Assessing the Ecological Inputs in Selected Forestry Related Environmental Impact Assessment (EIA) Reports in Sabah, Malaysia

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Abstract: *Logging activity is one of the prescribed activities for Environment Impact Assessment (EIA) reporting in Sabah. Ecology is a component of EIA and studies on ecological input in EIAs have identified a number of shortcomings. As there has been no review of the EIA in logging activity, this study sets to investigate the ecological input in the forestry related EIA reports. By knowing this, there is an opportunity to advance the current ecological component inclusion in EIA reports related to forestry projects for future improvements. Four main review areas were assessed in this study: (1) description of the development, the local environment and the baseline conditions (2) identification and evaluation of key ecological impacts (3) alternatives and mitigation and (4) communication of results. Results showed that the quality of the ecological components for three out of four main review areas generally met the satisfactory level of ecological components in EIA report. Review area 3 showed the highest level of poor ecological component quality compared to other scores, solely due to the reports lacking feasible alternatives to the proposed forestry project. However, this aspect is not required as compliance with the local EIA guidelines by the Sabah Environmental Protection Department (EPD). Nonetheless, it is still a good practice to include all mitigations and alternatives of project operations related to ecological components in the EIA report.*

Keywords: Environmental Impact Assessment; Ecology Input; Forestry Projects; Logging Activity; Sabah

1. Introduction

The greening of development in a country depends on its effectiveness in the environmental management tools [10]. In order to ensure sustainable development, evaluation of impacts arising from major activities that have significant environmental effects is done. This is achieved through an environmental management tool called as Environmental Impact Assessment (EIA) [3]. High quality of EIA ensures that a development or project has an effective environmental planning.

The overall effectiveness of EIA does not depend solely on a single component but rather a few aspects as a whole such as physical, biological and human environment of the project [10]. There has been a concern on the general quality of EIA and particularly its ecological content [17]. Thus, ecological input, having an increasingly important role in the decision making of a development, has been the focus in this study.

2. Statement of Problem

In Malaysia, there are generally two types of EIA which are Preliminary (Normal) EIA and Detailed EIA[14]. In this study, Normal EIA in Sabah was reviewed. As there is no review on the ecological input of EIA in logging activity in Sabah, this study wishes to fill the gap of assessment in this matter. By knowing this, there is an opportunity to advance the current ecological component inclusion in EIA reports related to forestry projects for future improvements. The aim of this paper is to assess the quality and compliance of EIA report with two of the primary references of EIAguidance of forestry related and logging activities in Sabah which are:
a) Handbook on Environmental Impact Assessment in Sabah (2005) [8]
b) Guidelines for Forest Harvesting (Logging) and Forest Plantation Establishment (2012) [7]

3. Methodology

The study's methodology was based on content analysis of the Handbook on Environmental Impact Assessment in Sabah (2005) and Guidelines for Forest Harvesting (Logging) and Forest Plantation Establishment (2012) for a sample of ten (10) normal EIAs from the same environmental consultant company in Sabah, Malaysia. The same environmental consultant was chosen in this study to ensure consistency and easier to detect trends in the reports. A modified Review Package by Lee and Colley (1992) (hereafter will be termed as 'Review Package') was used to assess the content of the EIAs. An abbreviated version of the collation sheet used in study is seen in Table 1. The selection ofthis Review Package is due to its reliability, relevance and extensive use by other researchers of the same field of study. The selected normal EIA are all forestry based EIA, specifically logging and forest clearing activities.
Table 1 Abbreviated Modified Review Package

Review Area 1: Description of the development
1.1   Description of the development
1.1.1   Purpose and objectives of the development
1.1.2   Design and size of development
1.1.3   Indication of the completed development
1.1.4   Nature and production processes and expected rate of production
1.1.5   Raw materials used during construction and operational phases
1.2   Site description
1.2.1   Site plan
1.2.2   Description and demarcation of land uses areas
1.2.3   Estimated duration of different phases
1.2.4   Expected number of workers and visitors
1.2.5   Access to site and likely means of transport
1.3   Waste and residuals
1.3.1   Types and quantities of waste and disposal routes
1.3.2   Proposed handling and disposal of wastes
1.4   Environmental description
1.4.1   Indication of likely area to be affected
1.4.2   Cumulative impacts defined broadly enough
1.5   Baseline conditions
1.5.1   Important components of the affected environment
1.5.2   Interaction and effect of project on the environment

