Article

Effect of Sand Mining on Socio-Economic and Ecology of Communities in Lukulo River Areas Kebumen Central Java

Komunitas: International Journal of Indonesian Society and Culture
10(2) (2018): 270-278
DOI:10.15294/komunitas.v10i2.15155

p-ISSN 2086 - 5465 | e-ISSN 2460-7320
http://journal.unnes.ac.id/nju/index.php/komunitas

UNNES JOURNALS

Thriwaty Arsal[1], Sumartono[2], Basri[3], Muchtarul Anam[4]

[1,2,3,4]Department of Sociology and Anthropology, Faculty of Social Science, Universitas Negeri Semarang, Indonesia

Received: January 10, 2018; Accepted: September 1, 2018; Published: September 30, 2018

Abstract

This research aims to explain the effect of sand mining on socioeconomic and ecology of communities in Lukulo River areas. The research is conducted in Gemeksekti Village, Kebumen Regency Central Java. Data collection uses observation and interview. The result of data collection is qualitatively analyzed to explain research data and facts. The research finds: (1) the effect of sand mining on the socio-economic and ecology of communities in the river areas indicate several aspects, such as, the loss of river's social function as a public space to facilitate communication and social activities. Communication in the river is initially worked well; however, it no longer exists and there are no activities conducted except sand mining. In addition, communication with communities across the river is also cut. Young people and children has lost their playground, thus it impacts the communities' socioeconomic activities, (2) the effect of sand mining on ecological damage consists of river widening and river water depth, river cliff slide, water pollution by diesel fuel and oil, stagnant river flow, and the loss of riverbanks as well as some of locals' rice fields.

Keywords

environmental ecology; river area communities; sand mining; social and economy

INTRODUCTION

River is a natural resource that could support the life function of organism. One of essential matters is water availability that could attract organism to stay alive. Despite its function as a water way to the ocean, river is vital in sustaining human life. Rochgiyanti (2011) stated that communities in Banjarmasin uses Kuin River as a floating market to fulfill their economic needs and as a mean of transportation for social mobility, such as working and going to school.

Human and cultural development is closely related to river existence. River plays essential role for transportation, residence, as well as government center in Indonesia. Majapahit city in East Java was surrounded and divided by artificial rivers flowing through Mataram Valley and it provided fertility. Progo, Elo, Bogowonto, Solo, Winong, and Code are rivers that had vital role for agriculture at that time. Therefore, human resources in Mataram was rapidly developed

Corresponding author
C7 Building, 1st Floor, Sekaran Campus, Semarang City, Central Java, Indonesia 50229
Email
thriwaty_arsal@mail.unnes.ac.id

and was the basis for temples development during Hindu-Buddhist eras as well as a road for Islamic expansion (Widyosiswoyo, 2000).

Lukulo River is one of rivers in Kebumen Regency that flows from North to South areas and passes through two regencies, Kebumen and Wonosobo. The upstream of Lukulo River is located at South Serayu Mountains and empties in Indian Ocean. The estuary is known as Tanggulangin Estuary and it is bordered with Klirong and Buluspesantren Subdistricts, Kebumen Regency. The river servesas a place for social activities for Gemeksekti people. The social activities include washing, bathing, and defecating. It is also a playground for children and a place to trade for locals every Wednesday morning. It is a strategic place to interact and socialize among the locals due to its function as a public space for Gemeksekti people.

The function of Lukulo River has shifted since the operation of sand mining that uses machines. Yudhistira (2011:76) defined mining as one of types of extraction activity process for materials that could be extracted, such as minerals and other earth mining materials. Sand mining is a process of extracting sand from the earth to use as a building material.

Sand is sucked from the river using machines and sold as a building material. Sand mining in Lukulo River is initially an activity conducted by the locals manually. Equipment used is traditional and environmentally friendly and the locals only use *sorok* (a stainless shovel) to dig the sand in the riverbed, and a bag to collect the sands. Along with progress in modern technology, there are certain parties that considered the sand mining as a land that can be used as an economic source. The current sand mining has used machines since it could produce more sands in a shorter period. In addition, it is easier for sand miners to obtain more sands with less effort. Machine sand mining conducted by the Gemeksekti people has brought ecological damage to the river.

