

PRELIMINARY ECOLOGICAL INPUT ASSESSMENT OF EIAs OF SELECTED QUARRIES AND OIL PALM PLANTATION PROJECTS IN SABAH, MALAYSIA

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Abstract: Since the introduction of Environmental Quality Act (Prescribed Activities) (Environmental Impact Assessment) Order 1987 in Malaysia, submission of an environmental impact assessment (EIA) report for approval is mandatory before the commencement of any of the prescribed activities. However, the insufficient ecological inputs have always been the major shortcomings of most EIA reports. Thus, this study aims to critically review EIA reports and compare the ecological input between EIA reports of quarry and oil palm plantation activities using a designated checklist. The common weaknesses identified in both EIA reports of quarry and oil palm plantation activities include the inadequacy of survey's coverage and duration, description of flora and fauna species without quantification and status, surveys which showed bias toward terrestrial ecosystem than aquatic ecosystem and impacts prediction which were descriptive in nature. It was found that greater emphasize of ecological input was on site assessment for the quarry activities whereby mitigating measures and monitoring programmes were emphasized in the oil palm plantation activities.

KEYWORDS: Environmental impact assessment; ecological input; quarry activities; oil palm plantation activities

Introduction

Environmental Impact Assessment (EIA) is a systematic process to identify, predict, evaluate and communicate information about the impacts on the environment of a proposed project and to detail out the mitigating measures prior to project approval and implementation (DOE, 1995). In Malaysia, EIA studies are required for prescribed activities under the Environmental Quality (Prescribed Activities) (Environmental Impact Assessment) Order 1987. In Sabah, EIA system was further strengthened by the passing of the Conservation of Environment Enactment 1996, Conservation of Environment (Prescribed Activities) Order 1999, Environment Protection Enactment 2002, Environment Protection Enactment (Amendment) 2004 and Environment Protection (Prescribed Activities) (Environmental Impact Assessment Order 2005 (EPD, 2005).

Ecological input, the information about the interrelationships of living organism, plant or animal and their environment has always been identified as the shortcoming of most EIA reports. Reviews of the quality of ecological input in EIA can be found in Thompson *et al.*, (1997), Warnken & Buckley (1998), Treweek (1999), Vun & Latiff (1999). Even though the ecological content in the EIA reports has often been criticized, the qualities of the EIA reports hardly have much improvement especially in the ecological content. This may be because there is still no standard methodology for either the ecological assessment of proposed development projects, or the review of the EIA reports to evaluate the quality of ecological input in Malaysia (Vun & Latiff, 1999).

In Malaysia, there have been researches carried out on ecological input of EIA reports such as coastal resort development and quarry activities (Vun & Latiff, 1999, Wahid *et al.*, 2010). However, there is no research focusing

on comparing the ecological input of EIA for quarry and oil palm plantation projects. In fact, more concerns should be focused on these two activities as there will be good prospects in the construction related industries and oil palm plantation industries. The prospects in the construction and infrastructure-related industries will trigger the increase of quarry activities being carried out as there will be increasing demands for building materials. On the other hand, oil palm related industries will also become the spearhead of Malaysia's economic forces in the future as Malaysia is the world's largest producer and exporter of palm oil whereby Sabah is the largest oil palm producer among all the states in Malaysia (Kollert *et al.*, 2005). Furthermore, palm oil has now emerged as an ingredient in biodiesel and can be processed into fuel in power stations. This would generate a new market and dramatically increase the global demand for palm oil.

This study aims to critically review the ecological input of EIA of quarry and oil palm plantation activities and make a comparison between these two activities. The results of the study would be able to determine the similarity and difference of ecological input in the EIA report for these two activities. By comparing these two diverse activities, qualities like practicality, effectiveness of the EIA guidelines and other strengths and weaknesses related to impact assessment could be identified and following this, efforts could be made to improve the quality of EIA reports and impact assessment practices in Malaysia.

