

**PERCEPTIONS OF RESIDENTS IN FELDA BUKIT GOH, KUANTAN
ON THE ENVIRONMENTAL IMPACT OF BAUXITE MINING**

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DEDICATION

To Allah
To my beloved mother
To my loving family
Thank you.

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First of all, I would like to express my deepest gratitude to Allah for giving me strength, courage and fortitude to face my study to graduation. Without His help I might not be able to finish my studies. A million thanks to my mother as well as all my family members for their continuous love, moral support and trust. You all are the source of my strength and the drive to my success today.

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ABSTRACT

Nowadays, mining is important and a source of income especially for a country rich in mineral resources. Increasing demand from domestic and international industrial sectors has increased the production of mineral resources such as bauxite. The high market price and demand of bauxite in various sectors have been beneficial for Malaysia. However, in the pursuit of profit, a lot of negative factors such as environmental pollution has affected the local community. Therefore, this issue should be taken seriously by the authorities and contractors to ensure that the community live in harmony and comfort. A study was conducted to determine the extent of public awareness about environmental pollution from bauxite mining. The aim of this study was to investigate the perception of community on bauxite mining impacts. A total of 100 respondents were selected by systematic random sampling technique for questionnaire survey to obtain information about the impacts of environmental pollution. The results were analyzed through SPSS data using descriptive statistics. Almost 90% of respondents give feedback that bauxite mining adverse impact on them. Dust pollution is the highest with 34% followed by 30% of solid waste pollution, water pollution by 21% and 15% of noise pollution. Therefore, residents agreed that bauxite mining cause bad impact than good.

ABSTRAK

Pada masa kini, perlombongan merupakan salah satu sumber pendapatan yang penting bagi sesebuah negara yang kaya dengan sumber semulajadi. Peningkatan permintaan dari dalam dan luar negara dari pelbagai sektor terutamanya perindustrian telah mempengaruhi peningkatan pengeluaran sumber galian semula jadi seperti bauksit. Nilai harga pasaran yang tinggi dan kegunaan bauksit dalam pelbagai sektor telah memberi keuntungan kepada Malaysia. Namun, dalam mengejar keuntungan dalam sektor tersebut muncul pelbagai fakto-faktor negatif seperti pencemaran alam sekitar yang mengundang permasalahan kepada masyarakat setempat. Oleh itu isu-isu seperti ini harus dipandang serius oleh pihak berkuasa dan kotraktor dalam menjaga keharmonian dan kesejahteraan masyarakat. Satu kajian telah dilakukan untuk mengetahui sejauh mana kesedaran masyarakat tentang pencemaran alam sekitar daripada perlombongan bauksit tersebut. Tujuan kajian ini dilakukan adalah untuk menyiasat tanggapan penduduk tentang kesan perlombongan bauksit. Seramai 100 responden telah dipilih secara sistematik teknik persampelan rawak untuk kajian soal selidik untuk mendapatkan maklumat mengenai kesan pencemaran alam sekitar yang berlaku. Dapatan data kemudian dianalisis melalui SPSS dengan kaedah pengagihan kekerapan. Sebanyak 90% responden berangapan bahawa perlombongan bauksit mendatangkan impak yang buruk kepada mereka. Pencemaran habuk merupakan yang tertinggi dengan 34% diikuti 30% adalah pencemaran sisa pepejal, 21% pencemaran air dan 15% pencemaran bunyi. Justeru itu penduduk sepakat berangapan bahawa perlombongan bauksit mendatangkan banyak keburukan daripada kebaikan.

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CHAPTER 1

INTRODUCTION

1.1 Background Study

Human beings have used minerals almost ever since they existed. The ages of human developments have coincided with the use of minerals. The modern urban industrial economy cannot survive without minerals and metals, so we cannot wish away mining. Minerals can be described by various physical properties, which relate to their chemical structure and composition. A mineral is an element or chemical compound that is normally glassy and that has been formed as a result of geological processes. There are several of minerals in our earth. Aluminium is one of the important minerals for human in modern day life.

