

# **APPLICATION OF ENVIRONMENTAL IMPACT ASSESSMENT TO RESEARCH ACTIVITIES**

**Study prepared for the International Development Research Centre**

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*Executive Summary*

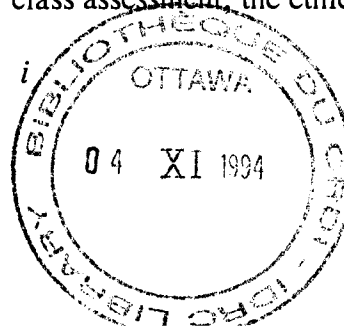
The International Development Research Centre (IDRC) commissioned this study to examine the application of environmental impact assessment (EIA) to research activities. The study focuses on the EIA of research projects in developing countries, since IDRC is the agency of the Government of Canada responsible for funding development-oriented research. The study involved a literature review and key informant interviews with officials from donor agencies and researchers engaged in development-oriented research. It was conducted between March 4 and May 27, 1994 by a multidisciplinary team of investigators from The University of Calgary.

The rationale for examining the application of EIA to development-oriented research is threefold. First, donor agencies are interested in ensuring that the projects they support do not have unacceptable environmental consequences. Second, the integration of EIA into project development, implementation, and follow-up may improve the environmental performance of research activities as a whole. Third, the application of EIA to development-oriented research could contribute to the capacity-building objective of donor agencies.

This study adopted two approaches for investigating the application of EIA to research activities in the development context. The first was a review of the relevant literature, focusing particularly on useful analogies raised by other applications of EIA. Second, using elite interview techniques drawn from social science methodology, we surveyed key informants in the donor and development research community.

The literature review describes the evolution of EIA methods and presents a generic EIA process and decision-making paradigm. The EIA process can be divided into four stages: screening, issue scoping and impact analysis, project decision-making, and follow-up and monitoring. These stages provide a framework of analysis for subsequent sections. This methodological framework is complemented by a discussion of research activities as a subject of EIA. Since this topic has not previously been examined, the literature review focuses on distinctive features of development-oriented research and examines their implications for EIA by way of analogy.

The literature on EIA in the development context is directly relevant to technical and ethical issues raised by the EIA of development-oriented research. These issues include: the accountability of donor agencies for the environmental consequences of development projects; the use of inclusion and exclusion lists as screening techniques; the constraints on EIA in developing countries; the application of donor-country EIA requirements to projects in other countries; the role of values in EIA methodology (e.g. the identification of "valued ecosystem or social components"); the participation of developing-country partners and the incorporation of indigenous knowledge into EIA; the role of follow-up activities in development projects; and EIA as an instrument of capacity building. The literature review also considers the implications for the EIA of development-oriented research of the literature on the EIA of policies, plans, and programs, class assessment, the ethics review of research,



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cumulative effects assessment, and Adaptive Environmental Assessment and Management (AEAM).

Consulting key informants in both donor and development research communities revealed an extremely limited state of practice. There is, however, a growing level of awareness concerning the need to formulate EIA policies and procedures. Donors suggested a variety of possible decision-making criteria and administrative procedures that they felt would contribute to effective EIA. Respondents favoured integrating EIA into existing modes of project development, reporting, and evaluation, although they differed on the jurisdictional criteria and degree of standardization that should govern assessment practice. Researchers and donors both supported including capacity-building activities as a part of EIA's implementation in development, although respondents differed regarding the degree to which EIA practice should itself be treated as a capacity-building exercise. Evaluating EIA's introduction as a component of development research was also judged to be a useful means of building feedback into the policy development process.

Though not all the options that were raised are compatible, our discussions revealed that the donor community is not at a state where any policy options have been either locked into, or out of, consideration. This current state of flux offers the opportunity to develop common EIA policies and standardized procedures that could economize the resources that both donors and researchers will have to devote to EIAs.

The principal recommendations and conclusions of this study are as follows:

- The most persuasive arguments for applying EIA procedures to development-oriented research are based on the principle of donor agency accountability and the potentially significant environmental effects of certain research activities.
- The purpose of EIA is to produce better decisions. The design of EIA procedures should therefore be guided by the needs and objectives of decision-makers.
- An adaptive EIA methodology represents the state of the art in EIA practice and should serve as a guide to applying EIA to development-oriented research. The adaptive approach improves the effectiveness and efficiency of EIA by integrating it with an iterative decision-making process. Unimportant information and effects are excluded from the analysis, and the EIA is continually re-focused on significant impacts. This approach also fits well with the adaptive and uncertain nature of many research activities.
- To achieve its full potential, EIA must be understood and accepted by program officers in donor agencies and by researchers. Support for EIA will depend on it being seen to be both effective (*i.e.* it should address real problems and lead to improved research projects) and efficient (*i.e.* it should achieve its objectives with a minimum financial and administrative burden). EIA processes should be designed

and implemented accordingly. For example, they should include effective screening procedures. Class assessment could also be used to streamline issue scoping and impact analysis.

