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EIA follow-up

Environmental impact assessment follow-up: good practice and future directions — findings from a workshop at the IAIA 2000 conference

Jos Arts, Paula Caldwell and Angus Morrison-Saunders

Environmental impact assessment (EIA) follow-up refers to the activities undertaken during the post-decision stages of the process to monitor, evaluate, manage and communicate the environmental outcomes that occur in order to provide for some follow-up to the environmental impact statement. This article presents the key findings of a workshop on EIA follow-up conducted at IAIA'00 Back to the Future, the 20th Annual Meeting of the International Association for Impact Assessment held in Hong Kong, 19–23 June 2000.

Keywords: environmental impact assessment; follow-up; monitoring; international practice

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This article presents the results of a workshop on EIA follow-up at IAIA'00 in Hong Kong. It is based on a specifically prepared discussion paper (Arts *et al*, 2000), the various papers presented (CD-ROM of proceedings (Environment Canada, 2000; see also reference list) as well as on the discussions during the workshop sessions.

OVER THE LAST THREE DECADES much experience has been gained internationally with environmental impact assessment (EIA). However, attention has been predominantly focused on pre-decision analysis. To this end, as EIA practitioners we must ask ourselves how do we know whether plans and projects happen as anticipated at the stage at which the approval decision was granted?

For example, were the actual impacts in accordance with the conditions of the decision and the predictions in the environmental impact statement (EIS). How do we know whether some additional action is needed to prevent unacceptable environmental impacts? This calls for some follow-up to EIA to keep an eye on the real effects of projects. While the notion of EIA follow-up is straightforward, the implementation of it proves to be rather difficult in practice.

There is a considerable body of international literature on EIA follow-up. This focuses on a range of issues such as:

- definition of terms (for instance, Munro *et al*, 1986; Tomlinson and Atkinson, 1987; Thompson and Wilson, 1994; Arts and Nooteboom, 1999);
- relevance and rationale (for instance, Holling, 1978; Bisset, 1980; Arts, 1994; Dipper *et al*, 1998);
- proposed methodologies for EIA follow-up (for instance, Bailey and Hobbs, 1990; Serafin *et al*, 1992; Sippe, 1997; Arts, 1998; Wilson, 1998);
- evaluating technical aspects of the EIA process such as accuracy of predictions and quality of

EISs (e.g. Beanlands and Duinker 1984, Bisset 1984, Culhane *et al.* 1987, Sadler 1987, Elkin and Smith 1988, Lee *et al.* 1994, Barker and Wood 1999); as well as

- relationships with monitoring and environmental management (for instance, Canter, 1993; Glasson, 1994; Petts and Eduljee, 1994; Au and Sanvicens, 1996; Brew and Lee, 1996; Sanvicens and Baldwin, 1996; Morrison-Saunders and Bailey, 1999).

However, issues such as how to do EIA follow-up, good practice and future directions have been addressed far less. It seems that the theory is quite clear but that its practice is still rather misty. The workshop on EIA follow-up at the annual conference of the International Association for Impact Assessment in 2000 (IAIA'00) in Hong Kong was intended to address the practice in particular, by considering current innovations and examples of good practice, and identifying future directions for further development of this important part of a full-grown EIA process.

The workshop was attended by over 50 people representing some 20 countries over two days of the conference, during which time some 15 presentations were made. The quality of presentations was very high and there was active participation and lively discussion during the workshop discussion sessions. This article presents some recent experiences and innovations discussed at the workshop.

The following sections address some of the key findings of the comprehensive array of material presented at the workshop, including: what is EIA follow-up, why should we pursue it, and how do we do it? Subsequently, some of the recent experiences and innovations in EIA follow-up gained by practitioners in specific countries are highlighted.

What is EIA follow-up?

The term 'follow-up' has been in use for some time (for example, Caldwell *et al.* 1982; McCallum, 1985; 1987) and is used here as an umbrella term for various EIA activities, including: monitoring; auditing; *ex post* evaluation; post-decision analysis; and post-decision management. These words are used quite loosely and overlap considerably; hence it is convenient to group them under the generic term of EIA follow-up. A glossary of these various terms is given in Box 1 based on the recent work of Arts and Nootboom (1999).