Review Area 2: Identification and Evaluation of Key Ecological Impacts
2.1   Definition of the effects of the project on environment
2.1.1   Description of effects of project on environment
2.1.2   Description of interaction of effects on environment
2.1.3   Ecological impacts from non-standard operating procedure
2.1.4   Ecological impacts from deviation from base line conditions
2.2   Assessment of ecological impact significance
2.2.1   Significance to the affected community and society in general
2.2.2   Significance of ecological impact in conjunction with national and societal values
2.2.3   Choice of standards, assumptions and value systems to assess significance

Review Area 3: Alternatives and Mitigation
3.1   Alternatives
3.1.1   Discussion of alternative sites
3.1.2   Consideration of alternative processes, designs and operating conditions
3.1.3   Reappraisal of rejected alternatives identified during investigation course
3.2   Scope and effectiveness of mitigation measures
3.2.1   Mitigation measures considered (ecology related)
3.2.2   Mitigation measures include modification, compensation and alternative facilities (ecology related)
3.2.3   Indication of effectiveness of mitigation measures (ecology related)
3.3   Commitment to mitigation
3.3.1   Record of commitment
3.3.2   Proposal of monitoring arrangements

Review Area 4: Communication of Results
4.1   Layout
4.1.1   Introduction briefly describing the ecological inputs of the project
4.1.2   Logical arrangement of information (ecology related)
4.1.3   Summary of chapters4.2Presentation
4.2.1   Comprehensive to non-specialist (ecology related)
4.2.2   Terms, acronyms and initials defined (ecology related)
4.2.3   Presented as an integrated whole (ecology related)
4.3   Emphasis
4.3.1   Emphasis given to severe impacts (ecology related)

4.3.2   EIA should be unbiased
4.4   Non-technical summary
4.4.1   Non-technical summary present in the EIA
(which includes ecological issues)

A six-point A to E scale (plus 'not applicable' grade) was used to score the Review Package as a measure for the quality of the report (Table 2). The compliance of the EIA reports was assessed with regard to the Handbook on Environmental Impact Assessment in Sabah (2005) and Guidelines for Forest Harvesting (Logging) and Forest Plantation Establishment (2012). The percentage of the each of the scores in the Review Areas will be calculated by summing up the number of respective score obtained in the particular Review Area and then divide it with the total number of Review Questions contained in that particular Review Area.

Table 2: Six-point Scale

Score	Explanation
A	Relevant tasks well performed, no important tasks left incomplete
B	Generally satisfactory and complete, only minor omissions and inadequacies
C	Can be considered just satisfactory despite omissions and/or inadequacies
D	Not satisfactory, important task(s) poorly done or not attempted
E	Very unsatisfactory, important task(s) poorly done or not attempted
N/A	Not applicable. The review topic is not applicable or it is irrelevant in the context of the EIA

The Review Package process promotes the use of personal judgement of the reviewer about the relative importance of the individual sub-categories when aggregating grades. To overcome issues of subjectivity and promote objectivity within the review (with one reviewer), this study followed a method used by Gray and Edward-Jones [6]. A randomly chosen selection of EIAs was reviewed for the second time by the same reviewer. The results of the first and the second EIAs were then compared. Differences in the outcomes were checked through revisiting the EIA and using the review notes to establish the reason for the difference in grading.

4. Results and Discussions

Overall EIA Ecological Input Quality by Review Area
The overall finding of this study is shown in Figure 1. The result shows that Review Area 4 has the highest percentage of A score (84%) with the lowest E score (11%) while Review Area 3 showed the lowest percentage of A score (25%) and the highest E score (38%). Review Areas 1 and 2 generally scored a satisfactory score of A which are 70% and 51% respectively, while also having a comparative E score which are 15% and 17% respectively. Although Review Area 2 has only 51% of A score, its B score, which is still acceptably good, was rated 16%.

Review Area 1: Description of the development

Review Area 1 is based on a set of review questions on the description of project as a whole, before focusing on ecology inputs of the report. All of the reports reviewed have explained on the purpose(s)/objective(s) of the logging activity, complied with the site description as asked by the Guideline (refer Table 3) and also stated the estimated types and quantities of wastes together with the routes of disposal for all types of wastes listed.