- Follow-up and monitoring are important both for project management and for improving subsequent project design and EIA practice. To be effective, they require adequate planning and resources.
- The establishment of EIA of development-oriented research as standard practice would benefit from cooperation and the sharing of information and experience among donor agencies.
- An important scoping issue is whether EIA should extend beyond research activities to consider the environmental consequences of the application of research products. In most cases, EIA of research products should be built into the research program itself, rather than evaluated at the outset. However, where particular research products are predictable and pose significant environmental risks, the initial EIA should address the consequences of their application.
- Participation of developing-country partners in the EIA of research activities has the potential of improving the effectiveness of the EIA process and providing an opportunity to identify common priorities and shared values. It can also be a useful means for capacity building.

The literature review and selected survey of donor agencies and researchers conducted for this study provide an overview of the rationale for and the issues raised by the application of EIA to development-oriented research. The study also identifies a general framework and a number of more specific approaches to guide donor agencies. Successful implementation of EIA in this context, however, will require additional investigation in two principal areas. The first is the best means of integrating EIA into the policy formation and decision-making processes of donor agencies. Second, more detailed work should be undertaken in the area of process design to produce recommendations regarding the application of specific EIA techniques to particular types of development-oriented research.

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## 1. INTRODUCTION

### 1.1 Terms of Reference for the Study

This study was commissioned by the International Development Research Centre (IDRC) of Canada to examine the application of environmental impact assessment (EIA) to research activities. IDRC's particular interest is in research in developing countries funded by national, multinational, or private agencies or foundations.

The call for proposals was received by the Environmental Research Centre at The University of Calgary on February 9, 1994, and a proposal was submitted to IDRC on February 23. Notification that the proposal had been accepted by IDRC was received by the Environmental Research Centre on March 4. A draft report was submitted for comments on April 28, 1994. The final report was submitted on May 27, 1994.

The contract specifies a study comprised of two components. The first is a review of the literature and practice relating to the application of EIA to development-oriented research activities. The second is a review of existing and prospective practice and thinking on the EIA of research activities among a pre-selected international group of research donors (suggested by IDRC) and among researchers active in development work. The description of how the study was conducted is found in Section 2 (Study Methodology).

### 1.2 Development-Oriented Research Activities as a Subject of EIA

The application of EIA to development-oriented research activities (or to research in general) has not been examined in much detail to date. This topic is, however, likely to become increasingly important as a result of the convergence of two trends. The first is the increasing acceptance, in both government and the private sector, of EIA as an important tool for environmental management. At a minimum, EIA is intended to anticipate and prevent unacceptable environmental consequences before they occur, rather than having to react to them and correct them after the fact. The second trend is the pressure on agencies involved in international development to take the environmental implications of their projects seriously (i.e., to incorporate systems and expertise in the environmental area into their project cycles). Agencies are seen as accountable for the environmental effects of projects that they support, and are being required to evaluate the success of their activities in more holistic terms (e.g., promotion of sustainability).

Within this general context, the application of EIA to development research can have three specific objectives: avoiding environmentally unacceptable research projects; improving the environmental performance of projects in general; and increasing the EIA capacity of research partners from developing countries.

The first objective reflects the concern of agencies funding development-oriented research that their projects not lead to unacceptable environmental consequences. Their concern mirrors the attention paid by funding agencies to the environmental implications of



development projects in general. The issue is one of agency accountability for funding decisions; the solution is careful prior screening and, where necessary, more extensive examination of proposed research projects to ensure that they do not lead to unacceptable negative environmental effects.

Second, EIA as applied to research may be part of a proactive process of increasing the awareness of environmental implications on the part of researchers, and improving project design and implementation generally. Thus, in addition to screening out harmful projects, EIA could be used to ensure that research projects conform with certain environmental objectives (e.g., the promotion of sustainability) and to encourage the optimization of net environmental benefits for all projects.