It should be noted that EIA follow-up, as discussed here, relates to the follow-up of individual plans or projects subject to EIA. It does not relate to the evaluation of (general) EIA systems — that is the analysis of EIA regulations and practice, the overall performance of EIA systems or the quality of EISs under that system. However, the results of EIA follow-up for EIA projects may be of use for the improvement of an EIA system.

Box 1. Glossary of EIA follow-up terminology

Many different terms are used in relation to EIA follow-up. Early attempts at defining many of these terms are provided by Munro *et al.* (1986) and more recently by Sadler (1996) and Au and Sanvicens (1996). We find the following definitions established by Arts and Nootboom (1999) to be useful:

Monitoring is in essence the collection of data (measuring) with the aim of providing information on the characteristics and/or functioning of (environmental) variables. For this purpose, monitoring usually consists of a program of repetitive observation, measurement and recording of environmental variables and operational parameters over a period of time for a defined purpose — in the case of early warning systems it may include evaluation of the monitoring data. More specific types of monitoring are baseline monitoring (measuring the initial state before action is undertaken), monitoring of compliance with, and effects of, the consent decision, and area-wide monitoring (measuring the general state of the environment in an area).

Auditing is a concept which has its origins in economics and accountancy, where it refers to objective examination — a comparison of observations with pre-defined criteria. Tomlinson and Atkinson (1987) have defined a number of specific types of audit that can be undertaken in EIA. Auditing is a periodic activity that involves comparing monitoring observations with a set of criteria (such as standards, predictions or expectations), and reporting the results. In contrast to the continual activity of monitoring, audits are single or periodic events. Environmental auditing may be carried out to facilitate management control and to assess compliance. In environmental management systems, auditing serves as a self-regulation of the activity's own stated environmental policy, for instance, the ISO 14000 standards series.

Evaluation is a term much used in planning and policy for the generic process of gathering, structuring, analysing and appraising information. Evaluation explicitly involves value-judgements. It often relates to subjective policy-oriented judgements rather than purely scientific and technical analysis. *Ex ante* evaluation (for instance, an EIS) focuses on the preparation phase of the planning cycle, including problem analysis, formulation of project goals, and development and pre-selection of alternatives. *Ex post* evaluation concerns the appraisal of a policy, plan or project which has been or is currently being implemented. It involves an evaluation of the activities and situations that followed a particular decision.

Post-decision analysis is, like EIA follow-up, a generic term referring to a wide range of activities that can occur after a decision has been made and the implementation of a project has commenced.

Environmental management system (EMS) operationalizes the implementation of all measures developed in the pre-decision stage (regulatory, mitigative, environmental agreements and so on) while integrating a follow-up system that will ensure compliance to these measures and an evaluation of their effectiveness.

It is useful to divide the EIA process into two stages based around the principal consent decision for approving a proposed plan or project: pre-decision and post-decision. The pre-decision stage incorporates the early components of EIA prior to project implementation (for instance, project planning, screening, scoping, impact prediction, mitigation design and so on extending through to the decision itself). These activities have been extensively examined in the EIA literature and are not addressed in this article. EIA follow-up is concerned primarily with the post-decision stage of a project or plan. It relates to the various components of the

project life-cycle after the consent decision has been taken (for instance, final detailed design, construction and operation phases).

In the IAIA'00 workshop, it was argued that EIA follow-up may be seen as comprising four key activities:

- Monitoring: the collection of data and comparison with standards, predictions or expectations;
- Evaluation: the appraisal of the conformance with standards, predictions or expectations as well as the environmental performance of the activity;
- Management: making decisions and taking appropriate action in response to issues arising from monitoring and evaluation activities; and
- Communication: informing the stakeholders as well as the general public about the results of EIA follow-up.

In relation to these key activities the following functions or objectives of EIA follow-up were defined during the workshop:

- provide information about the consequences of an activity (for instance, conformance with EIS predictions or environmental performance of the activity) and check compliance with implementation requirements;
- enhance scientific knowledge about environmental systems, cause-effect relationships, mitigation measures, construction techniques and so on;
- improve the quality of the methods and the techniques used in EIA, and make it more cost-effective;
- improve public awareness about the actual effects of development projects on the environment, thereby legitimizing the consent decision and justifying the continuation of the activity; and
- maintain some decision-making flexibility by affording explicit opportunities to intervene in developments when changes in the activity, or in the environmental and socio-political environment warrant (that is, an adaptive management approach).

Why follow-up?