Environmental damage aspects due to the sand mining include land slide, land erosion, less water availability caused by soil damage as a consequence of sand mining, less ground water absorption, and high vehicle traffic in the village that results in air pollution. Communities in Lukulo River areas are generally experience damage produced by the sand mining; however, they ignore the damage since it is their livelihood (Yudhistira, 2011).

The environmental damage was not the first. According to research result data from Post Graduate Program Institution of Undip that studied sand mining in Keningar Village, Dukun Sub-district, Magelang Regency, it was found that (1) erosion occurred in the soil structure; (2) there was a potential of land slide; (3) less water availability; (4) a decrease in ground water infiltration and absorption; and (5) the loss of organic materials.

Due to the hazardous impacts of the sand mining, the government of Magelang Regency issues a policy of Regional Regulation (Perda) No. 1/2008 that replaces Perda No. 23/2001 on Mining Business License. Moreover, in August 24, 2004, the regional government issues two policies, Mining Activities Arrangement and Control and the Arrangement of Route and Tonnage of Group C Excavation Materials Transport in Merapi Areas, Magelang Regency.

The sand mining activities in Lukulo River have been accommodated by legal system in Indonesia. Salim (2005, pp. 115-119) stated that sand mining is arranged in Law No. 11/1967 on Basic Provisions of Mining. Article 3 paragraph (1) of the law states that artisanal mining is a mining business of excavation material from all groups (A, B, and C), performed by people who domiciled in the public mining for their daily life and is conducted in a simple way. Sutedi (2011:95-97) asserted that another decree on artisanal mining is mining authorization given by the Minister of Energy and Mineral Resources (ESDM) to the local communities. Criteria and properties of the simple and small mining include the use of non-sophisticated equipment, the production is sufficient for the miners' daily life, the area is not more than 5 ha, and the mining age is relatively short due to its properties and the various

area-specific properties. The authority of the Minister of ESDM to provide license for artisanal mining is entrusted to governor of area that has mining materials.

Sand mining operated in Lukulo River is a mining of excavation materials in category C. It means that the materials are neither strategic (A) nor vital (B). The sand mining conducted in Lukulo River is environmentally unfriendly due to the use of machines that damage the river ecology. The use of machines has disturbed river flow. In addition, fuel and oil spilled into the river causes water pollution thus triggers ecological damage and problems to the communities in the river area.

Similar damage is also occurred in India. Shaji and Anikular (2014) stated that sand mining conducted in Kerala India has damaged the river environment as well as brought concern regarding miners who are drinking in the mining areas. The damages include: the river is sunken that could inhibit river flow, there is a change in the river path, bridge is destroyed, and coconut trees in the river edge are fallen. A study by Pitchaiah (2017) on sand mining conducted by communities found that the activities had damaged the river waterways, eroded the river edge, destructed soil structure and underwater habitats, and created noise and destruction on road related to traffic of sand carrier vehicles.

A research result by Siregar (2012) indicated that sand mining conducted by communities in Jongbiru Villlage was initially used traditional way; however, along with the development, the sand mining had shifted into conveyor sand mining with simple machine and then a diesel machine (mechanical mining). The use of mechanical machines had created ecological damage to the river that caused Mritjan Bridge to collapse. The sand mining also caused deepening and widening of the river due to river water scrape. In addition to the ecological damage, the sand mining activities gave impact on the socio-economic life dysfunction of communities in the river areas.

According to Merton (Ritzer,201:429), dysfunction is a condition where a component is unable to play its roles and functions according to those expected. The condition disturbs the system performance. In social science, dysfunction is defined as disintegrative causes of a social or cultural element in a society that brings negative impact. Dysfunction is an ideological bias of a certain system. If an individual only focuses on adaptation, which is the positive consequence, he/she does not aware that one social fact could bring negative consequences to other social facts. The negative consequences will then bring dysfunction to the societies.

