

Research Article

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Environmental and Health impact of Quarry mining among Quarry workers and Residents: Evidence from Sample Survey

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Abstract

Quarry mining is viewed as one of the important economic activities which have the potential of contributing to the development of economies. At the same time it always has adverse environmental impacts and eventually health impacts. While the contributions of mining activities to economic development of study area is well acknowledged, but the gains from the mining sector to the economy is achieved at significant environmental, health and social costs. The objective of the study was to examine the environmental and health impacts quarry mining on quarry workers and residents of Balal Gram Panchayath of Kasaragod district, coming up with mitigation measures and recommendations to tackle these issues. Without considering the ecological and health concerns several quarries started operating here, this quarries created problems not only to the environment but also to the local population of this area. The environmental impacts of mining activities have resulted in land degradation, air pollution, noise pollution, vibration, property damage etc. The combined effects of environmental problems have culminated into health problems with high prevalence of diseases such as cough and cold, asthma, heart problems, head ache, eye problem, stress, throat infection, allergy. The study have demonstrated vividly that quarry mining effects on health and environment among workers and residents in the communities is a function of distance from active mine sites.

Keywords

Environmental impact,
Health impact,
quarrying

1. Introduction

Within the last decade, environmental and health concerns have gained prominence throughout the world. Several international protocols have been established by the global community to deal with the emerging environmental and health issues. To achieve rapid economic development, many countries resort to various activities to exploit natural resources. One of

such activities is quarry mining. Consequently, quarry mining is an important economic activity which has the potential of contributing to the development of areas endowed with the resources. Mining activities have lots of environmental and health impacts. This has emanated from the methods of operation by the quarrying companies and its effects spread on the

natural environment as well as the people in the quarry located area. The health cost of mining operations sometimes outweighs the benefits gained. The gain from the sector in the form of increased investment are being achieved at great environmental, health and social cost to the people recording series of public outcry against the quarrying companies.

Residents are the major victims of the adverse impacts of quarrying operations. The various impacts produced by these operations are both size and locations dependent. Many of specific impacts are on the nearest communities in the form of effects on air, earth surface, land degradation, deterioration of ground water, erosion of soil, noise and percussions from rock blasting, generation of dust, smoke and fumes, production of noxious gases and ground vibration. Suspended particulate matter is quite outstanding among all pollutants emanating from quarrying operations. These environmental impacts will become as a major threat to the residents of the quarrying sectors with various health diseases.

2. Objectives of the study and Methodology

The main objectives of the study are:

1. To examine the environmental and health impacts of quarrying activities among the quarry workers in the study area.
2. To analyze major problems that hinder the environment and health aspects of residents in the study area and
3. To examine the measures have been adopted to curtail consequences of quarry mining operations among workers and residents in the study area.

The study area was confined within the Balal Grama Panchayath, Kasaragod district. In Balal Grama panchayath has sixteen quarries and crusher unit. Among these only four quarries drilled and crushed at the study area and becoming a major threat to the people. These four quarries are taken for the present study. The selected quarries are Muthappanmala quarry, The eyathichal quarry, Padayamkallu quarry, and Athiyadukkam quarry. The nearby residential area from the selected quarries are stratified into three zones according to the distance, ranging from less than 0.5km, 0.5-1km, and more than 2km respectively.

The present study is predominantly based on both primary and secondary data. Systematic field surveys were conducted for the collection of both primary and secondary data on the environmental and health impacts of mining and quarrying activities taking place in the Balal Grama panchayath. Primary data are collected from each family and one person has been taken as respondents for the present study. The respondents are mainly the head of the families residing the quarry areas. Total sixty samples from these four quarry sites have been selected on the random sampling. Forty members are taken as respondents from quarry residing areas and twenty members are as worker respondents.

