UNIVERSITI PUTRA MALAYSIA

IMPLEMENTATION OF RULES REGARDING QUARRY REHABILITATION IN SELANGOR, MALAYSIA

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By

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Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfillment of the Requirements for the Degree of Master of Science

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Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Master of Science

IMPLEMENTATION OF RULES REGARDING QUARRY REHABILITATION IN SELANGOR, MALAYSIA

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April 2018

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Selangor is blessed with an abundant reserve of granite rocks which supplies raw material to develop physical infrastructures in Selangor and the Klang Valley. However, quarry activities affect the environment's ecosystem and biodiversity resulting in soil erosion, water pollution and visual effects. Quarry rehabilitation can balance between socio-economic, infrastructural development and environmental needs. Generally, the objective of this research is to identify factors hindering quarry rehabilitation in Selangor by examining the existing legislative framework provisions on quarry rehabilitation, investigate the present status of quarry rehabilitation implementation and identify challenges to implement quarry rehabilitation in Selangor. It is a qualitative case study focusing on quarry rehabilitation in Selangor. A document analysis is used to analyze primary legal documents related to quarry rehabilitation, site observation to quarries left without rehabilitation was done to identify the physical appearance of each and focus group discussions with stakeholders were also conducted to attain their inputs. The document analysis of laws and policies related to quarry rehabilitation shows that there are loopholes and ambiguity in the laws and policies, lack of enforcement due to the existing provisions and non-legally binding policies which are not effective. Site observation to quarries left without rehabilitation shows characteristics of environmental degradation with unrestored and unmaintained vegetation and water channels, falling rocks, soil erosions and surface runoffs that results the site to be unstable and hazardous. The focus group discussions with the stakeholders identified 17 factors that challenged the implementation of quarry rehabilitation including operational challenges and enforcement issues. This research shows a pressing need to amend our current legislation to implement quarry rehabilitation in Selangor.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains

PELAKSANAAN PERATURAN-PERATURAN MENGENAI PEMULIHAN KUARI DI SELANGOR, MALAYSIA

Oleh

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Selangor dilimpahi batu granit yang menjadikannya pembekal bahan mentah untuk pembangunan infrastruktur fizikal di Selangor dan Lembah Kelang. Namun, aktiviti menguari meninggalkan kesan terhadap ekosistem dan biodiversiti alam sekitar mengakibatkan hakisan tanah, pencemaran air dan kesan visual. Pemulihan kuari dapat mengimbangi antara aspek sosio-ekonomi, pembangunan infrastruktur dan alam sekitar. Secara umumnya, objektif kajian ini adalah untuk mengenal pasti faktor-faktor penghalang kepada usaha pemulihan kawasan kuari di Selangor melalui penelitian peruntukan rangka kerja perundangan yang sedang berkuatkuasa bagi aktiviti pemulihan kuari, memeriksa status pelaksanaan pemulihan kuari dan mengenal pasti cabaran-cabaran yang dihadapi dalam pelaksanaan pemulihan kuari di Selangor. Ini merupakan kajian kes kualitatif berpusat pada pemulihan kuari di Selangor. Analisis dokumen digunakan untuk menganalisis dokumen undang-undang berkaitan pemulihan kuari, pemerhatian tapak operasi dijalankan untuk mengenalpasti ciri-cirinya dan perbincangan kumpulan fokus dengan pihak pemegang taruh turut diadakan untuk mendapatkan input mereka. Analisis dokumen ke atas undang-undang berkaitan pemulihan kuari menunjukkan terdapat celah dan kesamaran dalam peruntukan undang-undang sedia ada. Pemerhatian tapak di kuari yang telah berhenti beroperasi dan tidak menjalani aktiviti pemulihan menunjukkan keadaan alam sekitar yang terjejas dengan adanya tumbuh-tumbuhan dan saliran yang tidak diselenggara dan dipantau, longsoran tanah dan limpasan permukaan yang menjadikan tapak tersebut tidak stabil dan berbahaya. Perbincangan kumpulan fokus telah mengenal pasti 17 faktor yang mencabar pelaksanaan pemulihan kuari di Selangor termasuk cabaran operasional dan isu-isu penguatkuasaan. Berdasarkan kajian ini, pindaan undang-undang perlu dilakukan seberapa segera bagi tujuan mengusaha dan menjayakan pemulihan kuari di Selangor.