Third, the application of EIA to development research can be tied to the capacity-building objective of agencies funding development projects. Incorporating EIA procedures into different stages of research activities, from design and approval to monitoring and follow-up, can yield benefits beyond the project itself that are consistent with the overall mandates of development funding agencies. This capacity-building potential is particularly clear if developing-country partners are involved in the EIA process, and thus gain expertise and experience.

This study draws on the extensive literature and experience in the fields of EIA and international development to inform its investigation of the potential application of EIA techniques to development-oriented research. In conducting this study, a broad range of research practice was examined, and specific reference was made to the experience and approach of IDRC in its support of development research.

IDRC's experience, and the other interviews conducted, indicate the wide spectrum of activities that fall within the category of "development-oriented research." However, one common characteristic is that, in the development context, most research has an applied orientation. IDRC's focus, for example, is neither on research in the pre-production or pre-construction stage (e.g., R&D in the engineering sense, feasibility studies, demonstration projects, etc.) nor on pure (or basic) research. Research may also be an adjunct to other activities. For example, development projects may be designed with a research component. The result is that EIA of development-oriented research is a concern not simply of research funding agencies, but also of agencies with general development mandates.

Development-oriented research includes a tremendous variety of disciplines and research methodologies. Research projects examine topics as diverse as natural resource management, urban planning and waste management, human health issues, biotechnology, and economic and trade policy. The range of research methodologies includes field tests and pilot studies for experimental products or techniques, laboratory experimentation, population studies (e.g., nutritional or epidemiologic studies), surveys of public opinion and practices, and literature-based work.

Given this heterogeneity of development-oriented research activities, one can anticipate some difficulty in developing a standardized formula for EIA. General themes and issues can, however, be identified. Furthermore, as discussed in this study, a general approach to the EIA of development-oriented research can be developed.

Since the EIA of development-oriented research is a new area of activity for most donor agencies, there is little concrete experience on which to base conclusions. However, some initiatives in this area have occurred. Particular note should be made of IDRC's experimentation with a screening process using a specialized environment committee. This process screened several hundred development-oriented research proposals, identifying environmental concerns in some cases. A small percentage of the total number of projects reviewed through this process required modification prior to approval to address environmental concerns. As summarized in Section 4 of this study, experience in other donor agencies indicates growing concern with the environmental implications of research, although these issues are most frequently accommodated as part of the general project review, rather than being dealt with in a distinct EIA process.

More generally, IDRC's approach to development provides important lessons for the application of EIA to research. The commissioning of this study reflects IDRC's post-UNCED expanded mandate to support research activities that promote sustainable and equitable development (IDRC, 1993: 3). IDRC's publication *Empowerment Through Knowledge: The Strategy of the International Development Research Centre* emphasises the importance of delegation of decision-making processes and learning (IDRC, 1991: 18-19):

"The intent must be clearly to develop the capacities of people, give them greater opportunities to contribute, and integrate their contributions within a learning process that is cumulative and whose results are greater than the sum of its parts. It is important, therefore, that we pass to our research partners even greater responsibility and authority in defining, planning, executing, and controlling the research agenda. This will entail the acceptance of higher risk, but it is imperative to the evolution of responsible partnerships and genuine empowerment."

The relationship of EIA to decision-making, and the importance of capacity building in the context of development-oriented research, are two recurring themes of this study.

### **1.3 The Focus on Distinctive Issues Raised by the EIA of Research**

EIA is the subject of an extensive literature and a wide range of practical experience in many countries and contexts. Consequently, narrowing the field of inquiry has been essential for the purposes of this study. Many general issues raised by EIA are relevant as well to the context of development-oriented research. In certain respects, conducting an EIA of research activities is similar, if not identical, to EIA of other projects or activities. The

focus of this study is therefore on features of development-oriented research that raise distinctive or particularly interesting issues for EIA.

In defining the focus of this study, particular attention was paid to the following types of questions:

- What characteristics distinguish EIA as applied to research from other applications of EIA?
- What common EIA issues have particular importance for the EIA of research?
- What aspects of research in developing countries, or research having development-oriented objectives, should be taken into account in the EIA process?
- What can the available literature and the experience of selected funding agencies tell us about the application of EIA to research activities?
- What are the key issues to be addressed from the perspectives of donor agencies, researchers and partners from developing countries?

These questions are not amenable to simple answers. Nonetheless, they provided useful direction for the investigation and analysis undertaken for this study.