Methodology

The study was an initial review of 12 Preliminary EIA reports for quarry and oil palm plantation activities in Sabah. Six EIA reports were selected respectively for each activity from year 2000 to 2005 from the collection of eight EIAs on oil palm and 48 EIAs on quarry activities from the Sabah Environmental Protection Department (EPD) (Table 1). These EIAs were selected based on accessibility and as much as possible from the period of six years (2000-2005) to represent

that particular period and for comparison purposes. Due to time constraint for review and also report availability, the sample of EIAs for quarry activities was limited to six only. Thus, any conclusions from this preliminary study are therefore indicative and not definitive.

The selected EIA reports were reviewed and evaluated based on a designated checklist which is produced by referring to Sabah EIA Guidelines and previous relevant researches. A checklist is very useful for impact screening, providing effective means of summarizing and presenting large quantities of disparate information (Trewick, 1999). Besides that, it also plays an important role to provide a framework for the ecological input comparison between quarry and oil palm plantation activities. In fact, the study was carried out in two phases: critical review of EIA reports for quarry and oil palm plantation activities using the designated checklist and compare the ecological input between these two activities by using the checklist.

The six categories of EIA process were used to derive review headings which were used to summarize the results in the checklist and to identify the aspects of the EIA process that give rise to deficiencies in term of ecological assessment. The review headings include: site assessment, biological environment for baseline studies, impacts prediction, mitigation measures, monitoring and residual impact (Table 2).

Results and Discussion

Site Assessment

Before any consideration of potential ecological impacts within the project area, a certain amount of background knowledge is required to enable the baseline conditions to be characterized. In other words, information about the ecological receptors in the 'receiving environment' provides the raw material for impact screening and establishing the range of likely interactions between potential stressors and ecosystem components (Trewick, 1999).

Table 1: List of EIA reports reviewed in this study.

Type of activities	Number of EIA reports reviewed	Project location	Date of submission
Quarry activities	1	Telipok	Dec 2000
	2	Kudat	Oct 2001
	3	Sandakan	May 2002
	4	Semporna	Dec 2003
	5	Telipok	Sept 2004
	6	Penampang	Dec 2005
Oil palm plantation activities	1	Sandakan	Mar 2001
	2	Sandakan	Dec 2001
	3	Tawau	Aug 2002
	4	Kinabatangan	Oct 2002
	5	Kinabatangan	Mar 2004
	6	Tongod	May 2005

Table 2: Aspects reviewed for the EIA reports.

Review headings	Aspects for consideration
Site assessment	<ul style="list-style-type: none"> • Habitat classification and mapping of the project site and surrounding areas • Existing land use of project site and surrounding areas • Position and distances of nearest protected areas, sensitive or undisturbed habitats • Initial flora and fauna inventory survey • Indicator species survey • Detail on surveys coverage • Duration of the surveys • Sources of ecological secondary data
Biological environment for baseline studies	<ul style="list-style-type: none"> • Species are listed • Species are quantified • Presence of rare or endangered species • Habitats and communities of species • Status of species are listed
Impacts prediction	<ul style="list-style-type: none"> • Ecological impacts prediction • Scale of ecological impacts prediction • Methods to predict ecological impacts
Mitigation measures	<ul style="list-style-type: none"> • Mitigation measures for ecological impact • Detail of implementation of mitigation measures
Monitoring	<ul style="list-style-type: none"> • Ecological impact monitoring
Residual impact	<ul style="list-style-type: none"> • Residual ecological impact • Residual ecological impacts are addressed