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LIST OF ABBREVIATIONS

NRE	Ministry of Natural Resources and Environment
JMG	Department of Minerals and Geoscience
PTGS	Selangor Land and Mines Office
WBCSD	World Business Council on Sustainable Development
DOE	Department of Environment
JPJ	Road Safety Department
JAKOA	Department of Aboriginal People
SDG 2030	Sustainable Development Goal 2030
MT	Matric tonne
NLC	National Land Code 1965
SQR	Selangor Quarry Rules 2003
NMP	National Mineral Policy 2009
EQA	Environmental Quality Act 1974
MDA	Mineral Development Act 1994
NFA	National Forestry Act 1984 (Act 207)
APA	Aboriginal People Reservation Act 1954
TPA	Town Planning Act 1976 (Act 172)
KPI	Key Performance Index
ESIA	Environmental and Social Impact Assessment

CHAPTER 1

INTRODUCTION

1.1 The Quarry Industry in Malaysia

Quarry refers to a site to which the ground is excavated or blasted for the purpose of extracting and removing rock material from any land (Ministry of Natural Resources and Environment, 2014). The quarrying or rock extracting industry in Malaysia has substantially contributed to the manufacturing and construction sectors (Minerals and Geosciences Department of Malaysia, 2016). A 9.7% growth was recorded for construction work done in the first quarter of 2017 valued at RM35.1 billion compared to RM32.6 billion in 2016 (Statistical Department of Malaysia, 2017). With that, granite has been identified as one of the 33 types of world class minerals that play an important role in the chain of demand and supply within the manufacturing and construction industries (Goh and Effendi, 2017).

The mineral industry contributed 8.9% of the nation's Gross Domestic Product (GDP) in 2015 (Bank Negara Malaysia, 2016), while another US$1.8 billion in 2016 (Ministry of International Trade and Industry Malaysia, 2016). Meanwhile, the Index of Industrial Production (IPI) in March 2017 expanded by 4.6%, when compared to the same month in 2016. In fact, the Manufacturing and Mining Index supported this expansion (Statistical Department of Malaysia, 2017). Other than that, non-metallic mineral products and fabricated metal contributed as much as 10.1% to the sales value in March 2017 of the manufacturing sector (Statistical Department of Malaysia, 2017). The quarry industry is closely related to the industry of innovation and infrastructure, sustainable cities and communities, responsible consumption and production, as well as life on land, which is part of the rock extracting industry, as indicated in the Sustainable Development Goal 2030 (SDG 2030) initiated by the United Nations in 2015. With that, quarry rehabilitation has emerged as a vital mechanism to sustain both the environment and the industry.

Quarry operations in Selangor mainly produce granite to cater to demands, thus contributing substantially to the building of physical infrastructures, including construction of airports and highways, upgrading of existing roads and ports, as well as establishment of two townships like Putrajaya and Cyberjaya (Ministry of Primary Industries, 2002). Quarries often concentrate near areas where demand and supply is at its greatest, such as the urban areas (Yundt and Messerschmidt, 1979). Naturally, rocks are non-renewable resources, inclusive of granite. Utilizing available resources to prevent sterilization is essential to cater to the escalating demands with outward expansion of urban centers. This industry is also important with the evolving land uses (Baker and Hendy, 2005), which may include industry, recreation, housing, commercial, establishment or agriculture (Yundt and Messerschmidt, 1979). Rehabilitation and reclamation refer to the process of restoring a mine or a quarry site

into a safe, sustainable, and environmentally friendly condition for post-mining or post-quarrying activities (Ministry of Natural Resources and Environment, 2013). According to the Ministry of Natural Resources and Environment (2014), quarry rehabilitation involves the management of all natural resources properties during and after the extraction process. Hence, rehabilitation in Malaysia reflects the progressive restoration of quarry site to a safe, sustainable, and environmentally sound site during and after extraction activities. Within the Malaysian context, the performance of the quarry industry has risen with the progressing development due to the prevailing policies on development and various projects initiated by the government. In fact, the number of quarries in Malaysia has increased from a total of 354 in the year 2013 increased to 376 in 2015, as depicted in the following:

Table 1 : Numbers of quarries in Malaysia 2013-2015

NO.	STATE	NUMBER OF QUARRIES		
		2013	2014	2015
1	Johor	47	46	71
2	Kedah	19	19	17
3	Kelantan	13	13	13
4	Melaka	8	8	8
5	Negeri Sembilan	18	18	18
6	Pahang	30	30	30
7	Perak	63	63	59
8	Perlis	5	7	6
9	Pulau Pinang	17	17	15
10	Sabah	41	43	45
11	Sarawak	48	48	55
12	Selangor	30	30	25
13	Terengganu	15	16	14
TOTAL		**354**	**358**	**376**

(Source: Auditor General's Report on Quarry Management and Its Impact to the Environment, 2015)

Table 1 presents the number of quarries in Malaysia from year 2013 until 2015. In 2013, the total number for quarries in Malaysia was 354. Later, it increased to 358 in 2014 and 376 in 2015. These quarries produce aggregates, clay, earth materials, kaolin, sand and gravel, silica, feldspar, limestone, and mica (Minerals and Geoscience Department of Malaysia, 2016). Selangor, in particular, has the second largest number of quarries after Johor in producing granite for construction purposes.

Table 2 : Quarry Production 2013-2015

NO.	STATE	PRODUCTION (TONNES)		
		2013	2014	2015
1	Johor	41,747,492.69	39,612,295.99	62,900,367.80
2	Kedah	10,073,474.00	4,580,397.07	4,039,573.00
3	Kelantan	2,749,522.00	2,373,159.00	2,914,268.00
4	Kuala Lumpur	0.00	0.00	0.00
5	Melaka	2,157,513.00	2,697,476.00	2,326,116.00
6	Negeri Sembilan	11,336,400.00	15,403,540.56	9,142,552.56
7	Pahang	3,859,055.06	3,717,944.65	3,295,310.16
8	Perak	24,606,628.00	17,338,195.53	13,417,400.58
9	Perlis	2,915,840.00	356,274.25	984,124.00
10	Pulau Pinang	6,775,639.00	6,530,469.60	5,022,240.00
11	Sabah	5,262,553.38	4,735,705.35	6,481,277.00
12	Sarawak	10,586,528.00	10,586,528.00	14,548,884.00
13	Selangor	25,522,229.00	27,550,186.00	28,927,467.00
14	Terengganu	5,580,557.00	679,491.00	4,744,570.00
TOTAL		**153,176,431.13**	**136,161,663.00**	**158,744,150.10**

(Source: Minerals and Geoscience Department of Malaysia, 2016)

Table 2 presents the quarry production from year 2013 until 2015. In 2013, a total of 153,176,431.13 tons had been produced by quarries in Malaysia, but saw a decline in 2014 to 136,161,663.00 tons. This number, however, increased in 2015 to 158,744,150.10 tons. In 2015, the value of production for 2015 was RM2,766 million, mostly gained from granite and limestone quarries.

1.2 The Granite Quarry Industry in Selangor

In comparison to other states, Selangor has been blessed with abundant granite reserves located in the districts of Kuala Langat, Hulu Selangor, Gombak, and Hulu Langat. The quarry operations in Selangor mainly produce granite to cater to the demands from Klang Valley, Selangor itself, and for export to abroad. With that, 28 active quarries are located in Selangor.

