

ENVIRONMENTAL IMPACT ASSESSMENT: NATIONAL APPROACHES AND INTERNATIONAL NEEDS*

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Abstract. This paper examines the spread and development of 'environmental impact assessment' (EIA) since the enactment of the U.S. Environmental Policy Act on January 1, 1970, which established for the first time under any jurisdiction the formal requirement that an EIA be made and that an 'environmental impact statement' (EIS) be filed prior to implementation of certain major development projects.

The paper is divided into three parts. In the first part, we briefly review the forms of EIA introduced in the western industrial countries and contrast these with developments in the socialist countries of Eastern Europe, and in the Third World. The approaches to EIA adopted by five countries – the United States, Australia, Canada, the Federal Republic of Germany, and the Soviet Union – are used to illustrate the types of national approaches that have been followed. In the second part of the paper, we use some questions raised by impact assessments as codified in legislation or regulations at the national level to highlight some of the limitations of impact assessment. Finally, we turn to international impact assessments and describe the modest progress made to date. Key impediments to the development of appropriate conceptual and institutional frameworks and methodologies for international EIAs are noted.

In conclusion, we offer some suggestions about needed actions at both the national and international levels.

1. Introduction

It is now over a decade since the U.S. National Environmental Policy Act (NEPA) came into force on January 1, 1970. This legislation was passed to ensure that environmental concerns received adequate attention at all levels of government planning, decision-making and action in the United States. It established for the first time the formal requirement that an 'environmental impact assessment' (EIA) be made and that an 'environmental impact statement' (EIS) be filed prior to the implementation of certain major development actions.

This widely noted and acclaimed development came as a stimulus and a challenge to other nations who were at that time responding to citizens' concerns for the protection of the human environment, especially where major developments were being proposed by government or industry. Each nation has been faced with a choice whether or not to institute new mechanisms or to amend existing mechanisms for EIAs. The different solutions countries have chosen reflect the decisions they have made about how impact assessments and statements fit into their overall policies and strategies for controlling and managing the impact upon environment of their development activities.

The pattern emerging in the past decade is that most industrialized countries and some developing countries have instituted new procedures designed to give more weight

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to environmental considerations in planning. However, examination of some of the problems of early U.S. experience, together with the influence of different political and institutional structures, socio-economic systems and different ecological and environmental conditions, has resulted in systems that vary considerably from the U.S. model (ECE, 1979). The majority of countries have preferred to integrate impact assessment procedures in their pre-existing planning processes, rather than enact special legislation establishing entirely new processes. These developments have promoted an increasing variety and richness in the forms of EIA in use around the world and the purposes for which it has been introduced (Wandesforde-Smith, 1980).

Three aspects of EIA are dealt with in this paper. First, we identify the two basic approaches to EIA that have been adopted by different countries, and use these, in conjunction with varying political, socio-economic and environmental conditions to distinguish five types of approaches to EIA (Table I). Reference is made to specific EIA systems to describe the major features of these approaches. Second, we consider some of the limitations of EIA to illustrate how developments in the last decade at national and subnational levels have led to the creation of an important, but flawed, process. Third, we turn to international impact assessments and describe the modest progress made to date. In conclusion, we offer suggestions about needed actions.

TABLE I
Examples of national approaches to EIA

Formal, explicit procedures			Informal, implicit procedures	
U.S. Model	Developed World Variants	Developing World	Mixed Economies of W. Europe	Centrally Planned Economies of Socialist Europe
U.S.A.	Australia Canada Netherlands	Malaysia Papua-New Guinea Philippines	Belgium Denmark Eire Federal Republic of Germany Great Britain Sweden Switzerland	Bulgaria Czechoslovakia Democratic Republic of Germany Hungary U.S.S.R.

2. National Approaches

The environmental impact assessment procedures that have been adopted by different countries can be distinguished according to whether they are based on *informal* procedures, which are often modified or adapted to the needs of individual situations and proposals; or on *formal* procedures, which are sometimes embodied in legislation, and which are specifically designed to ensure an integrated examination of economic, social, and environmental factors affecting a development proposal. Similarly, the procedures can be characterized either as *explicit*, and leading to the preparation of

individual environmental impact statements; or as *implicit* and forming an integral part of planning, with emphasis on the impact assessment process rather than on the end product (ECE, 1979; Kennedy, 1980). EIA procedures are usually formal and explicit, or informal and implicit, a contrast that is explored in this paper. Some approaches that specific countries have adopted are listed in Table I. These approaches reflect how countries have dealt with the important procedural and institutional questions summarized in Table II.