Aluminium is a chemical element. It is a silvery-white, soft, non-magnetic, ductile metal. Aluminium is the third most abundant element in the Earth's crust after oxygen and silicon. Aluminium is the most abundant metal. Aluminium makes up about 8% of the crust by mass, though it is less common in the layer below. Aluminium metal is so chemically reactive that native specimens are rare and limited to extreme reducing environments. Instead, it is found combined in over 270 different minerals. The chief ore of aluminium is bauxite.

Bauxite is a soil or a rock formation, which is, composed mainly of aluminium hydroxide minerals. From an industrial perspective, bauxite is a natural material from which alumina can be extracted in a bayer plant (N.Gow and Lozej, 1993). According to USGS (2014), world resources of bauxite Africa 32%, Oceania 23%, South America and Caribbean 21%, Asia 18% and elsewhere 6%. An ore for alumina (aluminium oxide), provides employment to people especially the locals. The employment is in the form of manual labour, truck drivers and road side food joint workers and shopkeepers. Export of the ore earns valuable foreign exchange to the country and royalty to the state government.

In Malaysia, from the Department States that Malaysia at present has a bauxite reserve estimated at 109.1 million tonnes. The bulk of it (80.2 million tonnes) is located in Pahang, followed by Terengganu (23.5 million tonnes), Sabah (2.6 million tonnes), Sarawak (1.6 million tonnes) and Johor (1.2 million tonnes). Bauxite becomes main income for the state government. Factor of increasing bauxite operation is the demand from the importer especially China. As we know, China is the country that famous in production product. China becomes the largest importer of bauxite according to Storesund (2013), China demanding 8.5% of bauxite sources.

In Malaysia, the famous state that rich with bauxite is Pahang. According to the latest figures from the Minerals and Geoscience Department, Pahang has the country's biggest estimated reserves of bauxite totalling 80.2 million tonnes. However, there are reported estimates that up to 20 million tonnes may have been mined in 2015, meaning Pahang could exhaust its reserves roughly four or five years from now. According to China Customs data, Malaysia exported 15.87 million tonnes of bauxite to the country in the first nine months of last year and analysts reported Malaysia may have produced up to 20 million tonnes in 2015.

However, bauxite mining is known to be environmentally destructive. The mining activity impact on air, water, land, wildlife and other biological resources as well as it has a significant social impact too. According to Rohan J Lad and Samant (2012), the bauxite mining activity taking place in the upper catchment of the rivers is seriously affecting the water resources in the study area. There is lack of strong and effective measures for the reclamation and restoration of mined land by the respective companies. Mining being a temporary economic activity leaves long term socioeconomic and environmental footprints.

This research will be focusing on perception people about the bauxite mining in their residential. Perception people will come in different feedback. Bauxite mining has given them several chronic problem and the factors will be analysed in this research. People in Kuantan will be the respondent of the survey that will distributed in this research. The mining bauxite project famous just last two and half year ago.

1.2 Problem Statements

A French chemist, P. Berthier, first discovered bauxite in 1821 while investigating specimens found near Les Baux in southern France. Bauxite, an aluminium ore, is the world main source of aluminium. According to Plunkert (2004), bauxite is a naturally occurring, heterogeneous material comprised primarily of one or more aluminium hydroxide minerals plus various mixtures of silica, iron oxide, titania, alumina silicate and other impurities in trace amounts.

In 2009, Australia was the top producer of bauxite with almost one-third of the world's production, followed by China, Brazil, India, and Guinea. Although aluminium demand is rapidly increasing, known reserves of its bauxite ore are sufficient to meet the worldwide demands for aluminium for many centuries.

Bauxite mining being an impermanent activity, at most times, leaves long-term negative impact on the environment. If the production bauxite mining not be control it occurs of negative impact especially to environment and directly connected to society.

