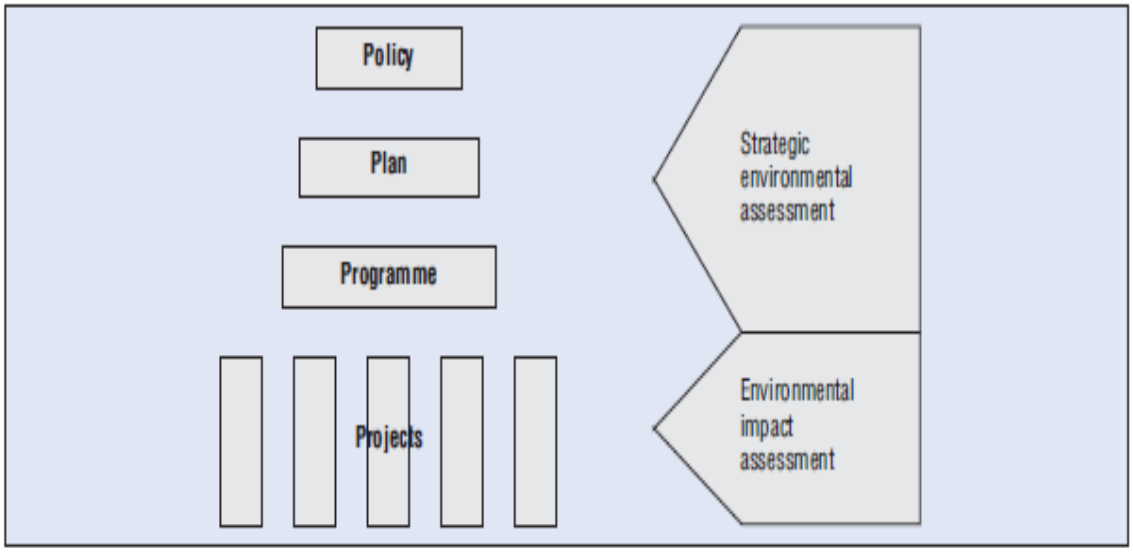

Figure 18 Upstreaming environmental consideration through EIA and SEA

Source: OECD, Applying Strategic Environmental Assessment : Good Practice Guidance for Development Cooperation, 2006.

Table15 SEA level applied in mining industry context

SEA level	content	Mining
Policy network	- Policies should be open, capable to be explained and inspected -Strategies and policies based on the principle of sustainable development -Action plans aimed at environmental issues and impacts -Classification of criteria and mechanisms to ensure that SEA is part of decision making process	-Considering economic policy (mining industry development, mineral trade and manufacturing, etc.) environmental policy, public health policy, human security policy as well as related policies to be consistent with sustainable development
Organizations	-Establishing internal and external organization to consistent with SEA process -Assigning specific responsibilities -Proposing appropriate legislation	-Cooperation among sectors and organizations (state, private and civil society)
Practices	-SEA is an important part of development policy which should be	-All stakeholders should be involved in decision making

	applied -The scope should be concise at the same time be broad enough to be able to determine the mechanism of development -The scope required comply with environment impacts -Public participation is essential in SEA -Informing the result of analysis and decision to the community -Tracking and monitoring measures should be implemented	-The parties should monitor the implementation -Focusing on wide ranging approaches, including applying local knowledge

Source: Adapted from Partidario (Partidario,1999)

In brief, SEA requires a long-term and holistic scheme, so it is a more appropriate tool to balance between development and sustainability. It has a potential to minimize the conflicts between local communities and project owners as it is planned and carried out at the policy or program level. Anyhow, it also focuses on participatory development. SEA is capable to reduce cumulative impacts, environmental and social impacts (when implementation is done as planned).

6.3 Developing an agreement on sustainable mining and monitoring

Mining is an important industry with rather high contribution to national economy. The world of today could not exist without mineral products because we use minerals in many ways in our everyday lives. However, there is a certain level of environmental impact such as pollution produced during the mining activities, of which the major environmental problem usually results from the processing and transporting of mineral products rather than from the actual mining process itself. Though mining activities affect relatively small areas, it can have a large impact on the local environment and local communities (mine workers and their communities, including nearby communities). Therefore, both the government and mining companies have to

develop good plans and controls in order to prevent or minimize the problems while ensuring smooth running of the industries, and also helping to create strong economy and employment.

There are Universal Declaration principles (United Nations, 2002) that are associated with sustainable mining (please see appendix). The Universal Declaration has stimulated environmental management in different countries, including Thailand. The environmental legislation aims to protect environment such as the Constitution of the Kingdom of Thailand Act B.E.2550, and Minerals Act B.E…(proposed legislation).

The measures for sectoral collaboration in term of checking, intervention, protection the human rights, and the environment from the operation of mining activities have been developed through consultation with different agencies[IV]. Seven measures have been suggested (Geoff Evans et al, 2002) 1) Strengthening the rights and capacities of civil society 2) Standing for communities and civil society 3) Contesting companies' license to operate 4) Stop financing destructive mining 5) Enhancing nation state powers and responsibilities to protect citizens 6) Making the executives or owners personally responsible for the actions of their corporation 7) Democratizing shareholder powers

There have been studies to identify sustainable mining indicators as reviewed in Chapter 2. Relevant government offices should review the issues (listed in the Table below), suggested measures (listed above), and the sustainable mining indicators (reviewed in Chapter 2) and adapt them to suit the Thai context. These principles and indicators will be a starting point in participatory monitoring of mining

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[IV] The key persons were Geoff Evans, environmental scientist and director of Mineral Policy Institute, Sydney, who is working on the environmental justice issues; Gabrielle Russel who works for Futures Foundation, the organization surveyed the needs and opportunities in the future, and Rory Sullivan, convener of the Amnesty International's Working and Advisory Group on Economic Relations, Australia.

industry. Table 16 shows summary of key sustainability issues for mining and mineral sector.

Table 16 Summary of key sustainability issues for mining and mineral sector

Summary of the key sustainability issues for the mining and minerals sector (listed alphabetically)

Economic issues	Environmental issues	Social issues
– Contribution to GDP and wealth creation – Costs, sales and profits – Distribution of revenues and wealth – Investments (capital, employees, communities, pollution prevention and mine closure) – Shareholder value – Value added	– Biodiversity loss – Emissions to air – Energy use – Global warming and other environmental impacts – Land use, management and rehabilitation – Nuisance – Product toxicity – Resource use and availability – Solid waste – Water use, effluents and leachates (including acid mine drainage)	– Bribery and corruption – Creation of employment – Employee education and skills development – Equal opportunities and non-discrimination – Health and safety – Human rights and business ethics – Labour/management relationship – Relationship with local communities – Stakeholder involvement – Wealth distribution

Source: Azapagic (2004: 657)

6.4 Improvement of legal procedure and lawsuit on environmental cases

Although Klity court cases seem to be successful in that there is a positive verdict towards the local communities, the legal procedure reflects complexity and length of lawsuit in the justice system.