The rationale for EIA follow-up seems to be similar to that of EIA itself: getting a grip on uncertainties intrinsic to a prospective activity, such as project planning and decision-making. Although a thorough pre-decision analysis such as EIA is a necessary prerequisite, it is not a sufficient condition for sound (or sustainable) planning, decision-making and management of projects. There will always be uncertainties and gaps in knowledge.

There seems to be an 'implementation gap' (Dunsire, 1978) in EIA. There may be a considerable difference between project plans (and their related EISs) and their implementation (and the occurring

There is a recognition of the need for follow-up to EIA activities, although in the post-consent decision stages it is performed in only a minority of cases: feedback from EIA follow-up provides an opportunity to improve EIA practice

environmental consequences). In the end it is not the predicted effects, but the real effects that are relevant to the environment. Not only does follow-up provide information about the consequences of an activity as they occur, but it also gives the responsible parties (proponent and/or competent authorities) the opportunity to take adequate measures to mitigate or prevent negative effects on the environment. In this regard, EIA follow-up can be seen as the missing link between EIA and project implementation (see also Figure 1).

There is a prevailing recognition of the importance of, and the need for, some form of follow-up to EIA activities which was stressed again at the workshop. In practice, however, such follow-up in the post-consent decision stages is performed in only a minority of cases. This seems to be a weak point of EIA practice in most jurisdictions and it appears that EIA is not being used to its full potential. The feedback from EIA follow-up programs provides a learning opportunity to improve EIA practice.

Current practices

The workshop presentations addressed a broad scope of EIA follow-up issues which largely relate to the

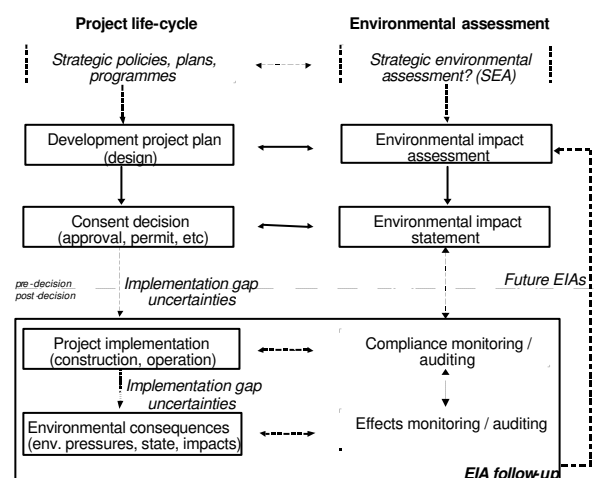


Figure 1. EIA follow-up as a link between EIA and project implementation

four key elements of monitoring, evaluation, management and communication. It is not possible to summarise all the material that was covered, however, the following discussion highlights some of the key issues and innovations that emerged. They include: institutional and procedural arrangements; techniques for follow-up of individual projects (screening and scoping); community participation; impact on local communities; and adaptive environmental management.

Institutional and procedural arrangements

Just as institutional arrangements for conducting EIA have evolved considerably since the first systems were established in the 1970s, there has been considerable development in regulations for EIA follow-up especially in recent years. At the workshop, experiences from countries such as Hong Kong, Portugal and the Netherlands were discussed.

Being one of the major trading entities in the world through its harbour and airport facilities and with extremely high-density residential areas, Hong Kong faces increasing pressures for both development and environmental protection. Early approaches to EIA focused mainly on impact prediction and derivation of mitigation measures with little emphasis on actual environmental performance (Hui, 2000). Shortcomings in the system were evident from complaints about the projects by the public affected, accusations of the EIA recommendations being ignored or not honoured by the contractors, and the prediction methodologies adopted in the EIA studies being proved to be inaccurate or even inapplicable.

In 1990, an environmental monitoring and auditing system was put in place when it was developed for the US\$20 billion Airport Core Program projects. This so-called EM&A system has recently been amended by an EIA Ordinance which came into effect in April 1998 to further improve accountability in EIA and environmental performance.

A major component of the new procedures is the requirement for proponents to employ an independent environmental checker (IEC) to check the works carried out and data collected by the environmental team responsible for the actual monitoring and audit of works carried out on site (Hui, 2000). The IEC also verifies and certifies that mitigation measures are fully and properly implemented as recommend in the EIA report.