Several negative impact of bauxite mining occurs if no controlling and monitoring by the government and stakeholders. Dust pollution, water pollution, acid land, deforestation and biodiversity loss. All the negative impacts affected the environment. Relationship between environment and social cannot be avoided. Dust pollution will be the main negative impact in everywhere bauxite mining operates. According to Rohan J Lad and Samant (2012), the entire bauxite mining area and all roads leading to mines, ones denuded of forest have become dusty due to increased dust pollution.

Large-scale deforestation also will be change the surface area of land. Otherwise, the habitat also will be affected by the bauxite mining. The bauxite mining activity taking place in the upper catchment of the rivers is seriously affecting the water resources some cases the location of bauxite mining near with river and location for water sources for people affecting the quality of water in that area. The bauxite mining activity also has led to formation of large areas of wastelands (Rohan J Lad and Samant, 2012).

1.3 Research Aim and Objectives

The aim of the study is to identify the perception of society towards environmental impact of bauxite mining. Based on the problem statements above, several objectives were drawn.

- To determine perceptions of society towards environmental impact on bauxite mining.
- To identify awareness of bauxite issues towards environmental impact.

- To formulate a framework on reducing environmental impact of bauxite mining.

1.4 Research Questions

1. What is the perception of society towards environment impacts of bauxite mining?
2. What is the awareness on environment impact of bauxite mining?
3. How to reduce the environment impacts of bauxite mining?

1.5 Significance of Research

The findings of this study will give understanding to people about the impacts of bauxite mining towards environment, community and procedure to reduce the impacts. Considering that the main purpose of this study is to identify the perceptions of people towards bauxite mining.

1.6 Scopes of the Study

From the research, objectives that had been outlined above, several scopes were outlined in order to achieve the objectives. The context of the study will focus on the major urban issues. The bauxite mining issues is a huge topic in Kuantan. This study will focus on bauxite mining in Kuantan area only. The residential that affected and near with the location of bauxite mining will be the respondent for this research. This research focusing on perceptions respondent towards impacts of bauxite mining projects that affected the environment. Among of the people in Kuantan have be worried the environment implications because of bauxite mining. Furthermore, the study will focus on the potentials of framework to reduce the impacts. The framework will be a new dimension for better social quality of life for everyone.

