

# Sustainability in the Environmental Impact Assessment and Ecological Inputs for Quarry Activities in Melaka Tengah, Melaka

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**Abstract**— In Malaysia the Environmental Impact Assessment (EIA) was introduced in 1988, as a measure of sustainability in developmental projects. The aim of this study was to examine the compliance with the guidelines and ecological adequacy of the information input in the preparation of the EIA report. The ecological input is an important part of the EIA. In this study, the choice was made for two EIA reports in Melaka which was sent to the DOE for approval. The method used was according to the revised package of measurement for 12 ecological input criteria in the EIA report. The results of this study found many omissions in the provision of ecological inputs and disobedience. Among the twelve criteria for assessment of the ecological inputs available in the description of the existing environment, consultants were not sensitive enough to identify the sample geology, flora and fauna and aquatic habitat. The review of the EIA report showed there were reports describing the effects of individual and yet try not to quantify these effects. For further description of mitigation measures to the physical aspect, no emphasis was made on the effectiveness of the proposed measures. In addition, mitigation measures were implemented. The residual impact was discussed briefly in both reports. The results of the survey in the vicinity of the project site also found a lot of environmental impact of specific ecosystems and flora and fauna of the river ecosystem. The dust pollution also affected the surrounding community. Overall, both the EIA report for the project was found to be less effective including information regarding ecological input and compliance aspects. A comprehensive and commitment of all parties is crucial to ensure continuity in the development process that can be achieved through improvements in the preparation of the EIA report mainly for information and compliance with ecological guidelines.

**Keywords**— *Environmental Impact Assessment, quarry activity, ecological input, assessment*

## 1. Introduction

In Malaysia the Environmental Impact Assessment (EIA) was used as a tool to incorporate environmental considerations in the process of sustainable development and management development. Various development projects are designed and implemented in every state and province. However, the development process has to be planned and controlled in order to avoid the ongoing environmental destruction and maintain sustainable development. The use of EIA is important as a means of measuring the environmental strategies in Malaysia. The ecological impact assessment is an important aspect of the environmental assessment to ensure the conservation of biological diversity is maintained. The project description aspects are the most important in determining the balance and sustainability of the environment and economic development, as provided in the Environmental Quality Act 1974 in the environmental assessment for scheduled activities.

## 2. Literature Studies

### *EIA Requirements*

According to Section 34A of the Environmental Quality Act 1974 and the Environmental Quality Order (Prescribed Activities) (Environmental Impact Assessment) 1987, a development project in the category of prescribed activities is required to prepare the EIA report. This report is provided prior to submission to the Director General of the Department of Environment for consideration to get approval before any project is carried out (Department of Environment, 2000).

Section 34A also requires the EIA report to be submitted in accordance with the EIA guidelines from the Department of Environment. A Handbook of Environmental Impact Assessment Guidelines issued by the Department of Environment is a general guideline of environmental impact assessment for all development activities. These guidelines are then issued for the second issue (1995) and third (2000) (Department of Environment, 2015). Since 1992, more specific guidelines for prescribed activities have been provided by the Department of Environment to strengthen the effectiveness of the EIA procedure. For example, for

quarrying activities, there are additional guidelines namely the Environmental Impact Assessment Guidelines for Mines and Quarries. The format of the preparation EIA report should be in accordance with the guidelines and assessment must ensure that all necessary information is included in the guidelines provided in the EIA report.

Apart from that, filling the form is necessary for public involvement in the initial assessment, even though it is not required. However, a detailed report of public involvement is mandatory. Public involvement in assessment processes is vital during the formation of TOR (Terms of Reference) for detailed evaluation. TOR is a summary list of the significant impact on the environment and no significant impact has been assessed during detailed evaluation (Department of Environment, 2015).

In the early stages of EIA introduction, most of EIA consultants are allowed to appoint the project proposer to prepare the EIA report. However, since 1994 to improve the quality of the EIA report, only EIA consultants are registered with the authorized Department of Environment to conduct an environmental impact assessment (Department of Environment 1996). Since the registration scheme was introduced in 1991-2003, a total of 313 individual consultants and 80 consultancy firms had been approved for registration by the Department of Environment (Department of Environment, 2004).