Selangor has bright potential in the quarrying industry. The industry is able to grow due to the available rock reserves and resources, infrastructure and growth areas, supply and demand, as well as the statutory Acts, Rules, and Regulations that support the growth of this industry. Infrastructures and growth areas have channeled towards the completion of Kuala Lumpur International Airport 1 (KLIA1), KLIA2, construction of new highways, upgrading of existing roads and Port Klang, as well as the establishment of 2 townships; Putrajaya and Cyberjaya. The manufacturing and services sectors are expected to generate future growth in districts of Petaling, Klang, Gombak, and Hulu Langat. The growth of these districts and the neighboring areas of Klang Valley maintain an active demand and supply chain of quarry products from Selangor (Ministry of Primary Industries, 2002).

Quarrying refers to a type of open-pit mining. It produces construction materials, such as granite, limestone, aggregate, marble, cement, and lime. In order to start operating, rocks surfaces are drilled and inserted with explosive. This, then, produces fragmented chunks of rocks that can be washed, crushed, and screened based on sizes and strength. In a quarry site, carious machineries are used to process the rocks, including crushers, conveyors, forklifts, saws, and trucks. Hence, this study focused on the Granite Quarries in Selangor State Land. Granite is a type of hard-rock that has been widely used in the construction arena. In a granite quarry, blasting is performed to collect rock fragments. A truck carries these fragmented rocks to the vibrating feeder to be transferred to the jaw crusher. This produces coarse rocks, which are then transported by a belt conveyor into the impact crusher. This process produces finer rocks and they are sent to the vibrating screen for screening, which produces heaps of finished product. For finer granularity, a portion of the rocks is sent to the vibrating screen to be crushed into finer form. This process generates another heap of finished products, which are identified based on their sizes and strength. As the quarries in Selangor mostly produce granite and resided on State Land that is regulated by the Selangor Quarry Rules 2003, this research focused on these quarries.