1.7 Research Approach

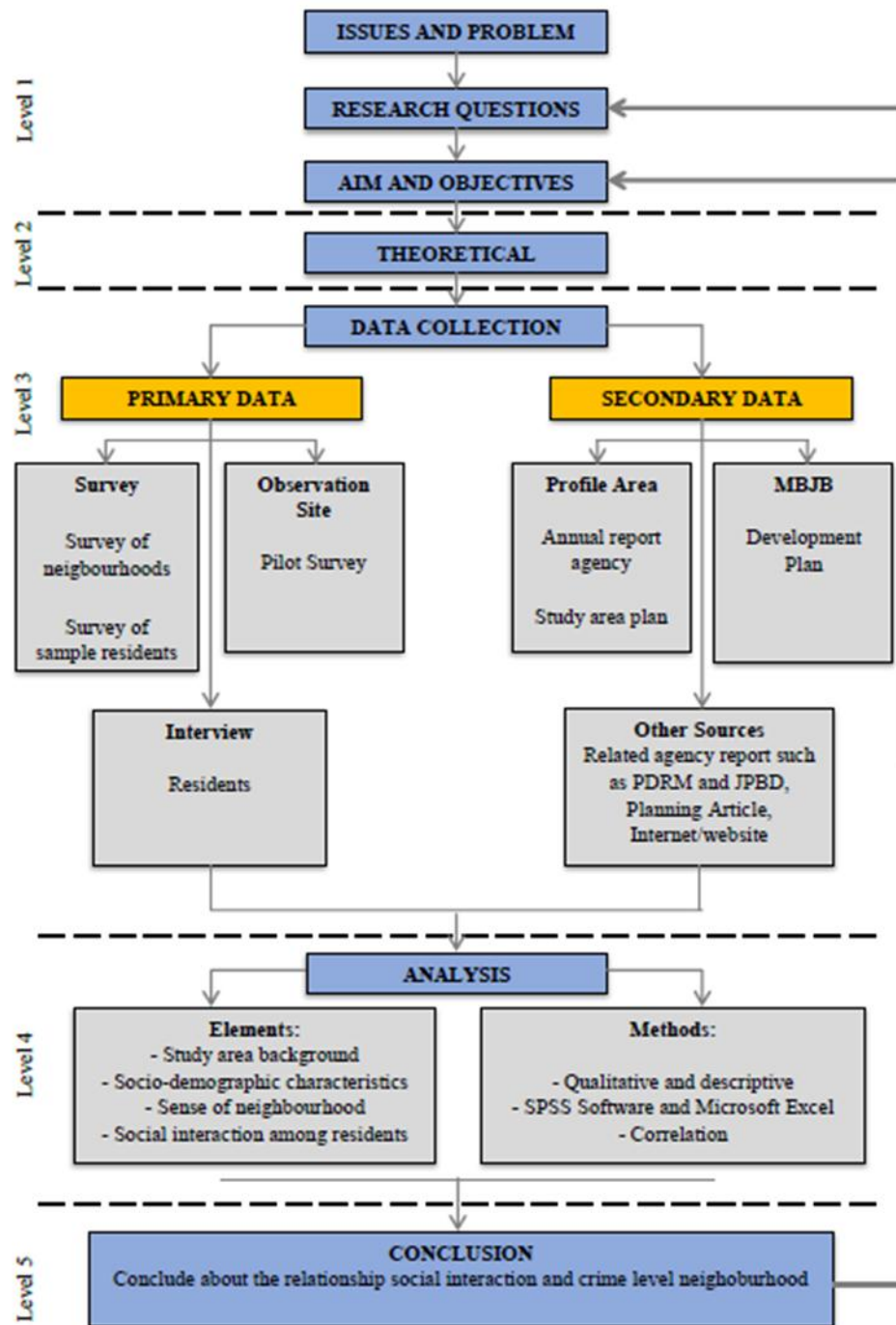


Figure 1.1 Study approach.

1.8 Summary

Bauxite mining impacts towards environment at Felda Bukit Goh become seriously issues. This research will focus on Felda Bukit Goh area as study area and located near with bauxite mining. Final stage of this research is to summarise findings which answer every research questions. The aim of the research is to identify the perception of society towards environmental impact of bauxite mining. At the end of this research will give contribution to the future bauxite mining in Malaysia. Furthermore, ideas for further research will be given to improve this study in different perspective such as location, number of neighbourhood, number of sampling and so on.

REFERENCES

- Annual, U. L., Urban, J., Law, C., & Benoit, M. D. (1974). Strip Mining : Methods of Control by the Three Levels of Government, 8(January).
- Ahmad, A. F., K, S. H., Ahmad, R. M., & Rao, R. J. (2014). Impact of Mining Activities on Various Environmental Attributes with Specific Reference to Health Impacts in Shatabdipuram , Gwalior , India, 3(6), 81–87.
- Abdullah, N. I. (2015, November 26). 'No plans to stop bauxite mining' 'No Plans to Stop Bauxite Mining'
- ANDERSON, W. (2000). Environmental Law Enforcement: the Role of the Judiciary, 1–19.
- Asare, B. K., & Darkoh, M. B. K. (2001). Socio-Economic and Environmental Impacts of Mining in Botswana: A Case Study of the Selebi-Phikwe Copper-Nickel Mine. *Eastern Africa Social Science Research Review*, 17, 1–41.
- Behera, P. K. (2015). International Journal of Economics & Socio-Economic Impact of Industrialisation and Mining on the Local Population : A Case Study of NALCO Industrial Area , Koraput, 4(8).
- Bray, E. L. (2007). Bauxite and Alumina. *US Geological Survey Minerals Yearbook–2002.*, 1(703), 26–27.
- Britton, A., Lakhdari, R., Harvey, J., & Forster, S. (2015). *The Social and Economic Impacts of Gold Mining*, 1–40.