#### *Requirement Aspects of Ecology in EIA*

The emphasis on ecological input in EIA, is not clear until the introduction of the National Policy on Biological Diversity (National Policy on Biological Diversity) in 1998 (MOSTE, 1998). One of the strategic policies is to improve the sustainable use of biological diversity in the EIA report for development projects. Previously, the emphasis on biodiversity is not linked directly to the EIA. Although this EIA idea comes from the Third Malaysia Plan (1976-1980), it was developed with the main objective to assist environmental planning of the new projects or for the expansion of projects that had been carried out.

There are three main categories in the EIA report, namely physico-chemical, biological and social environment. Biological components include animal and plant, the distribution and the presence of various species and community habitats (Table 1). To describe in detail the biological component, the EIA guideline book also emphasizes the importance of taking into account the level of habitat species and its community.

Bird life is one of the aspects emphasized here, as well as the community life of rock and wildlife area. The guidelines state that the maintenance of geology border, wildlife and plants between the project and the sensitive ecological area nearby is also important. In addition, it is stressed that attention should be given to the production of new habitat caused by the construction and expansion of the original community (Department of Environment, 1995).

Table 1. Components of biological highlighted in the EIA guidelines

Important Aspect	Detail
Species and population	<ul style="list-style-type: none"> <li>• terrestrial plants</li> <li>• terrestrial wildlife</li> <li>• other terrestrial fauna</li> <li>• wildlife rock/aquatic</li> <li>• other wildlife rock/aquatic</li> </ul>
Habitat and communities	<ul style="list-style-type: none"> <li>• terrestrial habitat</li> <li>• mainland community</li> <li>• aquatic/rock habitat/estuary</li> <li>• aquatic community</li> <li>• rock life community/estuary</li> </ul>

Source: Department of Environment in 1995

### 3. Methodology

The Department of Environment (DOE) guidelines as well as information from external researchers have completed the Ecology Input Revision Package in assessing the ecological input for preparation of the EIA report for the operation of the quarry project. The same revision package can also be used to evaluate the EIA report which was developed for other scheduled activities to determine modifications.

In this revised package, a total of twelve criteria are used to assess the ecological input in the EIA report (Table 2). General and additional guidelines for quarry projects are seen in the process of putting together in this package. Some questions of ecological consideration or proposals from other researchers are used, if any certificate is not found in the DOE guidelines. But for this paper, focus is on the explanation project in the revised EIA report.

Table 2. Twelve criteria review and the appropriate category

No.	Review
1	Description of project development
2	Description of existing biological development
3	Forecasting ecological impact
4	Significant impact assessment
5	Mitigation measures
6	Residual Impact
7	Monitoring and auditing
8	Checklist
9	Communication report
10	Summary
11	Reference
12	EIA consultant

From this package, the EIA report is reviewed to determine the sufficiency of the information on ecological input and see the extent of compliance with the implementation of the project against what is stipulated by the relevant authorities of project description. 'Yes' or 'No' statements are provided for the revised checklist based on the relevant EIA reports. The

answers obtained from the measurement, determination of adequacy is made by measuring the scoring for the answer 'YES' (Table 3). Results were recorded and analyzed revisions were made to get the number of reports or the percentage of reports that are categorized based on adequacy mark for overall revised report.

Table 3. Overall assessment score

Score	Scoring evaluation
1	Relevant information is well documented, no important tasks left incomplete
2	Generally satisfactory and incomplete part
3	Can be considered quite satisfactory or incomplete
4	This part is quite good but overall not satisfactory because too many incomplete
5	Not satisfactory, significant incompleteness
6	Very unsatisfactory, important tasks are not made well or not made direct

Revision to any reports are carried out in three replications within a period of at least two months for each part to minimize any predisposition. As such therefore revisions will be as objective as possible. After three repetitions, if there is any difference in the results obtained, the EIA report in question will be reviewed to eliminate any inequalities.

#### 4. Results and Discussion

For clarification purposes, the division according to the criteria are reviewed ad described in the 'Package Review Input Ecology'.

##### a. Project Description

This aspect of the research project description is given less emphasis by the project proponent including the summary of the features, technical, economic and environmental development projects. Description of the environmental footprint is also less clear about the actual situation of the project site. A Handbook of Environmental Impact Assessment also found to be less clear regarding important information that should be included in the description of the project. Criteria for review concerning description of the proposed project are summarized in Table 4.

