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## Solution on Handling of Illegal Gold Mining Activities in Kuantan Singingi Region

### INTRODUCTION

Industrial and technological development is very rapid today have a positive impact in form of industrial products and technologies that can be utilized in improving the quality of life, but also have a negative impact in forms of environmental pollution, such as industrial waste and technology. Environment pollution needs to be controlled so as not to interfere the environment and human health [1].

Environmental pollution caused by heavy metals, such as arsenic, lead, cadmium, and mercury are very harmful to human health, animals, plants and life continuity in the surrounding environment [2]. At low concentrations, heavy metals have direct effect and accumulate on the food chain, disrupting environmental biota so will impact on human health despite relatively long and far from the polluted sources [3].

The emergence of environmental pollution cases which exceeds the limit, resulting in losses and social unrest, because has a high risk to expose to heavy metals and transition metals which are toxic in certain doses and concentrations. As well as incidence of Minamata disease cases, a “strange” disease which has a neurologic effect on human, written in historic scientific work Minamata Byo by Masazumi (1972) from Gakuen Kumamoto University, Japan. This disease t is caused by organic methyl mercury poisoning in fish and shellfish , believed to be due to organic mercury pollution by a chemical factory in Minamata city, Japan that dump waste into Minamata bay in Shiranui Sea area [4].

Since industrial era, mercury becomes an excavation contaminant material, because mercury can be utilized as much as possible. One of environmental pollution due to mercury is the excretion of waste products (tailings) on gold processing by amalgamation[5]. Gold mining activities using amalgamation processing in general, will produce a positive impact that is served gold for needs of human life, but also has a negative impact in form of environmental pollution by Hg vapor. A total of 10% -

30% Hg which used to be lost or released to the environment[6].

Illegal gold mining activities are risking health and safety of workers because the use of mercury as an ingredient for mixing and combustion of amalgam processes (mercury and gold). The impact will be seen in next few years. Research on effects of mercury have been carried out in Indonesia, among others by Sudarmaji et al [7] that examines consumption of marine fish variable, mercury levels in hair, and health symptoms of community in Kenjeran Beach, Surabaya. The study indicates symptoms occurs in those who consumed fish among other kidney pain, dizziness, tumors, gums bleeding, and vision problems. Rudolf [8] also investigated health problem in the perpetrators of illegal gold mining and society in relation to mercury exposure around Kapuas River, Sintang Region, West Kalimantan. The results showed no difference in disease due Hg content between the groups of miners and non-miners.

Illegal Gold Mining Handling in Africa and Amazon, recommends that the Government needs to involve the stakeholders in designing environmental planning strategy, and should intervene to restrict the use of mercury by the community through a participatory approach on perpetrators of illegal gold mining (ASGM: artisanal and small-scale gold mining) [9 , 10,11].

According to Nuraina [12], until today in several Provincial, Regency / City in Indonesia does not have Qanun (regional regulations) to regulate mining, while the Qanun position as a key to the determination of mining area and issue the permit.

Illegal gold mining activities are found in various regions in Indonesia, among others; in Pongkor, Bogor-West Java, Kulo-North Sulawesi, Landak-West Kalimantan, Gunung Mas- Central Kalimantan, Jambi, Sijunjung-West Sumatra. In Riau province is also found in Kampar, Indragiri Hulu, but are most numerous in Kuantan Singingi (Kuansing), which is along the flow of the Kuantan River, Singingi River, irrigation dams, creeks and plantation area [13].

Kuansing area is known contain gold (alluvial) which is quite a lot, thus attracting the interest of small-scale illegal gold miners who come from outside of the area. Illegal gold miners activity is conducted since 2006, initially by migrants and followed by local villagers. Illegal gold miners number has increased very rapidly from year to year and spread almost in every district and villages close to the river flow. In January 2014 there were approximately 2,103 units and in January 2015 is estimated at more than 3,000 units of illegal miners raft and machinery (Dongfeng) equipped with a vacuum, and a unit run by 3 to 4 workers. It is estimated that approximately 9,000 to

12,000 gold miners who actively operate every day, both migrants from outside the region and the local community. There are even some illegal gold miners were using heavy equipment (excavator) to dredge the land

optimally[13].

Kuansing local government and its board have tried to socialize impact of illegal gold mining activities in each district, but the majority of illegal gold mining perpetrators in those villages or village around looks are less concerned. Curbing illegal gold mining has also been frequently made by the Government together with the police, even with the involvement of the Riau Police, as do curbing Siak's illegal gold mining operations for 12 days. This operation is performed by searching along Kuantan Singingi river and managed to burn over 438 rafts of illegal gold miners, arresting dozens of perpetrators. However, after the operation ended, local residents back again conduct of illegal gold mining activities.

Based on initial survey results, some of the illegal gold mining perpetrators saying that they did not feel scared if raided and arrested by the police. They always get information from the security officers who protect their activities. Perpetrators and owners of illegal gold mining confessed always depositing security money (bribes) to the officers in each time security officers came to the area, about once a week. Some community leaders, religious leaders, village officials and traditional leaders (niniak mamak), who lived in villages in Kuansing, there are anti to illegal gold mining activities, but many of them do not care about it. They seem familiar with such as illegal gold mining activities in the neighborhood. Even among them are the investor, land owners, illegal gold mining workers and have relatives as perpetrators of illegal miners to improve their economic. Illegal gold mining activities in Kuansing resulted in water pollution of Kuantan River, Singingi river, a tributary whose waters flow into residential areas, water irrigation dam which is already cause for concern. According to Bintal Amin (2014), illegal gold mining activities in Kuansing will be "a time bomb" that have an impact on the environment, so this should be a common concern, particularly use of mercury to the environment. The use of mercury, should not directly discharge into rivers and the environment and should be managed well [14].

The local government faced two choices, there are : to eradicate illegal gold mining which has polluted the river environment or provide employment for the community through permit of people mining. This research aims to formulate solutions to handling of illegal gold mining activity in an effort to preserve the river environment in Kuantan Singingi.

## RESEARCH METHODOLOGY

This research is descriptive research. Qualitative explorative research method conducted to gather information from informants, focus on representation of phenomenon that happens to get an idea of the perception of informants (stakeholders) and the public about the watershed of alternative solutions handling illegal gold mining activities through questionnaires, document tracking, field observation and in-depth interviews related to efforts made by the local government, police, stakeholders in quest for solutions to handling of illegal gold mining activity and protect the river environment in Kuantan Singingi from pollution.

This research was conducted in seven districts from 15 districts in Kuantan Singingi. The chosen districts are location with most illegal gold mining activity and dispersed in Kuantan River, Singingi River, Kukok River and irrigation dam that had previously been conducted enforcement efforts by the regional government officers and the Police, namely: Singingi Hilir district, Singingi, Kuantan Mudik, Gunung Toar, Hulu Kuantan, Kuantan Tengah, and Sentajo Raya. The research was carried out two years, starting on February 15 2014, until February 15, 2016.

Population in this study are all illegal gold mining workers spread over 15 districts in Kuantan Singingi, approximately 8,412 until 12,000 people. The amount is obtained based on number of illegal gold mining rafts, approximately 2,103 until 3,000 units scattered along Kuantan River, Singingi River and creeks also the irrigation dam. One unit of illegal gold mining run by 3-4 people. Sampling was done based cluster by quota and accidental sampling, each district was taken a sample of 30 people of workers spread throughout seven districts. Determination of the sample using Rapid Assessment Procedure (RAP) method which has been jurisprudence by World Health Organization (WHO), as many as 30 respondents for each district, so the sample size is 30 x 7 = 210 Illegal workers. Then the people who live in the basin and is not involved as perpetrators of illegal miners are also used as a sample (respondents) as many as 210 people.

Further for qualitative research, Informants are selected by purposive sampling. The selected informants is Head of Energy and Natural Resources Department, Environmental Agency (BLH), Health Department, Plantation, Fisheries, Agriculture, Chief of Police, Environmental expert, Chairman of Parliament, Head of Local District, Chief of village, Community leaders and perpetrators of illegal gold mining. The number of informants is determined according to data adequacy required. Data collection was discontinued if no longer found the variation information.

## RESULTS

#### a. Effort to Handling of Illegal Gold Mining That Ever Do

Based on information from several informants, that on 2013 has been established Integrated Team Combating illegal gold mining by the local government in cooperation with the Police of Kuantan Singingi Kuansing in the efforts of socialization, education, advocacy and curbing illegal mining. Cross-sector efforts already made by the local government and stakeholders in 2013-2014, but in practice there are still some problems as follows.

Table 1. Efforts Ever Conducted by Local Government and Stakeholders

No  
Effort That  
Ever Do  
Activities  
Problems  
1  
Socialization  
and Education about Impact of Illegal Gold Mining Activities  
Seminar, Promotion,  
Brochure dispersed, poster, leaflet, billboard, etc.  
Socialization and education  
didn't reach village community, resulted they didn't know about the impact of illegal gold mining.

2  
Coordination  
and Advocacy  
- Regent ever asks  
the Region Government and Region Police by Forkopimda about illegal  
- Government, Police Officers, and Publics have less commitment to curb illegal gold  
gold mining solutions.  
- Regent has been sent a mail to President's Special Team and related ministries (Environmental Agencies,  
Energy and Natural Resources Ministry, Ministry of Internal Affairs) about illegal gold mining solution in  
Kuansing ( on  
2013).  
mining in sustainable and  
required large funds to curb illegal gold mining meanwhile Kuansing's local government budgets are limited.  
- The central government has not responded to a letter from Head of District related illegal gold mining solutions  
in Kuansing.

3  
Illegal Gold  
Mining  
Disciplined  
A joint team from the Riau  
Police, Local Government, and Kuansing Police have to disciplined illegal gold mining (capture some  
perpetrators and burned more than 438 rafts of illegal gold mining, seized evidence) that operate along the flow  
of Kuantan, Singingi, Kukok river.  
Efforts to curb illegal mining by  
the security officers often get physical resistance by the perpetrators of illegal gold miners. Curbing illegal gold  
miners who do not yet effective, illegal gold mining return after curbing. There were local police officers  
involved in illegal mining and commit extortion.

The following image is the result of field observations, in the form of a billboard ban on illegal gold mining  
activities made by Kuansing's District Police.

Interviews and observations result in the field, is also supported by the results of a document search on  
disciplined illegal gold mining, as shown in Figure 2, the police along with the local government confiscated  
machine tools Dongfeng and burn the raft of illegal in stream Kuantan and Singingi river, but perpetrators of  
illegal gold mining against by breaking operational car of Kuansing's Government.

Efforts to curb illegal mining conducted so far is considered less effective, due to illegal mining activity is still  
going on, both in the river and on the land and has spread almost to all districts in Kuantan Singingi.

b. Problems and Obstacles in Handling of Illegal Gold Mining All This Time Problems and Obstacles in handling of illegal gold mining activities in Kuansing based on interview with informants are :

1. There is no mutual commitment from policy makers.
2. Concern the perpetrators of illegal gold mining toward environmental pollution and health risk is still lacking. Perpetrators do not want to stop illegal gold mining for economic reasons for their family. This is supported by observations in the field, that illegal gold mining has resulted in pollution of river water and irrigation dams (see Figure 3).
1. The role of policy makers (stakeholders) and the public is still lacking
2. There were local police officers who frequent extortion and let illegal gold mining activities happen.
3. Lack of human resources and operational funds to curb illegal mining.
4. Mining area and mining license by people are not possible because gold potential in Kuansing is alluvial, that mining authority is in the central government and provinces.

c. Solution to Handling of Illegal Gold Mining Activities

Alternative solutions to handling of illegal gold mining activity in Kuantan Singingi

based on perception of the community surrounding the watersheds (respondents) are as follows:

Table 2. Perception of the community surrounding the watershed toward solution to handling illegal gold mining activities in Kuantan Singingi, 2015

No Public Perception Toward Solution on Handling Illegal Gold Mining

Activities (n=210)

1 The Local Government and Police expected to handle illegal gold miners seriously.

%

98.1

2 Just let Illegal Gold Mining going on 0.5

3 The illegal mining activity should be disciplined or terminated 100

4 Illegal gold mining activity should always raid (workers, investors, and fence were arrested and prosecuted)

5 We recommend that local police officers were involved, did extortion, and protect illegal gold mining dealt with firmly and prosecuted

6 Need to be made to local regulations, the establishment of the gold mining region and artisanal mining license

7 We recommend that the perpetrators of illegal gold miners return to work as before, such as farming, gardening, fishing, trade etc.

8 The local government should provide employment for the workers illegal mining in order not to pollute the environment

9 We recommend that local government, police, and other interested parties more seriously supervise / control the sale of diesel oil

10 We recommend that local government, police, and other interested parties more seriously supervise / control the sale of mercury

99.0

99.5

13.8

99.0

15.2

49.5

98.6

Questionnaire result in the table above, is also supported by interviews result with informants who says that a solution to handling illegal gold miners activity are as follows:

1. Need to build a mutual commitment to stop illegal gold mining activities initiated by the regional government collaborate with police officers and related stakeholders as well as all levels of society in Kuantan Singingi.
2. Increase awareness of illegal gold miners and the community about the importance of keeping the river environment and health
3. Law Enforcement firmly for the perpetrators (investors, workers), a receiver, the apparatus involved to protect and carry out illegal payments to the perpetrators of illegal gold mining.
4. Establish Environmental Care Forum or re-activate the integrated team combating illegal gold mining from Muspida, Upika and the entire community, a variety of other cross-sector. Some informants mentioned that existing Integrated Team Combating illegal mining, first in 2012-2014 was very active, but lately inactive



because of budget constraints local government in combating illegal miners.

5. The Local governments need to help provide other livelihood alternatives for the perpetrators of illegal gold mining and the local community, such as farming, agriculture, fisheries and others for the welfare of the community.

6. Controlling Illegal gold mining activities with overseeing the sale of mercury, diesel fuel and equipment related to illegal mining gold mining activities.

7. Needed a Regional Regulation to handling of illegal gold miners in the form zoning of mining area. However, in contrast to the perception of some other informants who disagree with zoning the mining area because it was feared would result in contamination of the waste remains in the surrounding area. Moreover, by looking at the nature of the spread gold (alluvial), is an obstacle to establishing a suitable location for zoning the mining area.