TABLE II
Important procedural and institutional questions

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1. Are EIA requirements embodied in legislation or in administrative measures?
 2. What criteria are used to determine which development actions have to undergo EIA? In particular:
 - (a) Is EIA required for both public and private development proposals and actions?
 - (b) Is EIA applied to policies, plans and programmes or is it restricted to individual projects?
 - (c) At what levels of activity is EIA used: national, federal, regional, local?
 - (d) What criteria are used to decide whether an EIA is needed for a specific development proposal?
 - (e) Who decides whether the criteria are met?
 - (f) Can actions which meet the criteria be exempted from compliance with EIA requirements on other grounds?
 3. What kinds of environmental impact studies and documents are required?
 4. Who is responsible for the preparation of any studies and documents that are required?
 5. Who may participate in the assessment of development? In other words, what provision is there for inter-agency review, public participation, and judicial review?
 6. Are sufficient safeguards incorporated in EIA procedures to ensure access to information?
 7. How are the costs of EIA allocated amongst the parties?
 8. What is the relationship between EIA, planning, and decision-making?
 9. What steps, if any, have been taken to ensure or encourage post-action monitoring and review?
 10. Have mechanisms been provided to determine the effectiveness of EIA processes and to recommend modifications on a continuing basis?
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The adoption of a formal, explicit approach to EIA is demonstrated by the U.S. federal EIA system. The U.S. procedures have been modified several times since they were first introduced by the Council on Environmental Quality (CEQ). The CEQ continuously monitors the EIA process in the U.S. so that problems can be identified and eliminated. Its establishment by NEPA institutionalized environmental concerns in the Executive Office of the President. The procedures were last modified by a set of binding guidelines on the implementation of NEPA released by the CEQ in November, 1978.

These guidelines sought to achieve three goals to promote more effective implementation of NEPA: reduced paper work, reduced delays, and better decision-making (Bass and Warner, 1979). Many of the changes and innovations introduced in these guidelines are outlined below. In addition to these requirements, numerous states have enacted similar EIA requirements in the last ten years. These laws, such as California's Environmental Quality Act, generally require state and local agencies to prepare environmental documents similar to EIS's before taking any actions that may significantly affect the environment (Bass and Warner, 1979). Bass and Warner (1979) believe the 1978

guidelines, together with recent changes at the state level, will go a long way toward harmonizing the federal process with the state processes. The following account is restricted to the U.S. procedures at the federal level.

The U.S. approach exhibits several notable features. First, the EIA requirements extend to a wide variety of state, local and private as well as federal actions, and to policies, plans, and programmes as well as specific projects. This is because the U.S. process is applicable to all types of federal actions, which the 1978 guidelines interpret to cover new and continuing activities, including projects and programmes entirely or partly funded, assisted, conducted, regulated, or approved by federal agencies, as well as new or revised agency rules, regulations, plans, policies or procedures and legislative proposals (ECE, 1979).

Second, the decision by the proponent on whether or not the criteria used to determine which development actions are subject to EIA are met is closely scrutinized. The 1978 guidelines require a proponent agency, when it develops a proposal for action, to determine if that action will significantly affect the quality of the human environment. This determination is made with the aid of an environmental assessment (EA) document. This document, according to the 1978 guidelines, must include a discussion of factors to be weighed in the initial planning stages as well as analysis of alternatives. If it is determined that the action will not significantly affect the quality of the human environment, the agency makes a report called 'Finding of No Significant Impact' available to the public and uses the EA document internally to identify measures it can take to minimize impact. If the action does significantly affect the quality of the human environment, the agency is responsible for the formal filing, preparation and submission of an EIS. The proponent agency cannot easily circumvent the latter route for actions that are likely to have significant impacts, since it is possible to challenge decisions on whether or not an EIS is required for the proposed action in the courts.

A third feature, introduced above, is that implementation of EIA leads to the preparation and filing of a draft EIS followed by a final EIS. The 1978 guidelines establish a standard EIS format that should be followed by each federal agency unless compelling reasons dictate otherwise. It is hoped that this innovation will further reduce confusion and delay (Bass and Warner, 1979). The fourth feature, closely connected to the one just mentioned, is the allocation of responsibility for the preparation of analyses and EISs to the proponent (lead agency). However, an important innovation referred to as 'scoping' was introduced in the 1978 guidelines to determine the proper content of an EIS before it is prepared. This procedure is designed to avoid subsequent criticism that essential matters were overlooked.

The scoping procedure should also help clarify how responsibilities for preparing EISs should be allocated among the proponent and other interested parties. To clarify the allocation of responsibilities, further, the 1978 guidelines spell out the roles of lead and co-operating agencies and give the CEQ the opportunity to decide who is the lead agency in cases where this is disputed. The 1978 guidelines also encourage state and local agencies with some authority over the proposal to become involved in the federal EIA process.

The fifth feature, therefore, is the way in which all interested parties are encouraged to at least participate in the review of EISs. This occurs at two stages, following preparation of a draft EIS and when the final EIS is filed with the Environmental Protection Agency (EPA) by the proponent (lead agency). The U.S. procedures therefore enable the CEQ, EPA, federal expert agencies, state and local agencies as well as the general public to participate effectively in the assessment of development.

