

Social Engineering Model of Natural Resources Management of Palu City

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Abstract: Small scale gold mining in Poboaya has damage the natural resources. There are two points of the area that sustain the excessive extraction such as in point of 0°, 51, 10, 85" LS and 119°, 56, 43, 23" BT, height of 593 DPL (location 1) and then in point of 0°, 52, 19, 37" LS and 119°, 56, 50, 52" BT, height of 685 DPL (location 2). Actually, local people in Poboaya have local knowledge due to natural resource management techniques. However, local knowledge is not able to stem natural resources of extraction process. It is getting worse through the assumption of local that what they do is harmless or not dangerous. Furthermore, various researches proved that Poboaya has experienced pollution, disruption to public health and environmental damage. Upon that fact, then implementing social engineering technique is needed to change the behavior of people who endanger themselves and others. In this regard, all that needs to be done is to inform the public about the dangers and risks of their research while providing an environmentally friendly mine alternative solution through an open pit system of gradual excavation techniques from the highest elevation to the low elevation and to the depth of the mining boundary that has been determined.

Key words: Strategy, adaptation, ecology, social engineering and technology, determined, dangers

INTRODUCTION

Cases show us that natural resources in almost all regions in Indonesia have been damaged and the condition of the environment is very worried. It can be seen through the natural forest area of indigenous Indonesians experiencing shrinkage at high speed which is 72% as a result of uncontrolled logging for decades. The rate of deforestation was about 1 mln.ha/year in the 1980's, then increased to 1.7 mln.ha in the 1990's and continued to increase in an average of 2 mln.ha, since, 1996 per year or higher than previous estimates of 0.6-1.2 mln.ha per and peak in the period 1997-2000 increased to 3.8 mln.ha/year (Anonymous, 2003). The interpretation result of citra landsat of 2000 there are 101.73 mln.ha of forest and degraded land of which 59.62 mln. ha are in forest areas (Anonymous, 2003).

Several literatures do show that poverty and economic disempowerment are behind the destruction of natural resources. They believe in causal relationships that the rapid development of human populations leads to massive depletion of natural resources (deforestation) (Razman *et al.*, 2009a-c, 2010). But the factors of poverty

and economic inequality do not research alone. There is another explanation rooted in ethical-economic issues held by economic actors in the current market economic order (Razman *et al.*, 2014, 2015), namely greediness triggered by cultural orientation of accumulation-materialism. Unconscious policy designed is more oriented to the value of material as a normative and moral measure in any relationship of interrelation with others or with other creatures. This shift in orientation formed through a state-based, that is purely economic-oriented (Nancy, 1992; Reppeto and Gillis, 1988) where the natural and the environmental resources are used as capital important in the implementation of national development, so that, in the name of the development and to achieve the target of high economic growth, then the destruction of natural resources is done massively-extensively considered reasonable regardless of the principles of justice, prosperity, democratic and sustainability of natural resource functions (Zainuddin 2012).

Argument above indicates that environmental handling and poverty are two things that cannot be separated from each other but the construction that needs

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to be built is the function of the environment as an absolute life support which is a prerequisite for efforts to improve the welfare of the community (Razman and Azlan 2009; Razman, 2014, 2015). Vice versa, the environmental sustainability (especially in the name of development) cannot be achieved without glancing at the socio-cultural spaces of local people (Emrizal and Razman 2010; Razman *et al.*, 2010; Sulaiman and Razman 2010) or exiled the community from their home town.

The concept of social engineering: The concept of social engineering actually does not have strong roots in sociology repertoire. There is no references indicate that this concept is a standard concept in sociology. However, the concept of social engineering needs to be interpreted as knowledge of institutions aimed at solving a social problem faced. Social engineering is defined as an attempt to change an existing social order so that it can be used to achieve a goal desired by parties outside the social order itself. Considering that the characteristics of the marine industry that involves a lot of human resources and social life order.

Another concept can be integrated to the concept of social engineering to be socially more useful is the concept of social planning. The concept of social planning that is integrated into the industrialization process refers to the demand of process occurs that can actually brought to the desired social improvement which really can touch the institutional, social system and social resources exist in the community where the industrialization process will or is done.