Table 4: Summary of the review category for a description of the proposed development projects

Number	Aspects to be considered	Compliance
1	Does it state the total project area?	2
2	Does it explain the vast amount of land that is being developed?	1
3	Does it indicate clearly the project site on the map?	1
4	Does it explain the current land use to be developed?	0
5	Does it state any geographical boundaries and ecology?	1

6	Does it explain the operation of the project activities?	2
7	Does it include a schedule for the implementation of the project?	2
8	Does the selection project is done in fair manner?	0
9	Does the report include the option not to carry out the project?	0
10	Is there any attempt to identify key issues relating to the development?	1

In addition, the project description needs to identify some groups of wildlife such as birds and wildlife threatened by quarrying activities. The connection between seasonal patterns in the distribution of the species in question is to be considered (Treweek 1999). This situation coupled with quarrying activities might have an impression such as air pollution, especially during the dry season. Air pollution will also affect the wildlife of the surrounding area. For a description of the project, the construction of such housing units, infrastructure and support should also be taken into account. The review report states about the unit housing, infrastructure and support facilities. This facility is important in determining the impact arising from mitigation measures.

##### b. Description of existing biological development

This section is about the description of the existing biological environment which focuses on the abundance of species and the status of species at the site. The review report, states that the conservation status of the species is being monitored, but only includes species that are rare, endemic, almost extinct, protected and other common species. There is no reference to why the status is given. In addition, the failure to provide information on the importance of species and habitats makes it difficult to assess the ecological impact of ecology. Similarly, with the status of the species, the information provided only refers to the fauna and flora of the land. The important rock and aquatic life are not given status even though the species are classified as sensitive. Apart from providing conservation status, there is also a need to develop the distribution of the species involved. From the reviews, there is no indication of the impact of species impact on EIA's initial assessment report (Table 5).

Table 5: The abundance and status of the species, and carrying capacity

Number	Aspects to be considered	Compliance
1	Analyze the number of species within the site	2
2	Species retention status	0
3	Important habitat distribution / species	0
4	Carrying capacity	1

##### c. Forecasting ecological impact

Table 6 shows the aspects considered in this review. Results show that both initial assessments of EIA have included a section on the impact prediction, but the

ecological impact prediction only specifies the method of making the forecast involved.

Table 6: Summary of ecological impact forecasting

Number	Aspects to be considered	Compliance
1	Forecasting method	1
2	Basics forecasting	2
3	Declares a response or uncertainty	0
4	Cumulative impact	2
5	Indirect impact	2
6	Long / short impact	2

d. Significant impact assessment

According to the EIA guidebook, environmental data collection, public participation and project description will provide the information needed by the evaluator to determine the identified environmental impact equilibrium (Department of Environment 2000). Table 7 shows a summary of the proposed impact equivalent impacts. Both of these reports identified significant impacts as the project base was in the sensitive environment of rocks and forest treasures. There are reports available that state the intangible impact with the introduction of the mitigation measures, but does not refer to a case study or expert opinion (mandatory). The provided report only lists reasons that are not supported. As shown in the following statement:

- a. *'many activities involved in the proposed project have potential to generate impacts to the environment. However, suitable mitigation measures will abate and mitigate these predicted impacts'*
- b. *the environment impact generated by these activities are related to air pollution, noise and increase in surface run-off, erosion, siltation, waste generation from vegetation clearing and construction works. Need mitigation measures to control these impacts.*

Some of these reasons are acceptable but EIA reports should supply all the information needed to make a decision. Therefore, the opinion of the referring expert is important.

Table 7: Summary of Significant impact assessment

Number	Aspects to be considered	Compliance
1	Impact impact assessment * significant ecological impact * no significant impact	2 1
2	Impacts significant impact	1
3	Are all the predicted impact issues assessed?	1
4	Uncertainty in assessment of impact equilibrium	0
5	Does it reveal an unknown impact?	0
6	Reports without ecological impact assessment	0

e. Mitigation Measures

In this section, the EIA report should describe the design of the steps to be taken in the project planning to minimize or eliminate the possible significant environmental impacts (Department of Environment 1995, 2000). Table 8 shows a summary of the reviews on the mitigation measures as proposed in the EIA preliminary assessment.