The shift in Lukulo River functions after the entry of mechanical sand mining has made the river is no longer served as a place for social and economic activities as a consequence of ecological damage in the river. Communities in the river areas are initially use the river water for free to fulfill their daily water needs; however, following pollution occurred in the river due to mining residues, such as diesel fuel and oil, they have to incur certain cost to build wells or subscribe water utility from the water utility company (PDAM) to obtain consumable water.

METHOD

The research location was Gemeksekti Village, Kebumen Central Java. Informants in the research were communities who lived in Lukolo River, actors or sand mining workers, and public figures. Informants were selected using stratified random sampling (Danim, 2004).

The research used qualitative research to describe and understand activities conducted by the communities in the river; methods used for and the process of sand mining, mechanically as well as manually; ecological damage caused by the mining; and the shift in socio-economic functions experienced by the communities. As regards the research, analysis unit was individual (men and women in Lukulo River areas) assuming that individuals action to perform sand mining job was supported by several aspects, especially, economic aspect, and it followed Weber's (Weber, 1964; Rit-

zer, 2003; Nugroho, 2000) methodological individualism. Qualitative data analysis was conducted on incident/event information and motivation basing the social actions of actors involved in the sand mining process. Data collection and validity techniques were conducted through observation, interview, documentation, and data triangulation.

RESULT AND DISCUSSION

Lukulo River played important roles for social life of communities in Gemeksekti since it is a water source used by the communities to fulfill their daily life including washing, bathing, and watering agricultural crops, as well as a playground for children, such as swimming, fishing, and playing football at the field near the river and other activities. Farmers who had rice fields in the river edge utilized the river water to water their rice and *palawija* crops.

River water flowed in a depth of about 50 cm during dry season thus the river could be crossed by people in Karangpoh village (across Gemeksekti Village) to wash their clothes together with people in Gemeksekti Village. In addition to washing, bathing, and playing activities, every Wednesday morning the river edge was made as a temporary market by the locals to trade goods such as divan, chicken, and cupboard. People would cross the river to trade in the market thus it became crowded. Many people came not merely to wash or take a shower but also to buy daily necessities, such as divan, cupboard, bamboo chair, vegetables, etc.

The activities conducted by the people in the river had created an intense communication among the people. Topic discussed in their conversation covered household issues, kitchen activities, *batik*, education, jobs, activities among teenagers, and other issues developed in the communities. People who went to the river were not merely from Gemesekti but also those who lived around the river areas; therefore, the atmosphere was increasingly crowded since there were many people doing their activities in the river. Relations among the Gemeksekti people were in harmony as well as with other people from Karangpoh Village. When Karangpoh villagers had events such as shadow puppet show, religious day celebrations, people from Gemeksekti were invited to the event and vice versa. Lukulo River played role as a place to facilitate daily social relations among Gemeksekti and Karanglo people.

Sand Mining History

In early 1970s, Lukulo River was created as a sand mining land by the people using manual ways. Equipment used were *sorok* (shovel) and *pikulan* (carrying poles). The majority of sand miners were Gemeksekti people. In 1983, sand content in the river was abundance. Sand thickness was about one to one and a half meters especially during rainy season when the river experienced flood. Sand contained in the river came from sediments resulted from materials sedimentation in the river. Nicholas (2009) defined sedimentation as a deposition process of materials transported by water, wind, ice or glacier in a basin. Sedimentation process comprised of sediments weathering, erosion, and transportation and deposition. Materials containing in the river consisted of stones and other materials that were eroded and settled and became sand.

Miners used *sorok* (a stainless tool in rectangular shape with size of 40x30 cm) to dig sand in the riverbed. Sand in the river was excavated and put in a basket. When the basket was full, the miners would carried them using carrying poles to be collected at the courtyard. The collected sand would be sold by the miners by stopping trucks that passed through the road. The condition took place up to early 2007. Sand marketing system at that time was one *rit* or equal to one truck (± 4 cubic) and one and a half *rit*.