#### **1.4 Outline of the Study**

The study is divided into six principal sections, the first of which is the Introduction. Section 2 briefly outlines the study methodology. The literature review, in Section 3, includes a discussion of generic EIA issues and an examination of topics relating directly to EIA of development-oriented research. Section 4 reviews the thinking and practice among donor agencies, and the perspectives of researchers are described in Section 5. Recommendations and conclusions are presented in Section 6. The study also includes a list of references, with selective annotations, and appendices containing the names and agencies of people contacted for the study and the list of issues and questions that was sent to everyone who was interviewed.

## **2. STUDY METHODOLOGY**

Our investigation proceeded along two parallel tracks. One mode of analysis focused on synthesizing the relevant literature on EIA processes that were either applied to, or had implications for, development research. The second aspect of this study involved contacting donor agencies and researchers and inquiring into their experience with or opinions about research EIAs. Both sources of information inform our recommendations and conclusions.

### **2.1 Literature Review**

We searched for literature relevant to the application of EIA to development-oriented research in the areas of environmental impact assessment, development studies, environmental law, and public policy analysis. Bibliographic databases at the International Development Research Centre and The University of Calgary were consulted, as well as specialized catalogues that were accessed through the Internet. We supplemented the books and journal articles found in library collections with publications provided by donor agencies and researchers. This material included unpublished "in-house" reports, project and program reports, and EIA manuals.

Since little of this literature focused directly on the topic of applying EIA to development-oriented research, we sought out analogous procedures and problems in other forms of EIA (e.g., EIA of development projects and EIA of scientific research). We identified a generic EIA model that we used to focus our analogies. The review itself sought to raise the issues that would face those devising an EIA policy for development research and indicate how these concerns had been addressed in other contexts.

### **2.2 Consultation of Donor Agencies and Researchers**

We adopted a key informant approach to consulting donor agencies and researchers. This method uses interviews to elicit information about the state of theory and practice at the leading edge of a policy or project. Unlike more formal surveys, the key informant approach does not depend upon asking all the same questions in each interview or targeting all the respondents in advance of consultation.

The key informant approach targets specific individuals and tailors its inquiry around their particular experience. Respondents typically represent a subset of a larger population, in this case development agencies and research organizations, who have direct experience with the question under investigation. Since there are relatively few informants who can offer such input, a random sampling technique is not feasible. Instead, one key informant is asked to nominate other individuals who could contribute to the investigation.

Our consultation began with a list of 16 donor agencies supplied by IDRC. This list was comprised of participants in the "Donor Consultation on Agenda 21 Research and Capacity-Building Initiatives", held at Bellagio, Italy, November 8-11, 1993. We contacted each donor by fax and attached our list of questions and issues (Appendix 1) to the introductory letter. A number of agencies did not respond to our enquiry. Others sent us a brief written response, usually indicating that EIA procedures for research neither existed nor were contemplated. Some donors did send us the names of contact persons, whom we then interviewed.

Our initial interviews revealed that almost no respondents felt qualified to address all of the issues raised on our list of questions and issues. We thus focused on topics that each respondent indicated familiarity with. We also asked respondents for other contacts who could address these issues. In this way, we broadened our consultations beyond the IDRC donor list. Contacts with development researchers were pursued in a similar fashion.

Establishing initial contact, scheduling interview appointments, and identifying other informants took more than a week in many cases. Thus, a number of informants who had been brought to our attention could not be interviewed by the study deadline. This deadline was dictated by IDRC's intention to present a report based on this study at the "International Summit on Environmental Assessment", convened by the Canadian Federal Environmental Assessment Review Office (FEARO) and the International Association for Impact Assessment (IAIA) in June, 1994. Informants who were interviewed are listed in Appendix 2.

### **3. LITERATURE REVIEW**

#### **3.1 Introduction**

This section begins by examining the broader context of the study through a survey of the evolution of EIA methods. The generic EIA process is then described in some detail, since this process provides a structure that is applied throughout the subsequent discussion. General aspects of EIA in the research context are reviewed next. The literature review then turns to a range of EIA topics that are in important ways analogous to, or have significant implications for, the EIA of development-oriented research.

The literature review examines the technical, procedural and ethical issues related to the application of EIA procedures to development-oriented research activities. These issues arise in the context of screening, scoping, detailed assessment, project decision-making, and implementation of monitoring and evaluation. Certain issues are also specific to the development context. Since there is little or no literature dealing directly with most aspects of the EIA of development-oriented research, this section reviews a broader literature and systematically applies it to this particular context.