In section 48 of the National Environmental Quality Act B.E.2535, "the project owner shall prepare the environmental impact assessment report to the Office of Natural Resources and Environment." However, the provisions of the mineral laws has substance of cancellation of penalties for environmental damage, for example, though the mining industry is not allowed to operate near the highway or public waterway (within 50 meters) or it is prohibited from discharging water, sand and soil or mining waste outside the mining area, but the penalty may be waived if approved by the Director-

General, Department of Primary Industries and Mines, Ministry of Industry. The mechanism for rehabilitation after mining operation is not clearly defined, and the detail on cleaning up contamination is not specified.

Along with the issue of cancellation of penalties, the punishment of polluters should also be considered. The principle of "polluter pays" has become a part of civil law where the punishment for legal violation is to pay an amount of money or a fine. It has been suggested that “the polluter should be regarded as a criminal”, so civil and criminal penalties should be enforced. The summary of suggested law machanism for mining industry is shown in the Figure 19.

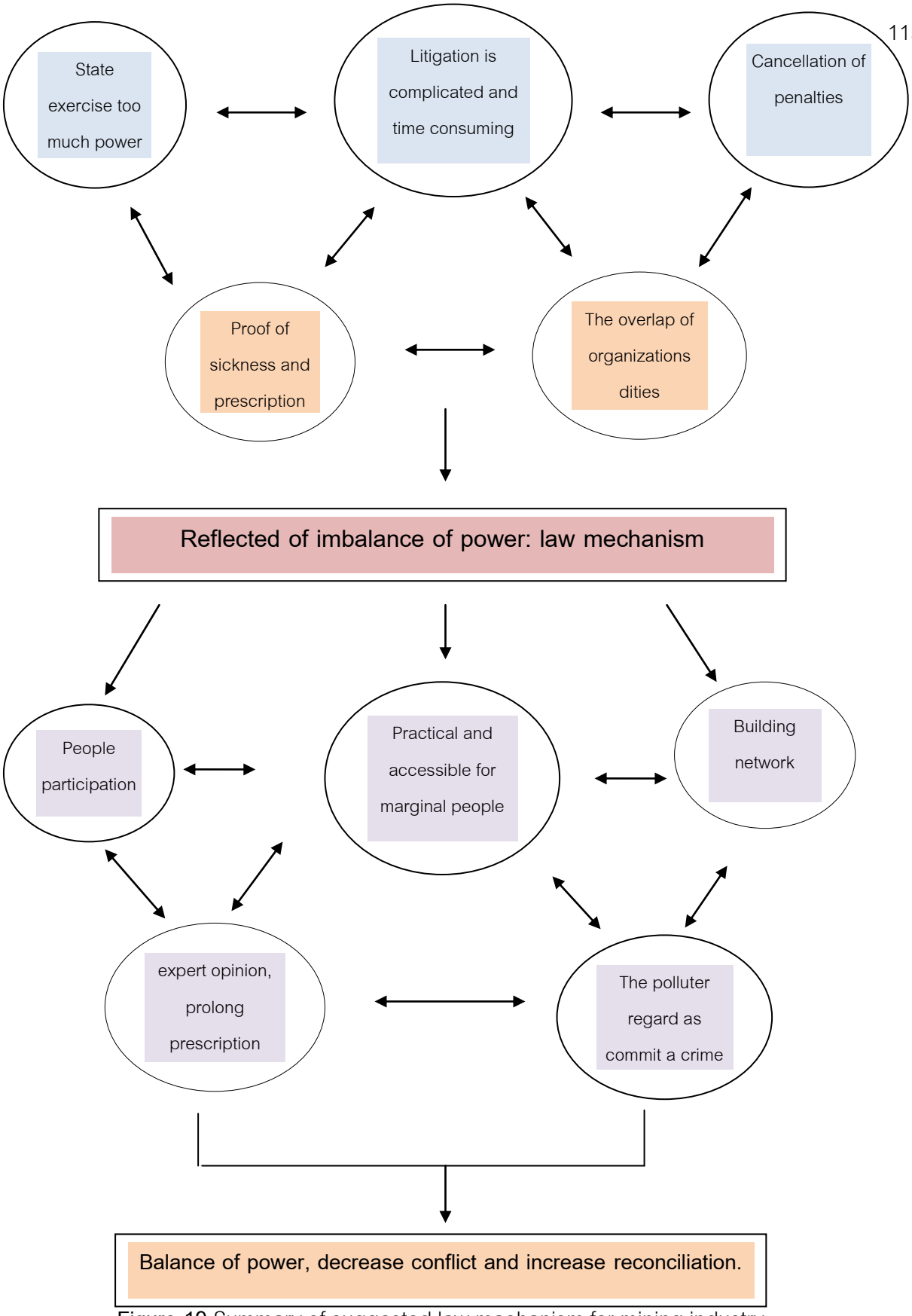

Figure 19 Summary of suggested law machanism for mining industry

Legal framework is critical in protecting the environment and the communities from the impact of mining operation, however, violations of the laws are often seen. Thus, the use of economic mechanism should also be added. This will be elaborated in the next section.

Using expert witness is also important in court case. In terms of determining the cause of illness, it is apparent from Klity case that health impact from lead contamination is difficult to prove. There is a question whether villagers who suffered from disability, like blindness and cerebral palsy, are the direct victims of lead toxicity or not. Diagnoses by different doctors or other health professionals are not always in agreement. Finding solid proofs is cumbersome and slow. The Court of justice should seek opinions from various professionals.

In several environmental cases, the right to sue has been lost by prescription. It is a result of the (in)ability to access legal system. Therefore, environmental cases should have longer duration period than other common cases. Like in the case of Klity community, the damage caused by mining operation took longer than 20 years to appear. Furthermore, after the villagers are ill and while they need to wait for the court decision, they should receive some forms of financial and other assistances (like patient card and free medical services for Cadmium-affected patients in Mae Tao, Tak Province).

The cost of travel and distance between the village and the court of justice is another obstacle. Klity villagers have to hire trucks from the village to the court for these hearings. Travelling during the rainy season is especially difficult on dirt and laterite road (as shown below), if they get stuck in the mud and rain, it may take more than one day to travel to the court. For a longer-term planning, legal mechanism should be more practical and accessible for marginalized and disadvantaged people.

Figure 20 Laterite road which poses an obstacle for Klity villagers to travel to the court of justice

6.5 Developing other economic measures like economic sanctions and enforcing polluter pays principle

It has been accepted that environmental costs of mining and mineral processing was largely ignored in public policy. In the United States and elsewhere, mining operation usually carried out in remote and thinly populated areas, and in addition, before 1960s and 1970s, "the public was preoccupied with economic growth and other priorities." (Tilton 1994:58).

Environmental degradation and pollution is usually not reflected as cost in the market system. These external costs are complicated and difficult to quantify due to uncertain factors. The consequences of mining operation may generate external social, economic, and environmental cost. From the analysis of different dimensions of human security, it is clearly seen that Klity villagers pay a very high price for the mining effect, and these costs are not counted in market transaction (Jonathan Koomey and Florentin Krause, 1997). Pollution is an echo of market failure because the mining company was not charged (not until the case went to court trial). The creek is regarded as public goods, so no one can own, regulate, or being charged for its use (Lewin,

1982). There are a number of economic-based incentives which could shift environmental externalities as shown in the Table 17.