In profit sharing calculation, land owner received Rp. 20,000/truck. Sand produced from the mining was channeled to the people who need the sand both in the city and outside the city. Manual sand mining could produce 7 trucks of sand/day, whereas mechanical sand mining could reach 20 trucks/day. The miners used two diesel machines in every location to suck the sand from the river and a compressor machine as a breathing apparatus for miners. The bre-

athing apparatus was required to help divers during sand mining in the river since the river was deeper. Sand miners were initially used one machine as an aid in sand extraction; however, since the river was deeper they required the compressor as a breathing apparatus thus they could stay in the water for ± an hour to suck the sand.

Figure 1. Sand mining equipment: machines and hoses.

Sand mining using machines involved three miners, two as divers and one was assigned to separate sand from *krokos* stone in the ground. The process involved one person dove into the riverbed by holding on hoses used to suck the sand. The hoses were directed by the diver into the sand in the riverbed. Hoses connected to a machine will suck sand in the riverbed and the sand would be channeled directly into the truck. A person who stayed on the truck would separate *krokos* from the sand. Job division was conducted in rolling. For example, there were three miners A, B, and C. First, A would dive into the riverbed to look for sand by directing the hoses into the riverbed that contained a lot of sand; B separated *krokos* from the sand using *sorok* and C took a rest. Next, B would dive and C separated the sand from *krokos*, whereas A took a rest, and so on. Sand separated from *krokos* would go directly into the back of the truck to be distributed to customers.

Figure 2. Sand mining activities using diesel machine

Sand mining result was divided into three: the miners, machine owner, and operational cost. The sand price was Rp. 300,000/truck and divided into three: miners (diver: Rp 150,000; machine owner: Rp 120,000; and operational cost: Rp 30,000). The diver's share was further reduced by Rp 25,000 for the person who separated *krokos* from sand. Therefore, if there were two miners the fee of Rp 125,000 would be divided into two resulted in each miner to receive Rp

62,500 per sand truck.

The difference between manual and mechanical sand mining was related to its selling system. In manual sand mining, the selling system was divided into two: one truck and 1 ½ truck, whereas in mechanical sand mining the selling system was based on one truck. Following is an interview with an informant, "MS":

> In the past, selling system in manual mining can be conducted by debt; now, however, since there was less sand, no money means no sand. In manual sand mining, location owner joins in the mining activity, whereas in sand mining using machine the owner plays role as a foreman (5/01/2018)

The sand mining in Lukulo River had experienced an evolution, from manual to mechanic. Suwarsono (2006:10) stated that evolution is a unidirectional-movement social change similar to a straight line that blends between its subjective view on value and end goals towards a form of modern society.

Mining using machine is a characteristic of modern society. Evolution in mining equipment results in transformation in the relations between land and mining equipment owners and miner workers. It can be seen from an organizational structured intertwined between the sand mining actors. The relations between land owners and miner workers was initially a mutual support in form of *gotong royong* (mutual assistance); however, it had turned into a patron-client relations. The mining workers were the coolie, whereas the machine owners were the foreman or employer. The patron-client relations established due to the shift in land owner orientation from merely fulfilling the need to profit orientation.

Effect of sand mining on communities' socio-economic

People in Gemeksekti viewed Lukolo River as a shared natural resource thus they were free to use it for various activities and interest, among others: washing, playing, and sand mining. However, they had no responsibility to protect the river ecology as well as its preservation. As a consequence, several community groups utilized and exploited the river to fulfill their economic demand by performing sand mining that damaged the river ecology.

Before the existence of sand mining, the river served as a public space to communicate and interact among the locals. Due to the intense communication and activities, the public space brought the Gemesekti people closer. Women chatted while washing their clothes in the river. Their conversation usually involved such topics as kitchen issue, cooking, *batik*, and other current topics occurred in the society. The river was also a playground for children in the afternoon. They were swimming, fishing, washing their bicycle, and playing football. In addition, the river was also a place to develop children characters, such as to train their courage, cooperation, responsibility, and patience. Activities in the river had facilitate socialization between parents and children. This type of social activities were currently disappeared due to the river ecological damage. The damage had complicated the communication. An interview with informant "SMRT" stated that:

> In the past, the river could be used as a communication place while people were washing. In addition, several people from Karangpoh village made use of the river edge as a place to trade divan, cupboard, and chicken in Wednesday. Now, the trade takes place in Karangpoh village since the river is no longer crossable. Additionally, it is hard to go to the river, let alone wash in the river since the water is very deep. Thus, it is difficult to sit and set foot on the river. Moreover, it said that there are crocodiles in the river (07/01/2018)

Lukulo River was currently could not be crossed and it had to take a long route to go to Karangpoh village. The consequence of the damage in the river ecology was people in the village had lost their public space to communicate and interact and there were less people conducted activities in the river, except the miners. The locals were unable to maintain the socio-economic function of the river after the sand mining

existed. Riverbanks disappeared and people were no longer able to perform activities such as washing, bathing, fishing, and so on. In addition, communication was disconnected between people in Gemeksekti and those in Karangpoh Village since the river could not be crossed anymore due to the depth that reached 3-5 meters. The condition frightened the people in those villages to do activities in the river. Another impact of the river ecological damage was related to the disappearance of the temporary market every Wednesday morning. It was caused by traders from Karangpoh village who were unable to cross the river due to its depth. The market was once a routine activity among the people to trade local craft products.

Effect of sand mining on communities' economic activities

One of economic impacts felt by the people in Gemeksekti was people should spend a lot of money to build wells and to subscribe water utility from PAM. The cost incurred for the water subscription was 70,000 – 80,000 per month, whereas to construct a well of 1 meter depth and 80 cm of width would require Rp 400,000. However, water only came out at depth of 12-15 meters; thus the cost would be Rp 4,800,000 to 6,000,000. The people started to subscribe for PDAM water and build wells since Lukolo River water could not be used to fulfill their daily needs due to water pollution caused by mining waste such as oil and diesel fuel.

Figure 4. PAM water as water source used by the villagers

Mechanical sand mining in Lukulo River gave impact on several aspects in Gemeksekti people, among others, environmental, river ecological, and socio-economic impacts. The environmental impact included road damage from the residential area to the river, air pollution around the river areas, the loss of rice fields in the river edge, and damage in football field since it often used as a parking lot for sand transport trucks. The large number of wells that dry during dry season caused by deeper river surface. An interview with informant "HSY" found that:

The changes are huge. The river was flat but now it is deeper, the river edge slides, and rice fields in the river edge have gone. Now, we have constructed road to the river three times and the river is no longer crossable since it is deep. Moreover, the river water is not flowing and it is dirty because it is mixed with diesel fuel and gasoline. To set our foot on the river to wash clothes is currently difficult. Before the existence of sand mining with machine, we still able to wash and take a bath in the river even during dry season, but now only miners who take a bath in the river. (7/01/2018)

Effect of sand mining on ecology

Sand mining had damaged the ecology of Lukolo River and it triggered pollution, such as water pollution by diesel fuel and oil. In addition, it made the river water deepening and trash scattered on the river inhibited the water flow. River wall eroded by the river water and flood occurred during rainy season. The river edge once had *plered* of sloping land before the water get into the river but now, it no longer existed. The river edge was in form of a steep river wall similar to a cliff. The river had experienced a significant widening for the last 10 years.

The river was once had 15-20 meter of width but it now had widened to 25-30 meters with 5 meter depth. The river was widening during rainy season due to landslide on the river wall caused by river flow. During rainy season, a dam located in Kaligending village, in the northern area of Gemeksekti Village, was opened to prevent water runoff.

The water runoff could increase the river currents and with the winding condition of Lukulo River, the river water hit the water wall harder and it could cause stronger erosion on the wall. The river currents also flooded the rice fields located near the river. To date, there were no efforts from the village government as well as local government to repair damage in the river due to the sand mining.

Figure 3. Lukulo River condition after sand mining

Since 1980s, the river had become one of components in a social structure in the communities. The river functions, however, had changed when sand mining existed. The use of machines were expected to bring positive impacts on the communities; however, it was the contrary. The facts were it caused environmental and ecological damage in the river. The sand mining was still operating until now due to the less awareness among the communities to maintain the environmental and natural resources preservation.