#### **3.2 The Evolution of EIA Methods**

Formulating EIA guidelines for research activities can benefit from building on the experience of first and second generation EIA procedures. Since the introduction of formal EIA procedures, assessment efforts have utilized increasingly sophisticated means of issue identification in order to improve the ratio of analytical quality to quantity. They have done so by developing a progressively sharper analytical focus on issues relevant to decisions that must be taken, while simultaneously broadening the participation of individuals and organizations concerned with environmental change.

First generation EIAs placed a premium on the collection and description of environmental information. However, the information deficit that had prompted the search for data was rapidly replaced by factual overload, and the value of collecting data for its own sake came to be questioned. Kennedy and Ross note that "In the final analysis, the catalog format [of EIA] does not assist decision makers in their review of key decision areas" (Kennedy & Ross, 1992: 477). As environmental professionals came to the conclusion that information alone would not produce better environmental outcomes, a second generation of EIA practice came into being.

Instead of producing exhaustive environmental data catalogues, this second generation of EIAs adopted sophisticated analytical techniques used in the natural sciences, such as the specification of "valued ecosystem components" and impact matrices, to focus analysis. These techniques were both more parsimonious in their demands for environmental data and more ambitious in what they promised to reveal. As analysts focused on certain categories

of data, they set out to model the complex causal relationships by which physical, economic, and social perturbations interact with one another in an ecosystem.

The assessment criteria for these second generation EIAs have varied considerably. Some jurisdictions have sought to prescribe analytical standards in broadly inclusive terms. For example, the U.S. *National Environmental Policy Act* (NEPA) requires accounting for the "cumulative impact" of a proposed environmental change in relation to the affected ecosystem. Judicial activism has spurred increases in these standards as EIAs are periodically rejected and higher minimum standards are incorporated into America's evolving environmental jurisprudence.

In contrast, the Netherlands' approach is to impose a detailed schedule of environmental assessment criteria (Cerny and Sheate, 1992). Unlike the U.S. approach, these criteria specify clear requirements that set both a ceiling and a floor on EIA practice. While the result is greater certainty regarding requirements, the Dutch government must keep up with developments in EIA practice and alter the process accordingly.

Canada has accorded institutional diversity and procedural flexibility greater weight in establishing second generation EIA criteria than most other industrial nations. The degree to which cumulative effects are taken into account, and the means by which physical, economic, and social interaction in an ecosystem are evaluated, have been left open to interpretation. Within the federal government, line agencies bear primary responsibility for deciding when an EIA should be carried out and what level of cumulative effects should be taken into account. For the most part, Canadian courts have limited their intervention to declaring what governments cannot do (e.g., deciding to forego an EIA) rather than setting assessment standards that government must meet. Spaling and Smit (1993) argue that the analytical openness of Canada's assessment standards has led to a more fluid and innovative process for addressing cumulative effects.

Focusing EIAs to prevent information overload is a more difficult task in practice than in principle. One approach is the use of "Strategic Environmental Assessment" (SEA) to incorporate the policy, plan, and program contexts into EIAs. Lee and Walsh claim that SEAs share the same ultimate objectives as EIAs, but that "they operate at different points in the planning process and at different levels of generality" (1992: 135). SEAs adopt a broad programmatic focus. The SEA "should intertwine with the planning process from beginning to end. It is not just a hurdle to be jumped at a specific point; rather, it is a continuous process which allows decision-makers to weigh environmental issues on a par with economic and social concerns now considered as a matter of course" (Cerny & Sheate, 1992: 154). Reid suggests that bringing EIA into a project at the level of its inception will improve more than just the quality of analysis. By means of what he terms "upstream planning", the environmental criteria of SEA can highlight opportunities for environmentally advantageous policies and programs as well as warding off adverse consequences long before problems materialize. (Reid, 1992: 152).

By developing its analysis in parallel with policy development, SEA aims to identify contextual values from participants themselves, thus facilitating a clear focus on the impacts that matter. With an overarching SEA in place, analysts can focus on measuring cumulative effects that are connected to priority impacts and forego examining those that are not. The success of this technique will depend upon the degree to which those connected with a policy or proposal take SEA procedures seriously. If relevant parties are absent or excluded, then the range and sensitivity of particular impacts will not be accurate. As SEA is a recent analytical innovation, the ability to identify relevant impacts systematically is still being perfected.

Another technique that could either complement SEA or lead to some alternative in guiding a third generation of EIAs to more insightful specification of impacts is what Holling and others (Holling, 1978) have termed Adaptive Environmental Assessment and Management (AEAM). This approach blends elements of SEA into project-specific EIAs by use of a structured consultive process to identify needed data when and where its relevance becomes clear. AEAM's objective is to focus the EIA on providing decision-makers with what they "need to know" rather than what participants in a more generic SEA would consider "nice to know" (Yarranton & Hegmann, 1994: 1).