Table 17 Possible shift in environmental externalities by applying economic-based incentives

researcher	incentive economic based method	main content	output
J.N. Blignaut and E.F. Heymann	1.set the environmentally sustainable development vision of a company	implement in strategy, goals, objectives and targets	fully understand environmentally sustainable development as a business philosophy
	2.environmental management, information system and (cleaner) production	the actions to ensure environmentally sustainable development integration of environmental	(could have) profitability become lower in short and medium term but the company will gain the benefit in long term
	3.environment accounting	management in all sectors of company (profit-people-environment principle)	recognize as environmental friendly company
Sisira Jayasuriya	quasi option value	the need to proceed with care when certain actions can lead to new information in the future, for example, constructed mine in national park could cause extinction of animal and plant species.	optimal preservation of environment
Henk L.M.Kox	convert International Commodity Agreements to New (ICAs) International Commodity Agreements (NICAs)	to secure price markup for environmentally safe production (export tax, import levy)	price markup for environmental preservation

researcher	incentive economic based method	main content	output
Jonathan Koomey and Folrentin Krause	calculating externality costs	externality costs (however, it is difficult to quantify and assess the uncertain, also, the assessment of factors varies in different area)	resource planning, less polluting
J.N. Blignaut	applied and weighing the coal using with volume of coal purchased in 2000 and IPCC 1966 guidelines	the environmental and health impacts have not been counted in as cost, the estimation of the social cost is more than double the cost of coal market	reconsideration on social cost that should reflect on the actual cost
Mark S. LeClair and Dina Franceschi Peter Lewin	applied taxes and subsidies to internalize external costs or benefits	differential tariff: products that generate negative environmental externalities should pay more taxes, on the other hand, products with positive externalities should be subsidized	increase efficiency environmental management and reduce pollution
Somskaow Bejranonda	price relationship	-*charge* - emission charge fee, waste treatment charge (company pays for pollution emission and environmental recovery) - product charge (include environmental tax in the product) - user charges (set tariffs for environmental remedy) - administrative charges (control and authorization fee) - tax differentiation (more environmental products pays less, less environmental products pays more) -*subsidy*	efficiency management for pollution control

researcher	incentive economic based method	main content	output
	quantity relationship liability rules	- grants (free financial aid) -soft loans (low interest) -tax allowances (accelerated depreciation, rebates) pollution trade - non-compliance fee (fee for company that pollute over the pollution control standard) - performance bonds (the company buy the bonds, however, if the company release the pollution over the pollution control standard, the government will seize the bonds)	incentive to release least amount of pollution to sell the credit to other company concern more on social and environmental responsibility

Due to the failure of market in calculating these externalities, the Polluter-Pays Principle or PPP was initiated. PPP is developing from two approaches, first, command and control which polluter must pay for pollution treatment in the form of pollution tax or fines, and second, market-based approach where there are incentives in terms of economic benefits such as tax exemption. It was then promoted by the Organization for Economic Cooperation and Development or OECD in 1970.

The development of Polluter-Pays Principle or PPP should encourage mining companies to better manage their waste and discharge. To cut down the cost, mining companies would have a motivation to decrease the waste by using clean and green technology and having efficient treatment system. In addition, these principles may encourage the shifting of development mindset, from solely pre-occupying with economic growth and profit to a more sustainable approach. Economic sanctions and motivations, together with relevant laws, regulation and enforcement, may help improve

the situations. This Klity case points towards the need for economic incentives to be one of strategic implementation for mining operation. Public policy formulation should be consistent with sustainable development and sustainable community.

This mechanism should be supported and implemented by the government. Thailand brought the principle into the Environmental Act of 1992 and hope that it will eventually transform attitude and action of operators. Translating PPP into practice in Thailand needs to consider three elements, namely criteria for pollution level, enforcement, and monitoring. The government should set the pollution level criteria in order to protect environment and community. The enforcement and monitoring is essential for effective PPP, while the former requires actions from government authority, the latter calls for public involvement in order to ensure accountability.

The case of Superfund in the United States should be interesting to follow. It is assumed under the laws that responsible parties should pay for the cleanup. These parties are defined broadly, so that generators, transporters, owners, and operators could be included. Furthermore, "*Individuals, small companies and large corporations, banks, and federal and state agencies, as well as local governments and schools, can all be potentially responsible parties (PRPs*)" (Tilton 1994:64). The Superfund is not a cure-all program, and there needs to be a thorough study on the concept, legislature process, and applications to find room for adapting and improving should Thailand may adopt the concept. It has been observed that "*even with the best of intentions and the strongest legislation, it is simply not possible to force those responsible to pay for remediation*." (Tilton 1994:65).

6.6 Balancing development, environment and sustainability in the context of local communities and mining industry

The main purposes of mining in Thailand are not only for export but also for domestic use. The early National Economic and Social Development Plans (NESDP) focused on building public infrastructure and aimed for economic growth, as a consequence, natural resources were heavily extracted and exploited, including mineral resources. This has caused a significant impact on the environment and the local communities. Realizing this, the 8th NESDP was shifted to the balance of economy, social and environment.

Mineral resource is a non-renewable, therefore, the mineral resource conservation policy is necessary. The Department of Primary Industries and Mines takes direct responsibility for mineral resource management as well as developing mineral resource policy, law and regulations.

Table 18 Summary of the National Economic and Social Development Plans (NESDPs), with the focus on mineral resources

NESDP		substance
Booming of Tin mining industry	NESDP1 (B.E.2504-2509)	promote the mineral survey and export the mineral ore which are tin, wolfram, lignite, gypsum to generate national revenue
	NESDP2 (B.E.2510-2514)	set the aim of mineral manufacturing according to market value, boost capability and efficiency of mining as well as revised the laws to attract investors
	NESDP3 (B.E.2515-2519)	promote the export of mineral along with survey the new potential mineral areas to replace imported mineral
	NESDP4 (B.E.2520-2524)	determine land management policy for mining industry as well as decentralize decision about mining industry to provinces, including revised and updated the law to suit the current situation
	NESDP5 (B.E.2525-2529)	accelerate the survey and assess the new potential mineral area for boosting tin mining

Shift to mining industry	NESDP6 (B.E.2530-2534)	increase efficiency of mineral use, incerase the price of merchandise and products which use the mineral as raw material as well as distribute and broaden out the goods with mineral as a component, together with survey the new potential mineral area
	NESDP7 (B.E.2535-2539)	increase the mineral value through resource management to serve domestic industry. Laws and regulations were revised to reduce conflict and protect the environment
	NESDP8 (B.E.2540-2544)	decentralized mineral resource management plan to provinces, promote efficiency mineral use and survey the new potential mineral area
Awareness of three pillars (economy, society and environment)	NESDP9 (B.E.2545-2549)	focus on the balance between accessible resource and environment protection, conservation and rehabilitation, build economic capability and competitive ability under the efficiency of production factor and management
	NESDP10 (B.E.2550-2554)	develop happy and green society, focus on human centered development, promote people participation. Sufficiency economy and sustainability are taken into account in development. Control pollutions that could damage environment and biodiversity
	NESDP11 (B.E.2555-2559)	Maintain the balance in natural resource, promote people participation, shifting development direction to be compatible with environment and community

Source: Adapted from the National Human Rights Commission of Thailand, 2004

The Department of Primary Industries and Mines states that it is possible to balance environmental governance with promoting the development of primary industries and mines (DPIM newsletter, April-June 2009). Good governance is needed to affirm the efficiency and transparency of mineral resource management. The six basic rules of good governance are: rule of laws, ethics, transparency, participation,

accountability and value for money. DPIM has encouraged the integration of good governance concept to mining companies and operators since 2010 as shown in the Table 19.

