Land use change in Kelantan: Review of the Environmental Impact Assessment (EIA) reports

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Abstract

Environmental Impact Assessment (EIA) is an essential process in minimizing the adverse environmental impact and to ensure sustainable land use. In Malaysia, under Section 34A, Environmental Quality Act 1974, the EIA was made compulsory for any project that can be a threat to the environment. All EIA reports require approval from the Department of Environment prior to the project commencement. This study argues that land use change for agriculture and logging in Kelantan has a direct connection on the approved EIA. The objectives of this study is to identify a list of EIA reports that have been previously approved in Kelantan since 2000 to 2015; and to analyze the EIA reports embracing the trends of approval, the type of project, territory involved, the consultant involved, the time of approval, potential impacts and mitigation measures. This study had been reviewed 192 EIA report in DOE Kelantan and covered year 2000 to 2015. The review process to look at the type of project, territory involved, the consultant involved, the time of approval, potential impacts and mitigation measures. It's covered three district of Tanah Merah, Kuala Krai and Gua Musang. To date, a total of 222 EIA reports have been approved in Kelantan. The results showed a notable increment in the approval trend of EIA reports. A total of 149 conducted EIA projects are fall within the territory of Gua Musang. Majority of the approvals are granted to agriculture and logging projects. Majority projects have passed over the area of secondary forest, oil palm and rubber plantations, permanent reserve forest and the watershed of tributaries of Sungai Kelantan. Land-clearing activities for agriculture and logging on a large scale have a significant impact to environmental change in Kelantan.

Keywords: agriculture, deforestation, environment impact assessment, Environmental Quality Act 1974, floods risk, land use change

Introduction

Environmental impact assessment (EIA) is a method to identify and predict the positive or negative impact to the environment, human health, social and economic effected from development projects to be implemented. EIA also contains an assessment impact that will or may occur to the environment with the proposed steps of prevention, reduction and control of

adverse effects or harm to the environment (Mohd Nadzri & Maziah, 1998; Wood 2003; Abdul Rahman et al., 2017). According to Mohan et al. (2015), the EIA process is intended to prevent or eliminate the potential adverse impact of anthropogenic development by recommending suitable reduction steps that are appropriate even though before the realization of an activity. To them, EIA is an analysis process and expectation assessment of environmental changes due to the necessity of a project or program that have an impact on the activities and human life and its environment (Toro et al., 2013; Katarina & Monika 2015; Mohan et al., 2015; Abdul Rahman et al., 2017). EIA is also seen as a tool to identify, investigate and measure the potential and mitigation impact. The potential and mitigation impact are two (2) essential component in EIA process (Glasson et al., 2012; Toro et al., 2013; Abdul Rahman & Zaini, 2015; Katarina & Monika, 2015).

Floods in Kelantan in 2014, has invited a variety of reactions to identify the cause of the flooding. The diversity of farming and logging projects implemented in Kelantan is seen as a contributing factor to the occurrence of floods, especially in Ulu Kelantan's hills. Observations done by expertises also do not deny the possibility of other factors such as an incredible 48 hours rain which fell on 22-24 December 2014 at the Ulu Kelantan, the river, topography and the environment as few others contributing factor. This situation is proved when the heavy rains have overflowed Sungai Galas with strong current of water and has drowned the old town of Gua Musang and nearby villages. The sudden overflowed called as "land tsunami" by locals has annihilated and drifted any objects blocking the flow, bringing along the mud. According to Zulhazman (2015) continuous heavy rain has caused fast water flows from the highlands to the rivers for there was no natural barrier of trees. When there was no tree to hold the soil, the landslides happened and carried along the river water flow to become mudslides. He also believes that the clearing of land for agriculture in some areas of Ulu Kelantan has caused many trees are cut down watching the lost of "natural fortress".