Sixth, the EIA process is closely linked to decision-making since the proposed action cannot be commenced until all the steps in the EIA process have been completed, and a decision has been reached. Before any decisions are made, the final EIS, which includes the comments of all the reviewers, is submitted to the agency. In addition, the 1978 guidelines provide that the lead agency must make available a formal 'record of decision' which explains the decision, states any mitigating and monitoring measures to be taken, and identifies the environmentally preferable alternative(s) when a decision is made.

Another feature is that judicial review is allowed at several steps in the EIA process. Towards the conclusion of compliance with EIA requirements, decisions on both the adequacy of the final EIS and the final decision itself, can be challenged in the courts. Reference was made earlier to how decisions on whether or not an EIS is required for a proposed action can be challenged in the courts.

Three other aspects of the U.S. federal approach are worth noting. First, the financial costs of participation in EIA in the U.S. are generally borne by the parties that incur them. Second, public access to information has probably been enhanced in the U.S. by EIA requirements, although relatively liberal access is guaranteed by freedom of information legislation. Finally, it would appear that little emphasis is given to post-action monitoring; responsibility for monitoring to assure that decisions are carried out and that no unexpected impacts occur is left to the proponent.

Several other countries, notably Australia, Canada, and the Netherlands, have supplemented or are about to supplement their existing planning institutions and processes with the establishment of formal, explicit EIA procedures. Their EIA processes vary in several important respects and all three systems differ from the U.S. model. The recent evolution of EIA in the Netherlands also illustrates the tendency over the last ten years for the adoption of EIA to become more discriminatory (Wandesforde-Smith, 1980). In this case, an initial research phase involving careful consideration of the experiences of other nations plus the results of several 'trial' EIAs in the Netherlands has been undertaken. This phase took several years and culminated in the publication of the "Government Standpoint on Environmental Impact Assessment". Draft legislation establishing an EIA process similar to that announced in the previous document has been introduced into the Dutch Parliament (Jones, 1980).

EIA systems were established in Australia and Canada soon after NEPA was passed. The Australian provisions at the federal level are contained in the 1974 Commonwealth Environmental Protection (Impact of Proposals) Act and were supplemented by administrative procedures established in 1975 (Hollick, 1980). As in the U.S., the federal requirements are supported by a variety of approaches at the state level (Munn,

1979a). In Canada, a federal Environmental Assessment Review Process (EARP) was established by Cabinet decision in 1973 and was amended in 1977. Once again, the federal provisions are supplemented by a variety of EIA requirements at the provincial and municipal levels (Pushchak and Wilson, 1981).

The Australian and Canadian federal approaches parallel the U.S. model in several important respects. The systems adopted by both countries establish new administrative bodies to monitor and co-ordinate their processes; the Department of Environment and Federal Environmental Assessment Review Office (FEARO), respectively. Both systems rely heavily on the self-assessment approach to decide both what development actions get assessed and for the completion of the assessments and the preparation of the impact statements themselves. Finally, both systems allocate central roles to public participation and interagency review. In addition, the Canadian EIA system is based on almost identical objectives, and provides for strong explicit links between EIA and decision-making similar to the U.S. system.

The differences, however, vary and must be dealt with separately. With respect to the Australian model four critical differences can be identified. First, the Australian legislation establishing EIA has modest aims which has helped avoid frequent judicial intervention to help define the Act or to enforce its requirements. The 1974 legislation only requires consideration of the environmental consequences of proposed actions, and thereby only provides a framework for obtaining and reviewing information. Hence, there is no need for projects to be environmentally sound and there is no provision that provides the authority to withhold approval on environmental grounds (Munn, 1979a). Second, federal agencies are given an exclusive power to decide for themselves whether actions they propose are likely to have significant environmental impacts, and therefore, to determine whether or not compliance with EIA is necessary. In the U.S. these decisions can be challenged in the courts. Third, a broad exemption is provided, under which any department can request the Minister of the Environment to exempt an action or class of actions from any or all of the EIA procedures. Finally, access to information is more restrictive in Australia. Comments and recommendations made in the course of government inter-agency reviews are not made public for example, which makes it difficult to comment on the effectiveness of such review procedures (Hollick, 1980).

Three critical differences between the Canadian and U.S. approaches may explain the greater prominence EIA has achieved in the U.S. First, the possibility of judicial review is denied under the Canadian system. Second, as in Australia, federal agencies are by and large given an exclusive power to decide whether or not compliance with EIA procedures is necessary for specific development proposals. Finally, in situations where EISs are required, the process is co-ordinated by ad hoc Environmental Assessment Panels as opposed to a permanent agency, such as EPA in the U.S. These Environmental Assessment Panels are appointed from the general community only after the decision requiring the preparation and submission of an EIS has been made. Their composition, functions, and responsibilities are defined in terms of the particular problems to be addressed by the EIA. The Panel guides the preparation of the EIS, and reports on this, plus the public response and any other information it feels is required to the Minister

of the Environment. This arrangement promotes flexibility, but also enhances the possibility that the EIA process can be systematically abused by one or more of the participants.