3. Results and Discussion

3.1 Environmental Impacts

The quarrying activities that are carried out by man affect our environment in one way or the other. Both physical and biological environment are affected by these activities. The effect to the environment in most cases is usually negative, blasting rocks with explosives in order to extract material for processing gives rise to various pollutions, damage to biodiversity and habitat destruction which affects the natural as well as the human environment are analyzed in various heads.

3.2 Degradation of Land

Quarrying has a devastating effect on land. Mining and quarrying activities without proper corrective measures have led to land degradation and it reduces the quality of land. From table 1 reveals that 90 percent of the respondent's land areas have been degraded. 100 percent (all the respondents) said that farmlands close to the quarries do not support proper plant (crop) growth. Dust and cloth chemicals are released by the quarrying deprives the land of its nutrients and renders the land infertile for agricultural purpose. This means that quarrying have a significant impact on their land.

Table 1: Distribution sample based on their opinion on Land Degradation

People's opinion about land issue	Number of respondents	Percent (%)
There is degradation of land	40	100
Farm lands do not productive	40	100

Source: Survey data

3.3 Air and Noise Pollution

Air pollution and noise pollution are the two major effects of quarry mining. Dust is the most common and the most extensive air pollutant from a quarry, although the severity will depend on factors like the local microclimate conditions, the concentration of dust particles in the air etc. Dust has effect both on

human health and natural environment. Noise pollution is any unwanted sound which is unpleasant and objectionable to the environment and human health. The quarrying operations and its associated activities like blasting, loading, machineries; stone crushing and transportation have caused noise pollution.

Table 2: Distribution of sample based on their Opinion on Pollution

Types of pollution	Very serious	Serious
Air pollution	29	11
Percent (%)	72.5	27.5
Noise pollution	33	7
Percent (%)	82.5	17.5

Source: Survey data

The respondents of 82.5 percent in table 2 stated that, the issue of noise pollution was very serious, the remaining 17.5 percent of the respondents said that the issue was serious. The level of seriousness decreased based on the distance of the residents home from the quarries, where those that were within a radius of 500 m said the issues of air and noise pollution was very serious and those that were within a radius of 1kmit was a serious issue. The issue of air pollution was aggravated because of the fact that constant passage of heavy trucks, dust particles is always seen suspended in the air. Quarry dust produced after cutting stones, was also another serious cause of air pollution in the area .When strong winds blow over the quarry sites, a lot of dust is lifted in the air and it cause a lot of nuisance around the area. Noise pollution is mainly as

a result of the working of some heavy machinery and blasting of stones.

3.4 Impact on flora and fauna

One of the biggest negative impacts of quarrying on the environments is the damage to biodiversity. This is a fact that dust disturbs the proper growth of plants and crops. Table 3 reveals that almost 100 percent and 97 percent of the respondents agreed that the yield of crops like coconut, rubber, arecanut, and other vegetables are coated with dust. It is visible that, there was a lot of dust on the leaves of the crops. Dust blocks the stomata of leaves and thus reduces photosynthesis. This will certainly reduce crop yield especially during the dry season when weather conditions are not favorable for plant growth.

Table 3: Distribution of sample based on their opinion about impact on flora and fauna

People's opinion about quarrying impact on flora and fauna	Number of respondents	Percent (%)
Dust reduces the crop yield	40	100
Plants and animals destroyed	36	90

Source: Survey data

Table 3 reveals that almost 100 percent and 97 percent of the respondents agreed that the yield of crops like coconut, rubber, aracunut, and other vegetables are coated with dust. It is visible that, there was a lot of dust on the leaves of the crops. Dust blocks the stomata of leaves and thus reduces photosynthesis. This will certainly reduce crop yield especially during the dry season when weather conditions are not favorable for plant growth.