## DISCUSSION

Illegal gold miners activities in various areas, especially in Kuantan Singingi has caused more harm to the community surrounding the watershed and problem due to river environmental pollution and also the risk of long-term health, as well as for the local community and for the country when compared to the benefits perceived by some perpetrators. The State loses revenue because these activities are done illegally, the miners do not pay taxes, royalties, wasted of resources while the environment becomes damaged and disrupted ecosystems, river water is polluted because of the mining ways and processing that does not follow the rules (good mining practice).

The impact of illegal activities toward river environmental pollution, its impact on socio-economic conditions of workers and the community surrounding the watershed, and also workers' health disorders can be described as follows:

Picture 4 Impact of Illegal Gold Mining Toward River Environment

## SOCIAL- ECONOMY AND HEALTH DISORDERS

The impact of illegal gold mining activities on the environment is the pollution of river water and water irrigation dam in terms of turbidity and levels of Hg, DO, BOD and COD parameter were exceeded the threshold, resulting life of various types of rivers biota such as fish, shrimp, shellfish and other disturbed and die, the river water can no longer be used for their daily needs. Influence illegal gold mining activity in

the social economy is illegal gold mining activity has improved economic income of workers and investors, but the illegal miners have been detrimental to the surrounding community the watersheds, communities have difficulty getting clean water and illegal gold miners activities often lead to conflicts between the perpetrators of illegal gold mining and the police, local officials and officers of the company, physical clash, even to do anarchists damaging the car and burn local government officials on building the company (PT.DPN) who participate in curbing illegal mining. Illegal gold mining activity influence on health, that of illegal workers in Kuansing experiencing various symptoms of illness, occupational accident, and if illegal gold mining left unchecked in the long term, it can have an impact on public health issues that accumulate mercury and lose the next generation.

According to Hendrik L. Blum in Notoatmodjo [15], the environment is one of the dominant factors that affect degree of public health. In this research, the river water and environment polluted can be at risk for various health problems in illegal gold mining workers and the surrounding communities who use river water, eat fish, shrimp, shellfish which accumulate Hg. Polluted rivers environment can also be a socioeconomic problem for the community surrounding the watershed, such as fishermen lost their livelihoods as a result of river water pollution and had trouble getting the fish in the river, the difficulty of a clean water source that requires a fee for the provision of clean water. Furthermore, health problems caused by river water pollution can also increase spending for medical expenses, and low socio-economic conditions of the community will also influence the risk of health problems.

### a. Effort to Handling of Illegal Gold Mining That Ever Done

These results indicate that socialization and education effort conducted by the local government, police and other Stakeholders in form orally and in writing, counseling, seminars, distribution of posters, leaflets and hoardings on the impact illegal gold mining activity on health and the environment is not optimal and has not reached to the countryside where there were lots of illegal gold mining activities, so that the information is not up to the perpetrators and their communities as a primary target. Efforts to introduce and educate people about the impact of illegal gold mining activity on health and the environment should be more frequent and routine, to remote villages in Kuansing so that the information is delivered to all targets. According

to Notoatmodjo [15], the target of health promotion consists of a target primary, secondary and tertiary. The primary targets, namely the perpetrators of illegal gold mining and communities affected by river water pollution and vulnerable / at risk for health problems caused by illegal gold mining activities. Secondary goals, namely community leaders, both formal and informal respected or influential for the perpetrators of illegal gold mining. Tertiary goal is policy makers or officers from all sectors.

Advocacy which did by the Kuansing local government and Riau Police (Province's Police) in an effort to curb illegal mining has not been entirely successful because the demolition is done unsustainable and time is limited so that the activities of illegal gold mining activity re-occur. Advocacy carried by Kuansing local government to the central government has not yet to get a response from the central government, either in the form of budget support as well as technical manual handling solutions implementation of illegal gold mining activity in the area.

The results show that efforts to curb illegal mining has been carried out by Kuansing local government officers and Kuansing police by burning hundreds of illegal rafts unit, seized evidence (machine Dongfeng), catch the perpetrators of illegal gold miners were working when the raid took place, capturing some of the results of illegal gold fence. However, perpetrators of illegal gold miners against the effort and sometimes they involve local resident thus destroyed Kuansing local government operational car. Efforts to curb illegal mining conducted so far considered to be less effective because of illegal gold mining activity still happening even a rapidly growing both in the river and on the land and has spread to almost all districts in Kuantan Singingi. This study is consistent with Nuraina's research result[12] in Aceh, that until today in several regencies / cities do not have the Qanun (regional regulations) to regulate mining. While the Qanun position as a key condition to make the determination of mining area and issued license people mining.

According to the Hanafi [16], local governments need to create a policy in the form of a special rule mining based on the principles of balance economic, ecological, social, political, and legal environment. The local government also issued a regulation to increase the role and participation of local communities, especially the holders of customary rights, in which includes the zoning WPR, avoid overlaps of interests, actions and sanctions by law enforcement agencies against criminals in the illegal mining activities.

b. Problems and Obstacles in Handling Of Illegal Gold Mining Right Now

Based on the research, it was found problems to handling illegal gold mining activity henceforth look for solutions based on the problems encountered, as well as the necessary role of institutions and related parties, as in the following table.

Table 3. Problems and Solutions to Handling Illegal Gold Mining Activities

No

Problem

Solutions

Department and Sector

Involved

1.

No mutual commitment

to curbing the illegal gold mining and protect the river environment from pollution.

Required mutual commitment and

Kuansing local government policy, law enforcement agencies, stakeholders, public support to curb illegal mining and the river environment of the river

- Local government (Regent and Chief of Department)

- Parliament, judiciary

- Police Region/ Police

District, Local Army Corp

- Head of District, Village Chief, Community organization, professionals

- Academians

- NGO, Community leaders, indigenous,

- religious leader

- mass media (radio,TV.

Newspaper)

2

No clear information

dissemination related to illegal gold mining

Required information

dissemination so that all stakeholders has one vision that illegal gold mining have been due river environmental pollution so needed a program to control and handle illegal gold mining, community empowerment, and reclamation.

- Integrated team on

Handling Illegal Gold

Mining

- Environmental Agencies, Department Planning and Regional Development, Fisheries Department

- Energy and Natural Resources Department, General Work Department

- Health Department,

Plantation Department

- Parliementary, Head

District, Village Chief

- Local army and corp

- Academians

- NGO, Community leader, indigenous, religious, media mass.

3

Illegal Gold Mining

Activities and the community don't aware yet about the impact of illegal gold mining toward pollution and health problem risk.

Required socialization and

education routinely about the impact of illegal gold mining toward environmental pollution and health problem as targeted (primary, secondary, tertiary) to raise awareness the perpetrators of illegal gold mining, community, and stakeholders.

- Integrated team on handling

to illegal gold mining

- Health Department, Energy and Natural Resources Department, Fisheries Department and Parliamentary

- Head of District, Village Chief, Community organization. Professional

- Police, local officers

- Academians

- NGO, Community leaders, indigenous

- Religious leader

- The mass media (radio, TV, Newspaper)

4

Lack of cooperation,

coordination and involved of the related sector in handling of illegal gold mining.

Kuansing local government need to

improve cooperation and coordination, involved related department and agencies. The local government also can ask help from the central government by the related ministry, police, comrade of soldier, to curbing the illegal gold mining.

- Element of

Muspida/Forkopimda (Regent, parliamentary, police, local police, and judiciary)

- Related department :

Energy and Natural Resources Department, Health Department, Fisheries, Agricultures, And Department of Social Affairs

- Press and public

- Central Government ( Ministry of Internal Affair, Energy and Natural Resources, Environmental, Social Affairs Ministry)

- Indonesia Soldier and

Police

5

Curbing illegal gold



mining and law enforcement towards the perpetrators of illegal gold mining and police officers were involved.

Curbing the illegal gold mining

gradually and sustainable in form band illegal gold mining activities in river flow, irrigation dam, creeks and plantation area. Law enforcement needed to raise a deterrent effect.

- Integrated team on combating illegal gold mining

- Law Enforcement

- Police and the corp

- Mass media

6

Social control after

close illegal gold mining activity

Preparing social control program

after close illegal gold mining for the local community who affected, preparing employment, empowerment, skill training, diversification, control rubber price. The local government can use village funds for village community welfare.

- Kuansing local government

- Private Company

- Police and the corp

- Head of District, Village chief, community, and press

c. Solutions to Handling Illegal Gold Mining Activities

The following figure is an instrument of policy research "Criminal Justice Policy

Cycle" [17] used to identify problems and find solutions to handling of illegal gold mining activity in Kuantan Singingi through a system approach.

Can be explained that system to handling of illegal gold mining in Kuantan Singingi from identifying the problem that illegal gold mining impact on river pollution, raises socio-economic problems in the local community and risking workers health and communities, and then to identify a solution that allows (disciplined or given permission) based on the objectives to be achieved include the component input, process, output, outcome, then selected the best solution is illegal gold miners to be

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disciplined with six solutions, namely: a joint commitment and policy, information dissemination, socialization, and education, improving cooperation and coordination, carry out policing and law enforcement, and social control. Furthermore, the implementation of regional governments policy, stakeholders towards illegal gold mining in maintaining and protecting the river environment, irrigation dams, and evaluating the policy pursued until the policy expires.

Illegal gold mining activity has damaged the environment and polluting Kuantan river, Singingi river and irrigation dam in Kuantan Singingi, so it needs to be elaborated 6 solution treatment and prevention as follows:

COMMITMENT AND POLICY

Required a mutual commitment and policies of Kuansing Local Government, law

enforcement by the officers, stakeholders, public support for disciplined the illegal gold mining to save the river environment, by :

a) Reactivating an integrated team to combating illegal gold mining, which consists of Muspida elements, Chief department, head of district, community representatives (community leaders, religious leaders, traditional leaders), academians and other stakeholders. This team is cross-sectoral, has a work program, and actualized

b) Allocated budget to curbing illegal gold mining operations through budgeting of Kuansing Environmental Agencies and provide investigator human resources in Environmental Agencies through training, so that environmental cases can be processed.

c) Demand and reactivating preventive corp (education, socialization, and public relations), law enforcement corp, and divide task and responsibilities, as well as providing operational facilities.

d) Planning and execution of illegal gold mining control program clearly e) Monitoring and evaluation sustainable control program

This study is consistent with Clifford [9], Hirons [10] in Sub-Saharan Africa, Spiegel et al, [11] in the Amazon, which recommends the handling of illegal gold mining that the Government needs to engage stakeholders in designing environmental planning strategies, and should intervene to restrict the use of mercury by the

community through a participatory approach to the perpetrators.

This research is in accordance with Robbins and Timothy;s opinion [18] that the effectiveness of integrated team is affected by the adequacy of resources, leadership, and structure, trust climate, performance evaluation and rewards system, members ability, personality, allocate roles, diversity, team magnitude, team flexibility, members preference, intent and purpose establishment of integrated teams, efficacy, conflict and social loafing level. According to Kreitner and Kinicki [19], usually the teams work is not always successful, could have had failures that can be caused due to an error in management or because of unrealistic expectations. According to the researchers that the lack of effectiveness in handling of illegal gold miners in Kuantan Singingi can be caused by a team that has not been able to overcome his weaknesses, operational funds are limited, some people involved in illegal gold mining hostile or colluded with the team, resistance to doing something and less long- term commitment to maintain and protect the river from pollution caused by illegal gold mining. Therefore, team effectiveness of handling of illegal gold mining team needs to be improved through teamwork systematically integrated to achieve collective goals, build trust, and more integrated.

#### INFORMATION DISSEMINATION

Required information dissemination of this study result so that all sector concerned with a perspective that illegal gold mining activities resulted in environmental damage and river pollution, so it requires the involvement of various sectors, departments and agencies involved in formulating treatment and preventive program, community development program, and rehabilitation or reclamation. Furthermore, need a large gathering at the district level to formulate action, should be designed speaker and participants that should be presented as well as the resulting formulation. Then followed up at the district level to the village level. It should also be pointed out that, the gold potential in Kuansing that is alluvial or scattered on the riverbed and the mainland, so that inefficient and not feasible economically managed, and uneconomical if mined using high technology because it will require huge costs. Therefore, the determination of mining area and mining license considered less possible, because of there will be not balanced between the results obtained (with the magnitude of the environmental reclamation costs to be borne by the government.

#### SOCIALIZATION AND EDUCATION

Integrated teams to combating illegal gold mining need do socialization and education regularly about impact of illegal gold mining activities toward environmental pollution and the risk of health problems targeted (primary, secondary, tertiary) to create awareness of illegal gold miners, local communities, and stakeholders. The local government through related agencies (Department of Health, Energy and Natural Resources Department, Environmental Agencies, Department of Fisheries, Head of District and others) need to work together with village officials, elements of society, NGOs concerned with the environment, the organization of health professions for socialization and education impact of illegal gold mining on health and river environmental pollution, including empowering the community leaders and religious leaders through religious lectures in mosques and wirid recitation.

Kuansing Police Chief through the work program can assign "Babinkamtibmas" to disseminate and educate the public by way of " walk and talk" through Police Environmental Concern Program, which is equipped with a booklet (module) guide to the dissemination of information and images related to the impact of illegal gold mining towards river water pollution, and the risks to health. (see appendix 20). According to Sippl and Henrik [20], socialization and education can build community insight to the dangers of illegal gold mining activity. Socialization and educational impact of illegal gold mining activity in Kuansing can be done through counseling,

seminars, distribution of posters, leaflets, put up a billboard or billboards on the roadside, advertising through radio, television, comic books, booklets / modules, education and training of community representative, preventive corp from police who do education, guidance to the public and direct visits to the site to stop the illegal gold mining activities. As is done in Ghana, the gold miners are very sensitive to the content of messages that emphasize the dangers of mercury to children. In Brazil, a brochure that said the impact of mercury on impotence, turned out to be very effective in raising awareness of the illegal miners.

This study is suitable with Notoatmodjo [15], that the socialization and education conducted by stakeholders need to pay attention to health promotion strategies (advocacy, social support, empowerment), and targeted health promotion, which consists of the primary, secondary, and tertiary target. Socialization and education is done it should also be able to: 1) Increase the ability of the community to, able to maintain and care for the surrounding environment, maintain and improve their health. 2) Bridging the community with those who

"concern" to environmental health.

3) Advocate for the decision makers in various sectors / acting to support programs related to environmental awareness of illegal gold mining activity. According to Borisch [21], that the public health association should help governments and stakeholders to promote the values of public health importance, conduct public policy, including solidarity, participation, empowerment and social justice.