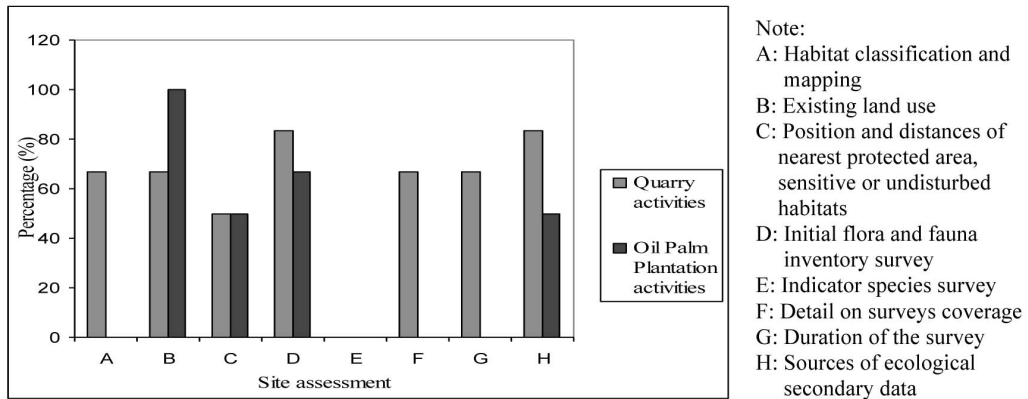


Figure 1: Site assessments of EIA reports for quarry and oil palm plantation activities.

In this checklist, there are eight aspects of ecological input requirements listed in the site assessment section (Table 2). All these aspects are used in the ecological assessment of the selected EIA reports and summarized in Figure 1.

The results indicated none of the EIA reports for oil palm plantation activities mentioned about the habitat classification and mapping, details on survey coverage and duration of the survey. In fact, it is important to include the habitat classification and mapping of the project site as the overall indication of the habitat types most threatened by development, as well as those most likely to be affected by a particular type of development can be gained (Thompson *et al.*, 1997). Besides that, the mapping of the project site enables the study boundaries to be drawn and include any areas of direct impact or any areas of secondary or indirect impacts (Treweek, 1999).

Out of the six EIA reports of oil palm plantation activities, none of them provided information about the survey's coverage and duration. Vun *et al.* (2004) also noted the similar problem for coastal resort development in Malaysia. In the studies, out of the forty one EIA reports reviewed, only nine reports specified the survey period and duration, and the designated sites for sampling. There appear to be a lack of knowledge amongst developers regarding the time and coverage which are required in conducting ecological survey and assessment for EIA reports. The weaknesses of this aspect may

also derive from the cost and time implications of undertaking detailed surveys, which is reinforced by the lack of any official guidance (Thompson *et al.*, 1997).

As for the indicator species survey, none of the EIA reports of quarry and oil palm plantation activities specified or even stated it. In essence, good indicators can be a reliable survey method because their presence reveal a great deal about the environment, ecosystem or habitat under study. Therefore, indicator species should be included in the EIA reports especially for oil palm plantation activities. This is due to most of the oil palm plantation areas are previous forest area and some of them are even adjacent to forest reserve. With the indicator species survey, it makes the site assessment and baseline data collection easier despite the time and space constraint.

Biological Environment for Baseline Studies

Among the EIA reports reviewed, nearly all the reports recorded a list of species located in the project site with their local names. However, if the existing environment is described in descriptive and non-scientific phrases, it could contribute to the inadequacy of baseline data collection. For example, there is one EIA report of palm oil plantation activities described the existing environment in such a phrase: "Few solitary trees that remain, their bare trunks glistening in the sun appearing very much like

gnarled skeletal fingers desperately reaching up for the clear blue sky.” Instead, such descriptive information could lead to difficulty in making a reliable prediction of impact on the biological environment (Treweek, 1999).

Apart from the descriptive phrases, another main criticism of the ecological content is the matter of quantification. Out of the six EIA reports of quarry activities, none of them quantify the terrestrial flora and fauna. For the EIA reports for oil palm plantation activities, 16.6% (Table 3) of reports indicated the abundance of terrestrial flora species but none of them stated the quantification of terrestrial fauna species. The same was observed in the studies of Treweek *et al.*, (1993) in a review of 37 EIA reports for highway development projects in Britain, there were only 54% of them which gave a list of the species present or absent, and only three included species abundance.