A shortcoming of the old system was a the lack of coercive power for the Environmental Protection Department (EPD) to ensure that all the mitigation measures in the EIA report were implemented. All the EIA follow-up works had been done administratively and there was no direct control mechanism to guarantee that the measures identified in the EIA report would be materialised. Indirect control mechanisms, for instance, through lease conditions and planning conditions, had been proved ineffective

in safeguarding the environmental performance.

Under the 1998 EIA Ordinance in Hong Kong, environmental permits are required for the construction, operation and/or decommissioning of designated projects. All recommendations in the EIA report, including any environmental monitoring and audit requirements, will be included in the environmental permits. Since the environmental permits are legal documents, the project proponents and contractors are legally bound by the permit conditions (Hui, 2000).

Another interesting aspect of the Hong Kong approach is that monitoring information is available to all people interested via the internet. In some cases there is even a sort of real-time monitoring by use of web-cameras installed on, for example, a building site. The public can also make their comments or complaints on the project via a website of the EPD. In this way public participation and involvement in the EIA process is encouraged (see also below). The evolution of the Hong Kong EIA system and its capabilities for follow-up is summarised in Table 1.

A second example of new EIA regulations emphasising the follow-up stages to EIA is provided by Portugal where new EIA regulations (DL 69/2000) came into force in May 2000 (Jesus, 2000). The previous procedures allowed some limited verification of the compliance of the detailed project with the EIA decision and some monitoring activities in major projects (Table 2). The new regulations specifically provide for a 'post-evaluation' phase which focuses on:

- compliance of the detailed project design with the EIA decision. Together with the detailed project proposal, the proponent must submit to the competent authority an impact assessment compliance report showing that the project was further developed in accordance with the original EIA decision and that the proposed mitigation measures were incorporated into the design. This public report is also subject, whenever specified in the EIA decision, to the review of the same Review Committee that reviewed the EIS. This advice is legally binding; and
- monitoring and auditing in all cases. Monitoring programs must be established in the EIS and proponents should periodically submit monitoring reports to the EIA authority. The EIA authority may impose project or management adjustments and/or additional mitigation in the case of unpredicted negative impacts. Additionally under the new regulations, EIA authorities can perform audits to verify compliance of the construction, operation or decommissioning of projects with the original EIA decision and also to verify the accuracy of monitoring programs.

The Portugal and Hong Kong institutional and procedural arrangements demonstrate a need for independent follow-up studies of EIA projects which are

Table 1. Evolution of EIA follow-up capability in Hong Kong

	No idea on extent of impact	Cannot verify EIA predictions	Fabrication of EM&A data	Mitigation only after impacts occurred	Cannot monitor cumulative impacts	No guarantee that measures are implemented	EM&A data out-dated	Difficult to retrieve EM&A records	Storage problem for EM&A reports	No access by the public	No user-friendly complaint mechanism	Do not encourage or facilitate public input	No feedback mechanism in the EIA process
Pre-1990 (before EM&A)	X	X	X	X	X	X	X	X	X	X	X	X	X
1990–1997						X	X	X	X	X	X	X	X
EM&A as part of EIA study	✓	✓											
Introduction of IEC in the EM&A system			✓										
Introduction of the action/limit level approach				✓									
Environmental Project Office					✓								
1997–2000	✓	✓	✓	✓	✓					X	X	X	X
Introduction of EIA ordinance making EM&A a statutory requirement						✓							
Specialist electronic environmental monitoring and audit system requiring electronic submission of EM&A reports							✓	✓	✓				
2001 and beyond													
Web-based cyber EM&A system	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Source: Hui (2000)