To implement sustainable river environmental protection program also takes the role of universities to provide input and solutions, involvement of various health professional organizations, the role of non-governmental organizations (NGOs) is strong and not bound by government and special interests, also takes the role of mass media (television, radio, newspapers, etc.). In addition, raised the case of environmental pollution caused by illegal gold mining in Kuansing and other areas into a national issue, so it gets the attention of policymakers at the district, provincial and national.

#### COOPERATION AND COORDINATION

Kuantan Singingi Regional Leader (Regent, Chief of Police, military command, judiciary) need to improve cooperation and coordination, involvement of departments and agencies (Energy and Natural Resources, Environmental Agencies, Health, Fisheries, Agriculture, Social and Workers Affairs), universities, NGOs, the role of media (the press) and community support indispensable to safeguard the policy to handling of illegal gold mining activity and save the river environment in Kuansing sustainably. When required, the Government may request assistance from the Provincial Government and the Central Government (President) through the relevant ministries (Ministry of Internal Affairs, Energy and Mineral Resources, Ministry of Environment, Ministry of Social Affairs) relating to budget aid and manual handling of illegal gold mining activity in an effort to save the river environment. In addition, it is also necessary control of the security officers involved, if necessary, request assistance Kuantan Singingi Regent to police chief and military commander to curb the unscrupulous members who were involved.

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This study is consistent with Gibb and OLeary research recommendations [22], in South America, Asia, and Africa, that required central government policy and national plan of action that includes a public health strategy toward the dangers of mercury exposure used by small-scale gold miners, as the result of Minamata Convention, should be immediately implemented.

This research is in accordance with Wahyono's opinion [23], which states that necessary communication between stakeholders in the handling of illegal gold mining because the local government has difficulty solving problems of illegal gold mining. The difference between the Regional Government Law No. 23/2014 [24] Clause 14, that the authority of the implementation of Energy and Natural Resources Ministry field is divided between the central government and provincial, with Mining Law No.

4/2009 [25] Clause 20-26, states that the mining area is determined by the regent / mayor after consultation with the regency / city, can lead to confusion. To solve problems above, the necessary communication and coordination between the Central Government, Provincial and Regency / City along with other stakeholders in handling of illegal miners. Local government must dare to make a new breakthrough in the publishing of regional policy, eg enter the role of indigenous peoples, local wisdom in the management of mining, prepare a budget for coordination with security forces in tackling illegal miners.

#### CURBING ILLEGAL MINING AND LAW ENFORCEMENT.

Curbing Illegal gold mining gradually and sustainable which is meant is done prohibition and control of illegal gold mining along the flow of Kuantan river, Singingi river, Kukok River and the irrigation dam. Later ban illegal gold mining in creeks, as well as in the area of the plantation, while preparing social control program for communities affected. Law enforcement expressly towards the perpetrators of illegal gold miners (workers and investor), local police officers were involved, protecting the illegal gold mining and doing extortion doing so raise a deterrent effect. According to Ikhsan [26], that curbing illegal gold mining in Sijunjung (West Sumatra) done gradually, can not do with a fast time, because of illegal gold mining activities in Sijunjung regenerate such a strong chain, so need time to break these chain. The difference with this study is the illegal gold mining activity in Kuansing operates relatively short time, ie since 2006 when compared to illegal gold mining in Sijunjung that has lasted decades, and is done for generations. So, we need long-term efforts through preventive efforts, is to change society mindset through intensive counseling. The government can do preventive and repressive. Short-term efforts, the government can curb illegal mining in mining locations in repressive (law enforcement) to perpetrators (investors and workers) as well as local police officers were involved. The Government may impose administration punishment in the form of reprimands, penalties, and

finances so that a deterrent effect.

Different with Somantri [27] which says that if illegal gold mining is closed there will be a very complex social problems associated with community culture that has been formed at this time, Security after closing the illegal gold mining will be vulnerable in respect of their economic situation to be disturbed. Therefore, the government needs

to conduct surveillance and set up social control programs after close illegal [gold mining activity](#).

## SOCIAL CONTROL

Local government and the business community (private) need to prepare a social control program after closing the illegal gold mining activity for the community, such as setting up jobs for local people affected by this policy. This study is consistent with Ikhsan's opinion [26] which says that government can instruct people to do other work as their livelihood. Providing assistance to these communities is a form of participation of the government to find solutions to problems when community leave their work as gold miners. Different with Somantri [27] who said that transfer [of gold miners](#) profession into other professions is not simple and easy. Similarly, Robbins's opinion [28] and Hanggraeni [29] that changes (job) is not an easy process. The process of change is usually always followed by resistance or refusal by each individual for several reasons: 1) The individual does not capture the whole essence of being delivered or simply get information piecemeal, 2) the fear of uncertainty, 3) economic factors, might result in they lose their economic resources that had been controlled, 4) security, the individual may feel threatened, 5) habit, doing new things unusual and this is a process that is very heavy.

Despite resistance or rejection of various individuals (perpetrators of illegal gold mining) to curb illegal gold mining process is done, but it does not make the enforcement process becomes impossible. According to Robbins [28] and Hanggraeni [29] resistance of course will impede changes (curb) process, but there are several ways to do so that people would voluntarily engage in the process of curbing illegal mining, namely: 1) Communicating curbing illegal gold mining process clearly to reduce uncertainty so that people feel safe and ultimately no longer be opposition, 2) Increasing community participation, 3) Facilitate and provide assistance, training, counseling to help them adjust, 4) negotiate towards those who oppose the process of curbing illegal gold mining that create a mutually beneficial solution, 5) in collaboration with the opponent illegal gold mining demolition to be more cooperative towards policing, 6) Provision punishment toward parties in opposition to the demolition process. There are times when punishment is required when persuasive ways that can not be reduced resistance to the process of curbing illegal mining. Curbing Illegal gold mining in Kuansing can be happen gradually in according to agreement or consultation with relevant parties, while preparing other employment for the people affected, and empowerment through counseling, organizing and community development training for improving various types of skills of business, ability to raise family income, and the utilization of existing environmental potential. All parties need the same perception or the "one language" to convince public that illegal gold mining has negative [impact on environmental](#) pollution, for life of surrounding community and the health risk is greater. Indeed, many business opportunities that can be developed for the community [in Kuantan Singingi](#), both in

agriculture such as farming, rice, peppers, onions, bananas, and other fruits, plantations (palm, rubber, citrus, durian, etc.), livestock operations (buffalo, cows, goats, chickens, etc.), fish farming cages program in Kuantan Singingi river flow as an attempt to save the river from pollution, pond fish culture storied (biopot) around the house residents who do not require huge costs. Likewise, the potential of the business of raw materials, rocks, gravel, and sand are managed in environmentally friendly ways, including the development of eco-tourism potential in Kuansing. Where possible, the government should control the price of rubber or provide subsidies for low rubber prices, because the majority of the villagers [in Kuantan Singingi](#) are rubber gardens. In addition, the public can diversify (diversification of business), such as rubber tapping morning, noon and afternoon manage fish ponds, farming and other businesses, so income is increased. Local governments can also use village funds budget to help provide agricultural land, plantations, seeds, livestock, fertilizer and other assistance [in order to](#) improve the welfare of rural communities.

## CONCLUSION

Solution to handling of illegal [gold mining activity in Kuantan Singingi](#), namely:

a) Required mutual commitment and local government policies to curb or halt illegal gold mining: Enabling Integrated Team [of curbing illegal gold](#) mining, allocate operating funds that are deposited through the budget Environmental Agencies, set up a Preventive and repressive with duties and responsibilities, organizational infrastructure, planning and program implementation, monitoring and evaluation curbing program sustainably.



- b) Information dissemination required that all parties have same perspectives that the illegal gold mining activities have resulted in environmental damage and pollution of the river, so it requires the involvement of various parties, agencies and related institutions to formulate prevention and treatment programs, community empowerment and reclamation.
- c) An Integrated team of combating illegal gold mining (synergy) continuing efforts to introduce and educate people regularly about the impact of illegal gold mining toward river environmental pollution and the health risk are on targeted.
- d) Kuansing regional leader and elements need to improve cooperation and coordination, the involvement of departments and agencies as well as community support indispensable to safeguard policy on handling of illegal gold mining activity and save the river environment in Kuansing sustainably.
- e) Curbing illegal gold miners can be gradually and sustainable, as well as law enforcement firmly against the perpetrators of illegal miners (workers and investors), local police officers involved and commit extortion so that a deterrent effect.
- f) The local government and the private sector need to prepare a social control program after close the illegal gold mining with prepare jobs for people, empowerment, improving skills and peoples incomes, diversification, local governments may use village funds budget to help the villagers.

#### SUGGESTIONS

- a) The perpetrators of illegal gold miners (workers / investors), the public and stakeholders to realize that illegal gold mining activities have resulted in river environmental pollution and detrimental to the surrounding community, and therefore illegal gold mining activity in streams and irrigation dams to be terminated through mutual commitment.
- b) To the parties concerned (local government, police, Society, perpetrator of illegal gold mining, etc.) need to prepare short term program (<1 year) to disseminate the impact of illegal gold mining on river environmental pollution; Medium Term Program (1-2 years) doing disciplined of illegal gold mining activity; Long-Term Program (> 2 years) conduct river environmental restoration and farmland.
- c) To Kuantan Singingi local government and stakeholders should use the results of this study as a material for preparing an integrated policy on handling of illegal gold mining and protect the river environment from pollution.



## Solution on Handling of Illegal Gold Mining Activities in Kuantan Singingi Region

### INTRODUCTION

Industrial and technological development is very rapid today have a positive impact in form of industrial products and technologies that can be utilized in improving the quality of life, but also have a negative impact in forms of environmental pollution, such as industrial waste and technology. Environment pollution needs to be controlled so as not to interfere the environment and human health [1].

Environmental pollution caused by heavy metals, such as arsenic, lead, cadmium, and mercury are very harmful to human health, animals, plants and life continuity in the surrounding environment [2]. At low concentrations, heavy metals have direct effect and accumulate on the food chain, disrupting environmental biota so will impact on human health despite relatively long and far from the polluted sources [3].

The emergence of environmental pollution cases which exceeds the limit, resulting in losses and social unrest, because has a high risk to expose to heavy metals and transition metals which are toxic in certain doses and concentrations. As well as incidence of Minamata disease cases, a “strange” disease which has a neurologic effect on human, written in historic scientific work Minamata Byo by Masazumi (1972) from Gakuen Kumamoto University, Japan. This disease is caused by organic methyl mercury poisoning in fish and shellfish, believed to be due to organic mercury pollution by a chemical factory in Minamata city, Japan that dump waste into Minamata bay in Shiranui Sea area [4].

Since industrial era, mercury becomes an excavation contaminant material, because mercury can be utilized as much as possible. One of environmental pollution due to mercury is the excretion of waste products (tailings) on gold processing by amalgamation[5]. Gold mining activities using amalgamation processing in general, will produce a positive impact that is served gold for needs of human life, but also has a negative impact in form of environmental pollution by Hg vapor. A total of 10% - 30% Hg which used to be lost or released to the environment[6].

Illegal gold mining activities are risking health and safety of workers because the use of mercury as an ingredient for mixing and combustion of amalgam processes (mercury and gold). The impact will be seen in next few years. Research on effects of mercury have been carried out in Indonesia, among others by Sudarmaji et al [7] that examines consumption of marine fish variable, mercury levels in hair, and health symptoms of community in Kenjeran Beach, Surabaya. The study indicates symptoms occurs in those who consumed fish among other kidney pain, dizziness, tumors, gums bleeding, and vision problems. Rudolf [8] also investigated health problem in the perpetrators of illegal gold mining and society in relation to mercury exposure around Kapuas River, Sintang Region, West Kalimantan. The results showed no difference in disease due Hg content between the groups of miners and non-miners.

Illegal Gold Mining Handling in Africa and Amazon, recommends that the Government needs to involve the stakeholders in designing environmental planning strategy, and should intervene to restrict the use of mercury by the community through a participatory approach on perpetrators of illegal gold mining (ASGM: artisanal and small-scale gold mining) [9, 10, 11].

According to Nuraina [12], until today in several Provincial, Regency / City in Indonesia does not have Qanun (regional regulations) to regulate mining, while the Qanun position as a key to the determination of mining area and issue the permit.

Illegal gold mining activities are found in various regions in Indonesia, among others; in Pongkor, Bogor-West Java, Kulo-North Sulawesi, Landak-West Kalimantan, Gunung Mas- Central Kalimantan, Jambi, Sijunjung-West Sumatra. In Riau province is also found in Kampar, Indragiri Hulu, but are most numerous in Kuantan Singingi (Kuansing), which is along the flow of the Kuantan River, Singingi River, irrigation dams, creeks and plantation area [13].

Kuansing area is known contain gold (alluvial) which is quite a lot, thus attracting the interest of small-scale illegal gold miners who come from outside of the area. Illegal gold miners activity is conducted since 2006, initially by migrants and followed by local villagers. Illegal gold miners number has increased very rapidly from year to year and spread almost in every district and villages close to the river flow. In January 2014 there were approximately 2,103 units and in January 2015 is estimated at more than 3,000 units of illegal miners raft and machinery (Dongfeng) equipped with a vacuum, and a unit run by 3 to 4 workers. It is estimated that approximately 9,000 to 12,000 gold miners who actively operate every day, both migrants from outside the region and the local community. There are even some illegal gold miners were using heavy equipment (excavator) to dredge the land

optimally[13].

Kuansing local government and its board have tried to socialize impact of illegal gold mining activities in each district, but the majority of illegal gold mining perpetrators in those villages or village around looks are less concerned. Curbing illegal gold mining has also been frequently made by the Government together with the police, even with the involvement of the Riau Police, as do curbing Siak's illegal gold mining operations for 12 days. This operation is performed by searching along Kuantan Singingi river and managed to burn over 438 rafts of illegal gold miners, arresting dozens of perpetrators. However, after the operation ended, local residents back again conduct of illegal gold mining activities.