In fact, EIA studies should be grounded in measurements if they are to include quantified, testable predictions (Vun *et al.*, 2004). However, according to A Handbook of EIA Guidelines (DOE, 1995), environmental data collection programmes must be kept within manageable and economic proportions. As a result, the EIA consultants may misinterpret it with the reasons that the quantification of terrestrial flora and

fauna is not time and cost effective. Thus, the handbook should be amended by stressing what should not be compromised in the consideration of time and cost, because it can become a grand excuse for the environmental consultants to avoid some of the ecological input requirements.

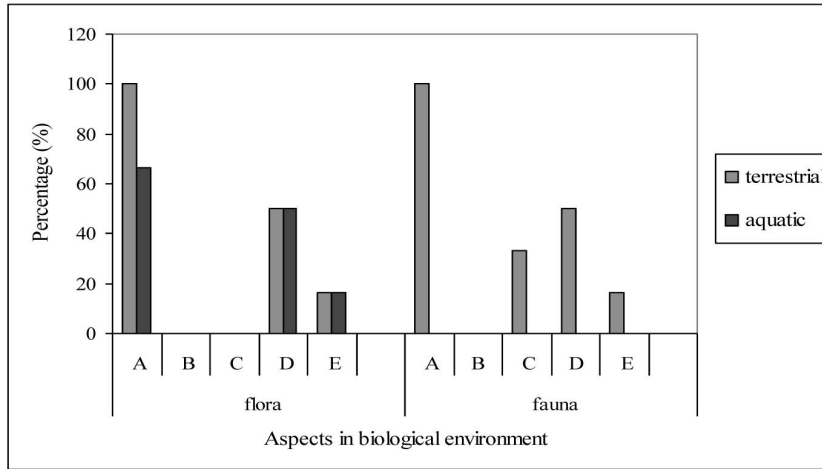
Habitats and communities of biota species is also one of the ecological input which should be included in the EIA reports. In the case of the environmental effects of development on habitats and communities, the special feature of terrestrial, aquatic, estuarine and marine ecosystem should be considered separately. This is due to each community has its unique characteristics and skills to adapt to different habitats.

Of all the EIA reports for oil palm plantation activities reviewed, only 50% of the reports included descriptions on the habitats and communities of terrestrial flora but no description was given on the habitats and communities of terrestrial fauna. Due to terrestrial fauna are mobile and oil palm plantations are usually carried out in a wide geographical forestry area, the habitats and communities of fauna are hard to determine.

Another thing worth noting was about the status of terrestrial flora and fauna. Both EIA reports for quarry activities and oil palm plantation activities did not have a satisfactory

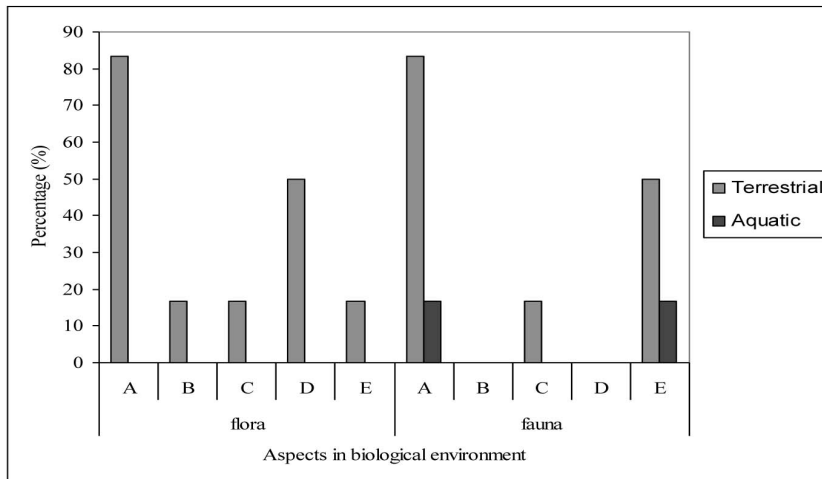
Table 3: The results of terrestrial flora and fauna in the baseline studies.