These differences highlight how administrative authorities in Australia and Canada have been left essentially undisturbed in their exercise of discretion over what gets assessed, how and when it gets assessed (Wandesforde-Smith, 1980). Consequently, the approaches that have been adopted have probably been less successful in producing more environmentally sensitive decisions in their respective jurisdictions compared to the U.S. approach.

In many developed countries, the assessment of the environmental consequences of development actions was already taking place in 1970, when NEPA came into force in the U.S., as a normal part of the review process required for development actions and proposals that needed authorization from planning authorities. Steps to ensure that the environment in these countries was adequately protected have been taken in the last decade by the ad hoc integration of informal, implicit EIA procedures into existing planning systems for development control. New acts, new bureaucratic structures, and new legal processes have generally not been instituted. Two broad sub-approaches can be identified (Table I). These reflect variations in the planning process that characterize the mixed economies of Western Europe on the one hand, and the centrally planned economies of Eastern Europe and the U.S.S.R. on the other.

Two points can be made at the outset. First, EIA can have beneficial results in these countries despite the existence of well-established social and economic planning processes. It brings to the attention of planners and decision-makers information about the interdependencies of policy that would otherwise be ill attended simply because planning and decision-making processes are well-established and well organized, and therefore very often specialized and organizationally fragmented (Wandesforde-Smith, 1980). Secondly, the integration of EIA into an existing planning process will only realize beneficial results, however, if the process meets certain minimum requirements. An obvious requirement for EIA is the provision of the information required, or the ways and means to obtain such information. Information will generally be required on a variety of aspects of development proposals, including the goals, objectives, alternatives, baseline information, effects on the environment, mitigation measures, monitoring and inputs from the general public and other agencies for example (ECE, 1979).

Most countries in Western Europe have adopted an informal, implicit approach (Table I). In most cases the application of EIA has been confined, in practice at least, to the analysis of major projects (Lee and Wood, 1980). One of the first countries to take this route was the Federal Republic of Germany, which will illustrate the use of this approach in countries with mixed economies. This account indicates that countries that have adopted this type of EIA process have also left the exercise of discretion over what gets assessed, how and when it gets assessed essentially undisturbed. If anything, they have been more successful than Australia and Canada in this regard, and to the extent that they have, the same comment applies. The approach in the Federal Republic of Germany is set out in a federal cabinet resolution adopted in 1975 titled "Principles

for the Environmental Impact Assessment of Federal Actions". Only two out of the eleven German states have established EIA procedures of their own: Saarland in 1976, and the city-state of West Berlin in 1978 (Kennedy, 1980).

At first glance the federal approach appears to replicate many of the features of NEPA noted earlier. However, careful consideration of the two approaches highlights several key differences, which can be conveniently dealt with under two subjects – the application of EIA and the provisions regarding assessment itself.

With respect to the application of EIA, the 'Principles' require federal authorities and agencies to examine and take into account at the earliest possible stage any harmful effects on the environment caused by their actions. Consistent with the U.S. approach, actions are defined broadly, to include drafts of legislation and general administrative guidelines, administrative procedures, contracts, programs, and plans related to public measures. However, the effect of this provision is reduced by another provision which provides that the 'Principles' need not be applied in cases where specific regulations for the protection of the environment have been provided through other laws. This is illustrated by the Ministry of Transportation, which has used this provision as a basis for its claim that the 'Principles' do not apply to the planning of federal highway projects. The Ministry has used sections of two federal laws, the Federal Highway Law and the Federal Control of Pollution Act, to support its position claiming that their provisions provide the equivalent of an EIA. However, as Kennedy (1980) points out, the sections referred to only make provisions for noise protection measures and insure that highway planning takes place in agreement and consultation with those federal and state ministries concerned with land-use planning. Most other federal agencies have reacted by issuing an in-house memorandum that officially recognizes the 'Principles' and incorporates them into general procedures, without giving any instruction vis-à-vis their implementation. The impact of the original provision is further reduced because many federal laws and regulations are implemented by state agencies under the German federal system of government.

Several features regarding the assessment procedure itself are noteworthy. The principles establish a six-step procedural scheme that includes a description of the proposed action, the determination of environmental effects, examination of remedies and alternatives, and a balancing with other concerns. Again, these provisions seem similar to NEPA; however, an appendix states that this scheme should be viewed as an aid to planning, which individual agencies can apply to specific tasks as they see fit, and not as a requirement for a separate, formalized procedure. In addition, the procedures allow only limited scope for either agency co-ordination or inter-agency review, and no provision is made, whatsoever, for public participation. The requirements for agency co-ordination state that 'lead' agencies can consult the Ministry of Interior and the Federal Environmental Agency for assistance in the preparation of an EIA if needed. There is no way of knowing to what extent other agencies participate in this process because much of what takes place in the German federal bureaucracy remains 'internal' and inaccessible to outsiders (Kennedy, 1980).