Table 19 Linking the principles of good governance and practices

Good Governance	Guidelines	Practices	Klity case
Rule of laws	-Having clear rules and regulations -Rule compliance, following conditional guidelines for permit, having clear mitigation measures	-Compiling information about rules, regulations, conditional guidelines, project plan	-No EIA requirement at the time -The laws and implementation are full of loopholes.
Ethics	-Be honest and become good social example	-Campaigning for good code of conduct among staff like honesty, hard work, patience, discipline, and become good social example	-The mining company does not respect Klity rights of access to information, rights to safe environment and health
Transparency	-Providing transparent information regarding environmental conditions before and during the project operation	-Provide transparent information about monitoring air, water, noise, etc. -Publicize the information at the company, school, temple, or sub-district office for easy inspection	-Access to information is difficult
Participation	-Open up and welcome staff and public opinions	- Having common agreement on the information to be publicized - Participatory monitoring by all sectors, and welcome suggestions to solve problems	Klity villagers do not have a chance to participate or to take part in making a decision

Good Governance	Guidelines	Practices	Klity case
Accountability	-Showing accountability and having responsibility when the operation brings about environmental impact. Accepting staff from local areas	-Identify comprehensive and clear environmental impact mitigation measures and become active and eager to solve problems -Informing the result of solving problems to the community -Accepting at least 20% of staff from local areas	Mining company is not eager to solve the problems, there is a lack of environmental and social responsibility
Value for money	Utilizing natural resources wisely and economically	-Having information about increasing efficiency in production, or using raw materials economically, or energy saving, or using the principle of 3 Rs in the organization	No information about value for money

Source: Good governance principles based on information from DPIM newsletter, April-June 2009, Klity case information based on this present study.

Another proactive move by DPIM is promoting "Green Mining Policy" since 2009. The six criteria for Green Mining Policy are in accordance with the good governance principles, like 1) Adhering to the principle of environmental and social responsibilities, 2) Having standardized management and mitigation measures, having environmental monitoring program, and using new technology for reducing pollution, 3) Promoting safety and health of staff, workers and local communities, 4) Having green area and well-managed landscape, establishing rehabilitation fund from the company's profit to guarantee about rehabilitation of the areas after money operation, 5) Adhering to the principle of transparency and publicizing important information to the public, 6)

Utilizing natural resources in an economical way, promoting programs like 3 Rs (Reduce Reuse Recycle) and building awareness for environmental conservation.

Although DPIM has made an attempt to improve the standard of mining operation, the image of mining industries remains negative especially for individuals and/or communities who have experienced the environment and social impacts. These individuals and communities come together to form a "Network of People Who Have Been Affected from Mining Operation in Thailand", and it becomes a strong movement that voices the opinions and makes recommendations for policy changes. Civil society and other concerned groups who worked on Klity and other similar cases have drafted "Klity Declaration" on May 27, 2012, to propose 14 points as follow:

Klity Declaration

1. The communities must be informed, they must receive accurate and complete information about mining activities, from the stage of surveying and determining the potential mining areas, granting concession or issuing permit, to the information during mining operation and information after mine closure. The information should include the area of concession, the use of chemical substances during extracting and processing, and different kinds of pollution caused by operation, pollution management plan, and other documents that the operator file to the government agencies in order to obtain permit.
2. The local people and communities need to have a real participation in the management, conservation, and making decision about utilizing natural resources in their communities. And they need to have a real participation in considering and monitoring the permit, monitoring the operation and renewing mining permit.
3. The local people must be able to monitor, veto and revoke mining sites if deemed to be inappropriate.
4. The public must be involved in making an amendment to the Minerals Act in order to monitor and protect the environment and human/community health.

5. When the government find out about contamination, environmental pollution, or impact on public health, they must act immediately to contain, correct, and eliminate the pollution. They must find the polluter(s) and enforce the rules so that the polluter(s) take responsibility.
6. The government must determine environmental standard such as the standard level of sediment, the standard level of heavy metals in the blood in order to specify the criteria to monitor contaminants and pollutants in the environmental and impact on public health.
7. The government shall arrange to have environmental fund for resolving pollution problems.
8. There has to be environmental and health risk payment insurance to compensate for environmental impacts and health risks. When the impact occurs, this amount of money will be spent on solving the pollution problems and on providing immediate medical treatment and rehabilitation.
9. Environment and health conditions in the areas that may be affected by the operation need to be examined in order to create baseline data before the start of mining operation. Environment and health examination needs to be conducted and recorded every year as a measure to ensure the prevention of environmental and health impact. Before granting a concession renewal or expanding operating areas, there needs to be an examination on contaminants in environment and health. Should there be any impact, granting or renewing will be withheld until the problems have been totally resolved.
10. The government must calculate the cost of environmental and health risks before deciding to grant mining permit.
11. There must be criminal punishment for environmental crime both for government agencies and polluter(s) in case of serious negligence in granting permit to mining operation which creates high environmental and community health impact.

12. Establishing medical institution(s) specializing in occupational health and pollutants to provide adequate health surveillance and to provide medical treatment for environmental-related illnesses and diseases.
13. Shorten the concession permit or license from 25 years to 10 years
14. The Pollution Control Department and related agencies must speed up Klity creek rehabilitation through real and active participation of Lower Klity creek village and other related sectors. This is to ensure that the water source, sediment, and food chain are all safe from lead contamination and to ensure that the community can make use of this resource as they used to do before the contamination.

In order to balance economic development and sustainability, there is a crucial need to listen to the voices of the affected people. Social license to operate (SLO) or the acceptance or consent of the local stakeholders is the "new paradigm" for the mining industry as well, SLO "*can be defined as a set of concepts, values, tools and practices that represent a way of viewing reality for industry and stakeholders*." A component of this SLO is a forum for negotiation "*whereby the parties involved are heard, understood and respected*." (Nelsen 2006:161).

6.7 Directions for future research

This research pointed out the weaknesses in mitigation measures of Klity community and used concepts like human security dimensions, risks, and dynamic sustainabilities in analyzing these complex and uncertain situations. Recommendations about further mitigation are made, along with the suggestions on how to lessen impacts from mining industry and prepare to respond to complex problems. The directions for future research should focus on exploring ways to rehabilitate the environment around Klity creek and to provide further support, including capacity building, to the local community. Currently there are plans to restore the creek, however, it is still debatable. It will be interesting to analyze how different stakeholders view “rehabilitation” differently, and so the methods suggested along with “dynamic sustainabilities” concept could be put to test.