Table 8: Summary of mitigation measures

Number	Aspects to be considered	Compliance
1	Does it explain the mitigation measure?	2
2	Does it explain in detail the following: <ul style="list-style-type: none"> <li>• description</li> <li>• specification</li> <li>• schedule event</li> </ul>	2 2 2
3	Does it explain the rationale for the mitigation measure?	1
4	Did any of the proposed mitigation measures be mentioned?	2
5	Does it consider the effectiveness of the proposed insulation?	1
6	Does it consider whether the mitigation measure will worsen the ecological environment?	1

Among the proposed mitigation measures in the report are limiting the operating area within a certain time period of and such measures will not affect the ecological system in the quarry operation site area. But there is no guarantee of control over the site environment. This step is also used to reduce noise at a certain time and reduce the migration of life like birds. Here is a statement on mitigation measures:

- *“since the quarry is currently in operation, clearing of vegetation will be carried out as and when necessary involving very small area at any one time.*
- *‘the contractor should ensure that the vehicles and machinery used are properly maintained with regular servicing to ensure that they are operating efficiently without emitting excessive noise. The hours of operation of noise equipment must be restricted, preferably to day light hours only*

All the proposals given about the operation and landscape areas are blurred without taking into account the long-term impact of the surrounding environment ecology. The operational area limitation is the easiest way since there is no maintenance cost, unless delays in quarrying and logging operations may be easier to implement and save on costs. This is because strategic prevention and control are more cost-enhancing.

f. Residual impact

From the EIA reports reviewed, it was found that the report some possible ecological impact residues (Table 6). However, this part only included the impact of

residues in the form of statements and not for ecological impact. According to the guidebooks, residual impacts refer to the possible environmental impact, which occurred after the implementation of the mitigation measures into the project plan (Department of Environment 1995, 2000).

#### g. Monitoring and auditing

Monitoring should be a key component of any development proposal so that the success of the mitigation step can be formed and the problems are identified and corrected (Thompson et al., 1997). Based on the reports reviewed, there is an explanation of the monitoring program (Table 7). But it does not show a commitment to monitor the environment. Both reports did not specify the allocation of expenditure, staff involved in monitoring, location for monitoring and schedule for reporting. The most widely reported part is the parameter for physical monitoring and the schedule for monitoring. Examining the findings reported on monitoring of chemicals, physical factors such as water turbidity, noise pollution, dust and vibration levels, there is no mention about monitoring the ecological aspects such as eutrophication and others.

#### h. Checklist

The checklist should include information such as data requirements and study options (Morris & Therivel 2001). Both reports have included a checklist in their reports. However, the explanation is only general. This is a significant weakness in terms of compliance. EIA's initial assessment of quarry operation activities should include a checklist in their reports. This is because quarry activity is the most frequent that contributes to the destruction of ecological systems especially for animals in the rocks and forests. Although this checklist is considered to be small compared to other parts of the report, it should be respected as it will reflect the transparency of the parties involved in the environmental assessment.

#### i. Communication report

There were eight aspects examined in the report communication examined, namely, clarity, balance, sustainability, executive summary, presentation, technical definition, abbreviation and notification. Generally speaking, the content of the report being reviewed is not satisfactory. This is true in the ecological information provided. Whereas other aspects of the report communication are complied with what was set by the guidelines. The overall review is easy to read and understand. However, the report is more likely to explain economic, social and physical factors rather than biological factors.

#### j. Summary of conclusion

Summary of conclusions is important because they reflect the whole report. The review shows that both reports include a summary of the conclusions, but the conclusions for the ecological environment are not included. The following example reads:

*'conclusion: in this EIA report various potential impacts are highlighted and mitigating measures are recommended. By its nature the operation of the quarry will increase the dust and noise level in the vicinity of the areas. There are practical measures that can be taken to reduce the impacts at the acceptable level as suggested in the report. Monitoring need to be carried out to assess the effectiveness of the measures that were taken. The project proponent should ensure that the nearby communities would either directly or indirectly benefited from this project in terms of employment, economic opportunities or improved amenities...'*

#### k. Reference

The information used in the report should be referred to in the text and documented in the reference section (Department of Environment 1995). Documents like this need to include the names of individual persons and key organizations, relationships and dates. Additionally the complete data collection process by the project proponent or its agent, as well as any form of public participation during the initial assessment should also be reported in the reference section. Should there be written opinions from outside experts it should also be attached. From the reports only part is specified, although there are many references found in the text.