Table 2. EIA follow-up requirements in Portugal since 1990

Issues	1990 regulations (amended in 1997)	Practice (1990–2000)	New regulations (>2000)
Project phase in which EIA process takes place and EIA decision is taken	Detailed project	Detailed project or preliminary studies (with alternatives) (case of roads or some major projects).	Preliminary studies (with alternatives), whenever possible
EIA decision	Not mandatory	Followed by competent authorities (with exceptions < 1%).	Mandatory
Follow-up at the detailed project phase (when the EIA process has occurred in the preliminary studies phase)	Not applicable	Proponent presents an EIA of the detailed project to the EIA Authority that advises the competent authority	Proponent should present to the competent authority an impact assessment compliance report (IACR) showing the compliance of the detailed project with the EIA decision. If required by the EIA decision, the Assessment Committee has a time schedule to produce a compliance declaration. If this declaration is negative the project cannot proceed.
Monitoring	Mandatory only in the cases when competent authorities do not follow EIA Decision.	Few limited monitoring programmes in place (construction & operational phases).	EIS must include provisions for the monitoring programme and indicate the frequency of presentation of the monitoring reports to the EIA Authority. EIA decision can specify monitoring requirements that are mandatory.
Institutional arrangements for monitoring	Monitoring is the responsibility of the proponent	For major projects specific committees were established (with representatives of EIA Authority, environmental and land-use authorities and, in some cases, local authorities and NGOs) to survey the monitoring programmes in place	Monitoring is the responsibility of the proponent. Monitoring reports are submitted periodically to the EIA Authority. The EIA Authority has the power to impose project or management adjustments or additional mitigation in the case of unpredicted negative impacts. In such cases, the EIA Authority informs competent authority.
Auditing	Mandatory only in the cases when EIA decision is not followed by competent authorities	Non-existent	Audits can be performed to verify the compliance of the construction, operation or decommissioning of projects with the EIA decision and also to verify the accuracy of monitoring programs.
Institutional arrangements for auditing	Audits should be performed by the environmental authorities	Non-existent	Audits are the responsibility of the EIA Authority (could be made by independents consultants and/or environmental authorities staff)
Public involvement	Not considered	Non-existent	The EICR is publicized by IPAMB. Monitoring and auditing reports are publicized by IPAMB. Individual citizens and NGOs may raise complaints on the environmental impacts of the project; IPAMB will interact with competent authorities and keep interested parties informed

publicly accountable and which are grounded in a legal requirement for their implementation. They also demonstrate how EIA systems typically evolve to increase the scope and capability for follow-up activities as issues with the implementation of projects are realised.

Follow-up techniques: screening and scoping

In addition to the emergence of new procedures and regulations, specific techniques for how to conduct EIA follow-up have been developing in recent years, for instance, in the Netherlands.

The EIA regulations in the Netherlands were introduced in 1987 and contained the mandatory requirement that every plan or project for which an

EIS has been prepared must be evaluated during or after implementation (see Meijer and van Vliet, 2000; Arts, 1998). The formal procedure of this *ex post* evaluation is quite simple and is laid down in a few sections of the Dutch Environmental Management Act. Much of the *ex post* evaluation is done analogously to the EIA process itself.

When the competent authority makes a decision about the project or plan approval, it has to provide for an evaluation section or program in which is stated what will be evaluated, when, and how. In contrast to EIS preparation, it is the competent authority rather than the proponent that is responsible for investigating the environmental impacts during or after the activity is implemented. However, the proponent has to co-operate with this post-decision

monitoring and evaluation process. Moreover, in practice most of the work is usually carried out by the proponent.

When considered necessary, negative impacts on the environment must be restricted or undone as far as possible. The competent authority has to draw up a report of the monitoring and evaluation results; this is made public. This sequence of investigation, reporting and taking mitigation measures is gone through as long as is considered necessary in a specific case.

While these regulations appear to be strongly in favour of EIA follow-up, in practice for many EIA projects no EIA evaluation has been carried out to date. Moreover, there is a need for a more selective approach to EIA follow-up aimed at added-value. For this reason, screening and scoping of EIA follow-up are important issues in the Netherlands (see Arts, 1998). Criteria for screening and scoping in EIA follow-up are presented in Box 2.

Box 2. Criteria for screening and scoping in EIA follow-up

In general, EIA follow-up may be more appropriate if more objectives — such as control of the project, information and communication — can be achieved. In addition, the consideration of the following screening criteria prove to be relevant when determining the need for EIA follow-up in a specific case (see also FEARO, 1993; Arts, 1998; Meijer and van Vliet, 2000):

- degree of uncertainty or complexity of the EIS;
- degree of uncertainty or unfamiliarity with the effectiveness of proposed mitigation or compensation measures;
- complexity and magnitude of a proposed activity, involvement of new or unproven technologies;
- sensitivity of the area where the activity is proposed;
- risk factor if the activity or mitigation measures are not correctly implemented;
- political and/or societal sensitivity of the proposed activity;
- intervening developments, for instance, significant changes in a project in subsequent planning and decision-making, new insights or views on environmental impacts.

Additionally, the availability of other evaluative activities that can be substituted by EIA-related evaluation and monitoring may help determine the need for EIA follow-up.