In Malaysia, section 34A of the Environmental Quality Act 1974 has set legal requirements for EIA for the activities to be authorized. The act also empowers the responsible minister (Ministry of Natural Resources and Environment) to suggest activities that can have a big impact on the environment have to go through EIA. Project developers must submit an EIA report to the Director General of the Department of Environment (DOE) prior to approval by the relevant parties. EIA report shall be made in accordance with guidelines issued by the department of the environment, which contains an assessment of the impact of the activities enumerated in prescribed activity (19 projects) on the environment and propose measures to be taken to avoid, reduce or control the negative effects on the environment (Abdul Rahman & Zaini Sarkawi, 2015; DOE, 2015; Abdul Rahman et al., 2017).

Land use change and floods scenario in Kelantan

Land use change and land cover reflect the changes in development that occurs in a place. Land use change from forest areas to different types of land use such as townships, settlements, industry, agriculture and tourism can affect the quality of environment that can cause the risk of natural disasters (Shaharudin Idrus et al., 2004; Tuan Pah Rokiah & Hamidi 2016). The studies conducted by Tuan Pah Rokiah & Hamidi (2016) showed that the land use development in the Kelantan basin for 1984 is less diversified or in other words it is not complex where only few land use pattern are categorized as rubber, coconut, oil palm, vegetables and so on. The pattern of land use development is moderate to potray the development barrier in the Kelantan Basin area was not as vibrant as the 1980s. For example,

agriculture activities were also moderate and exploited without use the latest technology that was limited the exploration of forest areas for agricultural activities.

However, in 1997, the pattern of land use in Kelantan in particular began to be complex compared to the year 1984. The vibrant land use development due to the lifestyle pattern of the people in the Kelantan Basin in facing with the mainstream of national development. Technological developments have led to large scale agricultural activities including rubber, oil palm and agriculture. Land use changes that occurred in particular areas in the northern part of Kelantan, are also increasingly apparent in the efforts of the state government to plan for develop the community farms. Many areas of forest reserve and rubber plantations as well as existing palm oil have been cut down and replanted. This process has exposed the area to a more open structure. This situation has given rise to speculation among media and non-governmental organizations which look at the causes and factors of floods in Kelantan.

The floods that struck Kelantan in the end of December 2014 have resulted in massive destruction of property, houses and livestock, while also killing people. This incident has left a big impact on the people in Kelantan. In addition to the outstanding factor of raining on 22-24 December 2014 at the Ulu Kelantan within 48 hours, the river, topography and the environment is often seen as a factor contributing to the big floods in Kelantan recently. The development of plantations, farms and logging is happening on a large scale, especially in the hilly areas in Ulu Kelantan often seen as a factor that contributed to the floods that occurred in Kelantan recently. This situation was supported when the effect of the rains have overflowed Galas River with strong currents up to drown the old town area of Gua Musang and several surrounding villages. The sudden overflow like a “land tsunami" by the people was annihilating and discarding all the objects in front or block the flow with mud.

According Zulhazman continuous heavy rain has caused water flow from the highlands flowing faster, rushing to the rivers because there is no natural barrier which are trees. If there are no trees to hold the soil then it will cause landslides and it carried along the soil with the flow of the rivers and the mudslides occur. He also believes the clearing of land for agriculture in some areas of Ulu Kelantan has caused many trees are cut down resulting 'natural fortress "lost (Hamzah, 2015; Mohmadisa, 2016).

In addition, the focus of open a forest towards the concept of one kind of plant or 'monoculture' cannot replace the functions of tropical forest plants in hydrological processes (Mohmadisa et al., 2016). Some of the rain will intercepted by leaves and other plant parts, and then evaporates into the atmosphere. The amount of water that not intercepted by the plant will fall to the ground and so are the flow line of the trees. In contrast to the trees of tropical forests, the farms 'monoculture' such as rubber, palm oil and vegetables cannot provide coverage of natural forest canopy like a slow falling rain on the earth's surface thereby increasing the amount of runoff.

The floods is considered the worst flood catastrophe continues to terrorize up to Kuala Krai resulted from combined water from three rivers which Lebir, Nenggiri and Galas River which meets in Kemubu, Kuala Krai,which forms Sungai Kelantan. Strong and big currents like 'Tsunami Land' which makes the affected areas become 'sea' of water rose as high as the third floor of Sekolah Kebangsaan Manek Urai Lama. During the same period, other districts of Tanah Merah, Pasir Mas, Machang, Tumpat, Kota Bharu and Jeli greatly affected by the floods.