Majority of the reports are having maps of the following, which complies with the requirement of the Handbook:
a) Existing environment
b) Location (including longitude/latitude or UTM co-ordinates and geographic boundaries of the project area and the assessment area)
c) Local plan development
d) Location of nearby land owned/leased by project proponent
e) Ongoing developments within the project area
f) Position and distance of the nearest protected area, sensitive or undisturbed habitat
g) Drainage/hydrology indicating watershed system surrounding the project area
h) Slope map

Site description was explained in text but lacking of the estimated duration of different phases and accessibility to site by workers/visitors. This might be due to uncertainties in regards of the project or lacking of commitment from the project proponent or client in supplying relevant information to the consultants [14].

Review Area 2: Identification and evaluation of key ecological impacts

The emphasis for Review Area 2 is the identification and evaluation of ecological impacts. The effects deemed necessary according to the Guideline are:
a) Soil erosion with associated river pollution
b) River or soil pollution by hazardous substances
c) Loss of habitat due to removal of vegetation
d) Emission of greenhouse gases due to decomposition of biomass from land clearing

Major, minor and significance of impact magnitude were fairly discussed in the ecological components of the reports. The data used to predict the magnitude of the ecological impacts were as quantitative as possible by using measurable quantities in predicting the possible impacts such as soil erodibility test (using USLE method) and water quality analysis (compared with INWQS). These abiotic factors were taken into consideration as it will eventually affect the harmony of the biotic factor's survival in the ecosystem of the forest.

One obvious major issue in this Review Area is the omission of one of the important issues required by the Guidelines for Forest Harvesting (Logging) and Forest Plantation Establishment (2012) which is "Emission of greenhouse gases due to decomposition of biomass from land clearing". This might be due to lack of relevant knowledge regarding the issue [19]. However, it is still important to address this issue to show that the report is from the perspective of a specialist rather than generalist.

Table 3: Site description as required by the Guideline [7]

Environment	Requirement
Physical	Topography; slope features; soil features; geology (rock features, stability), hydrology (drainage and seasonal flow pattern, flood plains, swamps), climate (temperature, wind regime, rainfall), surface water quality (particularly for Total Suspended Solids, Dissolved Oxygen, pH, temperature, phosphorus, nitrogen, coliform count and harmful pesticides) and air quality.
Biological	Wildlife; forest cover; rare; protected or endangered species (terrestrial and aquatic flora and fauna, elephant and rhinoceros home range) and area (mangroves, national parks' wildlife sanctuaries/corridors, salt licks, peat swamp, freshwater swamp), fisheries; aquatic biology; wilderness or protected areas; key conservation value habitats or species.
Human	Population and communities (including numbers, locations, composition, employment and others); land use; location of important economic resources/upstream and downstream activities (including plantations, river sand extraction, fish rearing, Tagal areas); infrastructure facilities (including water supply, electricity, sewerage, flood control); institution (such as schools, clinics and places of worship); water catchment areas; transportation (roads, navigation and others); archaeological; historical and cultural values and aesthetic values.

Review Area 3: Alternatives and mitigation
Review Area 3 has the lowest percentage of A scores solely due to the absence of considered feasible alternatives outlined for the project (questions 3.1.1, 3.1.2 and 3.1.3). There were no alternative sites, alternative processes or reappraisal of earlier planning stages found in the text of reports. All of the reports only showed the ideal operational and mitigation process while not showing any alternatives or options to the final choice made.

Ecological impacts were mostly identified using three main methodologies which are checklists (i.e. from Wildlife Department), EIA matrix (required by the Handbook) and also consultation with panel of experts. Main ecological mitigation measures stated in the reports were establishment of riparian reserves and also staged logging which allows the animals to have enough time to seek refuge in the neighbouring area.

Ecology is weakly predictive [18] whereby the wildlife might encounter village or settlements in the neighbouring area if logging activity is done without proper evacuations of wildlife. Establishment of Wildlife Protection Unit in the logging area might as well add up to the existing mitigation measures to be more effective on ground. The unit will enforce law, monitor and combat illegal activities, especially illegal hunting [15]. One reason on why these are not suggested might be in terms of financial barrier [8].

All reports included details of how the monitoring process should be implemented. The suggestions include recording the location of monitoring points (dated photos and coordinates), parameters of monitoring especially for water quality analysis and also schedule of monitoring and

reporting which happens once in every four months of the logging activity.

Review Area 4: Communication of result

Reports were found to be well prepared in terms of communication of result. There was adequate degree of ecological components in Review Area 4 whereby it contains the highest percentage of A because all of the reports reviewed scored A in terms of questions 4.1.1, 4.1.2, 4.2.1, 4.2.3, 4.3.1, 4.3.2 and 4.4.1 in the collation sheet (refer Table 2.1).

