ISSUES OF AIR POLLUTION IN ENVIRONMENTAL IMPACT ASSESSMENT OF DEVELOPMENT PROJECTS.

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ABSTRACT

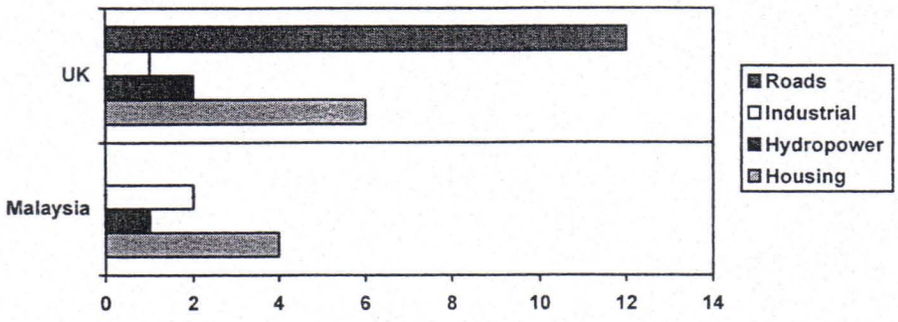
The aim of this study is to establish the trends in approaches and techniques being used to addressed the air pollution issues in project-related development. The interest was to look at the overall issues of air pollution and how it was dealt with in the context of Environmental Impact Assessment (EIA). However, the review was not based upon individual Environmental Impact Assessment techniques. Twenty eight samples from four different sectors were reviewed and information pertaining to construction activities, baseline conditions, impact predictions and mitigating measures were extracted and analysed. It was established that only 17% of reports had described the existing air quality in an appropriate manner. The construction activities was mainly confused with the description of intended development. Only 39% had described the activities as 'true' construction activities. The impacts of the construction phase on air quality for all projects were mainly associated with the generation of dust and particulates and emissions from vehicles exhaust. The predictions were made through quantitative or qualitative techniques. The later were being used in most projects. Nevertheless, there are reports especially from road schemes, which did not mention, the impacts of construction phase of the projects on air quality, at all. There are common mitigating measures to all or most project types such as; wetting of exposed earth surfaces and unpaved roads, covering transported materials which may potentially release dust and particles, imposing speed limits within construction site. In order, to ensure that the mitigation measures will be implemented, the written approval should be linked with terms and conditions, which include the implementation of all mitigation measures identified.

INTRODUCTION

With accelarating urban and industrial growth, vast quantities of harmful waste products have been released into the atmosphere. The rate of discharge is beyond the limits of natural cleansing ability and 'buffering capacity' of the atmosphere (Elsom, 1992). A number of human based activities have been responsible for these emissions. Amongst the most significant have been operation of fossil fuel fired power stations, petroleum refineries, petrochemical operations, iron and steel mills, hazardous wastes incineration plant, major highways or freeways and airports. In a number of less developed countries controlled burning of forests has been responsible for much air pollution. In addition, the construction of many of these facilities cause deterioration of air quality. Canter (1995) also notes that the rates of acid precipitation, global warming, the presence of a number of ozone holes, and in terms of human health, arise in respiratory disorders continue to cause alarm.

Air Pollution in Environmental Impact Assessment

The human activities that have led to deterioration in air quality were mainly confined to their development projects, primarily to their operational stage and to aggregations of such projects that cause cumulative effects. Environmental Impact Assessment (EIA) has recently been acknowledged and used as an important planning and development tool (Wathern, 1988). EIA allows the most likely consequences of a development project to be anticipated prior to the approval to commence any works on it. Thus, it may be possible to mitigate the most polluting projects, to decide that they should not proceed, to approve their development at a more appropriate location, or to develope them in some modified way so as to reduce impacts upon atmospheric quality.



UK - United Kingdom

Figure 1 - Project types based on country of origin breakdown

RESULTS

This section reports the findings of how the descriptions of the existing air quality were made, coverage of the construction activities been done, impact predictions were carried out and mitigation measures devised by the assessors in EIA reports. For each criteria, the project types were treated separately.

Existing Air Quality

The way in which existing ambient air quality of the proposed project sites had been addressed in the reports were looked into. From the review, three ways of addressing the issues were anticipated and used as the criteria for the avaluation. There are reports with: brief descriptions of the air quality without proper analytical quantification; analytical quantification supporting the given descriptions; this issue not mentioned at all is the worst case.