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APPENDICES

APPENDIX A

The National Environmental Quality Act, B.E.2535,

Chapter 2 Part 4. Section 46- 51

The Enhancement and Conservation of The National Environmental Quality Act, B.E.2535, Chapter 2 Part 4. Section 46- 51

Section 46 For the purpose of environmental quality promotion and conservation, the Minister shall, with the approval of the National Environment Board, have the power to specify, by notification published in the Government Gazette types and sizes of projects or activities, likely to have environmental impact, of any government agency, state enterprise or private person, which are required to prepare reports on environmental assessment for submission to seek approval in accordance with section 47, section 48 and section 49.

In the notification issued according to the first paragraph, procedures, rules, methods and guidelines shall be laid down for the preparation of environmental impact assessment report for each type and size of project or activity, including related documents that are required to be filed together with the report.

In case there has been an environmental impact assessment concerning project or activity of any particular type or size, or site selection for such project or activity in any particular area and such assessment can be used as a standard assessment applicable to the project or activity of the same type or size or to the site selection of such project or activity in the area of similar nature, the Minister may, with the approval of the National Environment Board, issue a notification in the Government Gazette exempting such project or activity of the same or similar nature from the requirement of environmental impact assessment, provided that the proponent of such project or activity shall express its consent to comply with various measures prescribed in the environmental impact assessment report which is applicable as the standard for assessment of such project or activity in accordance with the rules and methods specified by the Minister.

Section 47 In case the project or activity which is required to prepare the environmental impact assessment according to section 46 is the project or activity of a government agency or of a state enterprise or to be jointly undertaken with private enterprise which is required the approval of the cabinet in accordance with official rules and regulations, the government agency or state enterprise responsible for such project or activity shall have the duty to prepare the environmental impact assessment report at the stage of conducting a feasibility study for such project, such report shall be filed with the National Environment Board for its review and comments and then submitted to the cabinet for consideration.

In considering to give approval to the environmental impact assessment report filed according to the first paragraph, the cabinet may as well request any person or institution, being an expert or specialized in environmental impact assessment, to study and submit report or opinion for its consideration thereof.

For project or activity of government agency or state enterprise which is not required to be approved by the cabinet according to the first paragraph, the government agency or state enterprise responsible for such project or activity shall prepare and file the environmental impact assessment report in order to obtain approval prior to the initiation of such project or activity in accordance with the rules and procedures as provided by section 48 and 49.

Section 48 in case the project or activity which is required by section 46 to prepare the environmental impact assessment report is the project or activity which is required by law to obtain permission prior to construction or operation, the person applying for the permission shall have the duty to file the environmental impact assessment report with the permitting authority under such law and with the Office of Environmental Policy and Planning simultaneously. The report to be filed as aforesaid may be made in the form of an initial environmental examination (I.E.E.) in accordance with the rules and procedures determined by the Minister pursuant to section 46, second paragraph.

The official who is legally authorized to grant permission shall withhold the granting of permission for the project or activity referred to in the first paragraph until having been notified by the Office of Environmental Policy and Planning of the result of consideration pertaining to the review of the environmental impact assessment report in accordance with section 49.

The Office of Environmental Policy and Planning shall examine the environmental impact assessment report and related documents filed therewith. If it is found that the report as filed is not correctly made in accordance with the rules and procedures specified by virtue of section 46, second paragraph, or the accompanied documents and data are incomplete, the Office of Environmental Policy and Planning shall notify the person applying for permission who files the report within fifteen days from the date of receiving such report.

In case the Office of Environmental Policy and Planning finds that the environmental impact assessment report together with related documents as filed is duly made and completed with the data as required, or has been duly amended or modified in accordance with the foregoing third paragraph, it shall review and make preliminary comments on the report within thirty days from the date of receiving such report in order that the report together with the preliminary comments shall be referred to the committee of experts for further consideration.

The appointment of the committee of experts according to the foregoing fourth paragraph shall be in accordance with the rules and procedures determined by the National Environment Board. The committee shall be composed of expert members who are qualified or specialized in various fields of related disciplines and the authority legally competent to grant permission for the given project or activity under review, or its representative, shall be included in its membership.

Section 49 The review and consideration by the committee of experts according to section 48 shall be carried out within forty-five days from the date of receiving the environmental impact assessment report from the Office of Environmental

Policy and Planning. If the committee of experts fails to conclude its review and consideration within the said period, the report shall be deemed to have been approved by it.

In case the committee of experts approves or is deemed to have given approval to the report, the official legally empowered to grant permission shall accordingly order that the permission be granted to the person who applies for it.

In case approval of the report is denied by the committee of experts, the permitting authority shall withhold the granting of permission to the person applying for it until such person will resubmit the environmental impact assessment report that has been amended or entirely redone in conformity with the guidelines and detailed requirements determined by the order of the committee of experts.

When such person has resubmitted the environmental impact assessment report that has been amended or entirely redone, the committee of experts shall review and conclude its consideration within thirty days from the date of receiving the resubmitted report, If the committee of experts fails to conclude its review and consideration within the said period, it shall be deemed that the committee has approved the report and the permitting authority shall accordingly grant permission to the person who applies for it.

In case it is deemed reasonable the Minister may issue notification in the Government Gazette requiring that the project or activity of the type and size specified by the notification issued by virtue of section 46 also file the environmental impact assessment report when the application is made for renewal of permission for such project or activity in accordance with the same procedures as applicable to the application for the permission.

Section 50 For the purpose of review and consideration of the environmental impact assessment report pursuant to section 48 and section 49 and site inspection is deemed appropriate, the committee of experts or the competent official assigned by the committee shall be authorized to inspect the site of the project or activity identified in the report for which approval thereof is sought.

When the committee of experts has approved the environmental impact assessment report pursuant to section 49, the official who is legally competent to grant permission or the renewal of permission shall stipulate as the conditions of permission or renewal thereof all the mitigation measures proposed in the environment impact assessment report and all such conditions shall be deemed the conditions prescribed by virtue of the governing laws on the subject matter.

Section 51 For the purpose of compliance with section 47 and section 48, the Minister may, with the approval of the National Environment Board, require that the environmental impact assessment report as required by section 46 be prepared or certified by the person who is licensed to be a specialist in environmental impact assessment.

Application and issuance of license, qualifications of specialists who will be eligible to prepare environmental impact assessment reports, control of the licensee's performance, renewal of license, issuance of certificate in lieu of the license, suspension or revocation of the license and fee payments for the application and issuance of license shall be in accordance with the rules, procedures and conditions stipulated by ministerial regulation.

APPENDIX B

The 1992 Rio Declaration on Environment and Development

Principle 1

Human beings are at the centre of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature.

Principle 2

States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental and developmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction.

Principle 3

The right to development must be fulfilled so as to equitably meet developmental and environmental needs of present and future generations.

Principle 4

In order to achieve sustainable development, environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it.

Principle 8

To achieve sustainable development and a higher quality of life for all people, States should reduce and eliminate unsustainable patterns of production and consumption and promote appropriate demographic policies.