Based on initial survey results, some of the illegal gold mining perpetrators saying that they did not feel scared if raided and arrested by the police. They always get information from the security officers who protect their activities. Perpetrators and owners of illegal gold mining confessed always depositing security money (bribes) to the officers in each time security officers came to the area, about once a week. Some community leaders, religious leaders, village officials and traditional leaders (niniak mamak), who lived in villages in Kuansing, there are anti to illegal gold mining activities, but many of them do not care about it. They seem familiar with such as illegal gold mining activities in the neighborhood. Even among them are the investor, land owners, illegal gold mining workers and have relatives as perpetrators of illegal miners to improve their economic. Illegal gold mining activities in Kuansing resulted in water pollution of Kuantan River, Singingi river, a tributary whose waters flow into residential areas, water irrigation dam which is already cause for concern. According to Bintal Amin (2014), illegal gold mining activities in Kuansing will be "a time bomb" that have an impact on the environment, so this should be a common concern, particularly use of mercury to the environment. The use of mercury, should not directly discharge into rivers and the environment and should be managed well [14].

The local government faced two choices, there are : to eradicate illegal gold mining which has polluted the river environment or provide employment for the community through permit of people mining. This research aims to formulate solutions to handling of illegal gold mining activity in an effort to preserve the river environment in Kuantan Singingi.

## RESEARCH METHODOLOGY

This research is descriptive research. Qualitative explorative research method conducted to gather information from informants, focus on representation of phenomenon that happens to get an idea of the perception of informants (stakeholders) and the public about the watershed of alternative solutions handling illegal gold mining activities through questionnaires, document tracking, field observation and in-depth interviews related to efforts made by the local government, police, stakeholders in quest for solutions to handling of illegal gold mining activity and protect the river environment in Kuantan Singingi from pollution.

This research was conducted in seven districts from 15 districts in Kuantan Singingi. The chosen districts are location with most illegal gold mining activity and dispersed in Kuantan River, Singingi River, Kukok River and irrigation dam that had previously been conducted enforcement efforts by the regional government officers and the Police, namely: Singingi Hilir district, Singingi, Kuantan Mudik, Gunung Toar, Hulu Kuantan, Kuantan Tengah, and Sentajo Raya. The research was carried out two years, starting on February 15 2014, until February 15, 2016.

Population in this study are all illegal gold mining workers spread over 15 districts in Kuantan Singingi, approximately 8,412 until 12,000 people. The amount is obtained based on number of illegal gold mining rafts, approximately 2,103 until 3,000 units scattered along Kuantan River, Singingi River and creeks also the irrigation dam. One unit of illegal gold mining run by 3-4 people. Sampling was done based cluster by quota and accidental sampling, each district was taken a sample of 30 people of workers spread throughout seven districts. Determination of the sample using Rapid Assessment Procedure (RAP) method which has been jurisprudence by World Health Organization (WHO), as many as 30 respondents for each district, so the sample size is  $30 \times 7 = 210$  Illegal workers. Then the people who live in the basin and is not involved as perpetrators of illegal miners are also used as a sample (respondents) as many as 210 people.

Further for qualitative research, Informants are selected by purposive sampling. The selected informants is Head of Energy and Natural Resources Department, Environmental Agency (BLH), Health Department, Plantation, Fisheries, Agriculture, Chief of Police, Environmental expert, Chairman of Parliament, Head of Local District, Chief of village, Community leaders and perpetrators of illegal gold mining. The number of informants is determined according to data adequacy required. Data collection was discontinued if no longer found the variation information.

## RESULTS

#### a. Effort to Handling of Illegal Gold Mining That Ever Do

Based on information from several informants, that on 2013 has been established Integrated Team Combating illegal gold mining by the local government in cooperation with the Police of Kuantan Singingi Kuansing in the efforts of socialization, education, advocacy and curbing illegal mining. Cross-sector efforts already made by the local government and stakeholders in 2013-2014, but in practice there are still some problems as follows.

Table 1. Efforts Ever Conducted by Local Government and Stakeholders

No  
Effort That  
Ever Do  
Activities  
Problems  
1  
Socialization  
and Education about Impact of Illegal Gold Mining Activities  
Seminar, Promotion,  
Brochure dispersed, poster, leaflet, billboard, etc.  
Socialization and education  
didn't reach village community, resulted they didn't know about the impact of illegal gold mining.

2  
Coordination  
and Advocacy  
- Regent ever asks  
the Region Government and Region Police by Forkopimda about illegal  
- Government, Police Officers, and Publics have less commitment to curb illegal gold mining solutions.  
- Regent has been sent a mail to President's Special Team and related ministries (Environmental Agencies, Energy and Natural Resources Ministry, Ministry of Internal Affairs) about illegal gold mining solution in Kuansing ( on 2013).  
mining in sustainable and  
required large funds to curb illegal gold mining meanwhile Kuansing's local government budgets are limited.  
- The central government has not responded to a letter from Head of District related illegal gold mining solutions in Kuansing.

3  
Illegal Gold  
Mining  
Disciplined  
A joint team from the Riau  
Police, Local Government, and Kuansing Police have to disciplined illegal gold mining (capture some perpetrators and burned more than 438 rafts of illegal gold mining, seized evidence) that operate along the flow of Kuantan, Singingi, Kukok river.  
Efforts to curb illegal mining by  
the security officers often get physical resistance by the perpetrators of illegal gold miners. Curbing illegal gold miners who do not yet effective, illegal gold mining return after curbing. There were local police officers involved in illegal mining and commit extortion.  
The following image is the result of field observations, in the form of a billboard ban on illegal gold mining activities made by Kuansing's District Police.  
Interviews and observations result in the field, is also supported by the results of a document search on disciplined illegal gold mining, as shown in Figure 2, the police along with the local government confiscated machine tools Dongfeng and burn the raft of illegal in stream Kuantan and Singingi river, but perpetrators of illegal gold mining against by breaking operational car of Kuansing's Government.  
Efforts to curb illegal mining conducted so far is considered less effective, due to illegal mining activity is still going on, both in the river and on the land and has spread almost to all districts in Kuantan Singingi.

b. Problems and Obstacles in Handling of Illegal Gold Mining All This Time Problems and Obstacles in handling of illegal gold mining activities in Kuansing based on interview with informants are :

1. There is no mutual commitment from policy makers.
2. Concern the perpetrators of illegal gold mining toward environmental pollution and health risk is still lacking. Perpetrators do not want to stop illegal gold mining for economic reasons for their family. This is supported by observations in the field, that illegal gold mining has resulted in pollution of river water and irrigation dams (see Figure 3).

1. The role of policy makers (stakeholders) and the public is still lacking
2. There were local police officers who frequent extortion and let illegal gold mining activities happen.
3. Lack of human resources and operational funds to curb illegal mining.
4. Mining area and mining license by people are not possible because gold potential in Kuansing is alluvial, that mining authority is in the central government and provinces.

c. Solution to Handling of Illegal Gold Mining Activities

Alternative solutions to handling of illegal gold mining activity in Kuantan Singingi

based on perception of the community surrounding the watersheds (respondents) are as follows:

Table 2. Perception of the community surrounding the watershed toward solution to handling illegal gold mining activities in Kuantan Singingi, 2015

No Public Perception Toward Solution on Handling Illegal Gold Mining

Activities (n=210)

1 The Local Government and Police expected to handle illegal gold miners seriously.

%

98.1

2 Just let Illegal Gold Mining going on 0.5

3 The illegal mining activity should be disciplined or terminated 100

4 Illegal gold mining activity should always raid (workers, investors, and fence were arrested and prosecuted)

5 We recommend that local police officers were involved, did extortion, and protect illegal gold mining dealt with firmly and prosecuted

6 Need to be made to local regulations, the establishment of the gold mining region and artisanal mining license

7 We recommend that the perpetrators of illegal gold miners return to work as before, such as farming, gardening, fishing, trade etc.

8 The local government should provide employment for the workers illegal mining in order not to pollute the environment

9 We recommend that local government, police, and other interested parties more seriously supervise / control the sale of diesel oil

10 We recommend that local government, police, and other interested parties more seriously supervise / control the sale of mercury

99.0

99.5

13.8

99.0

15.2

49.5

98.6

Questionnaire result in the table above, is also supported by interviews result with informants who says that a solution to handling illegal gold miners activity are as follows:

1. Need to build a mutual commitment to stop illegal gold mining activities initiated by the regional government collaborate with police officers and related stakeholders as well as all levels of society in Kuantan Singingi.

2. Increase awareness of illegal gold miners and the community about the importance of keeping the river environment and health

3. Law Enforcement firmly for the perpetrators (investors, workers), a receiver, the apparatus involved to protect and carry out illegal payments to the perpetrators of illegal gold mining.

4. Establish Environmental Care Forum or re-activate the integrated team combating illegal gold mining from Muspida, Upika and the entire community, a variety of other cross-sector. Some informants mentioned that existing Integrated Team Combating illegal mining, first in 2012-2014 was very active, but lately inactive



because of budget constraints local government in combating illegal miners.

5. The Local governments need to help provide other livelihood alternatives for the perpetrators of illegal gold mining and the local community, such as farming, agriculture, fisheries and others for the welfare of the community.

6. Controlling Illegal gold mining activities with overseeing the sale of mercury, diesel fuel and equipment related to illegal mining gold mining activities.

7. Needed a Regional Regulation to handling of illegal gold miners in the form zoning of mining area. However, in contrast to the perception of some other informants who disagree with zoning the mining area because it was feared would result in contamination of the waste remains in the surrounding area. Moreover, by looking at the nature of the spread gold (alluvial), is an obstacle to establishing a suitable location for zoning the mining area.

## DISCUSSION

Illegal gold miners activities in various areas, especially in Kuantan Singingi has caused more harm to the community surrounding the watershed and problem due to river environmental pollution and also the risk of long-term health, as well as for the local community and for the country when compared to the benefits perceived by some perpetrators. The State loses revenue because these activities are done illegally, the miners do not pay taxes, royalties, wasted of resources while the environment becomes damaged and disrupted ecosystems, river water is polluted because of the mining ways and processing that does not follow the rules (good mining practice).

The impact of illegal activities toward river environmental pollution, its impact on socio-economic conditions of workers and the community surrounding the watershed, and also workers' health disorders can be described as follows:

Picture 4 Impact of Illegal Gold Mining Toward River Environment

## SOCIAL- ECONOMY AND HEALTH DISORDERS

The impact of illegal gold mining activities on the environment is the pollution of river water and water irrigation dam in terms of turbidity and levels of Hg, DO, BOD and COD parameter were exceeded the threshold, resulting life of various types of rivers biota such as fish, shrimp, shellfish and other disturbed and die, the river water can no longer be used for their daily needs. Influence illegal gold mining activity in

the social economy is illegal gold mining activity has improved economic income of workers and investors, but the illegal miners have been detrimental to the surrounding community the watersheds, communities have difficulty getting clean water and illegal gold miners activities often lead to conflicts between the perpetrators of illegal gold mining and the police, local officials and officers of the company, physical clash, even to do anarchists damaging the car and burn local government officials on building the company (PT.DPN) who participate in curbing illegal mining. Illegal gold mining activity influence on health, that of illegal workers in Kuansing experiencing various symptoms of illness, occupational accident, and if illegal gold mining left unchecked in the long term, it can have an impact on public health issues that accumulate mercury and lose the next generation.

According to Hendrik L. Blum in Notoatmodjo [15], the environment is one of the dominant factors that affect degree of public health. In this research, the river water and environment polluted can be at risk for various health problems in illegal gold mining workers and the surrounding communities who use river water, eat fish, shrimp, shellfish which accumulate Hg. Polluted rivers environment can also be a socioeconomic problem for the community surrounding the watershed, such as fishermen lost their livelihoods as a result of river water pollution and had trouble getting the fish in the river, the difficulty of a clean water source that requires a fee for the provision of clean water. Furthermore, health problems caused by river water pollution can also increase spending for medical expenses, and low socio-economic conditions of the community will also influence the risk of health problems.

### a. Effort to Handling of Illegal Gold Mining That Ever Done

These results indicate that socialization and education effort conducted by the local government, police and other Stakeholders in form orally and in writing, counseling, seminars, distribution of posters, leaflets and hoardings on the impact illegal gold mining activity on health and the environment is not optimal and has not reached to the countryside where there were lots of illegal gold mining activities, so that the information is not up to the perpetrators and their communities as a primary target. Efforts to introduce and educate people about the impact of illegal gold mining activity on health and the environment should be more frequent and routine, to remote villages in Kuansing so that the information is delivered to all targets. According



to Notoatmodjo [15], the target of health promotion consists of a target primary, secondary and tertiary. The primary targets, namely the perpetrators of illegal gold mining and communities affected by river water pollution and vulnerable / at risk for health problems caused by illegal gold mining activities. Secondary goals, namely community leaders, both formal and informal respected or influential for the perpetrators of illegal gold mining. Tertiary goal is policy makers or officers from all sectors.

Advocacy which did by the Kuansing local government and Riau Police (Province's Police) in an effort to curb illegal mining has not been entirely successful because the demolition is done unsustainable and time is limited so that the activities of illegal gold mining activity re-occur. Advocacy carried by Kuansing local government to the central government has not yet to get a response from the central government, either in the form of budget support as well as technical manual handling solutions implementation of illegal gold mining activity in the area.

The results show that efforts to curb illegal mining has been carried out by Kuansing local government officers and Kuansing police by burning hundreds of illegal rafts unit, seized evidence (machine Dongfeng), catch the perpetrators of illegal gold miners were working when the raid took place, capturing some of the results of illegal gold fence. However, perpetrators of illegal gold miners against the effort and sometimes they involve local resident thus destroyed Kuansing local government operational car. Efforts to curb illegal mining conducted so far considered to be less effective because of illegal gold mining activity still happening even a rapidly growing both in the river and on the land and has spread to almost all districts in Kuantan Singingi. This study is consistent with Nuraina's research result[12] in Aceh, that until today in several regencies / cities do not have the Qanun (regional regulations) to regulate mining. While the Qanun position as a key condition to make the determination of mining area and issued license people mining.

According to the Hanafi [16], local governments need to create a policy in the form of a special rule mining based on the principles of balance economic, ecological, social, political, and legal environment. The local government also issued a regulation to increase the role and participation of local communities, especially the holders of customary rights, in which includes the zoning WPR, avoid overlaps of interests, actions and sanctions by law enforcement agencies against criminals in the illegal mining activities.

#### b. Problems and Obstacles in Handling Of Illegal Gold Mining Right Now

Based on the research, it was found problems to handling illegal gold mining activity henceforth look for solutions based on the problems encountered, as well as the necessary role of institutions and related parties, as in the following table.