MATERIALS AND METHODS

This is a qualitative research that is how the research work applied to the symptoms that are difficult to measure (cannot be quantified because it is more of a qualitative). Qualitative research techniques can be classified into two ways: interactive and non interactive or documentaries. Interactive techniques are through interviews both formal and informal to search for data and information about the construction community in looking at nature and the environment (Denzin and Lincoln, 2000; Zainuddin, 2012). To get the credibility of the research results, the researchers took several steps as suggested Guba and Lincoln cited by Denzin and Lincoln (2000): repeated observation is doing research through visiting the location back and forth. Triangulation: is that data collection is done in several ways in addition to in-depth interviews with key figures, researchers also, conducted free interviews with formal leaders in the local area. Input is that all conclusions as result of this study will be

confirmed back to the interviewees to prevent misinterpretation. This research was conducted in small scale gold mining area (PESK) in Poboya, Palu City, Central Sulawesi.

RESULTS AND DISCUSSION

Socio-cultural conditions (social interaction): The history of Poboya sub-district shows that the inhabitants initially who lived in Poboya were homogeneous with bond of blood. They are Kaili tribe who are the original inhabitants of Poboya sub-district and until now they still live the village and use the original language of Kaili Tara. But in its development, the dynamics of population grow quickly, especially, after the mining. The inhabitants of the Poboya Region are currently heterogeneous in terms of ethnicity such as Bugis, Makassar, Java, Gorontalo, Manado, Bali, Hamahera and various other ethnic.

Social processes that occur between different populations of socio-cultural background as a result of these ethnic differences still have a harmonious relationship and mutual respect. This is indicated by the absence of horizontal conflicts or dissociative relationships among the population in the study area. Social adaptation works well through intense social interaction and there is also, inter-tribal marriage (assimilation). Since, gold mining in Poboya opened, the social life of multi ethnic communities begin to compete but the competition has not reached the stage of conflict yet.

Small scale gold mining production system (PESK): Production process at small-scale mining in Poboya pass through 3 important stages, they are:

Crusher: Stone collected will be processed through a production machine called crusher. This machine serves to destroy the rock into fine bits. At this stage the owner of the stone use a crusher machine and they are charged for rental fee of Rp. 10,000/sack. The rarefaction process takes a long time, ranging from 1-2 h and this process handled by the stone owner or business owner in accordance with the agreement.

Tromol processing: The tromol machine consists of a series of tubes designed in such a way that it can load rock material that has been destroyed through a crusher machine. Tromol machine is a processing machine made of large pipe diameter ± 40 cm with a length of ± 50 cm and then rotated with a speed of 5-7 rotation/sec for 3-4 h aimed at destroying the rocks until become mud. In such conditions it is estimated that gold will be separated from

the rock, so that, through silver water (mercury) poured inside tromol the gold will be easily caught and attached to silver water.

Waste processing: The owner of tromol earn money from renting service and have a great opportunity to earn profits in form of gold obtained by collecting and reprocessing all waste, this processes called Tong . In one process Tong is estimated to still contain 20-40% of the total gold produced through the tromol. All the waste processing products no longer belong to the miners but belong to the owner of tromol.

The current condition of Poboya, especially, the small scale gold mining area can be said to be damaged. This is marked by the existence of many large holes that exist on the slopes of the mountain in Poboya. According to information obtained from local custom figures that the number of holes that existed is in range between \pm 200-300 holes. Also, the use of mercury by the public that excessively at any time can disrupt public health in the future around the mining area of the people but this is also, impressed inverse by the local community interviewed in the field.

Results of interviews with several informants revealed that:

“Mercury wastes in Tromol that proceed gold material will not spill and seep into the soil because the reservoirs have been provided so that mercury content continues to be utilized in the Tromol and cycle rotation will always end up in the shelter and back again to be used to process the other material. In addition, the mercury content used by the community does not threaten their health because the springs they use for daily consumption are above Poboya gold mining area while the material processing activity or the place of the Tromol tool processes the material below so that the mercury contents will not mix the water they consume, besides gold mine of the people of Poboya is also considered to have a very important role for their economic life in Palu City because the mining particularly opened jobs for all communities Palu city and also to migrant residents who are living from areas outside the city of Palu so that the assumptions of some parties who say there has been environmental pollution caused by the gold mining activities of the people in Poboya is claimed to be not true by society”

Statement of the society is different from the results of research conducted by Zainuddin (2012) which found

the fact that PDAM water as a true source of clean water has been contaminated with mercury 0.005 ppm as well as found from research reports from Tambuhak Sinta Foundation that more than 10,000 people are at high risk of mercury poisoning. This number consists of those living and working in three areas of contamination (especially, in Poboya) whose air is heavily contaminated by open amalgam burning and contamination through direct contact, through the skin, food and beverages.