*Post hoc* assessment has also been identified as a way of identifying the impacts that matter (Task Force on Environmental Impact Assessment Auditing, 1990). *Post hoc* assessment provides decision-makers with a chance to contrast a target population's reaction to hypothetical proposals with subsequent feedback on actual projects. As long as the project's design can admit incremental adjustments based on the ongoing adaptive assessment techniques, then the impact preferences of a population can be revealed far more accurately once a project is underway than in the hypothetical perspective of an SEA. Far from being a means to push projects forward without due consideration, adaptive assessments have potential to include population input in a way that SEAs are unlikely to do. Serafin, et al. discuss an analytical mode in which "the assessment remained open-ended, interactive, pluralistic, and adaptive and evolved as it proceeded. The object of this mode of inquiry was to elicit feelings of interest and cooperation and shared ownership for the study among interested agencies and citizens" (Serafin, et al., 1992: 284).

### **3.2.1 Lessons From the Evolution of EIA**

This abridged history of EIA practices provides useful guidance for process design and valuable insight into the risks and opportunities that will confront those formulating EIA criteria for development-oriented research. In particular, it reinforces the point that EIA processes should be designed to meet, in an efficient and effective manner, the needs of decision-makers for information and analysis. Subsequent sections of this study return to this theme, and consider the application of particular techniques noted above to development-oriented research. In particular, cumulative effects assessment is examined in Section 3.9, EIA as applied to policies, plans, and programs (as discussed in relation to SEA) is



reviewed in Section 3.6, and Adaptive Environmental Assessment and Management is the subject of Section 3.10. *Post hoc* assessment, in the context of follow-up and monitoring in EIA, is discussed in Sections 3.3.7 and 3.5.7. These topics are also treated in the study's Recommendations and Conclusions.

This section also signals that the stakes of policy development on this issue are high. Put simply, the evolution of EIA underscores the value of securing focused, relevant, and reliable information on the environmental effects of research activities. Avoiding a repetition of the generic EIA's learning curve and effectively incorporating that experience into policy development would make a significant difference in the efforts that will be devoted to research EIAs. Adapting the best practices of EIA to research will greatly enhance the value of the time, energy, and resources that researchers and donor agencies will devote to EIA.

The greatest risk facing a new EIA regime for research is that it will establish a zero sum trade-off between development research and EIA procedures. Applicants and agencies would each have to redirect scarce resources to the production and assessment of information that does little more than satisfy an isolated requirement. Given the degree of uncertainty about both the process and products of many research activities, the tendency to flood decision-makers with an inventory of all possible impacts, much like first generation EIAs did, appears possible. Research EIAs would thus consume high levels of resources that would be perceived as unavoidable costs, whose value ceased at the moment research was approved.

The most significant opportunity that EIA practice can bring to development-oriented research is to make resources do double duty in achieving sustainable research processes and outcomes. Instead of treating EIAs as a "sunk cost" of project development, researchers and agencies would realize the added value of such activities by integrating them into what Reid (1992) has labelled upstream planning. Whether these efforts focused research strategies on "green" priorities or worked to enhance the capacity to assess environmental effects within a developing nation's research community, the benefits of research EIAs would visibly outlast project-specific activities and yield results that could build support for development research, both in host nations and internationally.

### **3.3 The Generic EIA Process**

#### **3.3.1 Introduction**

It is useful briefly to review the generic EIA process or methodology because it provides a framework for identifying and discussing the issues of particular interest for this study — the distinctive issues raised by the EIA of development-oriented research activities. These issues will be placed in the context of the generic EIA methodology, and that methodology will be returned to at the end of the study when recommendations and options for an EIA process for evaluating research activities are proposed.

In addition, it appears from interviews conducted for this study that the limited experience to date with systematic EIA of development research follows the conventional EIA methodology. For example, the expenditure of government money on research projects triggers the EIA process under Canada's Environmental Assessment and Review Process Guidelines Order (EARP, 1984: s. 6(c)). Our survey of current practice among selected government agencies funding research revealed that they relied on the standard EIA procedure, produced by the Federal Environmental Assessment Review Office (FEARO), when evaluating research. The standard procedure is thus, in practice, the point of departure for EIA of research.