Environmental Impact Assessment in Malaysia

After 40 years of implementation of EIA in the world, the EIA is still an important component in efforts to build a sustainable environmental. In Malaysia, EIA is compulsory for all activities or projects which can affect the environment. It stipulated under section 34A of the Environmental Quality Act 1974, EIA also seen as an important procedure in decision making (Dangi et al., 2015). There EIA procedure consists of several steps, sequence and the right content of it based on the legal practice of a particular country. EIA has a specific analytical method or technique, and uses many approaches customized to the problems identified (Wood, 2003). According Mohd Nazri and Maziah, Mohan and Glasson EIA can use various methods of analysis in explaining the expected impact (Mohd Nadzri & Maziah 1998; Glasson et al., 2012; Dangi et al., 2015). It depends on the type of project being assessed, the nature of the affected landscape and nature of potential impacts. The procedures contained in the EIA are often used as guidelines for determining the direction of a project or program in order to give maximum benefit to human welfare and the environment. A comprehensive EIA report able to help the decision makers make the best assessment, as it covers several disciplines such as biophysical, cultural, social and economic (Pavlickova & Vyskupova, 2014; B. Dangi et al., 2015).

Methods

This study has conducted a preliminary analysis of EIA documents in Kelantan, which has been approved by the Department of Environment Kelantan from 2000 to 2015. A total of 222 EIA documents approved during the period. The EIA document covers the entire project listed under Section 34A of the Environmental Quality Act 1974, and covers the entire territory in Kelantan (DOE, 2015). Accordingly, this study focuses only on the EIA report, which was approved in three major districts affected by the floods, which are Gua Musang, Kuala Krai & Tanah Merah. The analysis is conducted was descriptive analysis. An analysis of the potential impacts and mitigation of the impact was carried out to identify the activities undertaken and planned. Studies on the EIA document is an important factor in unlocking the extent of agricultural and forestry activities contribute to the occurrence of floods in Kelantan recently.

Results and discussion

Results of a preliminary study on the EIA report presents approval trends of the EIA report in Kelantan, the type of project approvals, the average approval time, a list of projects by territory, exploring a forest reserve status, a list of EIA consultants in Kelantan, a list of indicators forecasting and mitigation of potential impacts the impact is envisaged, as well as the status of flood risk assessment in EIA document.

EIA approval increasing in Kelantan 2000-2015

The study found a total of 222 EIA reports, which was approved during the period 2000-2015 in the state of Kelantan (DOE, 2015). Trends in the approval of EIA reports in Kelantan between 2000-2015 have shown a substantial increase (Figure 1). The increasing trend of the approval of the EIA report indicates the need for EIA approval on projects planned in Kelantan has to be taken seriously by state authorities and the Department of Environmental

Affairs. The increasing trend of approval of the EIA report showed property development and land clearing for agriculture has been through the process EIA accordance with the provisions of section 34A of the Environmental Quality Act 1974.