To determine what issues should be included in EIA follow-up (scoping) similar criteria as mentioned above are relevant. In addition, the feasibility of the EIA follow-up is essential for determining the scope of the EIA follow-up study. The feasibility is related to the following questions (Arts *et al*, 2000):

- Is it possible to measure and test the issue? The availability of information or appropriate methodologies are relevant considerations here;
- Is it financially and/or organisationally achievable to evaluate the issues? EIA follow-up will only be successful if appropriate budgets and staff resources are provided for;
- Is it possible to take additional measures? For example, juridical procedures and the competencies of proponent and regulatory bodies may be relevant here;
- What is the potential to react? For example, the capacity to implement remedial measures as needed and for adaptive environmental management to occur are relevant; and
- What is the potential to learn from experience? This is relevant both within a particular project and also to use the results for planning new activities.

Meijer and van Vliet (2000) provide an example of a selective approach to EIA follow-up developed by the Province of South Holland. This approach consists of a framework for screening and scoping, which is based on the following functions of EIA follow-up:

- control: specifying control mechanisms in addition to other evaluative activities and instruments (for instance, permit monitoring and enforcement);
- information: identifying uncertainties, gaps in knowledge and learning for future EIA activities; and
- communication: to both internal (co-ordination) and external (justification) stakeholders.

On the basis of EIA evaluations carried out in practice (including various waste-management projects), Meijer and van Vliet (2000) concluded that:

- EIA follow-up in the Netherlands is especially relevant to complicated projects such as roads, dikes, housing but also for industrial and waste-management projects;
- screening and scoping for EIA follow-up have to be done as early as possible;
- co-operation of the proponent is vital. Regarding this, it can be instrumental if the proponent applies for a new permit because of an extension to a project;
- co-ordination of various (monitoring) information flows is an important added-value and should be provided by the responsible authority; and
- EIA follow-up is an incentive for improving the quality of environmental management of projects as well as permitting and enforcement processes.

The relevance of careful scoping for EIA follow-up and the need for adaptation of EIA follow-up programs on the basis of monitoring results is also put forward by Denis (2000) in his discussion about the lessons derived from the La Grande Hydroelectric Complex in North Quebec, Canada. Denis also highlights the relevance of integrating the various monitoring information flows in a similar manner to Meijer and van Vliet (2000).

Community participation

While there has been a strong tradition of public participation in EIA during the pre-decision stages of the process, the opportunities for public involvement in the post-decision stages are not so apparent. Recent experiences discussed at the workshop suggest that there are various approaches that can be adopted. One makes use of an independent agency in which various stakeholders are represented and direct the follow-up process. Another method is a 'do-it-yourself' approach in which the public has direct access to monitoring data.

During the workshop, approaches were discussed that are oriented toward enhancing both communities' ability to participate and the communication between local communities and proponents and authorities. The latter is discussed in the next section.

Ross (2000) reported on a recent Canadian experiment in monitoring and management for a major diamond mining project in the north of the country for which an independent environmental monitoring agency (IEMA) was established to serve as an independent watchdog for environmental management at the mine. The IEMA is responsible to seven organisations including the proponent, the Government of Canada, the Government of the Northwest Territories, and the four aboriginal groups in the region. These organisations were all involved in the process of selecting and appointing Agency members.

The PADC EIA and Planning Unit (undated) describe a similar body — the Shetland Oil Terminal Environmental Advisory Group — established in 1977 to determine effects of the Sullom Voe oil terminal on the Shetland Islands. This group comprised representatives from industry, government, the Shetland Islands Council, other Shetland organisations and academic experts.

The tasks of the IEMA in Canada include:

- reviewing and commenting on monitoring and management plans and their results;
- participating in regulatory processes directly related to environmental matters involving the mine, its impacts and its cumulative effects;
- bringing traditional knowledge and concerns of the aboriginal peoples and the general public to the diamond mine operators and to government;
- keeping aboriginal peoples and the public informed about Agency activities and findings; and
- writing an annual report with recommendations that require the response of the proponent and governments.

The great strengths of this approach to EIA follow-up are the independence of the Agency and its direct two-way communication with all stakeholders in the project (Ross, 2000).