Table 3. Problems and Solutions to Handling Illegal Gold Mining Activities

No	Problem	Solutions	Department and Sector Involved
1.	No mutual commitment to curbing the <u>illegal gold mining and protect the river environment from</u> pollution.	Required mutual commitment <u>and</u> <u>Kuansing local government</u> policy, law enforcement agencies, stakeholders, public support to curb illegal mining and the river environment <u>of the river</u>	
		- <u>Local government (Regent and</u> Chief of Department)	
		- Parliament, judiciary	
		- Police Region/ Police	
	District, Local Army Corp		
		- Head of District, Village Chief, Community organization, professionals	
		- Academians	
		- NGO, Community leaders, indigenous,	
		- religious leader	
		- mass media (radio,TV.	
		Newspaper)	

No clear information

dissemination related to illegal gold mining

Required information

dissemination so that all stakeholders has one vision that illegal gold mining have been due river environmental pollution so needed a program to control and handle illegal gold mining, community empowerment, and reclamation.

- Integrated team on

Handling Illegal Gold

Mining

- Environmental Agencies, Department Planning and Regional Development, Fisheries Department

- Energy and Natural Resources Department, General Work Department

- Health Department,

Plantation Department

- Parliementary, Head

District, Village Chief

- Local army and corp

- Academians

- NGO, Community leader, indigenous, religious, media mass.

3

Illegal Gold Mining

Activities and the community don't aware yet about the impact of illegal gold mining toward pollution and health problem risk.

Required socialization and

education routinely about the impact of illegal gold mining toward environmental pollution and health problem as targeted (primary, secondary, tertiary) to raise awareness the perpetrators of illegal gold mining, community, and stakeholders.

- Integrated team on handling

to illegal gold mining

- Health Department, Energy and Natural Resources Department, Fisheries Department and Parliamentary

- Head of District, Village Chief, Community organization. Professional

- Police, local officers

- Academians

- NGO, Community leaders, indigenous

- Religious leader

- The mass media (radio, TV, Newspaper)

4

Lack of cooperation,

coordination and involved of the related sector in handling of illegal gold mining.

Kuansing local government need to

improve cooperation and coordination, involved related department and agencies. The local government also can ask help from the central government by the related ministry, police, comrade of soldier, to curbing the illegal gold mining.

- Element of

Muspida/Forkopimda (Regent, parliamentary, police, local police, and judiciary)

- Related department :

Energy and Natural Resources Department, Health Department, Fisheries, Agricultures, And Department of Social Affairs

- Press and public

- Central Government ( Ministry of Internal Affair, Energy and Natural Resources, Environmental, Social Affairs Ministry)

- Indonesia Soldier and

Police

5

Curbing illegal gold

mining and law enforcement towards the perpetrators of illegal gold mining and police officers were involved.

Curbing the illegal gold mining

gradually and sustainable in form band illegal gold mining activities in river flow, irrigation dam, creeks and plantation area. Law enforcement needed to raise a deterrent effect.

- Integrated team on combating illegal gold mining

- Law Enforcement

- Police and the corp

- Mass media

6

Social control after

close illegal gold mining activity

Preparing social control program

after close illegal gold mining for the local community who affected, preparing employment, empowerment, skill training, diversification, control rubber price. The local government can use village funds for village community welfare.

- Kuansing local government

- Private Company

- Police and the corp

- Head of District, Village chief, community, and press

c. Solutions to Handling Illegal Gold Mining Activities

The following figure is an instrument of policy research "Criminal Justice Policy

Cycle" [17] used to identify problems and find solutions to handling of illegal gold mining activity in Kuantan Singingi through a system approach.

Can be explained that system to handling of illegal gold mining in Kuantan Singingi from identifying the problem that illegal gold mining impact on river pollution, raises socio-economic problems in the local community and risking workers health and communities, and then to identify a solution that allows (disciplined or given permission) based on the objectives to be achieved include the component input, process, output, outcome, then selected the best solution is illegal gold miners to be

Solution on Handling of Illegal Gold Mining Activities in Kuantan Singingi Region 1227

disciplined with six solutions, namely: a joint commitment and policy, information dissemination, socialization, and education, improving cooperation and coordination, carry out policing and law enforcement, and social control. Furthermore, the implementation of regional governments policy, stakeholders towards illegal gold mining in maintaining and protecting the river environment, irrigation dams, and evaluating the policy pursued until the policy expires.

Illegal gold mining activity has damaged the environment and polluting Kuantan river, Singingi river and irrigation dam in Kuantan Singingi, so it needs to be elaborated 6 solution treatment and prevention as follows:

COMMITMENT AND POLICY

Required a mutual commitment and policies of Kuansing Local Government, law enforcement by the officers, stakeholders, public support for disciplined the illegal gold mining to save the river environment, by :

a) Reactivating an integrated team to combating illegal gold mining, which consists of Muspida elements, Chief department, head of district, community representatives (community leaders, religious leaders, traditional leaders), academians and other stakeholders. This team is cross-sectoral, has a work program, and actualized

b) Allocated budget to curbing illegal gold mining operations through budgeting of Kuansing Environmental Agencies and provide investigator human resources in Environmental Agencies through training, so that environmental cases can be processed.

c) Demand and reactivating preventive corp (education, socialization, and public relations), law enforcement corp, and divide task and responsibilities, as well as providing operational facilities.

d) Planning and execution of illegal gold mining control program clearly e) Monitoring and evaluation sustainable control program

This study is consistent with Clifford [9], Hirons [10] in Sub-Saharan Africa, Spiegel et al, [11] in the Amazon, which recommends the handling of illegal gold mining that the Government needs to engage stakeholders in designing environmental planning strategies, and should intervene to restrict the use of mercury by the

community through a participatory approach to the perpetrators.

This research is in accordance with Robbins and Timothy;s opinion [18] that the effectiveness of integrated team is affected by the adequacy of resources, leadership, and structure, trust climate, performance evaluation and rewards system, members ability, personality, allocate roles, diversity, team magnitude, team flexibility, members preference, intent and purpose establishment of integrated teams, efficacy, conflict and social loafing level. According to Kreitner and Kinicki [19], usually the teams work is not always successful, could have had failures that can be caused due to an error in management or because of unrealistic expectations. According to the researchers that the lack of effectiveness in handling of illegal gold miners in Kuantan Singingi can be caused by a team that has not been able to overcome his weaknesses, operational funds are limited, some people involved in illegal gold mining hostile or colluded with the team, resistance to doing something and less long- term commitment to maintain and protect the river from pollution caused by illegal gold mining. Therefore, team effectiveness of handling of illegal gold mining team needs to be improved through teamwork systematically integrated to achieve collective goals, build trust, and more integrated.

#### INFORMATION DISSEMINATION

Required information dissemination of this study result so that all sector concerned with a perspective that illegal gold mining activities resulted in environmental damage and river pollution, so it requires the involvement of various sectors, departments and agencies involved in formulating treatment and preventive program, community development program, and rehabilitation or reclamation. Furthermore, need a large gathering at the district level to formulate action, should be designed speaker and participants that should be presented as well as the resulting formulation. Then followed up at the district level to the village level. It should also be pointed out that, the gold potential in Kuansing that is alluvial or scattered on the riverbed and the mainland, so that inefficient and not feasible economically managed, and uneconomical if mined using high technology because it will require huge costs. Therefore, the determination of mining area and mining license considered less possible, because of there will be not balanced between the results obtained (with the magnitude of the environmental reclamation costs to be borne by the government.

#### SOCIALIZATION AND EDUCATION

Integrated teams to combating illegal gold mining need do socialization and education regularly about impact of illegal gold mining activities toward environmental pollution and the risk of health problems targeted (primary, secondary, tertiary) to create awareness of illegal gold miners, local communities, and stakeholders. The local government through related agencies (Department of Health, Energy and Natural Resources Department, Environmental Agencies, Department of Fisheries, Head of District and others) need to work together with village officials, elements of society, NGOs concerned with the environment, the organization of health professions for socialization and education impact of illegal gold mining on health and river environmental pollution, including empowering the community leaders and religious leaders through religious lectures in mosques and wirid recitation.

Kuansing Police Chief through the work program can assign "Babinkamtibmas" to disseminate and educate the public by way of " walk and talk" through Police Environmental Concern Program, which is equipped with a booklet (module) guide to the dissemination of information and images related to the impact of illegal gold mining towards river water pollution, and the risks to health. (see appendix 20). According to Sippl and Henrik [20], socialization and education can build community insight to the dangers of illegal gold mining activity. Socialization and educational impact of illegal gold mining activity in Kuansing can be done through counseling,

seminars, distribution of posters, leaflets, put up a billboard or billboards on the roadside, advertising through radio, television, comic books, booklets / modules, education and training of community representative, preventive corp from police who do education, guidance to the public and direct visits to the site to stop the illegal gold mining activities. As is done in Ghana, the gold miners are very sensitive to the content of messages that emphasize the dangers of mercury to children. In Brazil, a brochure that said the impact of mercury on impotence, turned out to be very effective in raising awareness of the illegal miners.

This study is suitable with Notoatmodjo [15], that the socialization and education conducted by stakeholders need to pay attention to health promotion strategies (advocacy, social support, empowerment), and targeted health promotion, which consists of the primary, secondary, and tertiary target. Socialization and education is done it should also be able to: 1) Increase the ability of the community to, able to maintain and care for the surrounding environment, maintain and improve their health. 2) Bridging the community with those who

"concern" to environmental health.

3) Advocate for the decision makers in various sectors / acting to support programs related to environmental awareness of illegal gold mining activity. According to Borisch [21], that the public health association should help governments and stakeholders to promote the values of public health importance, conduct public policy, including solidarity, participation, empowerment and social justice.

To implement sustainable river environmental protection program also takes the role of universities to provide input and solutions, involvement of various health professional organizations, the role of non-governmental organizations (NGOs) is strong and not bound by government and special interests, also takes the role of mass media (television, radio, newspapers, etc.). In addition, raised the case of environmental pollution caused by illegal gold mining in Kuansing and other areas into a national issue, so it gets the attention of policymakers at the district, provincial and national.

#### COOPERATION AND COORDINATION

Kuantan Singingi Regional Leader (Regent, Chief of Police, military command, judiciary) need to improve cooperation and coordination, involvement of departments and agencies (Energy and Natural Resources, Environmental Agencies, Health, Fisheries, Agriculture, Social and Workers Affairs), universities, NGOs, the role of media (the press) and community support indispensable to safeguard the policy to handling of illegal gold mining activity and save the river environment in Kuansing sustainably. When required, the Government may request assistance from the Provincial Government and the Central Government (President) through the relevant ministries (Ministry of Internal Affairs, Energy and Mineral Resources, Ministry of Environment, Ministry of Social Affairs) relating to budget aid and manual handling of illegal gold mining activity in an effort to save the river environment. In addition, it is also necessary control of the security officers involved, if necessary, request assistance Kuantan Singingi Regent to police chief and military commander to curb the unscrupulous members who were involved.

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This study is consistent with Gibb and OLeary research recommendations [22], in South America, Asia, and Africa, that required central government policy and national plan of action that includes a public health strategy toward the dangers of mercury exposure used by small-scale gold miners, as the result of Minamata Convention, should be immediately implemented.

This research is in accordance with Wahyono's opinion [23], which states that necessary communication between stakeholders in the handling of illegal gold mining because the local government has difficulty solving problems of illegal gold mining. The difference between the Regional Government Law No. 23/2014 [24] Clause 14, that the authority of the implementation of Energy and Natural Resources Ministry field is divided between the central government and provincial, with Mining Law No.

4/2009 [25] Clause 20-26, states that the mining area is determined by the regent / mayor after consultation with the regency / city, can lead to confusion. To solve problems above, the necessary communication and coordination between the Central Government, Provincial and Regency / City along with other stakeholders in handling of illegal miners. Local government must dare to make a new breakthrough in the publishing of regional policy, eg enter the role of indigenous peoples, local wisdom in the management of mining, prepare a budget for coordination with security forces in tackling illegal miners.

#### CURBING ILLEGAL MINING AND LAW ENFORCEMENT.

Curbing Illegal gold mining gradually and sustainable which is meant is done prohibition and control of illegal gold mining along the flow of Kuantan river, Singingi river, Kukok River and the irrigation dam. Later ban illegal gold mining in creeks, as well as in the area of the plantation, while preparing social control program for communities affected. Law enforcement expressly towards the perpetrators of illegal gold miners (workers and investor), local police officers were involved, protecting the illegal gold mining and doing extortion doing so raise a deterrent effect. According to Ikhsan [26], that curbing illegal gold mining in Sijunjung (West Sumatra) done gradually, can not do with a fast time, because of illegal gold mining activities in Sijunjung regenerate such a strong chain, so need time to break these chain. The difference with this study is the illegal gold mining activity in Kuansing operates relatively short time, ie since 2006 when compared to illegal gold mining in Sijunjung that has lasted decades, and is done for generations. So, we need long-term efforts through preventive efforts, is to change society mindset through intensive counseling. The government can do preventive and repressive. Short-term efforts, the government can curb illegal mining in mining locations in repressive (law enforcement) to perpetrators (investors and workers) as well as local police officers were involved. The Government may impose administration punishment in the form of reprimands, penalties, and



finances so that a deterrent effect.

Different with Somantri [27] which says that if illegal gold mining is closed there will be a very complex social problems associated with community culture that has been formed at this time, Security after closing the illegal gold mining will be vulnerable in respect of their economic situation to be disturbed. Therefore, the government needs

to conduct surveillance and set up social control programs after close illegal gold mining activity.

## SOCIAL CONTROL

Local government and the business community (private) need to prepare a social control program after closing the illegal gold mining activity for the community, such as setting up jobs for local people affected by this policy. This study is consistent with Ikhsan's opinion [26] which says that government can instruct people to do other work as their livelihood. Providing assistance to these communities is a form of participation of the government to find solutions to problems when community leave their work as gold miners. Different with Somantri [27] who said that transfer of gold miners profession into other professions is not simple and easy. Similarly, Robbins's opinion [28] and Hanggraeni [29] that changes (job) is not an easy process. The process of change is usually always followed by resistance or refusal by each individual for several reasons: 1) The individual does not capture the whole essence of being delivered or simply get information piecemeal, 2) the fear of uncertainty, 3) economic factors, might result in they lose their economic resources that had been controlled, 4) security, the individual may feel threatened, 5) habit, doing new things unusual and this is a process that is very heavy.