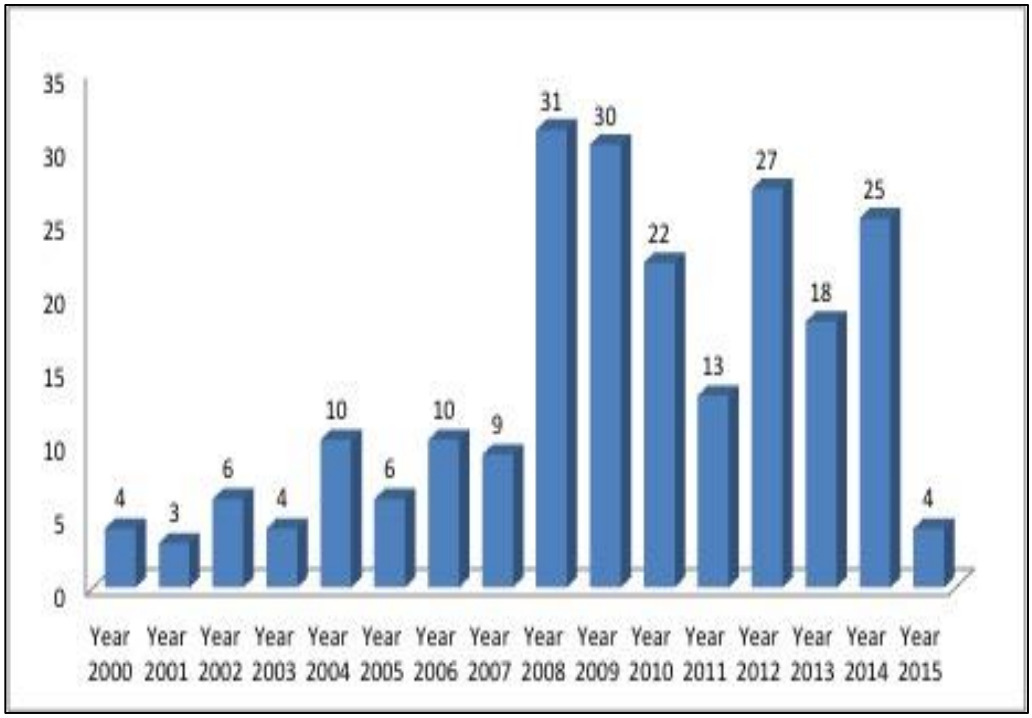

Figure 1. Number PEIA approved by year

The majority of the approved projects are agricultural projects

The majority of the approved projects are agricultural projects (replanting and new plantations of rubber and oil palm) as well as logging a total of 78.4%. The scale of the project area is located in approximately 500 hectares to 2,000 hectares. Agriculture and forestry projects appear to have dominated the list of approved EIA projects in Kelantan. The increasing trend is seen rising around 2008 until 2014 (Table 1).

Table 1. Projects that have received the approval of the EIA

Type of activities	Frequency	
Ferns rumohra asiantiformis plantation	2	
Fisheries	1	
Forest enrichment/agriculture/equal	12	*
Forest timber plantation	2	*
Housing	1	
Industry	2	
Infrastructure	13	
Integrated plantation	13	*
Karas trees plantation	1	*
Logging/forest enrichment	6	*
Mining	3	

Oil palm plantation	45	*
Pembangunan ladang ternakan lembu pedaging dan pertanian	1	
Petroleum	5	
Power generation and transmission	1	
Quarries	12	**
Resort and recreational development	3	
Teak forest plantation	2	*
TLC and oil palm	3	*
TLC/TLC reforestation/TLC forest enrichment	90	*
Vegetables	2	
Water supply	2	

* Agriculture involves replanting, clearing and logging forest reserve
** Quarrying of sand, stone and laterite

The time period for approval of the EIA report was less than two (2) months

EIA approval period in Kelantan for the period 2010-2015 was less than two (2) months (Figure 2). The time period for approval of the EIA plays an important role in a project, as if a long period of time it can take to contribute to the increasing of operating costs of a project, and this is not liked by the project developer. The length of time taken to determine a decision also reflects the efficiency of interested parties (DOE).