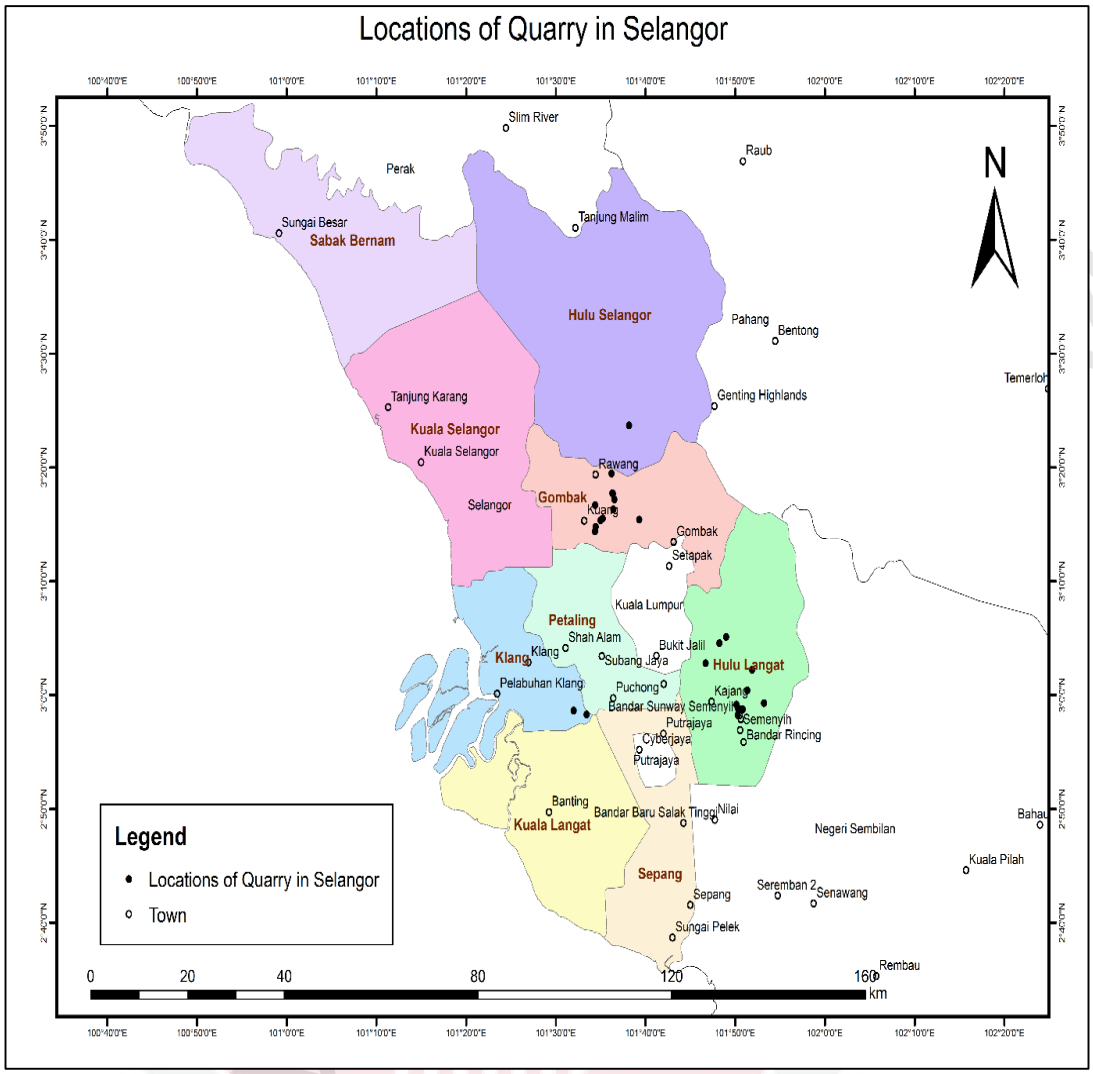

Figure 1 : Locations of Quarries in Selangor

Figure 1 shows the location of quarries available in Selangor. These quarries have been continuously operating and handed down from generation to generation. To date, the quarry operations are performed by using cutting-edge machineries for a more rapid production so as to deliver to the demands. Aside from these active quarries, three inactive quarries have been located at Ampang and Selayang, which measured about 234.51 acres.

1.3 Research Questions

The three research questions outlined for this research are listed in the following:

1.3.1 What are the loopholes or ambiguity that exists in the present law(s) that addresses quarry rehabilitation in Selangor?

1.3.2 Does leaving a quarry without rehabilitation affect the environment?

1.3.3 What are the challenges faced by stakeholders regarding quarry rehabilitation implementation?

1.4 Problem Statement

As demands for quarry products have reflected an increasing trend these past few years due to the thriving development in the country, the effect is, unfortunately, detrimental to the environment. Due to active quarrying, many exhausted quarries are abandoned without being rehabilitated. When a quarry ceases its operation, it is often regarded as a barren land and an eyesore. As of 2009, 314 active quarries were available in Malaysia (Ramli and Zulkifli, 2009). Of these quarries, only 12 practiced the best greening effort by conducting progressive rehabilitation simultaneously during the active phase of the quarry operation. At present, both Federal and State Government officials have no inventory or database to keep track of the rehabilitated quarries. Conventional rehabilitation schemes, which appear to be a practice among developing countries, have often failed due to the inability of calculating the specific features of a site even after careful planned (Kaliampakos and Mavrikos, 2006). In Malaysia, the Rehabilitation Scheme under the Selangor Quarry Rules 2003 obligates quarry operators to provide a plan for reclamation and protection on abandoned working which is a requirement in applying for a license. However, there is no provision to penalize if the initial plan is not done accordingly.

Although quarrying activity is essential for economic progression, it has environmental consequences that have to be addressed. Continuous and unmonitored quarrying contributes to the rising number of quarries that ceases operation and abandoned without rehabilitation. Disruption of flora and fauna, adverse visual impact, road damages, and water pollution are some of the negative effects due to abandonment of quarries (Baker and Hendy, 2005). Polluted soil, water, and air could creep into the human's nervous system, which may also result in mental disorders (Usman, 2016). On top of that, such quarries that are abandoned become a financial burden for the state government and an eyesore to the luscious greenery in Selangor, thus portraying an unfavorable image to the quarry industry.

In some nations, the extractive industry is so vital that shutting down the industry can lead to socio-economic problems, including unemployment and difficulties in livelihood leading to poverty, family disunity, and even early death of ex-employees after exhaustion of income (Angyobore, 2016). It is a financial burden for the state government to perform state-run clean-up due to unfamiliarity of technical know-how (World Bank, 2002), despite of the short-term gain for the irresponsible operators.