The descriptive pattern according to these criteria ranged from poor to good, that is, accross the full range of quality. Most of the reports which attempted analytical quantification addressed the total suspended particulates (TSP) and vehicle emissions. The summary of project type and the issues related to existing air quality which had been addressed are shown in Figure 2

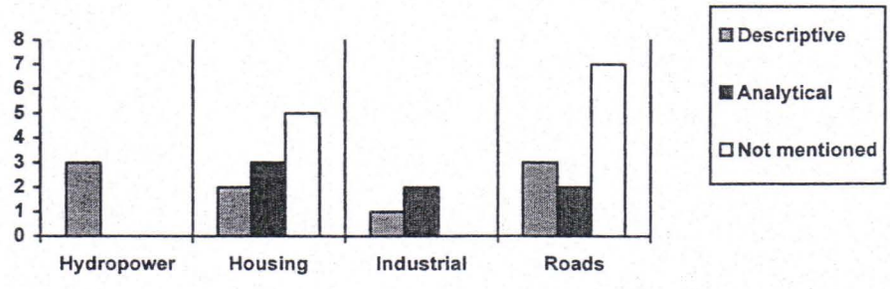


Figure 2 : Means of addressing existing air quality issues in samples by project types

Hydropower

The existing air quality for hydropower schemes was seen from the reports to be merely descriptive. The assessors writing the reports only described air quality in qualitative terms as 'good', 'high' and 'pristine'. No specific measurement was done to support their claims. Although the operational phase of these projects would have no adverse effect, in at least one case, The Malaysian hydropower project, involved biomass removal by burning.

Hydropower

All three reports reviewed attempted a description of the construction phase. Mainly, the impacts of construction phase that were discussed were generation of dust and particulates from construction activities and air pollution from vehicular emissions, especially heavy goods vehicles and excavators. One report had discussed biomass burning, which could generate effects similar to open burning at large scale.

Housing

Seven reports were seen to touch on the issue of construction. The common factors discussed were dust and particulate matter generated from construction activities and emissions from vehicles. However, there was one project that did not discussed these common factors. Rather, the risk of explosion of methane gas on site during earth works, as the site had previously been used as a landfill area. One project also involved massive quarrying activities during site preparation as the site was found to provide a source granite rocks which would generate money for the developer. In this case, therefore, special circumstances dictated that it sould be considered.

Industrial

All three project proponents had discussed the issue with the impacts considered tending to be the same. The common impacts were dust generated from construction activities and emissions from vehicles.

Road

The impacts of construction phase in this project type tend to differ from the other types reviewed. In addition, construction impacts vary within this category. Thus, the impacts of the construction phase of a new road would be different from the impacts of road upgrading or realignment. However, only seven reports had discussed this issue. The rest had attempted it very inadequately or not at all. These results were simplified as shown in Figure 4 and 5 below.

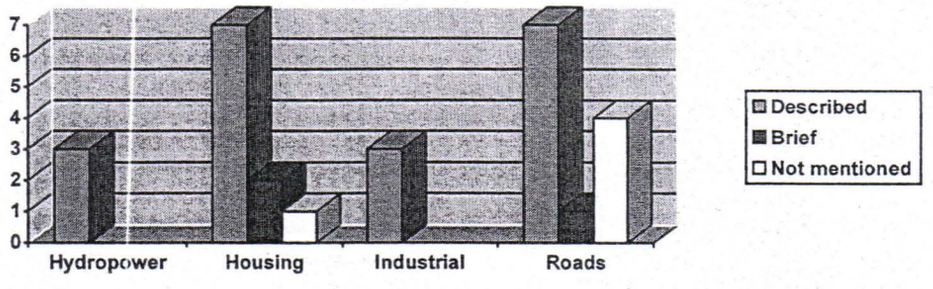


Figure 4: Construction phase impacts issues descriptions level.