Biological aspects	Quarry activities (%)	Oil Palm Plantation activities (%)
Flora		
A) Flora species are listed	100	83.3
B) Flora species are quantified	0	16.6
C) Presence of rare or endangered plant	0	16.6
D) Habitats and communities of flora	50	50
E) Status of flora species are listed	16.6	16.6
Fauna		
A) Animal species are listed	100	83.3
B) Animal species are quantified	0	0
C) Presence of rare or endangered animals	33.3	66.6
D) Habitats and communities of fauna	50	0
E) Status of fauna species are listed	16.6	50



Note:
 A: Species are listed
 B: Species are quantified
 C: Presence of rare or endangered species
 D: Habitats and communities of species
 E: Status of species listed

Figure 2: Review of terrestrial flora and fauna and aquatic flora and fauna in EIA reports for quarry activities.



Note:
 A: Species are listed
 B: Species are quantified
 C: Presence of rare or endangered species
 D: Habitats and communities of species
 E: Status of species listed

Figure 3: Review of terrestrial flora and fauna and aquatic flora and fauna in EIA reports for oil palm plantation activities.

result in the aspect of species status mentioned. The status of flora and fauna are mainly divided into common and protected species in the EIA reports reviewed. However, there is no point of reference that explains how the status of flora and fauna are given. Failure to provide adequate information about the local, regional, national and international importance of species and habitats affected will make the decision maker difficult to evaluate the significance of the ecological impacts (Vun *et al.*, 2004).

Comparison between Terrestrial and Aquatic Flora and Fauna

Besides terrestrial flora and fauna, the biological environment is constituted by the aquatic flora and fauna too. There is a common criticism of ecological impact assessment in the matter of tendency to survey terrestrial than aquatic biota (Vun & Latiff, 1999). Thus, terrestrial and aquatic flora and fauna in the EIA reports are reviewed and evaluated specifically (Figure 2 and Figure 3).

Table 4: Impact predicted in the EIA reports reviewed.

Impacts predicted in the reports	Quarry activities (%)	Oil Palm Plantation activities (%)
Habitat loss	83.3	33.3
Habitat fragmentation	33.3	33.3
Loss of existing vegetation	66.6	33.3
Loss of fauna	83.3	50
Disturbance to aquatic habitats	66.6	50
Excessive sedimentation and siltation of the rivers	66.6	50
Depletion in aquatic resources	0	50
Affect food availability for other biota species	0	33.3
Disturbed ecological balance	16.6	16.6
Eutrophication	0	16.6
Disturb the roaming range of elephants	0	16.6
No ecological impacts predicted	16.6	0

It was evident that there is a tendency to emphasize on terrestrial biota survey rather than aquatic biota survey in the EIA reports for quarry or oil palm plantation activities. Survey of terrestrial vegetation and wildlife was referred to in 83.3% of the reports for oil palm plantations reviewed, whilst aquatic flora and fauna were surveyed in 16.6% of the reports. The same findings were found in the studies of Treweek (1996), Thompson *et al.*, (1997) and Vun & Latiff (1999). This indicated that the bias survey towards terrestrial vegetation and animals is the common weakness among the EIA reports and more attention should be given on this aspect in the EIA process.

Besides that, the results of the study pointed another grave weakness of EIA reports which should be of great concern. It was discovered that some of the EIA reports stated the exactly similar description of flora and fauna species, habitats, frequency and status for different project site and locations but under the same environmental consultancy company. It is possible that, the consultancy company simply applied the results from previous survey on the EIA reports for the similar activities. In the perspective of ecological significance and importance, this plagiarism can seriously affect the decision maker in evaluating the ecological impact of proposed development.