The features outlined illustrate the informal, implicit nature of the EIA system the

Federal Republic of Germany has adopted. The 'Principles' are not enforceable through court action and are only politically enforceable to the extent that the chancellor can control individual ministries through appointments and dismissals. Nevertheless, Kennedy (1980) concludes his review of the German approach, by stating that there is reason to believe that at least in some agencies, at both the federal and the state levels, there are individuals genuinely committed to environmentally sensitive planning and decision-making. The 'Principles' may have assisted in the realization of this goal.

The informal, implicit procedures adopted by most countries in Western Europe can be contrasted with the procedures in Eastern Europe and the U.S.S.R. The centrally planned economies of these socialist countries provide a broad framework making it possible to incorporate environmental considerations in existing approaches to planning and management, where there is a genuine desire to do so. Over the last decade, most countries in Eastern Europe have given increased emphasis to environmental considerations in planning at all levels – from long-term plans (up to 1990) at national and regional levels down to local and individual projects that are already included in current plans. Their approach to EIA is illustrated by examining recent developments in the Soviet Union.

In 1972, special sections on measures for environmental protection and the rational use of resources were added to state plans for economic and social development at various levels by government decree. In the elaboration of the plans, stress was laid on comprehensive approaches: the need to consider regional changes in the state of the environment, and the need for consistency and the inter-linkage of current and long-term plans in order to ensure the implementation of both intermediate and long-term goals. These measures have helped shape planning and management procedures. Today, plans for environmental protection and the rational use of resources are made on the basis of 220 different indicators; and plan directives, when approved, must be implemented by the institution concerned (ministries, local authorities, enterprises and organizations). Planning authorities also have to take into account the current ecological situation in the region and the potential increase in pollution (which should not exceed permissible levels established by state authorities) before deciding on the location of a new enterprise. Project designs must seek ways to mitigate or avoid environmental degradation. In the case of large-scale projects with possible regional, or global implications, provisions are generally made for EIA studies, and decisions on implementation are withheld until an assurance of viability is obtained.

The Soviet Union has also strengthened mechanisms for public participation over the last decade. Mechanisms are provided within the framework of the Society for the Protection of Nature for a wide range of activities; including public education to promote awareness of environmental problems, promotion of public involvement in protection activities and participation in the monitoring of the state of the environment and in the assessment of development proposals which affect the environment. These procedures should enable the public to take part in both planning and management processes. However, it is not clear to what extent this actually occurs (ECE, 1979).

The most recent developments in the field of EIA in the Soviet Union have been the

development of comprehensive territorial schemes designed to protect the environment and the development and implementation of specific goal-oriented programmes for environmental control and improvement. A State Committee on Hydrometeorology and Environmental Control with wide responsibilities in the field of environmental protection has been established. One of the Committee's first tasks is to improve the organization and utilization of environmental expertise at the planning stage of industrial location (ECE, 1979).

The Soviet system also allocates the costs of EIA differently from the first three types of approach considered. The costs of EIA are generally reflected in product prices paid by consumers. In countries with mixed economies, such as the U.S., Australia, Canada, and the Federal Republic of Germany, the costs of EIA are generally borne by the participants in EIA.

The recent developments in the Soviet Union parallel those achieved by the introduction of NEPA in the U.S. Most notably, the Soviet system, like NEPA, provides for:

- (i) the consideration of the environmental consequences of development at an early stage;
- (ii) the application of EIA requirements to policies and programmes as well as projects at all levels of government; and
- (iii) the establishment of close links between EIA and decision-making.

However, it is not clear whether the recent innovations in the Soviet Union will have as large an impact on improving environmental quality and sensitizing decision-makers to the need to consider environmental concerns as NEPA appears to have had in the U.S. Earlier comprehensive legislation in the Soviet Union that spelt out the legal obligations of all industries and citizens toward preserving the environment has not been able to stem environmental disruption because the legislative action has been offset by another set of forces, partly economic, partly political, and partly technical that have created pressures to degrade the environment (Goldman, 1972). Whether the comprehensive legislation passed in connection with EIA in the Soviet Union is any more successful in enhancing environmental quality will depend on whether the offsetting forces have diminished.

The fifth and final type of approach that can be distinguished has to do with developing countries. Their approaches are distinguished from the previous ones because there is a need to encourage practical approaches to EIA that respect both the limited resources that may be available for EIA as well as the sometimes severe legal and institutional constraints under which EIA has to be practiced. The few developing countries that have acted to date have introduced formal, explicit as well as informal, implicit EIA systems.

In some developing countries there has been a thorough and systematic effort to create a distinct EIA process and to provide the institutional and other resources needed to make it operate. Malaysia and Papua-New Guinea, for example, have established formal, explicit procedures modelled on the Canadian and Australian approaches respectively. Other countries, such as Venezuela and Columbia, rely on exceedingly brief

and unspecific references in statute law to the desirability of taking environmental factors into account when decisions are made about development to provide the legal and/or political basis for EIA. In addition, they claim that existing administrative procedures and practices are the functional equivalent of EIA. Such approaches parallel the informal, implicit procedures outlined earlier. However, the validity of these claims is doubtful because there appears to be neither the political commitment nor the technical and administrative infrastructure to support them (Wandesforde-Smith, 1980). Given this state of affairs, reference in Table I is only made to examples of formal, explicit EIA procedures in the Third World.