#### l. EIA consultant

In Malaysia, EIA consultants play a crucial role in providing EIA reports. The quality of ecological content depends on the experience of EIA consultants as well as the presence of a multidisciplinary team. In this commentary, both reports provide a note regarding the team involved in the preparation. However, it has not stated about ecologists in particular. This is probably because they are the same people who conduct environmental assessments. The relationship between ecological input quality and multiple disciplinary teams was also examined. The ecological content of the EIA is linked with the presence of a multidisciplinary team comprising a wide range of disciplinary experts.

## 5. Recommendations and Conclusions

Original reactive and limitation on sustainable development have caused EIA more prone to be ineffective in environmental management of the country. The lack of an ecological input shows that the EIA regulations are limited in protecting the environment. Although this weakness can be caused by various factors, such as lack of experience of EIA consultants on ecological input, there is vagueness in the EIA guidelines and so on. However, in order to improve the effectiveness of the EIA it is insufficient only to express the relation of cumulative impact, directly and indirectly and sustainable development. This is due to the fact that EIA is based on the description of the project, with the limited scope of the environmental assessment.

Weaknesses in EIA should not be continued and provoked when issues related to the environment are caused by quarrying activities by certain parties.

Through the introduction of the SEA (Strategic Environmental Impact Assessment) it can be implemented with EIA to further strengthen the preparation of EIA report for the project description. The introduction of SEA is an addition in overcoming the limitation of EIA. The SEA approach involves policy, planning and environmental assessment plan. The SEA examined the impact on the environment of the development projects. The focus on the impact of development to the environment is the task of the EIA.

SEA does not intend to acquire EIA but involves every level of the decision-making process. At this stage, PPP for the environment is encapsulated in a proactive way of using SEA. The PPP will then form the framework for specific development goals and projects that can be evaluated using EIA. The SEA is widely used in some countries with specific experience undertake many proposed SEA, which is more easily implemented at the project level (Therivel & Partidario, 1996).

For the SEA to be carried out, it must find a way on the political agenda and the application in a long time. No one understands very well the weakness and inadequacy in EIA based on the project from the people involved in the relevant regulations. Therefore the Department of Environment has made a commitment to promote the use of SEA in the environmental management system in Malaysia. Although SEA is not a mandate in Malaysia, environmental studies became part of the research sector in the structure plan. The activities of the quarry are viewed from the level of PPP in SEA. This can be the basis for SEA development in the future.

SEA is not a procedure that can be replicated or taken by others. Problems, needs and priorities emphasized by the user affirmed the SEA process. This compatibility allows the SEA to be determined for the planning, policy making and decision making processes. Moreover, the strengthening of the environmental management system is an instrument of measuring the EIA as SEA.

In addition, existing guidelines and the additional proposal of SEA in the EIA, the review package is used to identify the information of ecology, besides the compliance of the developers to the guidelines, that can be implemented to serve as guidance in the preparation of the EIA report, especially for the description of the project for input ecology. This review package combined results from the research of outside researchers, existing guidelines and the researcher's own research, in accordance with the problems of ecological environment in Malaysia, especially in quarrying activities.

Attachment

No	Title of EIA Report	Date	Proposer	Consultant
1	EIA for existing granite quarry at lots 737,	Jun 1997	KOH AH SDN. BHD	Shoh Consultancy

	1078, 1079, 1369, 1370, 914, 1010, 1009, 1012, 1011, 1008, 543 and 653, Bukit Panchor Mukim Melaka Pindah, Daerah Alor Gajah, Melaka			
2	Environmental Impact assessment for the proposed Alor Gajah Quarry, Mukim Tabuh Naning, Daerah Alor Gajah, Melaka	Disember 1997	ICM TENGGA RA KUARI SDN. BHD	Biro Rundingan Universiti Kebangsaan Malaysia

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