Impacts Prediction

Impacts prediction is actually the core activity in the EIA process because it identifies the nature of the impacts that lead to decision being made on whether the proposed project can be undertaken, whether it needs to be mitigated or whether it is acceptable in its present form (Briffett *et al.*, 2004). However, impacts prediction is often the weakest part of the EIA reports because most of the EIA reports tend to consist of vague verbal forecasts rather than numerical estimates.

Although majority of the EIA reports mentioned about the ecological impact prediction, the impacts predicted tend to rely on descriptive rather than quantitative phrases. The same problem was encountered in a study by Treweek *et al.*, (1993) in Britain. Among the thirty seven EIA reports reviewed, only 8% of the reports attempted to quantify the impacts on the ecological environment. This could be due to the nature of ecosystems are complex and multidimensional. Thus, it is very difficult to account for natural variation so that any changes observed can actually be attributed to superimposed action (Treweek, 1999).

Table 4 gives a general overview of some of the ecological impacts predicted from the reports. The largest category of impacts identified in the EIA reports for quarry activities

was habitat loss and loss of fauna, with five out of six reports indicating that there is a possibility this could occur. For the EIA reports for oil palm plantation activities, it was discovered that the ecological impacts on aquatic habitats are more of concern. Out of the six EIA reports, three of them mentioned about the possible excessive sedimentation process and the implications such as disturbances to aquatic habitats and depletion in aquatic resources.

One type of potential indirect impact rarely considered was habitat fragmentation which was mentioned in only four out of the twelve EIA reports. This is an important aspect because the nature and size of many of the developments reviewed had the potential to cause a large scale of fragmentation.

Besides that, the scale of the predicted impacts is often neglected in the EIA reports for oil palm plantation activities. Among all the EIA reports reviewed, none of the predicted impact is rated as significant with the reason that the project site is small, has no significant conservation values and no protected wildlife species. The contributing factor to this common weakness may be due to there is no specific guidance and standard for the term of "significant" in the scale of impacts predicted until now.

It was also evident that none of the EIA reports reviewed noted the methods to predict environmental impacts of the project activities (Figure 4). Without the knowledge of the methods to predict impacts, the predicted impacts are not reliable and will affect the corresponding mitigation measures that would be proposed.

Mitigation Measures and Monitoring

In general, the majority of the EIA reports touched on the proposed mitigation measures for the impacts predicted. Among the EIA reports, 66.6% of the reports for quarry activities and 100% of oil palm plantation activities listed out the mitigation measures. However, only 50% of the EIA reports for quarry activities and 83.3% for oil palm plantation activities gave prescriptive details.

The common problem in the proposed mitigation measures section is that the abatement measures are often too general and do not correspond to the impacts predicted. Besides that, failure to specify a plan to implement the mitigation measures is also another problem encountered in the EIA reports. This is possibly due to the lack of site control or enforcement from the officers of Department of Environment (DOE) or Sabah Environment Protection Department (EPD). This was also true in the findings of Wahid et al. (2010).

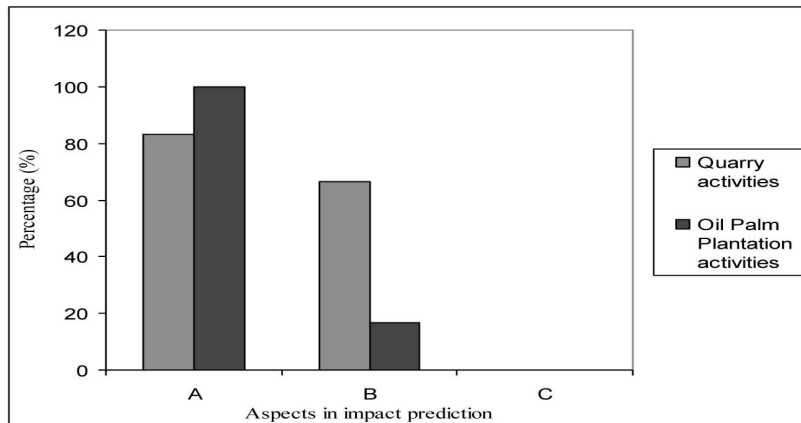
The same goes for the ecological impact monitoring programmes as there is only 50% of the EIA reports for quarry activities stated the ecological impact monitoring whereby all of the EIA reports for oil palm plantation activities mentioned it.