Until the constraints applicable for the developing world are substantially modified, external assessment by aid-granting institutions and bilateral aid agencies are likely to be important sources of learning about the environmental consequences of development in the Third World, despite the fact that the record of aid-granting institutions in this regard is far from adequate (Wandesforde-Smith, 1980). This is improving as development finance agencies, such as the World Bank, the U.S. Agency for International Development and the International Bank for Reconstruction and Development initiate and strengthen guidelines to ensure that they take the environmental consequences of investment proposals into account before making investment decisions. Other donor agencies, such as the Asian Development Bank, have initiated less formal requirements, although they are broadening their conventional information base for development decision-making to include more analysis of national resources and environmental aspects (Carpenter, 1980).

3. Some Limitations of Impact Assessment

The rapid spread and adoption of EIA over the past decade is further positive proof for the trend towards reconciliation of man and environment (Ashby, 1979). No doubt major violations of man's harmonious relations with environment will continue and no doubt more major struggles will be required. The great variety of EIA approaches which have been adopted illustrate how the approach to reconciling man with his environment can take quite different forms. At one extreme, a multiplicity of distinct assessment processes and policy tools, beginning with EIA, is adopted. At the other extreme, everything is subsumed under existing planning procedures, especially where the latter are highly centralized.

It must be noted, however, that EIA systems are not designed, in most countries, to protect the environment although citizen groups and the environmental movement generally may attempt to use them as such. Rather, these systems act as decision-shaping mechanisms, providing information to all interested parties on the probable consequences of proceeding with a proposed development, including alternatives. The ultimate decision on whether or not to proceed depends on economic, sociological and political as well as environmental considerations.

In this context, it is difficult to determine how successful EIA has been. Three preliminary comments are justified. First, the mere existence of an impact assessment

process in legal or administrative form is not a reliable indication of probable performance, and the simple fact that a given number of impact assessments has been completed indicates very little. Secondly, comparisons between different national approaches are extremely difficult to make. This is true even in countries where legal requirements have made the process highly visible. Of course, it is more true in countries where a cloak of administrative confidentiality conceals much from view. As a result, only a few attempts are made to take account of national differences and subtleties in national experience in the evaluation of EIA that follows.

Third, the implementation of EIA requires resources. Even in those countries that have opted for a self-assessment approach the government has inherited a considerable burden in assuming co-ordination and review functions. In Canada, for example, much time by highly-paid scientists in government departments is spent reviewing the environmental assessments prepared by project proponents and their advisors. We have already outlined the critical importance of these resource needs for developing countries. The allocations of resources for EIA should be weighed against whatever benefits have occurred from the adoption of EIA. A valid question to address is, therefore, whether these resources could have been better used in other ways to promote environmentally sensitive decision-making.

On the credit side, it seems likely that in almost all jurisdictions, the idea of an EIA process has had the effect of sensitizing decision-makers at all levels to environmental considerations. Nevertheless, it is not possible at the present time to form reliable judgments about the extent to which this increased sensitivity has been transformed into the generation of environmentally sound decisions.

In many instances, however, it is clear that the promise inherent in EIA has not been fully realized. As a result EIA can be seen as an important, but flawed process. Several short-comings at the national level that relate to procedural rather than substantive issues can be identified, and to the extent that these apply to specific EIA systems, the promise offered by EIA is not fully realized. These deficiencies, of course, relate to how different countries have dealt with the procedural and institutional questions raised in Table II. The first five deficiencies, for example, relate to question 2 in this table, in which some questions that determine what gets assessed are asked.

The shortcomings of EIA are:

(a) Projects not programmes.

The EIA process often appears to be so structured that it focuses attention on single projects one at a time, rather than assessing whole programmes consisting of many projects. Thus an EIS is filed on a highway link, an airport and a drainage project. This leads to a failure to address questions about the whole highway network, the whole system of airports, or the whole drainage pattern. If so, then perhaps statements are insufficiently related to transportation policy or land use policy. Such policies might not get made or might be strongly constrained as a result of piecemeal impact-by-impact decisions.

There are signs that this problem is being recognized and that impact assessments

are now being made at the policy or programme level, notably in the United States and to some extent in Canada. In many other cases, such as Australia and Great Britain, it is worth noting that it is the practice rather than the design of EIA that results in its use for single large projects only.

(b) Plants not whole technologies.

A similar question is that if EISs are written in terms of a single plant, such as a nuclear power station or a thermal electric generating station, then some lacuna may develop. One nuclear plant after another may be stopped or stalled on environmental grounds while the central question of overall energy policy is not addressed directly. Hence, energy policy may be developed indirectly by a series of EIAs.

Great Britain and the Federal Republic of Germany, despite their reliance on informal, implicit EIA procedures, appear to have made the most progress in making good this shortcoming.