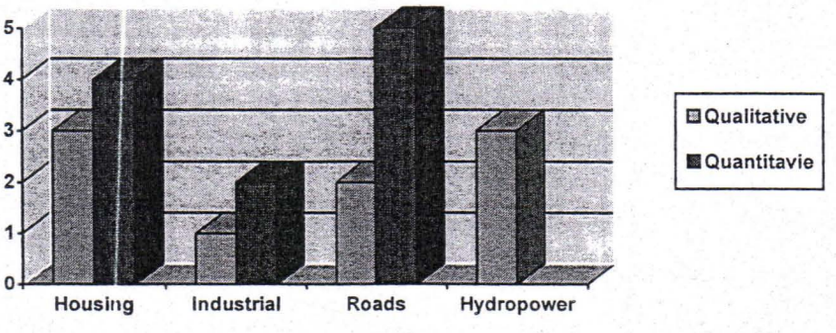


Figure 5: Descriptions of construction phase impacts

	Immediate turfing and protection for the exposed soil surfaces.(x2) Water spray nozzles at the outfall of the crushing plant conveyors. Elevated terrain between quarry faces and adjacent inhabited area. Wet control arrangements for point source dust generation at the crushing plant. Metal hoard along access road parallel to existing residence. Covering of stockpiles. Responsible and thorough housekeeping practice prescribe by site supervisor and quarry master.
3. Road	Spraying of water to exposed surfaces to wet them to control dust.(x3) Limits on dust and dirt levels to be discussed with local authority health division.
4. Industrial	Filter bag system to filter all emissions. No on-site open burning. Wetting of exposed soil surface.(x3) Speed limit of 30 km/h imposed for all vehicles within the site. Washing truck tyres before leaving the site. Covering of transported material if it is dry. Turfing surface as the work completed. Compacting loose earth/soil.

(N.B. (x n) means mitigation measures referred in n reports,example, x2 means referred in two reports)

DISCUSSION

Existing Air Quality

Prior to making predictions on the most likely consequences following a development, it is very important to establish the current situation as a reference point. As far as EIA is concerned, establishing baseline information for selected parameters is important before any meaningful predictions of the most likely impact can be carried out. Hence, for predicting the impact of a project on air quality, existing air quality information needs to be established.

Information of existing air quality can be established through a few methods. First, primary measurement of the ambient air quality using appropriate measuring equipment available on the market. Second, extrapolations can be made based on available existing secondary information. Finally, some subjective description of the situation based on observations, can give an indication of the current air quality status.

Nevertheless, from the review of selected EIA reports presented here, these methods were seen to be used preferentially by particular groups of project. There are reports that described the existing air quality based on; observation, extrapolation of secondary data, as well as by direct primary measurement using particular equipment. Extrapolation from secondary data may not reflect the actual situation at the development site as air pollution concentration at any point will depend very much on emission strength as well as dispersion efficiency. Furthermore, indications pertaining to the method and equipment being used to measure the air quality at the primary as well as the secondary level were not been adequately made. Many reports, totally failed to address this factor by not attempting to provide any baseline information. Reports from road schemes project (58%) most frequently failed to provide baseline information on air quality, with housing (50%) following closely behind. All three reports of hydropower schemes described the existing air quality, but only qualitatively. Looking at the locations of these projects, we may assume that the measurement were not done because all of them are located in rural and wilderness area. Especially, one project which was located in a remote area. Such an area would ambient air quality to be determined as it is well known to be pristine. However, air pollution is borderless and pollutants may originated from foreign sources.

Not only were road projects poorest with respect to describing the existing air quality, 42% did not attempt to address the construction phase impacts. It is difficult to establish any justification for them failing to bring this issue into the assessment. Road constructions normally involve significant amount of earthworks and transport of materials, hence air pollution issues due to this type of development should be given more attention.

major short-term impacts will originate from dust and particulate generation from construction activities and from emissions from vehicular movements.

One of the industrial reports (33%) made qualitative predictions and based on value judgement. Two other reports in this project type (67%) had made the prediction quantitatively. In one, Gaussian Plume Dispersion Model with Pasquill-Gifford parameter on a one hour averaging time was used. The ground level concentration at 1 km downwind, the maximum ground level concentration and distance from the source was estimated. The second case involved, on-site, measurement of TSP for 24 hours. The data gathered for both projects were then extrapolated and predictions were made on this basis.

As shown in Figure 31, 70% of housing development reports (7) had anticipated the impacts of the construction phase fairly adequately. Out of these, only four had carried out quantitative air quality prediction, whereas the remaining three predicted the impact qualitatively. Furthermore, 20% of the reports only stated the impact without any qualitative or quantitative justification. Mentioning 'there will be no significant impact' without any justification is not adequate to explained the issue. The worst case, however, displayed by 10% of the reports which did not mention this issue nor its mitigation.