3.5 Water Quality Loss

The environmental impact of quarrying activities is very complex and it not only destroys the existing vegetation but also affects the surface and ground water quality. The waste from quarrying industry like gases, dusts pollute the water environment. Table 4

indicates that respondents have noticed the loss of water quality in the wells, streams and rivers. 100 percent ascertained the reduction in water in the past 6-7 years. The entire respondents claim that the quality of water from the bodies have reduced in terms of domestic use. Along with the reduction in the water quality 100 percent also agreed that there is also the problem of water scarcity. Water in the wells are moving to the down of earth due to the vibration and blasting process of quarrying. All the respondents (100%) also noticed about the problem in fish harvest. There is a huge decline in the fish amount. Poor water quality in the streams and river as a result of solid and minerals from the quarries has destroyed the aquatic life. Fish harvest has therefore declined to the barest minimum.

Table 4: Distribution of Sample based on their Opinion on Water Quality Loss

Type of quarrying impact on water	Number of respondents	Percent (%)
Water quality reduction in water resources	40	100
Water scarcity	40	100
Fish catch reduction	40	100
Source: Survey data		

3.6 Health Impacts

Mining operations usually create a negative impact on the health of area residents vastly. Various health issues that are faced by the area residents due to quarry mining are summarized in different heads.

3.7 Influence of quarrying on Human Health

Influence of quarrying on human health is analyzed on the basis of dust is a nuisance, dust affects health, and

rain water roofs are unclean shown in the table 5. Table 5 reveals that all the respondents (100%) claimed that dust is a great nuisance to them, dust affected their health. Rain water harvested from roofs is always contaminated with dust. Also, all the respondents suggested that their frequent ill health could be linked to dust and flood water. Various kinds of health issues and diseases are the indications of the negative effects of quarrying in the village.

Table 5: Distribution of sample based on impact dust on Human Health

Types of dust effects	Number of respondents	Percent (%)
Dust is a nuisance	40	100
Dust affects health	40	100
Rain water from roofs are unclean	40	100
Source: Survey data		

3.8 Dust related diseases suffered from before and during quarrying

The major source of health issues from quarrying is due to the emission of dust. The important health issues faced by the area residents from before and during quarrying activity are shown in table 6. Both table 6 and table 7 shows that, 30 percent of the respondents suffered from cough before quarrying while all of them (100%) suffered from the sickness since quarrying began, 5 percent were infected with sneezing before and 30 percent since quarrying activity started. Also 40 percent of the target group suffered from asthma before and 65 percent after quarrying activity started 5 percent had heart problems

before quarrying and 15 percent due to quarrying started, 40 percent suffered from headache before and 95 percent since quarrying activity. Thirty five (35%) had eye problem before and now it is 50 percent with the quarrying activities. Only 5 percent had suffered from stress before quarrying and 40 percent of the people have stress before quarrying and 40 percent of people have stress since quarrying. 10 percent of them suffered the problem of throat infection before quarrying and it increased to 25 percent during quarrying. Allergy was only 25 percent before quarrying and after that it was about 70 percent. Several inhabitants have suffered from dust related diseases during quarrying rather than before quarrying.

Table 6: Distribution of sample based on dust related diseases suffered from before quarrying activity

Type of diseases	Number of respondents	Percent (%)
Cough	12	30
Sneezing	2	5
Asthma	16	40
Heart problems	2	5
Head ache	16	40
Eye problem	14	35
Stress	2	5
Throat infection	4	10
Allergy	10	25

Source: Survey data

Table 7: Distribution of sample based on dust related diseases suffered during quarrying activity

Types of diseases	Number of respondents	Percent (%)
Cough	40	100
Sneezing	12	30
Asthma	26	65
Heart problems	6	15
Head ache	38	95
Eye problem	20	50
Stress	16	40
Throat infection	10	25
Allergy	28	70

Source: Survey data

4. Main findings and Conclusion

Environmental quality is an important direct and indirect determinant of human health. Deteriorating environmental conditions are a major contributory factor to poor health and poor life and hinder sustainable development. The aim of the study was to examine the effects of quarrying on the environment and health of quarry workers and people living in the study area.