(c) Identified impacts not risk.

Impact assessments tend to be made in relation to identifiable and preferably quantifiable impacts. Elements of risk may therefore be overlooked, or disregarded because the risks can only be examined as isolated events and not as a statistical family. Thus the assessment of the impact of a particular pesticide such as DDT does not provide for a risk assessment of other organochloride compounds. Substitution of one pesticide for another may thus change one impact without reducing the risk, and may even increase it (Whyte and Burton, 1980).

(d) Identified impacts not trends.

A similar problem is that impact assessments tend to be made in relation to identifiable and preferably quantitative impacts without any or due consideration of future trends. Although the future is difficult to predict, there is a need to look not only at long-term trends associated with the development action, but also at long-term trends that may occur in the absence of the project.

(e) Passive not active response.

The initiation of an EIA depends on a project or development proposal. Usually this involves the application of scientific discoveries or technological developments. It does not permit or allow for questions to be raised about the actions that led to the creation of such a technology in the first place. It cannot be asked whether we should allocate funds to recombinant DNA research but only what the impacts of it might be. This shortcoming is alleviated to the extent that policy assessment is covered by EIA.

(f) Biased not neutral recommendations.

The practice of making the proponent responsible for preparing the EIS undoubtedly leads to considerable bias in many cases. Distortions in information collection, analysis and presentation are not necessarily obvious (even to the proponent!) and may not be

detected at the review stage. This is especially true in countries, such as the Federal Republic of Germany, where the self-assessment approach is relied upon, and relatively weak 'closed' review procedures have been established. Reliance on the self-assessment approach also has major implications for the consideration of genuine alternative concepts of development. The tendency is for it to be limited to the consideration of alternatives that focus upon alternative configurations of a development project as initially proposed by the developer, with different versions incorporating greater or lesser degrees of mitigation of the most significant impacts. This problem lingers on in the U.S. and is much more prevalent elsewhere.

(g) Documents not environmentally sensitive decisions.

A seventh observation about impact assessments as they are being carried out in countries that have imposed formal, explicit EIA procedures leading to the submission of an EIS, especially the U.S., is that they have become a disaster for the environmental movement (Fairfax, 1978). Efforts have been turned away from questioning and redefining agencies' powers and responsibilities. Instead, efforts have been focused on analysing documents which in Fairfax's view results in a 'misallocation of the environmental movement's resources'. The fruits of the effort seem to consist of 'ever more complex and intricate requirements for processing papers'.

(h) Scientifically valid, neutral research not good decisions.

The imposition of EIA has generally promoted a rationalistic bias by demanding scientifically valid, neutral research with quantitative information on which objectively derived decisions can be based. First, there is no logical link between this rationalistic approach and environmentally sensitive decisions; and second, to support this view implies that other considerations are not relevant. Of course the presence of bias will moderate the stress placed on rational inquiry.

(i) Final assessments rather than adaptive impact assessments.

The present practice is that an EIA becomes of merely historical interest once approval has been given to proceed with a development. A modest monitoring programme may be established, but there is no regular overview to determine if predictions are going wrong. For example, perhaps the development has attracted secondary industry in unexpected ways, sometimes by a series of individually insignificant increments. An impact assessment should be considered as an investigation into, rather than a determination of impacts. Therefore, a policy of adaptive impact assessment is advocated, in which the EIS is periodically reviewed. One of the goals should be to keep open as many options as possible.

(j) Token not effective public participation.

Effective public participation is thwarted in several ways in most countries that have adopted EIA. Many countries have recognized that effective participation is often handicapped by the cost of participation, but few have taken any steps to alleviate this

problem. The most obvious alternatives to the status quo are that the proponent or government should fund public participation. In some cases, such as Australia and the Federal Republic of Germany, effective public participation is thwarted by the absence of one or more of the following minimum requirements. Procedures for public participation should include: the exchange of information at an early stage; publication and wide dissemination of EIA documents; public meetings and/or hearings; publication of the rationale for the decision; information concerning results of post facto monitoring; and summaries of important documents in a manner easily understandable by the public (ECE, 1979).

4. International Environmental Impact Assessment

The EIA system is easiest to apply within a single jurisdiction. In such cases there is, nominally at least, a clearly defined way of reaching a decision on whether to proceed with a proposed development or project. However, there is an increasing desire to extend the EIA system to environmental problems that are international and sometimes global in scope. Large-scale examples include CO₂ climate warming, acid rains, stratospheric ozone depletion, integrated pest management, the protection of marine resources such as whales, and the control of toxic substances. Even on the smaller scale, there are jurisdictional problems if a nuclear power station is to be located on a river separating two countries, or if an irrigation system is proposed that will divert water from a river that borders or flows through another country.