Furthermore, the negative perception of the society towards the quarry industry does not only overshadow the contribution of this industry to the country, but it also demotivates potential investors and prevents the industry from further progress. Even

though laws have been erected as a mechanism of control, often times, strict liability rules are less effective, as predicted by economics theory (Bentata, 2013). Thus, legislation and policies must be aligned with the global practices of sustainability so as to stay relevant and feasible. In support of this, the United Nations have worked with the World Business Council for Sustainable Development to encourage sustainable practices by its state members. With that, a Key Performance Index (KPI) is established to ensure that quarry rehabilitation is indeed adapted in line with policy and planning formulation (WBCSD, 2012). The aspects of enforcement, monitoring, and corrective measures need to be enhanced to ascertain long-term benefits for both the industry and the stakeholders.

The SDG 2030 focuses on responsible consumption and production in developing infrastructures. Thus, building sustainable cities and communities relies on a sustainable quarry industry to cater raw materials to the demands of construction. Many countries and international organizations have begun encouraging efforts to rehabilitate quarry sites as a step towards sustainability. Quarry rehabilitation is vital, not only to sustain the environment, but also to sustain the industry itself. Only when adequate legal framework and policies with quarry rehabilitation that Malaysia can sustain this industry and continue to benefit from it.

In Malaysia, there are certain laws, policies and forums introduced by the Federal and State Government that generally discusses on quarry activities including the National Land Code 1965, Selangor Quarry Rules 2003, National Mineral Policy 2 and the National Land Council under the Ministry of Natural Resources and Environment. These laws policies and forums were introduced to facilitate the operation of a quarry including procedures to grant licenses or permits and safety measures.

Currently however, there is no specific provision in the current laws that addresses quarry rehabilitation thus making it insufficient in the aspect of enforcement. Enforcement agencies do not have the jurisdiction to enforce rehabilitation thus, unable to protect the environment. Environmental degradation as a result from the failure to rehabilitate these sites are without penalties. There is also a need to get the insights from different perspective among stakeholders that can provide the explanation as to why quarry rehabilitation is not feasible to date.

To date, there are no records in the form of inventory or database to monitor rehabilitated quarry sites in Malaysia. This means the actual effects of quarrying to the abandoned sites have not been observed of its characteristics. In this light, there is urgent need to record such data in a scientific research such as a thesis that can become a reference to stakeholders.

1.5 Research Objectives

The main objective of this research is to identify the factors that hinder quarry rehabilitation in Selangor. Meanwhile, the specific objectives of this research are as follows:

1.5.1 To examine the provision of existing legislative framework for quarry rehabilitation;
1.5.2 To explore the characteristics of sites which have been left without rehabilitation;
1.5.3 To identify challenges in the implementation of quarry rehabilitation in Selangor.

1.6 Significance of Research

This research will be able to provide the information on the existing status of laws and policies pertaining to quarry rehabilitation in Selangor, detect loopholes and ambiguity in the present laws and policies pertaining to quarry rehabilitation, point out the characteristics and the physical appearance of quarries without rehabilitation, identify challenges for implementation of rehabilitation and offer a way forward for lawmakers and policymakers in establishing a more effective law and policy.

1.7 Research limitations

Some limitations of this research are:

1.7.1 The population of this research reflects the state of Selangor, hence the results are only applicable to Selangor;
1.7.2 It was challenging to gain consensus from stakeholders to conduct meeting, brainstorming, and Focus Group Discussion sessions, as well as site visit;
1.7.3 Language appeared to be a barrier during the Focus Group Discussion sessions as it was conducted in the English language, when many participants preferred providing responses in the Malay language;
1.7.4 At present, there is no provision specifically addressing quarry rehabilitation thus there are no jurisdiction on enforcement;
1.7.5 There are no records be it in a form of statistical data, inventory or database showing the number of rehabilitated quarries in Selangor.

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