According to the interview result with NGD, the head of Gemeksekti Village, the current sand mining or category C excavation activities had no license either from the village government or regional government. The government did not issue any license for the machine owner who proposed a mining license since the mining is not in accordance with the Environmental Agency (BLH) regulation. The mining was illegal and they tried to avoid the civil service police (*Kepolisian Pamong Praja/Satpol PP*) when they operated. Sand mining would operate if the *Satpol PP* was not in action. If Sat Pol PP caught the mining in the act, they would seize the mining machines. However, the machines could be redeemed by paying certain fines. The condition encouraged mechanical sand mining to continue to this day.

CONCLUSION

The effect of sand mining on socio-economic and ecology occurred in the communities in Lukulo River areas. The effect included the disappearance of public space that facilitate communication and social activities. There was initially a sound communication in the river among the people; however, now it has gone as well as the social activities, except for sand mining. Communication with people across the river was also disconnected. The youth and children had lost their playground. In addition to the loss of social and economic functions, ecological damage also took place in the river. Some changes occurred after the existence of sand mining using machine. Those changes consisted of river widening and deepening. The ecological damages were related to landslide in the river cliffs, the loss of riverbanks and several rice fields, inhibition of river currents, and river water pollution caused by diesel fuel and oil. Despite the loss in its social function, river damage had brought economic impact on the communities, especially in Gemeksekti. People started to build wells and subscribe PAM water as their water sources. The cost

incurred related to these activities could reach five to six million rupiah. The cost for PAM water subscription was Rp 70,000 to 90,000/month. Sand mining in Lukulo River created social, economic, as well as ecological changes.

REFERENCES

Anja Byg, L. H. (2014). Socio-economic Changes, Social Capital an Implications for Climate Change in a Changing Rural Nepal. *GeoJournal*, pp. 169-184.

Lemke, M.J., Walk, J.W., Lemke, A.M., Sparks, R.E. and Blodgett, K.D., 2017. Introduction: The ecology of a river floodplain and the Emiquon preserve. *Hydrobiologia*, 804(1), pp.1-17.

Liu, J., Sui, W. and Zhao, Q., 2017. Environmentally sustainable mining: a case study of intermittent cut-and-fill mining under sand aquifers. *Environmental Earth Sciences*, 76(16), p.562.

Maring, P., Hasugian, F. and Kaligis, R.A., 2015. Social strategy of Ciliwung River Bank Community. *Komunitas: International Journal of Indonesian Society and Culture*, 7(1), pp.102-111.

Ngumuludin. (2016). *Profil Desa Gemeksekti.* Kebumen: Kelurahan Gemeksekti.

Pitchaiah, P. S. (2017). Impacts of Sand Mining on Environment. *Geo Informatics and Geological Science*, pp.01-06.

Ritzer, G. (2012). *Teori sosiologi dari sosiologi klasik sampai perkembangan terakhir postmodern.* yogyakarta : pustaka pelajar.

Rochgiyanti, R., 2011. Fungsi Sungai Bagi Masyarakat di Tepian Sungai Kuin Kota Banjarmasin. *Komunitas: International Journal of Indonesian Society and Culture*, 3(1), pp.51-59.

Shaji, J. and Anilkuar, R., 2014. Socio-environmental impact of river sand mining: An example from neyyar river, Thiruvananthapuram district of Kerala, India. J*ournal Of Humanities And Social Science*, 19(1), pp.1-7.

Siregar, G. V. (2012*).* Sengketa Penambang Pasir Mekanik Sungai Brantas: Studi kasus Sengketa Aktivitas Penambangan Pasir mekanik di Desa Jongbiru, Kecamatan Gampengrejo, Kabupaten Kediri. *BioKultur*, pp.179-198.

Tonkin, J.D., Jähnig, S.C. and Haase, P., 2014. The rise of riverine flow-ecology and environmental flow research. *Environmental Processes*, 1(3), pp.323-330.

Yudhistira, W. K. (2011). Kajian dampak kerusakan lingkungan akibat kegiatan penambangan pasir di desa Keningar daerah kawasan gunung merapi. *Jurnal ilmu Lingkungan*, pp.76-84.