Gold processing condition in poboya village: Gold mining managed by the community in Poboya is very dangerous because it contains chemicals (mercury). Gold processing by using mercury as a binder, water separation, stone flour and the separation between gold and silver is done manually, so in the separation process it is possible to contain mercury in water, stone flour and silver with gold while workers who perform the process do not use safety equipment that should be like glasses, masks, gloves and other safety devices.

Currently, the environment in Poboya has been polluted for example the water of river and land and air have been found mercury content exceeds the threshold. Health problem in the community has found such as: disturbances in vision, high blood pressure, convulsions, hard to concentrate and other diseases that were not previously felt and probably many other diseases that have not been detected, this is allegedly due to the effect of gold processing that does not meet the standard of processing. The discovery of mercury in the environment of water, air and soil around the gold mining area in Poboya, Palu city is possible due to several factors as follows:

The process of separation between mercury and silver is done by burning it outside the rom, it is known that mercury at high temperatures will easily evaporate, air that contain mercury, dispersed and attached to certain places such as vegetation, soil and other places and when it rains it flows over the surface of the ground along with rainwater falls, some are seeping into the ground and some reach the bodies of water (river) and so on into the sea.

Water that has been used to dilute the stone flour mixed with mercury is channeled and accommodated in a certain tub, left open and when its rain, the water is mixed with rain water because the capacity of the tub is limited after additional rain water is watered overflows and flows over the surface of the ground, some are seeping into the ground and some continue up into the bodies of water (river) and so on into the sea.

The stone flour liquid which has been separated from the gold grains is deposited in the shelter, after the solid

is removed and placed in the open area, it is then placed into sacks with a capacity of 25 L, on that moment, the water content will sink into the ground and when it rains, the water that is in the content of stone flour will come out and carry mercury and flows over the surface of the ground and some reaches the body of water (river) and so on into the sea.

After completing the work of cleaning up bodies and clothing and equipment that have been used in the gold washing process in water bodies, rivers or resident's wells, worker unconsciously carry and release mercury in that place which causes the contamination of water.

Methods and mining procedures: It is necessary have the opinion of environmentalists who can introduce the correct methods and procedures for mining because the mining conditions at Poboya is very harmful. Related to this matter Zainuddin (2012), offers the following alternatives:

Selection of mining areas: The selection of mining method is selected by calculating the cover stripping ratio of the overburden material based on the gold dispersal data located in Poboya area. With such conditions, the most appropriate method is the open pit system or surface mining. This mining method is more effective and more efficient than the underground mining method through removing the cover layer and then exploiting the gold ore.

Mining system: Based on the shape and characteristics of the gold layer and its cover layer, the mining system to be applied is an open pit system. The method of mining activity will be carried out by means of open Pit by gradual excavation technique from the highest elevation to the low elevation and to the depth of the specified mining boundary.

CONCLUSION

Poboya has experienced shifts viewed from the socio-cultural aspects. The intensity of people in and out and the influence of mass media, effected the customary activities and its strength that has started to loose. The customary role that should protect the natural resources in Poboya has weakened, even "custom" is part of the production chain of natural resource exploitation.

Local people in Poboya have knowledge about the techniques of natural resources management actually, local wisdom contains elements that the interaction between nature and community life cannot be separated and mutually need each other, so that, the need to protect the nature does not caused disasters . But the knowledge

was not able to stem the natural resource extraction process in Poboya. This is further exacerbated by local assumptions, that what they have done so far is not dangerous. While various research results prove that Poboya has experienced pollution.

There are two points of extractive resource management located in Poboya, Currently, it is at Point 51 51'10,85 "LS and 119056'43, 23" BT. Altitude 593 from sea level (DPL). Location II is at Point 00 52 '19,37 "LS and 1190 56'50.52" BT. Altitude 685 place from sea level (DPL).

Actually, local people in Poboya have local knowledge about the management of natural resources, however. Local knowledge was not able to stem the natural resource extraction process in Poboya. This is further exacerbated by local assumptions, that what they have done so far is not dangerous. While various research results prove that Poboya has experienced pollution.

Upon that fact, then what needs to be done is a social engineering technique by changing the behavior of people who endanger themselves and others. In this regard, what needs to be done is to provide communities with exposure to the dangers and risks of their research while providing an environmentally friendly alternative to mines.

Changing mining methods to be more environmentally friendly systems technically can be done. The most appropriate method is open pit system or surface mining. This mining method is more effective and more efficient than the underground mining method by removing the cover layer and then exploiting the gold ore. This method has never been done so it needs to be socialized to the community.

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