Despite resistance or rejection of various individuals (perpetrators of illegal gold mining) to curb illegal gold mining process is done, but it does not make the enforcement process becomes impossible. According to Robbins [28] and Hanggraeni [29] resistance of course will impede changes (curb) process, but there are several ways to do so that people would voluntarily engage in the process of curbing illegal mining, namely: 1) Communicating curbing illegal gold mining process clearly to reduce uncertainty so that people feel safe and ultimately no longer be opposition, 2) Increasing community participation, 3) Facilitate and provide assistance, training, counseling to help them adjust, 4) negotiate towards those who oppose the process of curbing illegal gold mining that create a mutually beneficial solution, 5) in collaboration with the opponent illegal gold mining demolition to be more cooperative towards policing, 6) Provision punishment toward parties in opposition to the demolition process. There are times when punishment is required when persuasive ways that can not be reduced resistance to the process of curbing illegal mining. Curbing Illegal gold mining in Kuansing can be happen gradually in according to agreement or consultation with relevant parties, while preparing other employment for the people affected, and empowerment through counseling, organizing and community development training for improving various types of skills of business, ability to raise family income, and the utilization of existing environmental potential. All parties need the same perception or the "one language" to convince public that illegal gold mining has negative impact on environmental pollution, for life of surrounding community and the health risk is greater. Indeed, many business opportunities that can be developed for the community in Kuantan Singingi, both in agriculture such as farming, rice, peppers, onions, bananas, and other fruits, plantations (palm, rubber, citrus, durian, etc.), livestock operations (buffalo, cows, goats, chickens, etc.), fish farming cages program in Kuantan Singingi river flow as an attempt to save the river from pollution, pond fish culture storied (biopot) around the house residents who do not require huge costs. Likewise, the potential of the business of raw materials, rocks, gravel, and sand are managed in environmentally friendly ways, including the development of eco-tourism potential in Kuansing. Where possible, the government should control the price of rubber or provide subsidies for low rubber prices, because the majority of the villagers in Kuantan Singingi are rubber gardens. In addition, the public can diversify (diversification of business), such as rubber tapping morning, noon and afternoon manage fish ponds, farming and other businesses, so income is increased. Local governments can also use village funds budget to help provide agricultural land, plantations, seeds, livestock, fertilizer and other assistance in order to improve the welfare of rural communities.

## CONCLUSION

Solution to handling of illegal gold mining activity in Kuantan Singingi, namely:

a) Required mutual commitment and local government policies to curb or halt illegal gold mining: Enabling Integrated Team of curbing illegal gold mining, allocate operating funds that are deposited through the budget Environmental Agencies, set up a Preventive and repressive with duties and responsibilities, organizational infrastructure, planning and program implementation, monitoring and evaluation curbing program sustainably.

- b) Information dissemination required that all parties have same perspectives that the illegal gold mining activities have resulted in environmental damage and pollution of the river, so it requires the involvement of various parties, agencies and related institutions to formulate prevention and treatment programs, community empowerment and reclamation.
- c) An Integrated team of combating illegal gold mining (synergy) continuing efforts to introduce and educate people regularly about the impact of illegal gold mining toward river environmental pollution and the health risk are on targeted.
- d) Kuansing regional leader and elements need to improve cooperation and coordination, the involvement of departments and agencies as well as community support indispensable to safeguard policy on handling of illegal gold mining activity and save the river environment in Kuansing sustainably.
- e) Curbing illegal gold miners can be gradually and sustainable, as well as law enforcement firmly against the perpetrators of illegal miners (workers and investors), local police officers involved and commit extortion so that a deterrent effect.
- f) The local government and the private sector need to prepare a social control program after close the illegal gold mining with prepare jobs for people, empowerment, improving skills and peoples incomes, diversification, local governments may use village funds budget to help the villagers.

#### SUGGESTIONS

- a) The perpetrators of illegal gold miners (workers / investors), the public and stakeholders to realize that illegal gold mining activities have resulted in river environmental pollution and detrimental to the surrounding community, and therefore illegal gold mining activity in streams and irrigation dams to be terminated through mutual commitment.
- b) To the parties concerned (local government, police, Society, perpetrator of illegal gold mining, etc.) need to prepare short term program (<1 year) to disseminate the impact of illegal gold mining on river environmental pollution; Medium Term Program (1-2 years) doing disciplined of illegal gold mining activity; Long-Term Program (> 2 years) conduct river environmental restoration and farmland.
- c) To Kuantan Singingi local government and stakeholders should use the results of this study as a material for preparing an integrated policy on handling of illegal gold mining and protect the river environment from pollution.

## Solution on Handling of Illegal Gold Mining

Activities in Kuantan Singingi Region

### INTRODUCTION

Industrial and technological development is very rapid today have a positive impact in form of industrial products and technologies that can be utilized in improving the quality of life, but also have a negative impact in forms of environmental pollution, such as industrial waste and technology. Environment pollution needs to be controlled so as not to interfere the environment and human health [1].

Environmental pollution caused by heavy metals, such as arsenic, lead, cadmium, and mercury are very harmful to human health, animals, plants and life continuity in the surrounding environment [2]. At low concentrations, heavy metals have direct effect and accumulate on the food chain, disrupting environmental biota so will impact on human health despite relatively long and far from the polluted sources [3].

The emergence of environmental pollution cases which exceeds the limit, resulting in losses and social unrest, because has a high risk to expose to heavy metals and transition metals which are toxic in certain doses and concentrations. As well as incidence of Minamata disease cases, a “strange” disease which has a neurologic effect on human, written in historic scientific work Minamata Byo by Masazumi (1972) from Gakuen Kumamoto University, Japan. This disease is caused by organic methyl mercury poisoning in fish and shellfish, believed to be due to organic mercury pollution by a chemical factory in Minamata city, Japan that dump waste into Minamata bay in Shiranui Sea area [4].

Since industrial era, mercury becomes an excavation contaminant material, because mercury can be utilized as much as possible. One of environmental pollution due to mercury is the excretion of waste products (tailings) on gold processing by amalgamation[5]. Gold mining activities using amalgamation processing in general, will produce a positive impact that is served gold for needs of human life, but also has a negative impact in form of environmental pollution by Hg vapor. A total of 10% - 30% Hg which used to be lost or released to the environment[6].

Illegal gold mining activities are risking health and safety of workers because the use of mercury as an ingredient for mixing and combustion of amalgam processes (mercury and gold). The impact will be seen in next few years. Research on effects of mercury have been carried out in Indonesia, among others by Sudarmaji et al [7] that examines consumption of marine fish variable, mercury levels in hair, and health symptoms of community in Kenjeran Beach, Surabaya. The study indicates symptoms occurs in those who consumed fish among other kidney pain, dizziness, tumors, gums bleeding, and vision problems. Rudolf [8] also investigated health problem in the perpetrators of illegal gold mining and society in relation to mercury exposure around Kapuas River, Sintang Region, West Kalimantan. The results showed no difference in disease due Hg content between the groups of miners and non-miners.

Illegal Gold Mining Handling in Africa and Amazon, recommends that the Government needs to involve the stakeholders in designing environmental planning strategy, and should intervene to restrict the use of mercury by the community through a participatory approach on perpetrators of illegal gold mining (ASGM: artisanal and small-scale gold mining) [9, 10, 11].

According to Nuraina [12], until today in several Provincial, Regency / City in Indonesia does not have Qanun (regional regulations) to regulate mining, while the Qanun position as a key to the determination of mining area and issue the permit.

Illegal gold mining activities are found in various regions in Indonesia, among others; in Pongkor, Bogor-West Java, Kulo-North Sulawesi, Landak-West Kalimantan, Gunung Mas-Central Kalimantan, Jambi, Sijunjung-West Sumatra. In Riau province is also found in Kampar, Indragiri Hulu, but are most numerous in Kuantan Singingi (Kuansing), which is along the flow of the Kuantan River, Singingi River, irrigation dams, creeks and plantation area [13].

Kuansing area is known contain gold (alluvial) which is quite a lot, thus attracting the interest of small-scale illegal gold miners who come from outside of the area. Illegal gold miners activity is conducted since 2006, initially by migrants and followed by local villagers. Illegal gold miners number has increased very rapidly from year to year and spread almost in every district and villages close to the river flow. In January 2014 there were approximately 2,103 units and in January 2015 is estimated at more than 3,000 units of illegal miners raft and machinery (Dongfeng) equipped with a vacuum, and a unit run by 3 to 4 workers. It is estimated that approximately 9,000 to 12,000 gold miners who actively operate every day, both migrants from outside the region and the local community. There are even some illegal gold miners were using heavy equipment (excavator) to dredge the land

optimally[13].

Kuansing local government and its board have tried to socialize impact of illegal gold mining activities in each district, but the majority of illegal gold mining perpetrators in those villages or village around looks are less concerned. Curbing illegal gold mining has also been frequently made by the Government together with the police, even with the involvement of the Riau Police, as do curbing Siak's illegal gold mining operations for 12 days. This operation is performed by searching along Kuantan Singingi river and managed to burn over 438 rafts of illegal gold miners, arresting dozens of perpetrators. However, after the operation ended, local residents back again conduct of illegal gold mining activities.

Based on initial survey results, some of the illegal gold mining perpetrators saying that they did not feel scared if raided and arrested by the police. They always get information from the security officers who protect their activities. Perpetrators and owners of illegal gold mining confessed always depositing security money (bribes) to the officers in each time security officers came to the area, about once a week. Some community leaders, religious leaders, village officials and traditional leaders (niniak mamak), who lived in villages in Kuansing, there are anti to illegal gold mining activities, but many of them do not care about it. They seem familiar with such as illegal gold mining activities in the neighborhood. Even among them are the investor, land owners, illegal gold mining workers and have relatives as perpetrators of illegal miners to improve their economic. Illegal gold mining activities in Kuansing resulted in water pollution of Kuantan River, Singingi river, a tributary whose waters flow into residential areas, water irrigation dam which is already cause for concern. According to Bintal Amin (2014), illegal gold mining activities in Kuansing will be "a time bomb" that have an impact on the environment, so this should be a common concern, particularly use of mercury to the environment. The use of mercury, should not directly discharge into rivers and the environment and should be managed well [14].

The local government faced two choices, there are : to eradicate illegal gold mining which has polluted the river environment or provide employment for the community through permit of people mining. This research aims to formulate solutions to handling of illegal gold mining activity in an effort to preserve the river environment in Kuantan Singingi.

## RESEARCH METHODOLOGY

This research is descriptive research. Qualitative explorative research method conducted to gather information from informants, focus on representation of phenomenon that happens to get an idea of the perception of informants (stakeholders) and the public about the watershed of alternative solutions handling illegal gold mining activities through questionnaires, document tracking, field observation and in-depth interviews related to efforts made by the local government, police, stakeholders in quest for solutions to handling of illegal gold mining activity and protect the river environment in Kuantan Singingi from pollution.

This research was conducted in seven districts from 15 districts in Kuantan Singingi. The chosen districts are location with most illegal gold mining activity and dispersed in Kuantan River, Singingi River, Kukok River and irrigation dam that had previously been conducted enforcement efforts by the regional government officers and the Police, namely: Singingi Hilir district, Singingi, Kuantan Mudik, Gunung Toar, Hulu Kuantan, Kuantan Tengah, and Sentajo Raya. The research was carried out two years, starting on February 15 2014, until February 15, 2016.

Population in this study are all illegal gold mining workers spread over 15 districts in Kuantan Singingi, approximately 8,412 until 12,000 people. The amount is obtained based on number of illegal gold mining rafts, approximately 2,103 until 3,000 units scattered along Kuantan River, Singingi River and creeks also the irrigation dam. One unit of illegal gold mining run by 3-4 people. Sampling was done based cluster by quota and accidental sampling, each district was taken a sample of 30 people of workers spread throughout seven districts. Determination of the sample using Rapid Assessment Procedure (RAP) method which has been jurisprudence by World Health Organization (WHO), as many as 30 respondents for each district, so the sample size is  $30 \times 7 = 210$  Illegal workers. Then the people who live in the basin and is not involved as perpetrators of illegal miners are also used as a sample (respondents) as many as 210 people.

Further for qualitative research, Informants are selected by purposive sampling. The selected informants is Head of Energy and Natural Resources Department, Environmental Agency (BLH), Health Department, Plantation, Fisheries, Agriculture, Chief of Police, Environmental expert, Chairman of Parliament, Head of Local District, Chief of village, Community leaders and perpetrators of illegal gold mining. The number of informants is determined according to data adequacy required. Data collection was discontinued if no longer found the variation information.

## RESULTS



#### a. Effort to Handling of Illegal Gold Mining. That Ever Do

Based on information from several informants, that on 2013 has been established Integrated Team Combating illegal gold mining by the local government in cooperation with the Police of Kuantan Singingi Kuansing in the efforts of socialization, education, advocacy and curbing illegal mining. Cross-sector efforts already made by the local government and stakeholders in 2013-2014, but in practice there are still some problems as follows.

Table 1. Efforts Ever Conducted by Local Government and Stakeholders

No  
Effort That  
Ever Do  
Activities  
Problems  
1  
Socialization  
and Education about Impact of Illegal Gold Mining Activities  
Seminar, Promotion,  
Brochure dispersed, poster, leaflet, billboard, etc.  
Socialization and education  
didn't reach village community, resulted they didn't know about the impact of illegal gold mining.

2  
Coordination  
and Advocacy  
- Regent ever asks  
the Region Government and Region Police by Forkopimda about illegal  
- Government, Police Officers, and Publics have less commitment to curb illegal gold  
gold mining solutions.  
- Regent has been sent a mail to President's Special Team and related ministries (Environmental Agencies,  
Energy and Natural Resources Ministry, Ministry of Internal Affairs) about illegal gold mining solution in  
Kuansing ( on  
2013).  
mining in sustainable and  
required large funds to curb illegal gold mining meanwhile Kuansing's local government budgets are limited.  
- The central government has not responded to a letter from Head of District related illegal gold mining solutions  
in Kuansing.