Principle 10

Environmental issues are best handled with participation of all concerned citizens, at the relevant level. At the national level, each individual shall have

appropriate access to information concerning the environment that is held by public authorities, including information on hazardous materials and activities in their communities, and the opportunity to participate in decision-making processes. States shall facilitate and encourage public awareness and participation by making information widely available. Effective access to judicial and administrative proceedings, including redress and remedy, shall be provided.

Principle 11

States shall enact effective environmental legislation. Environmental standards, management objectives and priorities should reflect the environmental and development context to which they apply. Standards applied by some countries may be inappropriate and of unwarranted economic and social cost to other countries, in particular developing countries.

Principle 13

States shall develop national law regarding liability and compensation for the victims of pollution and other environmental damage. States shall also cooperate in an expeditious and more determined manner to develop further international law regarding liability and compensation for adverse effects of environmental damage caused by activities within their jurisdiction or control to areas beyond their jurisdiction.

Principle 14

States should effectively cooperate to discourage or prevent the relocation and transfer to other States of any activities and substances that cause severe environmental degradation or are found to be harmful to human health.

Principle 15

In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.

Principle 16

National authorities should endeavour to promote the internalization of environmental costs and the use of economic instruments, taking into account the approach that the polluter should, in principle, bear the cost of pollution, with due regard to the public interest and without distorting international trade and investment.

Principle 17

Environmental impact assessment, as a national instrument, shall be undertaken for proposed activities that are likely to have a significant adverse impact on the environment and are subject to a decision of a competent national authority.

Principle 20

Women have a vital role in environmental management and development. Their full participation is therefore essential to achieve sustainable development.

Principle 21

The creativity, ideals and courage of the youth of the world should be mobilized to forge a global partnership in order to achieve sustainable development and ensure a better future for all.

Principle 22

Indigenous people and their communities and other local communities have a vital role in environmental management and development because of their knowledge and traditional practices. States should recognize and duly support their identity, culture and interests and enable their effective participation in the achievement of sustainable development.

Principle 23

The environment and natural resources of people under oppression, domination and occupation shall be protected.

Principle 25

Peace, development and environmental protection are interdependent and indivisible.

Principle 26

States shall resolve all their environmental disputes peacefully and by appropriate means inaccordance with the Charter of the United Nations.

Principle 27

States and people shall cooperate in good faith and in a spirit of partnership in the fulfillment of theprinciples embodied in this Declaration and in the further development of international law in the field of sustainable development.

APPENDIX C

The future we want, Rio+20

V. Framework for action and follow-up, Mining section

"The future we want", Rio+20 2012,

V. Framework for action and follow-up, Mining section

SECTION 227. We acknowledge that minerals and metals make a major contribution to the world economy and modern societies. We note that mining industries are important to all countries with mineral resources, in particular developing countries. We also note that mining offers the opportunity to catalyse broad-based economic development, reduce poverty and assist countries in meeting internationally agreed development goals, including the Millennium Development Goals, when managed effectively and properly. We acknowledge that countries have the sovereign right to develop their mineral resources according to their national priorities and a responsibility regarding the exploitation of resources, as described in the Rio Principles. We further acknowledge that mining activities should maximize social and economic benefits, as well as effectively address negative environmental and social impacts. In this regard, we recognize that governments need strong capacities to develop, manage and regulate their mining industries, in the interest of sustainable development.

SECTION 228. We recognize the importance of strong and effective legal and regulatory frameworks, policies and practices for the mining sector that deliver economic and social benefits and include effective safeguards that reduce social and environmental impacts, as well as conserve biodiversity and ecosystems, including during postmining closure. We call upon governments and businesses to promote the continuous improvement of accountability and transparency, as well as the effectiveness of the relevant existing mechanisms to prevent illicit financial flows

APPENDIX D

Interview guideline

Villagers

1. Personal information (gender, age, occupation, number of household)

2. What is the main occupation? What is the minor occupation? How much of the average income per household per year? How much of the cost for living (food, consumer goods and so on)

3. How is a sickness situation? Is it better or worse? How?

4. The sick villagers in Klity village have been increased or decreased?

5. What are the barriers of treatment (cost, travel, and so on)?

6. Do you still use the water from creek? What is for? Can you stop using water from creek? Why?

7. What are the reasons for not moving out of village even though the creek is contaminated with lead?

8. How can you live with contaminated creek?

9. What are the ways of life and traditions that related to nature?

10. What is the life before mine was constructed? During operated? And after it was closed?

11. Why do you decide to find justice in lawsuit? What are the obstacles?

12. How do you feel when you won the case?

13. What do you think about the mitigation measures so far?

14. The mitigation measures are success or fail? Why?

15. What should consider when propose the mitigation measures?

Interview guideline

Village leaders

1. Personal information (gender, age, occupation, number of household)

2. How is the history of Klity village?

3. How can you build the Klity network? When it start? How it start?

4. How can marginal community be able to build the strength against mining company and governmental organization? What are the obstacles in building the strength?

5. How do you get villagers involve with and concern of lead pollution?

6. What is the urgent problem that should be solving immediately?

7. What do you think about the mitigation measures so far?

8. The mitigation measures are success or fail? Why?

9. What should consider when propose the mitigation measures?

10. Suggest the mitigation measures to solve Klity problem?

Interview guideline

Law expertise

1. What are the gaps of the Environmental Protection Act and Mineral Laws in the aspects of preventing environment impact and protecting the community?

2. Please suggest the measures/ mechanisms to fill in this gap.

3. What should be considered in the improvement of environmental laws?

4. What are the obstacles and barriers to litigation in Klity case?

5. What are the barriers to prove for health problem stemming from lead contamination?

6. What is the step forward for Klity lawsuit?

7. What is the step forward of creek restoration?

8. What is the approach to create well-being and quality of life?

9. What is the approach to solve the problem of food security?

10. Are there any parts in the laws that give benefit to the mining company but do harm to environment and community? And in what way?