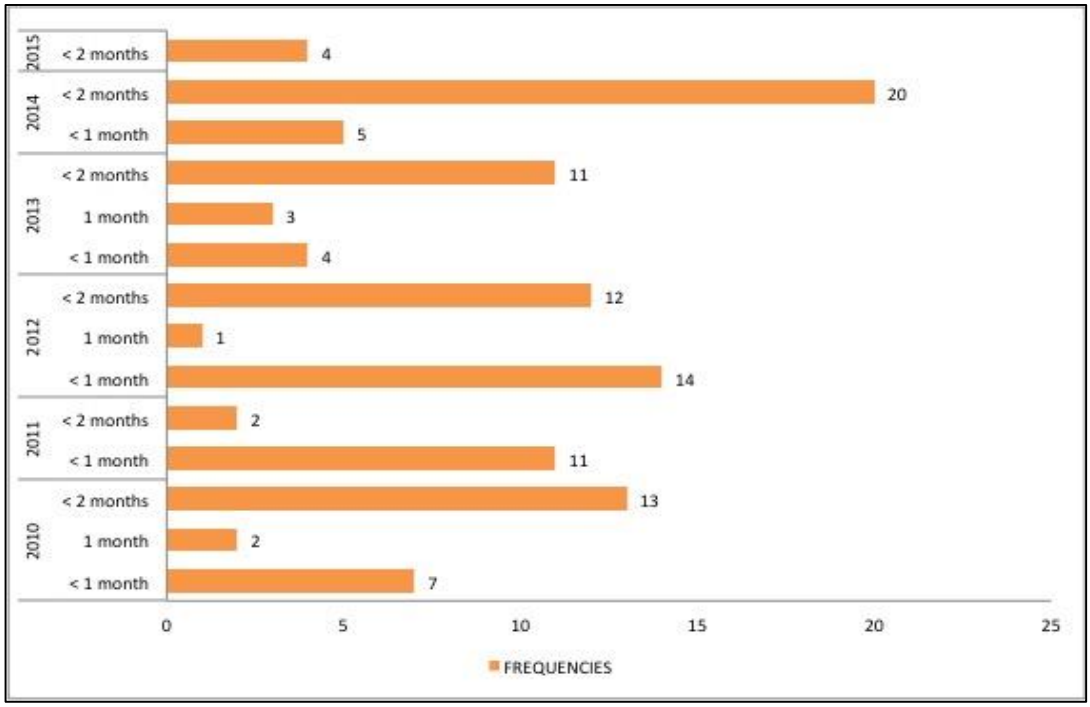

Figure 2. The length of time for approval of the EIA report for the period 2010-2015 in Kelantan

Gua Musang has high approved EIA projects

The study found that Gua Musang has high approved EIA projects in number of 149 projects. The majority of projects are plantations, agriculture and forestry, which represents more than 80% of the project that received EIA approval (Table 2).

Table 2. List of projects received EIA approval in Gua Musang, Kuala Krai and Tanah Merah

Year	Number of Projects Approved EIA		
	Gua Musang	Kuala Krai	Tanah Merah
2000	1	1	-
2001	3	-	-
2002	6	-	-
2003	4	-	-
2004	8		1
2005	4	1	-
2006	7	-	-
2007	6	2	-
2008	16	8	1
2009	21	3	1
2010	15	4	1
2011	8	4	-
2012	17	5	3
2013	12	4	-
2014	18	4	-
2015	3	-	-

Exploration of border and permanent forest

Analysis in the report of the EIA documents found that exploration of boundary of permanent forest reserves (PFR) and the forest area is often used for plantations or replanting project for timber rubber and palm clones. More than 24 PFR areas in especially in Gua Musang were explorated. This area includes the existing farms, former logging area, secondary forest and PFR such as PFR Sungai Berok, PFR Jentiang, PFR Gunung Stong Selatan, PFR Sungai Betis, Hutan Sekunder Relai, PFR Hulu Temiang, PFR Sokor Taku, PFR Sejana, PFR Sungai Sator, PFR Batu Papan, PFR Ulu galas, PFR Relai, PFR Lebir, PFR Terah, PFR Limau Kasturi, PFR Batu Papan, PFR Sungai Durian, PFR Sungai Nenggiri, PFR Sungai Perias, PFR Loging, PFR Sokor Taku, PFR Serasa, PFR Miskin dan PFR Gunong Rabong.

Consulting company active in the preparation of the EIA report in Kelantan

EIA consultant plays a key role in the preparation of the EIA report. The developer is responsible for selecting and identifying qualified consultant (registered with the Department of Environment Malaysia) for the preparation of the EIA report. Descriptive analysis of EIA documents found there are eight (8) consulting company active in the preparation of the EIA report in Kelantan. A total of three (3) EIA consulting firm responsible for providing more than 10 EIA documents during the period 2000-2015. However, the consulting company I.Z. Environment is seen between the companies of choice for project developers in preparation of the EIA report in Kelantan (Table 3).