According to the Guideline, there should be six chapters in the list of content in a forestry-related EIA report. All 100% of the reports followed exactly the manner required as follows:

Chapter 1: Executive Summary
Chapter 2: General Information
Chapter 3: Project Description
Chapter 4: Impact Prediction and Evaluation
Chapter 5: Recommended Mitigation Measures
Chapter 6: Recommended Monitoring Programme
Annex

The reports only lacked of summary of the chapters in the end of every chapter, whereby all reports scored E for that particular review question (question 4.1.3). It may be because the consultant already considered that the Chapter 1: Executive Summary has already summarised to the readers the contents of the report, because 100% of reports scored A in the review question regarding Executive Summary (4.4.1). This is not a requirement according to the Handbook or Guideline but rather one of the quality measures according to the Review Package.
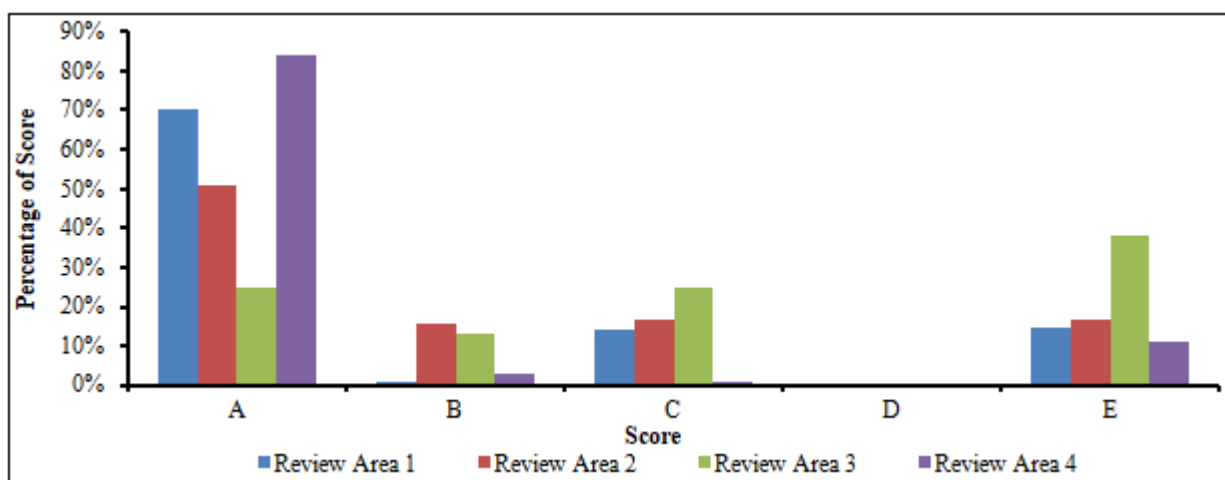

Figure 1: Variation in EIA Ecological Input between Review Areas

requirement according to the Handbook or Guideline but rather one of the quality measures according to the Review Package.

Other than that, some of the reports have a minor omission on the ecological technical terms, acronyms and initials whereby some initials were not found in the abbreviation page although it is used as an ecological term in the text. For example RIL, that stands for Reduced Impact Logging, which was inconsistently present in the abbreviation page of the reports reviewed. This may make it difficult for the non-specialists to understand the ecological information of the report.

Variation of EIA Ecological Components Quality with EIA length

The EIAs being reviewed have length ranging from 158 to 305 pages. Figure 2 shows the percentage of EIAs rated as A, B, C, D and E according to respective EIA lengths. The results show that there is no obvious trend indicating that there is a positive correlation between EIA length and EIA ecological components' quality. For example, all ten EIAs have a comparable percentage of A scores regardless of number of pages.

This result is different with the result shown by other studies [2][4][5][11][13][16]. Their studies showed that there is a positive correlation between length and increased quality of EIA whereby the longer the length, the more satisfying the EIA quality is. However, the lack of relationship between the two variables in this study was also experienced by the study of Adenaiya[1] whereby there was no relationship between length of EIA and its quality.