In Hong Kong there has evolved a quite different approach but with the same aim of improving the communication of EIA follow-up activities to the public. In early 2000, the Environmental Protection Department initiated the application of a web-based cyber environmental monitoring and auditing system for major development projects. A standard requirement is now included in the environmental permits for major development projects for the permit holders to upload the environmental monitoring and auditing results onto a dedicated website for public access. This system has a number of advantages including (Hui, 2000):

- multiple/unlimited access by web users;
- real-time monitoring and availability of data (that

is, images and monitoring data collected from development sites can be uploaded onto the website as they are collected, rather than having time delays associated with report production and publication);

- two-way communication is permitted as the public can also make their comments or even complaints on the project via the website; and
- improvements to the knowledge base on the EIA process for projects. All monitoring and auditing information stored for a project could easily be retrieved and compared with the EIA predictions. With a cyber system, the information and experience gathered could be systematically stored and managed.

At the time of the workshop, a number of pilot projects of this system were underway with the intention of having the system implemented during the latter half of 2000.

Communication and public participation are important components of an effective EIA follow-up system. Existing and emerging information technologies provide exciting new opportunities for public involvement in the process as these two examples demonstrate.

Local community issues

Most of the literature on EIA follow-up has emerged from developed countries with a long tradition of involvement in EIA. The issues faced in developing countries may pose additional challenges that have not been addressed previously. Some of those identified by O'Beirne *et al.* (2000) for aluminium smelter projects in South Africa and Mozambique include limited capacity for authorities to undertake EIA follow-up combined with a poor regulatory framework and issues concerning human health and well-being.

With respect to the latter, HIV/AIDS and malaria pose particular problems. For instance, the development of a new smelter and the arrival of new workers may cause further spread of HIV/AIDS among the local community and malaria may have a major

A recent Canadian experiment in monitoring and management for a major diamond mining project established an independent environmental monitoring agency to serve as an independent watchdog for environmental management at the mine

bearing on worker productivity. Both diseases call for specific programs to prevent major impacts on local communities' health (O'Beirne *et al*, 2000).

An additional issue relevant to developing countries is the 'informal sector' which refers to people attracted to project sites to trade with the workers. Informal traders may be beyond the control of project proponents and yet may have a significant impact on the lifestyle and well-being of the community with respect to the spread of disease and threats to worker safety (O'Beirne *et al*, 2000). Hence follow-up needs to incorporate the interactions between projects and the local community.

The experiences gained with EIA follow-up for the La Grande Hydroelectric Complex in Quebec, Canada (Denis, 2000) also stress the importance of local, aboriginal communities. This EIA follow-up program has especially taken into account the interests and knowledge of the local communities on ecological issues. Attention has also been given to using small working groups in which local people are represented.

In the USA, experience has been gained with involving local communities in EIA projects. For example, in the EIA follow-up programs for the Glen Canyon Dam project and the offshore oil and gas development in the Gulf of Mexico particular attention has been paid to the social and cultural impacts of the developments (Austin, 2000). The results indicate that community participation in monitoring and follow-up activities are enhanced through better informed communication about the projects, and regular communication between local communities and project managers. The follow-up programs have also increased the local communities' capacity to deal with the changes caused by these projects (Austin, 2000).

The experiences presented at the workshop clarify the relevance of specific local circumstance that may need to be taken into account during EIA follow-up as well as the usefulness of employing the knowledge of local communities when doing EIA follow-up.

Adaptive management approach

EIA follow-up is not a static exercise and the process should be subject to ongoing adjustment and improvement. In his discussion about Canadian EIA practice Włodarczyk (2000) suggests that improvements to follow-up need to be made in an incremental but continuous fashion. He stresses the importance of an approach that can be implemented quickly, that can evolve over time, and that includes a mechanism for tracking and evaluating the success of monitoring and follow-up.

This is consistent with the notion of adaptive environmental management in the face of uncertainty. Morrison-Saunders and Bailey (2000) reported on the environmental management activities for six case studies that had undergone EIA in Western

Australia. They found evidence of a flexible approach that promotes ongoing and adaptive environmental management and monitoring and is based on meeting environmental objectives rather than prescriptive mitigation requirements alone.

They found that, with an adaptive environmental management approach, project managers responded to inaccurate and unexpected impacts, which may otherwise have been ignored. Morrison-Saunders and Bailey (2000) also suggested that it is useful to focus on environmental management outcomes during EIA follow-up studies to determine the extent to which the environment was protected as intended by the EIA process.