3  
Illegal Gold  
Mining  
Disciplined  
A joint team from the Riau  
Police, Local Government, and Kuansing Police have to disciplined illegal gold mining (capture some  
perpetrators and burned more than 438 rafts of illegal gold mining, seized evidence) that operate along the flow  
of Kuantan, Singingi, Kukok river.  
Efforts to curb illegal mining by  
the security officers often get physical resistance by the perpetrators of illegal gold miners. Curbing illegal gold  
miners who do not yet effective, illegal gold mining return after curbing. There were local police officers  
involved in illegal mining and commit extortion.

The following image is the result of field observations, in the form of a billboard ban on illegal gold mining  
activities made by Kuansing's District Police.

Interviews and observations result in the field, is also supported by the results of a document search on  
disciplined illegal gold mining, as shown in Figure 2, the police along with the local government confiscated  
machine tools Dongfeng and burn the raft of illegal in stream Kuantan and Singingi river, but perpetrators of  
illegal gold mining against by breaking operational car of Kuansing's Government.

Efforts to curb illegal mining conducted so far is considered less effective, due to illegal mining activity is still  
going on, both in the river and on the land and has spread almost to all districts in Kuantan Singingi.



b. Problems and Obstacles in Handling of Illegal Gold Mining All This Time Problems and Obstacles in handling of illegal gold mining activities in Kuansing based on interview with informants are :

1. There is no mutual commitment from policy makers.
2. Concern the perpetrators of illegal gold mining toward environmental pollution and health risk is still lacking. Perpetrators do not want to stop illegal gold mining for economic reasons for their family. This is supported by observations in the field, that illegal gold mining has resulted in pollution of river water and irrigation dams (see Figure 3).

1. The role of policy makers (stakeholders) and the public is still lacking
2. There were local police officers who frequent extortion and let illegal gold mining activities happen.
3. Lack of human resources and operational funds to curb illegal mining.
4. Mining area and mining license by people are not possible because gold potential in Kuansing is alluvial, that mining authority is in the central government and provinces.

c. Solution to Handling of Illegal Gold Mining Activities

Alternative solutions to handling of illegal gold mining activity in Kuantan Singingi

based on perception of the community surrounding the watersheds (respondents) are as follows:

Table 2. Perception of the community surrounding the watershed toward solution to handling illegal gold mining activities in Kuantan Singingi, 2015

No Public Perception Toward Solution on Handling Illegal Gold Mining

Activities (n=210)

1 The Local Government and Police expected to handle illegal gold miners seriously.

%

98.1

2 Just let Illegal Gold Mining going on 0.5

3 The illegal mining activity should be disciplined or terminated 100

4 Illegal gold mining activity should always raid (workers, investors, and fence were arrested and prosecuted)

5 We recommend that local police officers were involved, did extortion, and protect illegal gold mining dealt with firmly and prosecuted

6 Need to be made to local regulations, the establishment of the gold mining region and artisanal mining license

7 We recommend that the perpetrators of illegal gold miners return to work as before, such as farming, gardening, fishing, trade etc.

8 The local government should provide employment for the workers illegal mining in order not to pollute the environment

9 We recommend that local government, police, and other interested parties more seriously supervise / control the sale of diesel oil

10 We recommend that local government, police, and other interested parties more seriously supervise / control the sale of mercury

99.0

99.5

13.8

99.0

15.2

49.5

98.6

Questionnaire result in the table above, is also supported by interviews result with informants who says that a solution to handling illegal gold miners activity are as follows:

1. Need to build a mutual commitment to stop illegal gold mining activities initiated by the regional government collaborate with police officers and related stakeholders as well as all levels of society in Kuantan Singingi.

2. Increase awareness of illegal gold miners and the community about the importance of keeping the river environment and health

3. Law Enforcement firmly for the perpetrators (investors, workers), a receiver, the apparatus involved to protect and carry out illegal payments to the perpetrators of illegal gold mining.

4. Establish Environmental Care Forum or re-activate the integrated team combating illegal gold mining from Muspida, Upika and the entire community, a variety of other cross-sector. Some informants mentioned that existing Integrated Team Combating illegal mining, first in 2012-2014 was very active, but lately inactive

because of budget constraints local government in combating illegal miners.

5. The Local governments need to help provide other livelihood alternatives for the perpetrators of illegal gold mining and the local community, such as farming, agriculture, fisheries and others for the welfare of the community.

6. Controlling Illegal gold mining activities with overseeing the sale of mercury, diesel fuel and equipment related to illegal mining gold mining activities.

7. Needed a Regional Regulation to handling of illegal gold miners in the form zoning of mining area. However, in contrast to the perception of some other informants who disagree with zoning the mining area because it was feared would result in contamination of the waste remains in the surrounding area. Moreover, by looking at the nature of the spread gold (alluvial), is an obstacle to establishing a suitable location for zoning the mining area.

## DISCUSSION

Illegal gold miners activities in various areas, especially in Kuantan Singingi has caused more harm to the community surrounding the watershed and problem due to river environmental pollution and also the risk of long-term health, as well as for the local community and for the country when compared to the benefits perceived by some perpetrators. The State loses revenue because these activities are done illegally, the miners do not pay taxes, royalties, wasted of resources while the environment becomes damaged and disrupted ecosystems, river water is polluted because of the mining ways and processing that does not follow the rules (good mining practice).

The impact of illegal activities toward river environmental pollution, its impact on socio-economic conditions of workers and the community surrounding the watershed, and also workers' health disorders can be described as follows:

Picture 4 Impact of Illegal Gold Mining Toward River Environment

## SOCIAL- ECONOMY AND HEALTH DISORDERS

The impact of illegal gold mining activities on the environment is the pollution of river water and water irrigation dam in terms of turbidity and levels of Hg, DO, BOD and COD parameter were exceeded the threshold, resulting life of various types of rivers biota such as fish, shrimp, shellfish and other disturbed and die, the river water can no longer be used for their daily needs. Influence illegal gold mining activity in

the social economy is illegal gold mining activity has improved economic income of workers and investors, but the illegal miners have been detrimental to the surrounding community the watersheds, communities have difficulty getting clean water and illegal gold miners activities often lead to conflicts between the perpetrators of illegal gold mining and the police, local officials and officers of the company, physical clash, even to do anarchists damaging the car and burn local government officials on building the company (PT.DPN) who participate in curbing illegal mining. Illegal gold mining activity influence on health, that of illegal workers in Kuansing experiencing various symptoms of illness, occupational accident, and if illegal gold mining left unchecked in the long term, it can have an impact on public health issues that accumulate mercury and lose the next generation.

According to Hendrik L. Blum in Notoatmodjo [15], the environment is one of the dominant factors that affect degree of public health. In this research, the river water and environment polluted can be at risk for various health problems in illegal gold mining workers and the surrounding communities who use river water, eat fish, shrimp, shellfish which accumulate Hg. Polluted rivers environment can also be a socioeconomic problem for the community surrounding the watershed, such as fishermen lost their livelihoods as a result of river water pollution and had trouble getting the fish in the river, the difficulty of a clean water source that requires a fee for the provision of clean water. Furthermore, health problems caused by river water pollution can also increase spending for medical expenses, and low socio-economic conditions of the community will also influence the risk of health problems.

### a. Effort to Handling of Illegal Gold Mining That Ever Done

These results indicate that socialization and education effort conducted by the local government, police and other Stakeholders in form orally and in writing, counseling, seminars, distribution of posters, leaflets and hoardings on the impact illegal gold mining activity on health and the environment is not optimal and has not reached to the countryside where there were lots of illegal gold mining activities, so that the information is not up to the perpetrators and their communities as a primary target. Efforts to introduce and educate people about the impact of illegal gold mining activity on health and the environment should be more frequent and routine, to remote villages in Kuansing so that the information is delivered to all targets. According

to Notoatmodjo [15], the target of health promotion consists of a target primary, secondary and tertiary. The primary targets, namely the perpetrators of illegal gold mining and communities affected by river water pollution and vulnerable / at risk for health problems caused by illegal gold mining activities. Secondary goals, namely community leaders, both formal and informal respected or influential for the perpetrators of illegal gold mining. Tertiary goal is policy makers or officers from all sectors.

Advocacy which did by the Kuansing local government and Riau Police (Province's Police) in an effort to curb illegal mining has not been entirely successful because the demolition is done unsustainable and time is limited so that the activities of illegal gold mining activity re-occur. Advocacy carried by Kuansing local government to the central government has not yet to get a response from the central government, either in the form of budget support as well as technical manual handling solutions implementation of illegal gold mining activity in the area.

The results show that efforts to curb illegal mining has been carried out by Kuansing local government officers and Kuansing police by burning hundreds of illegal rafts unit, seized evidence (machine Dongfeng), catch the perpetrators of illegal gold miners were working when the raid took place, capturing some of the results of illegal gold fence. However, perpetrators of illegal gold miners against the effort and sometimes they involve local resident thus destroyed Kuansing local government operational car. Efforts to curb illegal mining conducted so far considered to be less effective because of illegal gold mining activity still happening even a rapidly growing both in the river and on the land and has spread to almost all districts in Kuantan Singingi. This study is consistent with Nuraina's research result[12] in Aceh, that until today in several regencies / cities do not have the Qanun (regional regulations) to regulate mining. While the Qanun position as a key condition to make the determination of mining area and issued license people mining.

According to the Hanafi [16], local governments need to create a policy in the form of a special rule mining based on the principles of balance economic, ecological, social, political, and legal environment. The local government also issued a regulation to increase the role and participation of local communities, especially the holders of customary rights, in which includes the zoning WPR, avoid overlaps of interests, actions and sanctions by law enforcement agencies against criminals in the illegal mining activities.

#### b. Problems and Obstacles in Handling Of Illegal Gold Mining Right Now

Based on the research, it was found problems to handling illegal gold mining activity henceforth look for solutions based on the problems encountered, as well as the necessary role of institutions and related parties, as in the following table.

Table 3. Problems and Solutions to Handling Illegal Gold Mining Activities

No	Problem	Solutions	Department and Sector	Involved
1.	No mutual commitment to curbing the <u>illegal gold mining</u> and protect the river environment from pollution.	Required mutual commitment and Kuansing local government policy, law enforcement agencies, stakeholders, public support to curb illegal mining and the river environment of the river		
		- Local government (Regent and Chief of Department)		
		- Parliament, judiciary		
		- Police Region/ Police		
		District, Local Army Corp		
		- Head of District, Village Chief, Community organization, professionals		
		- Academians		
		- NGO, Community leaders, indigenous,		
		- religious leader		
		- mass media (radio,TV.		

Newspaper)

No clear information

dissemination related to illegal gold mining

Required information

dissemination so that all stakeholders has one vision that illegal gold mining have been due river environmental pollution so needed a program to control and handle illegal gold mining, community empowerment, and reclamation.

- Integrated team on

Handling Illegal Gold

Mining

- Environmental Agencies, Department Planning and Regional Development, Fisheries Department

- Energy and Natural Resources Department, General Work Department

- Health Department,

Plantation Department

- Parliementary, Head

District, Village Chief

- Local army and corp

- Academians

- NGO, Community leader, indigenous, religious, media mass.

3

Illegal Gold Mining

Activities and the community don't aware yet about the impact of illegal gold mining toward pollution and health problem risk.

Required socialization and

education routinely about the impact of illegal gold mining toward environmental pollution and health problem as targeted (primary, secondary, tertiary) to raise awareness the perpetrators of illegal gold mining, community, and stakeholders.

- Integrated team on handling

to illegal gold mining

- Health Department, Energy and Natural Resources Department, Fisheries Department and Parliamentary

- Head of District, Village Chief, Community organization. Professional

- Police, local officers

- Academians

- NGO, Community leaders, indigenous

- Religious leader

- The mass media (radio, TV, Newspaper)

4

Lack of cooperation,

coordination and involved of the related sector in handling of illegal gold mining.

Kuansing local government need to

improve cooperation and coordination, involved related department and agencies. The local government also can ask help from the central government by the related ministry, police, comrade of soldier, to curbing the illegal gold mining.

- Element of

Muspida/Forkopimda (Regent, parliamentary, police, local police, and judiciary)

- Related department :

Energy and Natural Resources Department, Health Department, Fisheries, Agricultures, And Department of Social Affairs

- Press and public

- Central Government ( Ministry of Internal Affair, Energy and Natural Resources, Environmental, Social Affairs Ministry)

- Indonesia Soldier and

Police

5

Curbing illegal gold

mining and law enforcement towards the perpetrators of illegal gold mining and police officers were involved.

Curbing the illegal gold mining

gradually and sustainable in form band illegal gold mining activities in river flow, irrigation dam, creeks and plantation area. Law enforcement needed to raise a deterrent effect.

- Integrated team on combating illegal gold mining

- Law Enforcement

- Police and the corp

- Mass media

6

Social control after

close illegal gold mining activity

Preparing social control program

after close illegal gold mining for the local community who affected, preparing employment, empowerment, skill training, diversification, control rubber price. The local government can use village funds for village community welfare.

- Kuansing local government

- Private Company

- Police and the corp

- Head of District, Village chief, community, and press

c. Solutions to Handling Illegal Gold Mining Activities

The following figure is an instrument of policy research "Criminal Justice Policy

Cycle" [17] used to identify problems and find solutions to handling of illegal gold mining activity in Kuantan Singingi through a system approach.

Can be explained that system to handling of illegal gold mining in Kuantan Singingi from identifying the problem that illegal gold mining impact on river pollution, raises socio-economic problems in the local community and risking workers health and communities, and then to identify a solution that allows (disciplined or given permission) based on the objectives to be achieved include the component input, process, output, outcome, then selected the best solution is illegal gold miners to be

Solution on Handling of Illegal Gold Mining Activities in Kuantan Singingi Region 1227

disciplined with six solutions, namely: a joint commitment and policy, information dissemination, socialization, and education, improving cooperation and coordination, carry out policing and law enforcement, and social control. Furthermore, the implementation of regional governments policy, stakeholders towards illegal gold mining in maintaining and protecting the river environment, irrigation dams, and evaluating the policy pursued until the policy expires.