The important environmental effects such as land degradation and pollution of various forms (that is air, water, and noise) in the surrounding communities of study area are associated with both surface and underground mining. Land degradation has resulted mainly from surface (open pit) mining with the use of heavy machines, toxic chemicals etc. Air pollution has emanated from emission of dust and other particles in to the air and also from the emission of chemicals. Noise and vibrations are essentially the effects of blasting of rocks with explosives from both surface and underground mines. Water quality loss has resulted from intoxication of water bodies with chemicals. These have adverse effect on the agricultural production, crop growth, and climate. Also water resources within the communities are not in a very good state as most of them have been contaminated with toxic chemicals or polluted with waste from mining activities, which also reduced the fish amount in nearby rivers. Associated health effects of quarry mining are also remarkable. The study also revealed that high prevalent rate of diseases such as cough and cold, eye problems, heart problems, head ache, throat infection, stress, among the workers and area residents were the direct and indirect effect of mining activities.

The main suggestions of the study are; environmental regulations and laws must be enforced by Governments agencies, local communities and non-governmental organizations for protection of and preservation of the environment; quarrying companies and authorities of the study area should as a matter of urgency, organize health screening exercise at least once or twice in a year and quarrying companies must be urged to take positive steps to reduce dust at the emission points.

Even though quarrying is regarded as a crucial economic activity in worldwide, it has a significant negative impact on both environment and health of the nearby people. Due to its nature, quarrying inevitably

leads to serious degradation on ecological and aesthetic values of the landscape in study area. It has been observed that most of the respondents from the study area are against quarrying due to the adverse effects of this to the environment as well as human beings. The major problems have been found in the quarry area of the study area are shortage of water, and pollutions of air, water, noise, land degradation, vibration, property damage and health problems on both workers and area residents. The respondents who were residing near to quarry sites are suffering more than those who are residing away from these sites. Most prevalent occupational diseases among the mine workers in the study area are respiratory problems, eye problems, skin problems, asthma, stress, etc. These diseases are also faced by the area residents also. The workers awareness level of the safety risks they are exposed to at was high but use of protective clothing while at work was poor. The exposure of workers to the high concentration and the poor use of protective clothing and gear predispose them to these problems. The quarry owners are ready to help the people of those areas who reside very near to quarry site for the smooth running of these quarries by giving money promises. While considering the ecological importance and adverse effect of these quarries to the human and environment, majority of the people are against the quarrying operation.

References

- Abhishek Pandey (2018), Environmental impact and damage categories caused by air pollution emissions from mining and quarrying sectors of European countries, *Journal of cleaner production*, Vol.97, pp. 1008-1020.
- Anand (2006), Mining and critical ecosystems: mapping the risks, world resources, *Journal of Environment and Occupational Sciences*, Vol.34, pp. 661-674.
- Ilyas M and Rasheed F (2010), Health and environment related issues in stone crushing in Pakistan, *Academic Journals*, Vol.76, pp. 643-648.
- Malini K and Ahern M (2010), Impact of granite quarrying on environment in Tamil-Nadu with reference to socio-economic status of workers, *International Journal of Health Services*, Vol.29, pp. 226-229.
- Mulenga and La Mata E (2005), Environmental impact of mining in tropical forest and Zambian quarry workers, *South African Medical Journal*, Vol.4, pp. 191-194.

- Oguntoke O and Abaoba A (2009), Impact of granite quarrying on the health of workers and nearby residents in Abeokuta, Ogun state, Nigeria, Ethiopian Journal of Environmental Studies Vol.12, pp. 254-263.
- Okafor(2006), Rural Development and the Environmental Degradation versus protection, International Archive of Occupational and Environmental Health, Vol.26, pp. 450-463.
- Olson and LoperaF (2004), Environmental degradation from Mining and Mineral processing in developing countries, Journal of Science of the Total Environment, Vol.26, pp. 436-447.
- Zhiyuan L (2014), The stone quarrying industry around China impact on worker and Environment, U.N. Journal, Vol.36, pp. 843-853

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