11. Please suggest law mechanisms that benefit environment and community

12. What are the strengths and weaknesses of EIA?

13. What is the necessity of EIA and SEA?

14. Please suggest law mechanisms for mineral resources management.

15. Please suggest how to encourage sustainable mining in Thailand.

Interview guideline

Health expertise

1. How is the health situation in Klity? How serious?

2. What are the barriers to prove for health problem stemming from lead contamination?

3. Please describe lead toxic in infants, children and adults

4. Please describe lead detoxifying.

5. How to prevent lead toxic?

6. Do you think the present mitigation measures can relieve health problem?

7. What should be considered when proposing mitigation measures to relieve health problem?

8. Please suggest mitigation measures to solve health problem

9. Can the villagers live with contaminated creek?

10. Please suggest medical plan to help alleviating health problems from lead contamination.

Interview guideline

Mining engineer

1. What do you think about Klity case?

2. Do the villagers have to move out of village? Why? What is the plan for resettlement?

3. Can the villagers live with contaminated creek?

4. At the present, mining case, what are the measures that protect environment and community?

5. Please suggest the mechanisms for fairness and effectiveness in the management of mineral resources

6. What is the challenge in Klity mitigation and creek restoration?

7. Please suggest creek restoration plan

8. Do you think the present mitigation measures can relieve problem?

9. What should be considered when proposing the mitigation measures to relieve problem?

10. Please suggest mitigation measures to solve problem.

11. Please suggest the step forward for Klity case.

12. Please suggest how to encourage sustainable mining in Thailand.

Interview guideline

Biotechnologist

1. Can the villagers live with contaminated creek?

2. What is the situation around the creek in terms of environment?

3. Are the villagers able to eat fish? Why?

4. Do you think the present mitigation measures can relieve problem?

5. Please suggest the mitigation measures to solve problem.

6. Can biotechnology helps to restore the creek?

7. Do the villagers have to move out of the village?

Interview guideline

Governmental agency

1. Can the villagers live with contaminated creek?

2. The situation in Klity area?

3. The mitigation measures are success or fail? Why?

4. Who is the main actor (governmental organization) to solve the problem?

5. How many governmental organizations related with Klity problem? Who are they?

6. Are the governmental organizations cooperating among others?

7. The obstacle to solve the Klity problem?

8. What is the urgent problem that should be solving immediately?

9. Please suggest the step forward of Klity case

10. What are lessons to be learned in Klity case?

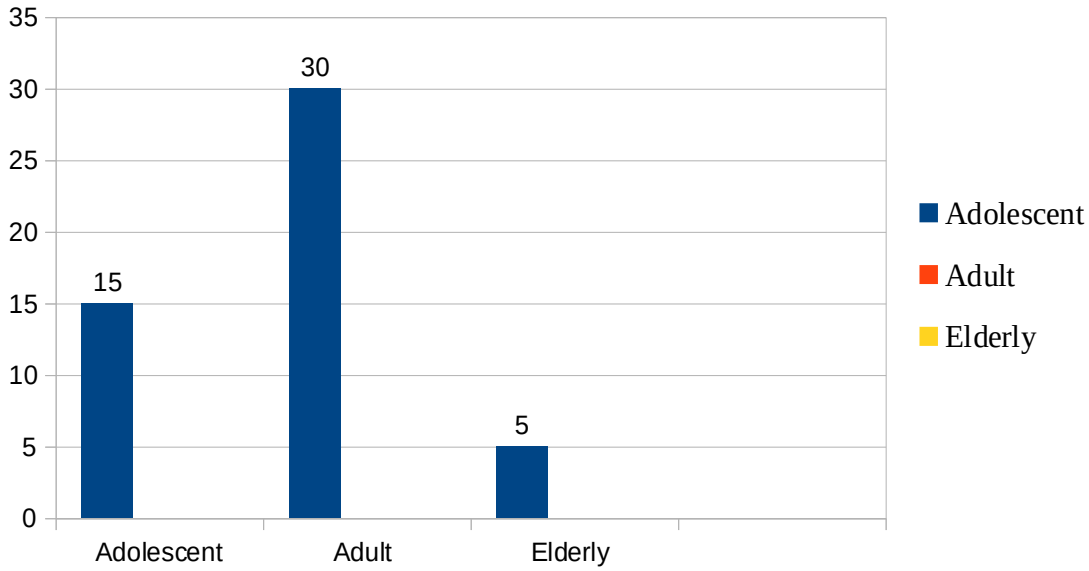
APPENDIX E

Villagers profile

Table 1 Age of the sampling

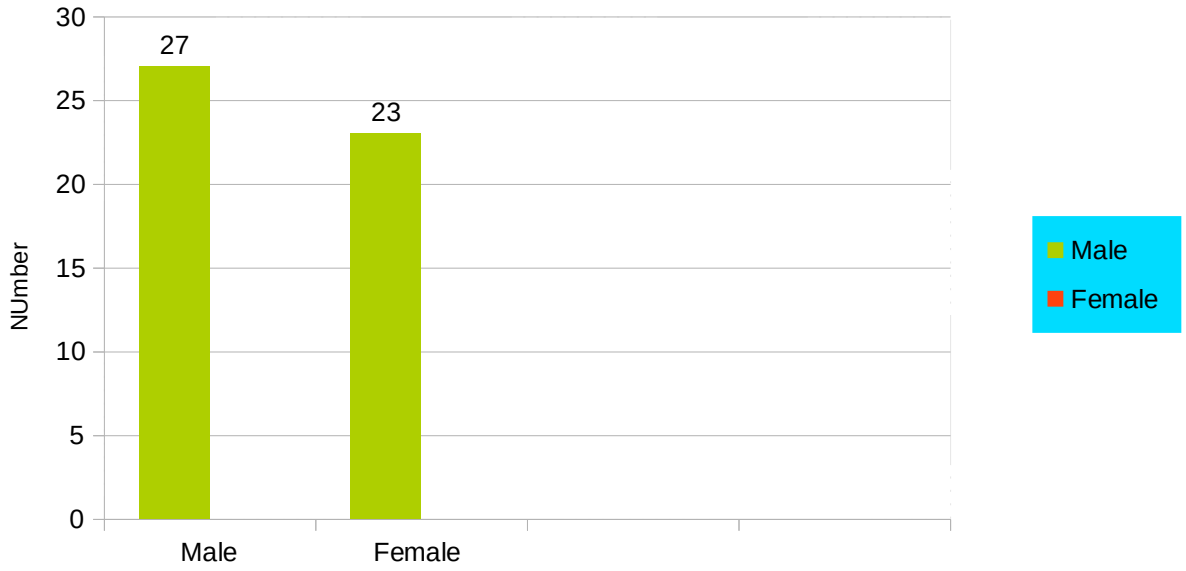
age	number
13- 15 early adolescent	8
16-18 middle adolescent	3
19-21 late adolescent	4
22-30	3
31-40	9
41-50	17
51-59	1
more than 60 years old	5
total	50

Chart 1 Age



The sampling consist of 15 adolescents, 30 adults and 5 elderly.