In each of the examples listed above there have been attempts to undertake inter-governmental assessments, although the scientific methodologies have not yet been well formulated in many cases. Scientists tend to solve easy problems that are well bounded, particularly in the case of interdisciplinary studies. There is therefore a danger that international EIAs may be irrelevant in the context of international policy formulations and management. Another difficulty frequently encountered is that most of the scientific research that has led to an identification of the problem may have been undertaken in only a few countries, which then wish to internationalize and thus legitimize their assessments. This arouses a perfectly natural suspicion by third parties who do not have the resources to challenge the assessment in any meaningful way.

Two classes of problems may be identified with respect to international EIAs:

- (i) The 'action' takes place in one or a few adjacent countries although the impacts may occur over a much wider area (e.g. acid rains, nuclear power stations);
- (ii) The 'action' takes place in many countries and the impacts may be distributed globally (e.g. stratospheric ozone depletion, CO₂-induced climate change).

In the former case, conventional methods of impact assessment can be used. Because several jurisdictions are involved, it is particularly important that the EIA should not be an advocate or adversary document. When the several governments involved attempt to agree on a course of action to be followed, they need an EIA that presents an unbiased view of the consequences of the several alternatives open to them. In particular, the EIA should identify the affected parties. (Who will gain and who will lose?)

For the second class of problems, in which the action takes place in many countries and the impacts are distributed globally, three important points should be mentioned.

(i) The natural variability of the environment is so great that it is difficult to determine whether the 'action' is already causing an impact. For example, the atmospheric concentrations of chlorofluoromethanes are increasing but the large natural variability in stratospheric ozone makes it impossible to decide whether the ozone layer has been depleted. Yet if governments wait until a downward trend in stratospheric ozone can be detected with 95% confidence, it will be too late to avoid a further significant depletion. An international EIA for the ozone depletion problem has been published (Munn, 1979b).

(ii) The 'actions' are usually so widely distributed (e.g. burning of fossil fuels) that management strategies available to governments will produce only incremental changes.

(iii) International assessments of global environmental problems tend to be scientific treatises, and are not very useful in the decision-making process. Because the forecast impacts are extremely uncertain in most cases, the EIA should at the very least:

- (a) recommend priorities for research and engineering studies;
- (b) recommend appropriate monitoring systems;
- (c) recommend economic analyses that need to be done;
- (d) recommend policies that keep options open.

In both classes of problems there is also the question of State sovereignty, which is a fundamental impediment. Here there are two considerations:

- (i) every state has a right to act within its own recognized sphere of activity; and
- (ii) every state has the right to claim that other parties should respect its own recognized sphere of activity, and the right to decide by itself the acts that shall be performed or permitted.

This principle makes it difficult to design an acceptable administrative procedure for EIA at the international level. Two key ingredients for a successful procedure are incompatible with the principle of State sovereignty. These are:

- (i) the establishment of a decision-making process with well-defined terms of reference at the management level where the proposal is being considered; and
- (ii) the inclusion of roles for other parties (e.g., scientific organizations such as the International Association for Water Pollution Research) who help 'shape' decisions in this process.

Countries argue that acceptance of the former is equivalent to voluntarily relinquishing sovereign rights, and the latter as an unnecessary invasion of ordinary diplomatic relations.

In the last decade several activities or impacts have been selected for environmental study, e.g. acid rains. However, these studies have had little impact so far even though they identify substantial environmental impacts, largely because they are not accompanied by clear administrative procedures. To date therefore, decision-making has been restricted to traditional diplomatic channels. This has had a number of consequences which have minimized the opportunities for protection and enhancement of the environment. One consequence has been that countries negotiate from fixed positions, which

prevent the participation of groups on all sides whose views differ from the official positions. The involvement of such groups may help to bring negotiations to more effective and environmentally sensitive conclusions. Another consequence has been the tendency for negotiations in one area (e.g. fisheries, trans-boundary pollution) to be influenced by what is occurring in other sectors of international relations (e.g. trade in automobiles, electronic equipment and the like). Although nations generally try to separate negotiations or confine them to particular topics, the general climate of economic relations undoubtedly affects environmental negotiations and may override them.

In summary, one of the main challenges of the next decade is the development of appropriate conceptual and institutional frameworks and methodologies for international EIAs. With respect to the CO₂ climate-warming problem, for example, it is not evident that scientists have a clear idea of the kinds of information needed to formulate policies for managing the global environment.

5. Conclusions

5.1. NATIONAL APPROACHES

A more thorough and independent review of EIA on a comparative, technical basis would be a most useful step. In particular, it would be helpful if in several countries a common study could be made which would

(i) compare projects which have gone through EIA before and afterwards: how was project design modified and why?

(ii) examine those which were exempted because of insignificant impacts: ask whether that assessment is correct? Has it had impacts which are serious and could have been minimized?

(iii) compare and contrast similar projects in different jurisdictions in terms of (i) and (ii).

5.2. INTERNATIONAL NEEDS

It is clear that international environmental impact assessment is still in an embryonic state. In order for it to develop, several actions seem desirable:

(i) the methods and procedures to be used in international EIA processes should be examined in some detail;

(ii) a synthesis should be compiled of experience to date in international impact assessments.

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