Similar to the first two types of project, air quality impact prediction of housing developments were mainly of dust from construction phase activities and construction related vehicles exhaust emissions. These impacts were also regarded as short term and insignificant. Quantitative predictions were mainly based on on-site TSP measurement for 24 hours averaging time. However, no information on the type instrument and method of measurement has been given

One of these quantitative assessments had shown a project with an existing level of TSP of 20700 ugm^{-3} which can be regarded as 'extremely' high, based on the TSP standard for Malaysia at only 260 ugm^{-3}. However, the assessor still presumed that the impact of such a level of TSP to be insignificant. The location of this project was within a heavily congested traffic area. Thus, the dust and the TSP generated from construction activities may worsen the quality of the ambient air. The mitigating measures being drawn up to suppressed the magnitude of this impact is discussed below.

Two more interesting facts emerged from the review. First, was an assessor's worry about the risk of the explosion of methane gas during earthworks due to the previous landuse as a landfill area expreseed in one report. Secondly, was a report which anticipated that site clearing and earthworks would involve the quarrying of granite rocks, including blasting, crushing and transportation of the rocks out of the site. The impacts of the dust and TSP generated and the vehicle emissions from these activities were also regarded as moderate and short term. A large proportion of the vehicles involved in transporting the rocks would be heavy good vehicles. This, coupled with the machinery being used during quarrying activities, along with the other earthworks and site clearing activities would have incurred some serious degradation on air quality of that area and area adjacent to it.

Housing project activities are often carried out at large scale. In this study a land take as large as 236 was involved which, certainly, would be likely to have significant impacts on air quality. The assessor of this project did not even attempt to measure and predict the impact of these activities. Rather, the impact was predicted qualitatively based on the value judgement of those preparing the EIA report..

From the twelve examples of reports reviewed under the road project category, only 58% (7) had discussed the construction phase impact. Five of them had carried out the prediction quantitatively. The most common methods used were based on the recommendation included in the MEA (DoT, 1993). A further report merely mentioned 'dust nuisance will arise from construction activities' without proper justification. The construction phase impact described in the reports were mainly, generation of dust, particulate matter and vehicles exhaust emissions.

The risks of air quality degradation during the construction phase of road schemes, may vary depending upon the type of road development carried out. In general, emissions from vehicles exhaust will increase as traffic flow rate decrease. Emission of air pollutants in freely flowing traffic is lower than in congested traffic (DoT, 1993).

Hence, it is fair to presume that road upgrading and road realignment projects will, during their construction phases, reduce traffic flow and are likely to cause an increase in emissions of air

were to be discussed with the local authority health division. There were no mitigation measures to remedy the problem of vehicle emissions, although impacts from this pollutant were anticipated in the reports.

Mitigating measures during the construction phase activity of industrial development, were seen to be similar with the previous project types. They can be divided into three similar categories to the road, housing, and hydropower development. Consequently, as expected, the mitigation measures suggested in the reports were also very similar.

One mitigating measures mentioned under the housing development category which was not considered in other project types merits special consideration, that is the regular monitoring of air quality on-site. Monitoring of air quality is very important as it can confirm the predictions that were made. Predictions normally will involve uncertainties and only monitoring of the relevant parameter and changes in it resulting from any construction activity will provide an opportunity to deal with an unexpected incident. However, detection of an unexpected effects is only part of the problem, it would still be necessary to adopt or adapt an appropriate mitigation measure to deal with it.

CONCLUSION

It is clear that air quality issues of the construction phase of many different types of project have been addressed in various ways of style, methods and techniques in their EIA reports. There are projects which do not address this issue at all, although by right they should do so. There are projects which attempt to address the issue, although the methods that are adopted are unsuitable or inadequate. Finally, there are projects which address the issue extensively, by including quantitative measurements and predictions to support any qualitative statement that are made. The latter is clearly the quality that all projects should achieved in dealing with air pollution issues arising from their activities. Nevertheless, implementations should follows written commitments to ensure that the air quality is preserved at good standard.

Written approval should be linked to appropriate terms and conditions of approval. The terms and conditions should include monitoring of air quality whenever it is needed, implementation of mitigating measures identified in the EIA report, and any other additional measures relevant to the issue. This should bind the developers legally to what has been proposed and approved for the impacts on the environment, especially on air quality, associated with their projects.

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