### **3.3.2 The Purpose of EIA**

EIA is a planning tool to ensure that projects or activities do not result in unacceptable environmental effects (Wathern (1988:6). For the purposes of EIA, "environment" is often broadly defined to include ecological and social impacts. EIA provides a basis for decision-making at the project design and approval stages. As Wathern (1988: 6) notes, project authorization is not the sole decision point:

"There are many decision makers involved in the evolution of a set of development proposals and the influence of most of them is exerted long before the submission of an application for formal project authorization.... In the past, attention has tended to focus on the most spectacular decision point, authorization, and the importance of a well-integrated appraisal in the refinement of development proposals has largely been undervalued. EIA is no longer seen as an 'add-on' process. Indeed, the greatest contribution of EIA to environmental management may well be in reducing adverse impacts before proposals come through the authorization phase."

Establishment of EIA as an integral part of the project approval stage for research activities may result in its adoption earlier in the planning process. The influence of EIA may extend to the conceptualization of a project, and this influence can be formalized through a preliminary disclosure procedure whereby project ideas are submitted to regulatory or approval authorities for initial comment prior to the commitment of significant resources to project development.

The basic EIA process is an iterative series of questions, investigations, and decisions. Within the general parameters defined for the process, the assessment proceeds from one stage to the next depending on the answers obtained at the previous stage. There are, of course, a wide variety of techniques for data collection, analysis, and interpretation that are employed as part of this process (Bisset, 1986; Biswas & Geping, 1986). The focus of this study, however, is on EIA process or methodology, rather than on the technical aspects of these specific techniques.

EIA methodology may be divided, at least conceptually, into two elements: the decision-making paradigm, and the four-stage process (screening, issue scoping and impact analysis, project decision-making, and follow-up and monitoring) used in EIA. It is important to keep in mind that EIA is the assessment of environmental effects of a project for the specific purpose of contributing to sound planning and decision-making. EIA is thus a focused investigation leading to a decision; many of the process issues raised by EIA relate to establishing the appropriate focus and to the relationship between the investigation and decision-making. The importance of viewing EIA in terms of its contribution to better decision-making is an important theme of this study.

### **3.3.3 The EIA Decision-making Paradigm**

In applying the EIA methodology, an iterative paradigm for making decisions can be identified. The objective is to screen out effects and projects that are insignificant in environmental terms, while continually focusing the EIA on matters of importance to the ultimate decision. The basic EIA decision paradigm involves the following questions and possible responses with respect to the proposed project (Yarranton & Hegmann, 1994):

1. What are the effects of the project on "valued ecosystem or social components" (VECs)?
2. How significant are these effects?
  - If the effects are severe or unacceptable, the project is rejected.
  - If the effects of the project as originally proposed are trivial or non-existent, the project is approved.
  - If the effects (or their severity or magnitude) are uncertain:
    - further research is undertaken to resolve the uncertainty before a decision is made;
    - it is concluded that the risks of unacceptable effects are sufficiently serious to justify rejection of the project; or
    - the project is approved, but the approval includes requirements of specific design measures to avoid, reduce, mitigate or compensate for anticipated impacts or provisions for ongoing monitoring and remedial measures to address any negative effects that may occur.

Judgements regarding the identification of VECs, the significance of environmental effects, and the relative importance of these and other matters to decision-making will be a function of the mandate and values of the decision-maker and of other variables (e.g., cultural, economic, and ecological factors) that may be specific to a particular context. The process for implementing the EIA decision-making paradigm can be divided into four stages: screening, scoping, project decision-making, and follow-up and monitoring.

### 3.3.4 Stage 1 — Screening

Screening is an initial evaluation of the project to determine whether a full assessment is required. It is intended to ensure that sound decisions can be made without an excessive expenditure of time, effort, and financial resources (FEARO, 1986: 11). A number of screening techniques have been identified in the EIA literature (Giroux, 1993).

One way that the screening process may be simplified is through the establishment of automatic inclusion or exclusion lists (*Canadian Environmental Assessment Act*, 1993: sections 5(1)(d), 7(1)(a), 21, 59(c), (d), (f)); FEARO, 1986: 11-14). According to the *Initial Assessment Guide* published by Canada's Federal Environmental Assessment Review Office (FEARO, 1986: 11): "These lists are meant to remove the harmless projects from further consideration, thus permitting initiating departments to concentrate on those proposals which warrant closer attention." Several examples based on experience in other jurisdictions are presented to illustrate exclusion lists. Interestingly, from the perspective of this study, one of these examples is (FEARO, 1986: 11):

"Scientific research and surveys in certain categories. For instance, some field surveys are harmless, but detrimental impacts might result from certain experimental field studies in fish and wildlife habitats."