Table 3. The frequency of consultant company

Consultant company	Frequency	Consultant company	Frequency
Alamsutira Sdn Bhd	1	Gs Alam Lestari Solutions	1
Anuar Mining And Environmental Consultant	2	Hydec Engineering Sdn Bhd,	1
Atmostech Multi-Trade & Ser	1	I.Z Environmind Sdn Bhd	95
Azm Engineers	1	Institut Penyelidikan, Pembangunan & Pengkomersilan (Irdc)	1

Capai Cerah Sdn Bhd	2	Integrated Envirotech Sdn Bhd	1
Chemsain Konsultant Sdn Bhd	1	Iz Environmental Sdn Bhd	1
Engineering And Environmental Consultants Sdn Bhd	1	Kenep Consultancy & Services Sdn. Bhd.	2
Environmental Resources Management (M) Sdn Bhd	4	Kiwiheng Wood And Environmental Consultants Sdn Bhd	1
Eqm Consultancy Services	1	Lankenv Environmental Sdn. Bhd.	1
Europasia Engineering Services Sdn. Bhd.	1	Mab Environmental Consultants Sdn. Bhd.	1
Forestcare Sdn Bhd	2	Mareff Management Sdn. Bhd.	3
Ghazali & Associates Sdn Bhd	1	Masa Environmental Consultant Sdn Bhd	7
Glisten Env. Consultan S/B	1	Mendiraya Urus Services	5
Green Hope Consultancy Sdn Bhd	32	Msk & Associates Sdn Bhd	1
Gs Alam Lestari Solutions	2	Mso Associates S/B	1
Pakar Management Technology (M) Sdn. Bhd.	3	Ukm Pakarunding	1
Puncak Moriah Engineering Sdn. Bhd.	15	Unisza Sdn Bhd	4
Pusat Pembangunan Perniagaan Universiti Putra Malaysia	4	Unit Perunding Universiti Malaya	1
Sangga Engineering & Enviroservices (Abdul Wahab Ali)	1	Universiti Pertanian Malaysia	1
Sba Consultant Sdn. Bhd.	4	Upm Consultancy & Services Sdn Bhd	1
Sentosa Ventures Sdn Bhd	2	W & R Envirobina Sdn Bhd	1
Shoh Consultancy	1	Wiranda (M) Sdn Bhd	1
Ssm Associates Sdn Bhd	1	Wiranda (M) Sdn Bhd	2
Surawaki Environmental Sdn Bhd	1	Yes Enviro Services Management	2

Indicators in Forecasting Potential Impacts and proposal for mitigation of the impact

There are 12 indicators used in the prediction of potential impacts and mitigation plan of the impact in the EIA report in Kelantan. All potential impacts and mitigation plan of the impacts vary according to the current status of land use, type of project, size of the project site and the location of the project.

1. Soil erosion
2. Surface runoff
3. Sedimentation
4. Noise generation
5. Air pollution
6. Water pollution
7. Solid waste disposal
8. Scheduled waste
9. Traffic congestion
10. Ecology (fauna &flora)
11. Forest fire
12. Socio-economy

Conclusion

Even though the EIA is a part of important measurement tool in helping to reduce adverse impact on the environment, widespread approval with limited regular monitoring, had contributed to the vulnerability of the environment, especially forests and catchments area

(Mohd Nadzri & Maziah, 1998). Preliminary studies on EIA reports found a high growth of EIA submission since 2000 to 2015 (Figure 1). Agricultural projects, logging and quarrying are dominating 78% of overall approved EIA reports that received by the Department of Environment Kelantan. The study also found out that many plantations, agriculture and logging have occurred in the district of Gua Musang. Open farmland, farming and logging have led to the exploitation of secondary forest, logged forest area, the existing plantation as well as exploitation on a number of permanent forest reserves. Majority of the affected area are hilly, water catchment areas and the main tributaries of Sungai Kelantan. The results of this study clearly indicate that the clearing of forest on a large scale with the approval of EIA may also be associated with the floods in Kelantan recently.

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