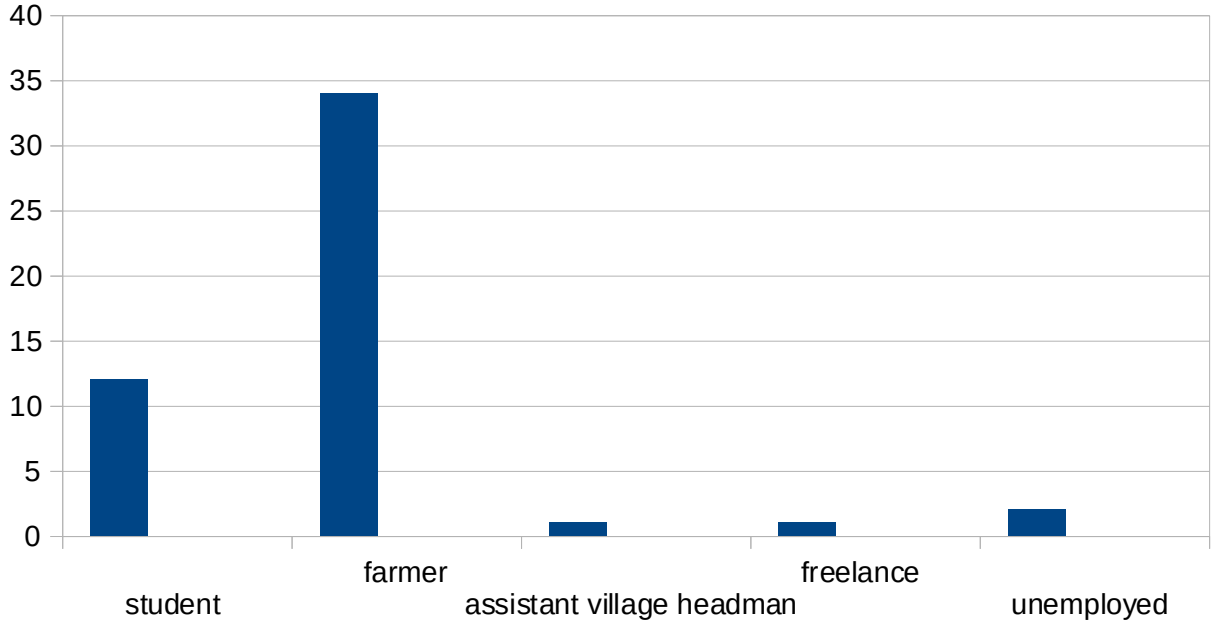
Chart 2 Gender



The sampling consist of 27 male and 23 female.

Chart 3 occupation

The sampling consist of 34 farmers, 12 students, 2 umemployed, 1 freelance and 1 head village assistant.



Klity Situation

Environment

Most of the villagers stated that the aquatic animals, vegetable and herb along the creek are contaminated with lead.

Sickness

Someof the villagers get the medical treatment from Rajavithi hospital. They have been in a severe condition since 1992- 1993. The symptoms are numbness, headache, joint pain, vomiting and so on. The money for medical care is come from the

mine which gives one million baht to the villagers. It separates into two parts, 500,000 baht for each, the first one is for supporting career and the second one is for health treatment. Nowadays, the money is all gone. Some villagers heal their sickness by taking herbal medicine. Some do nothing because they have no money for a treatment and no hope for good future, then they are still suffering from the sickness. Some sick villagers go clear of grass in the field in order to get sweat. It is because they believe that after sweating they will get better. Some of them express their feeling that not onlyphysical sickness, the mental sickness is also killing them. They are stress, angry, fear, depress and hopeless. Some of them worry about physicaland mental disorder of their children. However, there is one case that still healthy is because she go to boarding school in the city and come back to the village only long holiday.

Food insecurity

Most of the villagers still catch fish due to the fact that they do not have enough money to buy food from vendor outside the community. Furthermore, they have to go to the forest more often to hunt the animal and gather some plant. Their income is about 20,000 -30,000 baht per year per family. In case, they would like to buy food for every meal, they have to spendmore than 3,000 baht per month per family which most of them cannot effort for it. The aquatic animals, especially fish become much smaller, difficult to catch and contaminated. The plant along the creek also died from lead comtamination. Thus, in case, they cannot find the natural food or be able to buy food then they have debt (to the shop owner),for example, they can have eggs by signing their name and pay for it later. Some villagers have to work hard or find extra job to make more money in order to buy food for their family.

Mitigation measures

Poster

Most of the villagers inform that the information in poster is unclear. They do not know how much of lead (ppm)could harm them or how much of lead in fish could avoild for eating. The poster shows only numbers thus most of them do not pay attention. Besides, some of them cannot read Thai language. A small number of villagers think that the poster is still useful because at lease they know the lead level in aquatic animals, water and sediment whether it is increase or decrease. The villagers suggest that the lead information should be announced in the village meeting because they will pay attention more than reading the lead information from the poster by themselves.

The measurement of lead in blood

Most of the villagers stated that the measurement is not so beneficial because sometime they do not know the result and there is no long term for medical treatment. However, some of them believe it isstill useful, at least, it has blood's result somewhere.

Dam for trapping sediment

They mention that it is not useful because it is already collapse.

Lead absorbing plant

Some of the villagers stated that lead absorbing plantmay not very much help because in rainny season with strong current,the plants along the creek will be flow rapidly. In addition, some villagers inform that if the plant does not give the villagers any benefit in economic or usage, they do not have an incentive to grow those plants.

Water filter

The villagers do not use the water filter because the geographical of area and landscape of the houses are far from each other houses and together with slope and hill thus it is inconvenient to get the water.

Raising fish

The villagers cannot raise fish (cat fish) for long due to the fact that the water is deficient. Some of them eat the fish instantly because they knew that they can not have money to buy food for fish.

The reason for not moving out of the village

Some of the villagers do not want to move out of the village even though the creek is contaminated. It is because they were born in this area. Some stated that the mine and government should have responsibility to rehabilitate the creek. If the government attempt to evacuate villagers to another area without trying to solve the problem, it will not fair for the villagers. While some of teenagers mention that they do not want to move because of their parents are not willing to move, so they will be here too. For the adult, they do not want to move due to they are worried about their children. They afraid that the new place will difficult to live, especially, for Karen like them.

Creek Restoration

Most of the villagers place hopes on the academician because the lead problem never happened at the village so they do not know how to cope with the problem. Some villagers suggest that they need to drag the lead sediment out of the creek especially in the area where have plenty of lead sediment and for the rest of sediment, it can leave to natural restoration. In addition, it should has a pipewater with

water filter connected from water in the mountain to villagers houses. Some villagers strongly stated that no more mining because mine activities will worsen the problem.

BIOGRAPHY

Passanan Assavarak was born in Kanchanaburi province.She graduated in 2002 from Chulalongkorn University with a Bachelor's Degree in Political Science majoring in Sociology and Anthropology with 2nd class honor. She continued her graduation work in Sociology at Chulalongkorn University and received thesis grant from the Office of the National Culture Commission, Ministry of Culture. She finished her Master's Degree in 2005.

During her graduate study, she also worked as government officer at the Constitutional Court of Thailand (2004) and then became a research assistant at the Institute of Asian Studies, Chulalongkorn University (2005) Currently, she is working as lecturer at the School of Liberal Arts, King Mongkut's University of Technology, Thonburi. Passanan received a scholarship from the Graduate School of Chulalongkorn University and the Environment, Development and Sustainability (EDS) program to study for her Doctoral Degree.

Passanan presented her papers at several international conferences; for instance, "Development of Measures to Mitigate Impacts of Mining Industry: Lessons Learned from the Lower Klity Creek, Kanchanaburi Province" was presented at the 2nd International Conference on Human and Social Sciences in Albania (2012), another paper co-authored with Dr. Wanpen Worawongpongsa on "Peace Making: Religions diversity in the midst of Peace :Case study in Samut Songkram Province" was presented at the XII World Congress on Rural Sociology titled "Envisioning a Prosperous Rural Future in a Globalizing World." in Korea (2008), and the other paper on "Patriarchy: behind the silent voice of domestic violence" was presented at the International Development Studies Conference on "Mainstreaming Human Security: The Asian Contribution" held in Thailand (2007).