Future directions for EIA follow-up

The lessons that arose from the IAIA'00 workshop were very diverse. However, a number of useful and promising avenues for strengthening the practice of EIA follow-up were advocated.

Institutional arrangements

EIA regulations continue to evolve as the need for follow-up becomes increasingly evident and as the examples from Hong Kong and Portugal demonstrate (see Tables 1 and 2). It is important that EIA follow-up regulations clearly explain what work is needed and who is responsible. The resulting EIA follow-up programmes should be closely linked to approval decisions. Regarding this, it is important to give attention to clear and accountable commitments of parties involved. Additionally, quality control in EIA follow-up can be improved through the establishment of external (independent) bodies responsible for reviewing follow-up programmes and results as recent experience from Canada and Hong Kong has shown.

Techniques

Early and explicit screening and scoping (preferably during EIS preparation) should be undertaken to identify follow-up requirements. Experience from the Netherlands has shown the relevance of this resulting in selective and specific follow-up programmes that are closely linked to the consent decision and that make efficient use of existing monitoring and evaluation activities. Additionally, a flexible and adaptive approach to EIA follow-up is needed to maintain focus on important issues, for instance, scoping for EIA follow-up should be an 'objective-led' and constant process during all stages of the project cycle.

Communication and participation

Openness, reporting and public participation in EIA follow-up is an important issue for strengthening

follow-up practices. All stakeholders should be involved. Information sharing enhances local capacity building with benefits for proponents, regulators and local communities alike. Active public participation can also enable cumulative, health and local community effects (social and cultural) to be successfully addressed in EIA follow-up as recent experience in Canada, the USA and South Africa has found.

Improving project management

EIA follow-up promotes the application of EIA principles throughout the project cycle and provides opportunities to learn from experience. The effectiveness of EIA follow-up is enhanced when results from one programme are linked to future decision-making.

A proactive approach based on the use of event action plans or contingency plans is effective. These plans are initiated if monitoring programmes detect unacceptable impacts or other problems emerge. EIA follow-up promotes adaptive environmental management and should link up with EMS activities. Experience from Western Australia has demonstrated that having an adaptive management approach during the post-decision stages of EIA can result in effective environmental protection and management even when the EIS predictions prove to be inaccurate, or inappropriate mitigation measures are initially put in place.

Provision of adequate resources (both finance and capacity) is essential to make EIA follow-up a reality. However, it need not place an onerous burden on proponents and regulators. The efficiency of EIA follow-up — specifically the time, money and staff resources required — may be enhanced relatively easily by adopting a flexible and pragmatic approach (for instance, using simple monitoring systems with short feedback cycles that yield quick results).

Recent screening and scoping initiatives in the Netherlands have streamlined EIA follow-up programmes by making efficient use of existing monitoring and evaluation activities. Moreover, this has enabled the implementation of improved environmental management with limited investment in staff and financial resources required.

Training and development:

To date much EIA follow-up appears to have been initiated in response to problems with enforcement of approval conditions and in the face of unacceptable impacts or environmental management practices. It is important that the follow-up outcomes are also used to improve EIA systems and practices. There is a need to emphasise the advantages of EIA follow-up with respect to learning from experience and to share this with other EIA practitioners and regulators.

To this end, approaches for carrying out EIA

follow-up for various types of activities (such as project-based EIAs vs strategic environmental assessments) need to be developed and documented. It would be useful to develop generic screening and scoping criteria for EIA follow-up in the same manner that generic guidelines for the pre-decision stages of EIA have been established. Such criteria should provide direction on how to address factors such as uncertainty, sensitivity and feasibility.

There is a need for training and capacity building for EIA follow-up, especially for countries with little experience. Learning about EIA follow-up can be enhanced by establishing a network for exchanging experiences and information about it. To start this process and as a result of the IAIA '00 workshop, the papers presented have been published on a CD-ROM (by Environment Canada, Environmental Assessment Branch, October 2000) and a discussion forum for practitioners has been set-up on the internet by the Environmental Assessment Branch of Environment Canada (<http://ea-ee.ncr.ec.gc.ca/fup/login.asp>).

Additionally, EIA follow-up workshops were organized at the IAIA '01 Annual Meeting in Cartagena, Colombia and will be at IAIA '02 in The Hague, Holland to pursue further the challenges raised at the Hong Kong meeting.

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