The finding of this study is most likely because of the ecological components contents of the reports were similar in most of the reports reviewed. No obvious difference was seen in the ecological topics although the number of pages increased. The most obvious difference in each of the EIA reports was copies of documents in the Annex section. These documents vary in number of pages according to the land status and location of the logging activity. Therefore the additional pages have a very high possibility to arise from the copies of documents such as letters from relevant departments, letters of consents and conditional approval attachments, rather than texts related to ecological components.
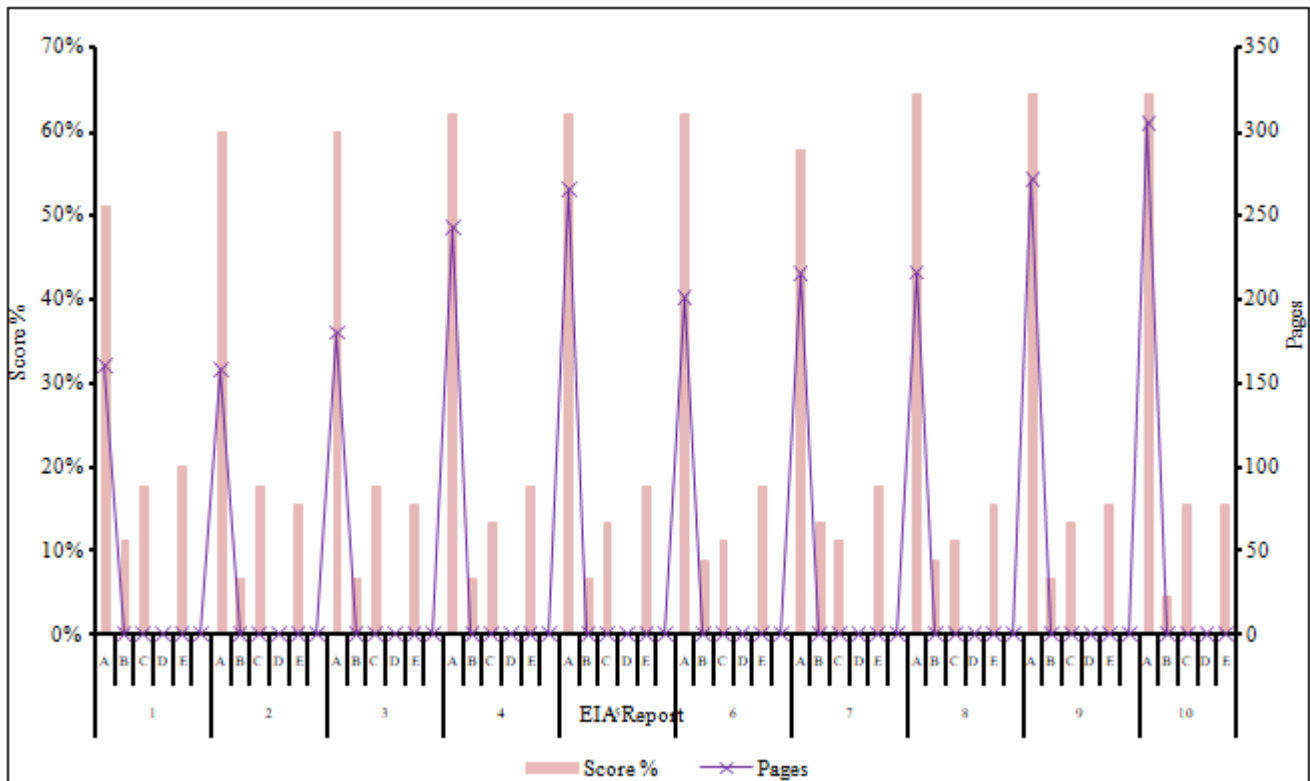
Figure 2: Variation in EIA ecological components with length

5. Conclusion

The overall results in this study showed that Review Area 4 (Communication of Result) has the highest percentage of A score (84%) with the least percentage of E score (11%). Meanwhile Review Area 3 showed the highest percentage of E score (38%) and the least percentage of A score (25%). This showed that the communication of result in EIAs reviewed were generally scored as very good whereby Review Area 3 gained the least percentage of A score solely due to absence of feasible alternatives outlined for the projects (i.e. sites, processes, designs and operating conditions) in all the reports. In this study, it is found that the critical issue that the reports did not comply to the Handbook is regarding the emission of green gases due to decomposition of biomass from land clearing due to insufficient knowledge on the topic. There was no major non-compliance of the reports, according to the Handbook. This study which reviews the ecological inputs quality of information presented in EIA does not reflect the quality of EIA at large, but only one quality component, namely ecological component. This component is undeniably necessary but not sufficient to make a decision about the reports' quality as a whole.

6. Acknowledgement

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