Specifically, it was found that the percentage of oil palm plantation activities are higher than the percentage of quarry activities in regards to the listing of mitigation measures, specification detail and monitoring methods. The most possible reason could be attributed to the more comprehensive and updated EIA Guidelines for Oil Palm Plantation. According to EIA Guidelines for Oil Palm Plantation Development, the mitigation measures which include preventive, control and compensatory are described and specified in detail (ECD, 2002). Therefore, it is recommended that the guidelines for quarry activities should be updated and detailed the recommended mitigation measures under every circumstances.

Residual Impacts

Residual impacts are potential environmental impacts which may remain after mitigating measures have been adopted into a project plan. If there are residual impacts identified in the EIA reports, monitoring or follow-up are needed to carry out (DOE, 1995).

Of the EIA reports reviewed, none of the EIA reports for quarry activities and only one out of the six reports for oil palm plantation activities had the residual impact in the project site. In fact, the weaknesses in the residual impacts are



Note:
 A: Ecological impact prediction
 B: Scale of ecological impact prediction
 C: Methods in predicting ecological impacts

Figure 4: Impacts prediction section in EIA reports for quarry and oil palm plantation activities.

Table 5: The findings of the study regarding the weaknesses of EIA reports on ecological input.

Stages of EIA process	Weaknesses
Site assessment	Failure to include habitat classification and mapping. Failure to conduct indicator species survey. Failure to indicate the survey’s duration and coverage. Failure to state the source of secondary data.
Biological environment for baseline studies	Description of existing environment with non-scientific phrases. Failure to quantify the flora and fauna species. Failure to state the status of flora and fauna species. Failure to include the habitat and communities of flora and fauna species. Tendency to survey terrestrial than aquatic biota.
Impacts prediction	Over-reliance on vague verbal forecasts than numerical estimates. Failure to include the scale of the predicted impacts. Failure to note the method of impacts prediction.
Mitigation measures	Failure to suggest the mitigation measures specifically correspond to the impacts predicted. Failure to specify a plan to implement the mitigation measures.
Monitoring	Failure to provide adequate data for the methods of monitoring.
Residual impacts	Failure to identify residual impacts.

very common among the EIA reports. The same case was observed in the study of Vun & Latiff (1999) in Malaysia. Although three of the seven reports had included ecological impact in their consideration of residual impact, but there was no residual impact predicted at the end. Instead,

many typical reasons were given in order to support their statements.

Conclusion

The results of this preliminary review of EIA reports demonstrated that there were a number

of shortcomings in the respects of ecological contents. The weaknesses of EIA reports on ecological input at every stages of the EIA process are summarized and tabulated in Table 5.

Overall, in terms of ecological input, EIA reports for quarry activities have more complete and comprehensive site assessment information than the oil palm plantation activities. On the other hand, EIA reports of oil palm plantation activities are doing a better job in proposed mitigation measures and ecological impact monitoring. Eventually, the comparison between the EIA reports for quarry activities and oil palm plantation activities does not aim to determine which EIA reports are more superior to the other reports. Instead, it is meant to find the similarity and difference of ecological input in EIA reports among these two activities. With this comparison, a better picture of the deficiencies of certain part in the EIA reports of these two activities could be identified. In line with that, efforts can be made in order to improve on the quality of EIA reports in Sabah, Malaysia.

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