- Clarks, G., & Jacks, D. (2007). Coal and the industrial revolution, 1700-1869. *European Review of Economic History*, 11 (1948), 39-72.
- Copeland, C. (2014). Mountaintop Mining: Background on Current Controversies. *Congressional Research Service*.
- Council, B. W. and E. M. (2000). Acid Mine Drainage: Mining & Water Pollution Issues in BC. *Environmental Mining Council of British Columbia*, 28.
- Fares, A., Giri, C., Govil, K., Hartemink, A., Holmgren, P., Keita-ouane, F., Warren, A. (2014). Drivers of Land use Change. *States and Trends of the Environment : 1987-2007*, 1–34.
- Gendron, R. S. (2013). Aluminum Ore the Political Economy of the Global Bauxite Industry.
- Hong, B. D., Slatick, E. R., Pantos, E. R., & McMillian, T. (1995). *Longwall Mining. Energy Information Administration*, (March).
- International Aluminium Institute. (2009). Fourth Sustainable Bauxite Mining Report 2008.
- Karim, F. N., & A. S. (2016, January 11). "BAUXITE: Illegal miners outnumber legal ones" "BAUXITE: Illegal Miners Outnumber Legal Ones"
- Keith, J. M. (2000). *Mining Technology*, 452 (Chapter 11),
- L.D. Jones , D.V. Lefebure, G. O. and T. G. S. (1998). Major Silver Deposits of British Columbia. *Ministry of Energy and Mines Energy and Minerals Division Geological Survey Branch*.

- Lad, R.J. & Samant, J.S., 2015. Impact of Bauxite Mining on Soil: A Case Study of Bauxite Mines at Udgiri, Dist-Kolhapur, Maharashtra State, India. *International Research Journal of Environment Sciences*, 4(May 2011), pp.77–83.
- Li, Z., Folmer, H., & Xue, J. (2016). Perception of Air Pollution in the Jinchuan Mining Area, China: A Structural Equation Modeling Approach. *International Journal of Environmental Research and Public Health*, 13(2), 735.
- Marg, D. K. S. K. (2012). Precious Minerals- The Wealth of India Division, (September 2011).
- Martin Brueckner and Dyann Ross, *Under Corporate Skies: A struggle between People, Place and Profit* (Freemantle, WA: Freemantle Press, 2011).
- M.Olivieira & M. Heemskerck. (2003). Perceptions of small-scale gold mining impacts: Results from focus group discussion in mining camps and affected communities. Tapanahonie & Brokopondo Regions, Suriname.
- Miller, G. (2010). Guidebook for Evaluating Mining Project EIAs, Chapter 1, 3–18.
- Mining, U. (2007). *Coal Mining Methods*.
- Mkpuma, R. O., Okeke, O. C., & Abraham, E. M. (2015). Environmental Problems of Surface and Underground Mining : a, 12–20.
- N.Gow, N., & Lozej, G.P. (1993). *Bauxite*.
- Nathan Associates Inc. (2013). Economic Effects of Indonesia ' s Mineral-Processing Requirements for Export, (April).

Plunkert, P. (2004). Bauxite and Alumina. U.S. *Geological Survey Minerals yearbook-2004*

Roulston, C. (2009). Mountaintop Mining Fact Book, (March).

Thomson. R (2014). World Silver Survey 2014- A Summary about The Major Sponsor of World Silver Survey 2014. The Silver Institute.

R. Ahmad. (2016, January 13). Pahang's bauxite fast running out. Pahang's Bauxite Fast Running out.

Sahu, H.B., Prakash, N. & Jayanthu, S., 2015. Underground Mining for Meeting Environmental Concerns – A Strategic Approach for Sustainable Mining in Future. *Procedia Earth and Planetary Science*, 11, pp.232–241.

Storesund, S. (2013). The alumina market outlook- 2013-15, 2013(1), 1-12.

Tse, P. (2005). The Mineral Industry of Malaysia, 1-7.

U.S Geological Survey. (2014). Mineral commodity summaries 2014: U.S. Geological Survey, 196.

ArcGIS Kuantan Web Map <https://www.arcgis.com/home/webmap/2016>