Illegal gold mining activity has damaged the environment and polluting Kuantan river, Singingi river and irrigation dam in Kuantan Singingi, so it needs to be elaborated 6 solution treatment and prevention as follows:

COMMITMENT AND POLICY

Required a mutual commitment and policies of Kuansing Local Government, law enforcement by the officers, stakeholders, public support for disciplined the illegal gold mining to save the river environment, by :

a) Reactivating an integrated team to combating illegal gold mining, which consists of Muspida elements, Chief department, head of district, community representatives (community leaders, religious leaders, traditional leaders), academians and other stakeholders. This team is cross-sectoral, has a work program, and actualized

b) Allocated budget to curbing illegal gold mining operations through budgeting of Kuansing Environmental Agencies and provide investigator human resources in Environmental Agencies through training, so that environmental cases can be processed.

c) Demand and reactivating preventive corp (education, socialization, and public relations), law enforcement corp, and divide task and responsibilities, as well as providing operational facilities.

d) Planning and execution of illegal gold mining control program clearly e) Monitoring and evaluation sustainable control program

This study is consistent with Clifford [9], Hirons [10] in Sub-Saharan Africa, Spiegel et al, [11] in the Amazon, which recommends the handling of illegal gold mining that the Government needs to engage stakeholders in designing environmental planning strategies, and should intervene to restrict the use of mercury by the



community through a participatory approach to the perpetrators.

This research is in accordance with Robbins and Timothy;s opinion [18] that the effectiveness of integrated team is affected by the adequacy of resources, leadership, and structure, trust climate, performance evaluation and rewards system, members ability, personality, allocate roles, diversity, team magnitude, team flexibility, members preference, intent and purpose establishment of integrated teams, efficacy, conflict and social loafing level. According to Kreitner and Kinicki [19], usually the teams work is not always successful, could have had failures that can be caused due to an error in management or because of unrealistic expectations. According to the researchers that the lack of effectiveness in handling of illegal gold miners in Kuantan Singingi can be caused by a team that has not been able to overcome his weaknesses, operational funds are limited, some people involved in illegal gold mining hostile or colluded with the team, resistance to doing something and less long- term commitment to maintain and protect the river from pollution caused by illegal gold mining. Therefore, team effectiveness of handling of illegal gold mining team needs to be improved through teamwork systematically integrated to achieve collective goals, build trust, and more integrated.

#### INFORMATION DISSEMINATION

Required information dissemination of this study result so that all sector concerned with a perspective that illegal gold mining activities resulted in environmental damage and river pollution, so it requires the involvement of various sectors, departments and agencies involved in formulating treatment and preventive program, community development program, and rehabilitation or reclamation. Furthermore, need a large gathering at the district level to formulate action, should be designed speaker and participants that should be presented as well as the resulting formulation. Then followed up at the district level to the village level. It should also be pointed out that, the gold potential in Kuansing that is alluvial or scattered on the riverbed and the mainland, so that inefficient and not feasible economically managed, and uneconomical if mined using high technology because it will require huge costs. Therefore, the determination of mining area and mining license considered less possible, because of there will be not balanced between the results obtained (with the magnitude of the environmental reclamation costs to be borne by the government.

#### SOCIALIZATION AND EDUCATION

Integrated teams to combating illegal gold mining need do socialization and education regularly about impact of illegal gold mining activities toward environmental pollution and the risk of health problems targeted (primary, secondary, tertiary) to create awareness of illegal gold miners, local communities, and stakeholders. The local government through related agencies (Department of Health, Energy and Natural Resources Department, Environmental Agencies, Department of Fisheries, Head of District and others) need to work together with village officials, elements of society, NGOs concerned with the environment, the organization of health professions for socialization and education impact of illegal gold mining on health and river environmental pollution, including empowering the community leaders and religious leaders through religious lectures in mosques and wirid recitation.

Kuansing Police Chief through the work program can assign "Babinkamtibmas" to disseminate and educate the public by way of " walk and talk" through Police Environmental Concern Program, which is equipped with a booklet (module) guide to the dissemination of information and images related to the impact of illegal gold mining towards river water pollution, and the risks to health. (see appendix 20). According to Sippl and Henrik [20], socialization and education can build community insight to the dangers of illegal gold mining activity. Socialization and educational impact of illegal gold mining activity in Kuansing can be done through counseling,

seminars, distribution of posters, leaflets, put up a billboard or billboards on the roadside, advertising through radio, television, comic books, booklets / modules, education and training of community representative, preventive corp from police who do education, guidance to the public and direct visits to the site to stop the illegal gold mining activities. As is done in Ghana, the gold miners are very sensitive to the content of messages that emphasize the dangers of mercury to children. In Brazil, a brochure that said the impact of mercury on impotence, turned out to be very effective in raising awareness of the illegal miners.

This study is suitable with Notoatmodjo [15], that the socialization and education conducted by stakeholders need to pay attention to health promotion strategies (advocacy, social support, empowerment), and targeted health promotion, which consists of the primary, secondary, and tertiary target. Socialization and education is done it should also be able to: 1) Increase the ability of the community to, able to maintain and care for the surrounding environment, maintain and improve their health. 2) Bridging the community with those who

"concern" to environmental health.

3) Advocate for the decision makers in various sectors / acting to support programs related to environmental awareness [of illegal gold](#) mining activity. According to Borisch [21], that the public health association should help governments and stakeholders to promote the values of public health importance, conduct public policy, including solidarity, participation, empowerment and social justice.

To implement sustainable river environmental protection program also takes the role of universities to provide input and solutions, involvement of various health professional organizations, the role of non-governmental organizations (NGOs) is strong and not bound by government and special interests, also takes the role of mass media (television, radio, newspapers, etc.). In addition, raised the case of environmental pollution caused by [illegal gold mining in](#) Kuansing and other areas into a national issue, so it gets the attention of policymakers at the district, provincial and national.

#### COOPERATION AND COORDINATION

Kuantan Singingi Regional Leader (Regent, Chief of Police, military command, judiciary) need to improve cooperation and coordination, involvement of departments and agencies (Energy and Natural Resources, Environmental Agencies, Health, Fisheries, Agriculture, Social and Workers Affairs), universities, NGOs, the role of media (the press) and community support indispensable to safeguard the policy to handling [of illegal gold](#) mining activity and save the river environment in Kuansing sustainably. When required, the Government may request assistance from the Provincial Government and the Central Government (President) through the relevant ministries (Ministry of Internal Affairs, Energy and Mineral Resources, Ministry of Environment, Ministry of Social Affairs) relating to budget aid and manual handling [of illegal gold](#) mining activity in an effort to save the river environment. In addition, it is also necessary control of the security officers involved, if necessary, request assistance Kuantan Singingi Regent to police chief and military commander to curb the unscrupulous members who were involved.

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This study is consistent with Gibb and OLeary research recommendations [22], in South America, Asia, and Africa, that required central government policy and national plan of action that includes a public health strategy toward the dangers of mercury exposure used by small-scale gold miners, as the result of Minamata Convention, should be immediately implemented.

This research is in accordance with Wahyono's opinion [23], [which states that](#) necessary communication between stakeholders in the handling [of illegal gold](#) mining because the local government has difficulty solving problems of illegal [gold mining](#). The difference between the Regional Government Law No. 23/2014 [24] Clause 14, that the authority of the implementation of Energy and Natural Resources Ministry field is divided between the central government and provincial, with Mining Law No.

4/2009 [25] Clause 20-26, [states that the](#) mining area is determined by the regent / mayor after consultation with the regency / city, can lead to confusion. To solve problems above, the necessary communication and coordination between the Central Government, Provincial and Regency / City along with other stakeholders in handling of illegal miners. Local government must dare to make a new breakthrough in the publishing of regional policy, eg enter the role of indigenous peoples, local wisdom in the management of mining, prepare a budget for coordination with security forces in tackling illegal miners.

#### CURBING ILLEGAL MINING AND LAW ENFORCEMENT.

Curbing [Illegal gold mining](#) gradually and sustainable which is meant is done prohibition and control of [illegal gold mining](#) along the flow of Kuantan river, Singingi river, Kukok River and the irrigation dam. Later ban [illegal gold mining](#) in creeks, [as well as in the area](#) of the plantation, while preparing social control program for communities affected. Law enforcement expressly towards the perpetrators [of illegal gold miners](#) (workers [and investor](#)), [local police officers were involved](#), protecting the [illegal gold mining](#) and doing extortion doing so raise a deterrent effect. According to Ikhsan [26], that curbing [illegal gold mining](#) in Sijunjung (West Sumatra) done gradually, can not do with a fast time, because [of illegal gold](#) mining activities in Sijunjung regenerate such a strong chain, so need time to break these chain. The difference with this study is [the illegal gold](#) mining activity in Kuansing operates relatively short time, ie since 2006 when compared to [illegal gold mining](#) in Sijunjung that has lasted decades, and is done for generations. So, we need long-term efforts through preventive efforts, is to change society mindset through intensive counseling. The government can do preventive and repressive. Short-term efforts, the government can curb illegal mining in mining locations in repressive (law enforcement) to perpetrators (investors and workers) [as well as](#) local police officers were involved. The Government may impose administration punishment [in the form of](#) reprimands, penalties, and

finances so that a deterrent effect.

Different with Somantri [27] which says that if illegal gold mining is closed there will be a very complex social problems associated with community culture that has been formed at this time, Security after closing the illegal gold mining will be vulnerable in respect of their economic situation to be disturbed. Therefore, the government needs

to conduct surveillance and set up social control programs after close illegal gold mining activity.

## SOCIAL CONTROL

Local government and the business community (private) need to prepare a social control program after closing the illegal gold mining activity for the community, such as setting up jobs for local people affected by this policy. This study is consistent with Ikhsan's opinion [26] which says that government can instruct people to do other work as their livelihood. Providing assistance to these communities is a form of participation of the government to find solutions to problems when community leave their work as gold miners. Different with Somantri [27] who said that transfer of gold miners profession into other professions is not simple and easy. Similarly, Robbins's opinion [28] and Hanggraeni [29] that changes (job) is not an easy process. The process of change is usually always followed by resistance or refusal by each individual for several reasons: 1) The individual does not capture the whole essence of being delivered or simply get information piecemeal, 2) the fear of uncertainty, 3) economic factors, might result in they lose their economic resources that had been controlled, 4) security, the individual may feel threatened, 5) habit, doing new things unusual and this is a process that is very heavy.

Despite resistance or rejection of various individuals (perpetrators of illegal gold mining) to curb illegal gold mining process is done, but it does not make the enforcement process becomes impossible. According to Robbins [28] and Hanggraeni [29] resistance of course will impede changes (curb) process, but there are several ways to do so that people would voluntarily engage in the process of curbing illegal mining, namely: 1) Communicating curbing illegal gold mining process clearly to reduce uncertainty so that people feel safe and ultimately no longer be opposition, 2) Increasing community participation, 3) Facilitate and provide assistance, training, counseling to help them adjust, 4) negotiate towards those who oppose the process of curbing illegal gold mining that create a mutually beneficial solution, 5) in collaboration with the opponent illegal gold mining demolition to be more cooperative towards policing, 6) Provision punishment toward parties in opposition to the demolition process. There are times when punishment is required when persuasive ways that can not be reduced resistance to the process of curbing illegal mining. Curbing Illegal gold mining in Kuansing can be happen gradually in according to agreement or consultation with relevant parties, while preparing other employment for the people affected, and empowerment through counseling, organizing and community development training for improving various types of skills of business, ability to raise family income, and the utilization of existing environmental potential. All parties need the same perception or the "one language" to convince public that illegal gold mining has negative impact on environmental pollution, for life of surrounding community and the health risk is greater. Indeed, many business opportunities that can be developed for the community in Kuantan Singingi, both in

agriculture such as farming, rice, peppers, onions, bananas, and other fruits, plantations (palm, rubber, citrus, durian, etc.), livestock operations (buffalo, cows, goats, chickens, etc.), fish farming cages program in Kuantan Singingi river flow as an attempt to save the river from pollution, pond fish culture storied (biopot) around the house residents who do not require huge costs. Likewise, the potential of the business of raw materials, rocks, gravel, and sand are managed in environmentally friendly ways, including the development of eco-tourism potential in Kuansing. Where possible, the government should control the price of rubber or provide subsidies for low rubber prices, because the majority of the villagers in Kuantan Singingi are rubber gardens. In addition, the public can diversify (diversification of business), such as rubber tapping morning, noon and afternoon manage fish ponds, farming and other businesses, so income is increased. Local governments can also use village funds budget to help provide agricultural land, plantations, seeds, livestock, fertilizer and other assistance in order to improve the welfare of rural communities.

## CONCLUSION

Solution to handling of illegal gold mining activity in Kuantan Singingi, namely:

a) Required mutual commitment and local government policies to curb or halt illegal gold mining: Enabling Integrated Team of curbing illegal gold mining, allocate operating funds that are deposited through the budget Environmental Agencies, set up a Preventive and repressive with duties and responsibilities, organizational infrastructure, planning and program implementation, monitoring and evaluation curbing program sustainably.

- b) Information dissemination required that all parties have same perspectives that the illegal gold mining activities have resulted in environmental damage and pollution of the river, so it requires the involvement of various parties, agencies and related institutions to formulate prevention and treatment programs, community empowerment and reclamation.
- c) An Integrated team of combating illegal gold mining (synergy) continuing efforts to introduce and educate people regularly about the impact of illegal gold mining toward river environmental pollution and the health risk are on targeted.
- d) Kuansing regional leader and elements need to improve cooperation and coordination, the involvement of departments and agencies as well as community support indispensable to safeguard policy on handling of illegal gold mining activity and save the river environment in Kuansing sustainably.
- e) Curbing illegal gold miners can be gradually and sustainable, as well as law enforcement firmly against the perpetrators of illegal miners (workers and investors), local police officers involved and commit extortion so that a deterrent effect.
- f) The local government and the private sector need to prepare a social control program after close the illegal gold mining with prepare jobs for people, empowerment, improving skills and peoples incomes, diversification, local governments may use village funds budget to help the villagers.

#### SUGGESTIONS

- a) The perpetrators of illegal gold miners (workers / investors), the public and stakeholders to realize that illegal gold mining activities have resulted in river environmental pollution and detrimental to the surrounding community, and therefore illegal gold mining activity in streams and irrigation dams to be terminated through mutual commitment.
- b) To the parties concerned (local government, police, Society, perpetrator of illegal gold mining, etc.) need to prepare short term program (<1 year) to disseminate the impact of illegal gold mining on river environmental pollution; Medium Term Program (1-2 years) doing disciplined of illegal gold mining activity; Long-Term Program (> 2 years) conduct river environmental restoration and farmland.
- c) To Kuantan Singingi local government and stakeholders should use the results of this study as a material for preparing an integrated policy on handling of illegal gold mining and protect the river environment from pollution.