A list approach could also be adopted to identify projects that are clearly unacceptable. Alternatively, a more flexible preliminary disclosure or screening process could be used to identify at an early stage projects that need not be further considered because they stand no chance of being approved.

The use of lists to classify projects for EIA purposes is discussed in two subsequent sections of this study. Section 3.5.2 ("Identification of Types of Projects Requiring EIA") notes that some classification of development projects according to their environmental risks has already been undertaken. The discussion of "Class Assessment" in Section 3.7 examines an approach whereby certain projects may be listed according to their type or class, and then subjected to a simplified EIA process using a generic assessment for projects in each category.

Where the list approach is not adopted, some baseline environmental data, a project description, and an initial evaluation of "valued ecosystem or social components" (VECs)

will be required to make the screening decision. In either case, rigid screening criteria must be applied with caution since, as Wathern (1988: 9) observes, "it is the combination of project and location which determines the magnitude and significance of impacts."

### **3.3.5 Stage 2 — Issue Scoping and Impact Analysis**

If the screening decision is that the project may cause potentially significant adverse environmental effects, the EIA moves to an issue scoping and impact analysis phase (Ross & Elder, 1993). The purpose is to focus the EIA on those effects that are important in terms of the decision-maker's statutory mandate (e.g., determination of "public interest", or more constrained evaluation of environmental effects) or decision-making criteria (Yarranton & Hegmann, 1994).

This process begins with a descriptive phase that involves the collection and synthesis of information on the project and its potential environmental effects. An important element is the identification of "valued ecosystem or social components" (VECs). In other words, a qualitative assessment of the environment that is potentially affected by the project is necessary to focus the EIA. The values of those conducting the EIA can have a significant impact on the process at this stage.

Once the project has been linked to potentially significant environmental and social issues, impact analysis can be undertaken. This analysis involves the definition and testing of impact hypotheses. It concludes with an assessment of the extent of impacts (e.g. scope, duration, and magnitude).

Following impact analysis, the EIA will usually include an investigation of impact management options. The objectives are to identify mitigation measures (including project redesign or impact remediation) and to assess residual impacts. Impact management may also include consideration of measures for implementing mitigation procedures and the ongoing monitoring of environmental effects.

### **3.3.6 Stage 3 — Project Decision-making**

With the impact analysis and impact management stages completed, the EIA process then enters the project decision-making stage. The decision-maker determines the acceptability of impacts on VECs and reaches a conclusion as to whether the project should be approved as proposed, approved subject to conditions, or rejected. Management of uncertainty is a principal concern at the project decision-making stage.

### **3.3.7 Stage 4 — Follow-up and Monitoring**

Ongoing monitoring following project approval is an important, if sometimes overlooked, stage of EIA (FEARO, 1986: 23). It may be included in an EIA process for four principal reasons. First, if projects are approved subject to conditions (such as the implementation of mitigation measures or procedures for monitoring and responding to effects), follow-up may be required to ensure that these conditions are being complied with and to determine their effectiveness.

Second, monitoring is important to identify the need for remedial action in cases where a project results in unanticipated environmental effects. It can thus play a direct role in project management. Monitoring should therefore be linked to a process for implementing remedial measures where required.

Third, monitoring and follow-up can result in improvements in the design of subsequent projects. For a donor agency, it is therefore important that the results of monitoring and follow-up are incorporated into the project cycle, so that the agency can systematically learn from past experience.

Fourth, follow-up and monitoring can provide a useful check on the EIA process itself. It can be used to assess the predictive accuracy of the issue scoping and impact analysis, to evaluate the EIA process (e.g., effectiveness, efficiency, fairness), and to determine the success of mitigation strategies (Task Force on Environmental Impact Assessment Auditing, 1990). This information may be used to improve future EIAs (Sadler, 1988). An important theme of this study is the need to evaluate systematically the success of EIA procedures as they are applied in the research context, and to use the results of this evaluation improve EIA methods and implementation.

## **3.4 The EIA Process in the Research Context**

The generic EIA process outlined above is broadly applicable to the EIA of research activities, and many of the substantive and procedural issues raised in other contexts are equally relevant to the EIA of research. A screening process must be established to eliminate activities with trivial or no environmental effects, issues must be scoped and impacts analyzed when a full assessment is required, the EIA must include an effective decision-making component, and follow-up or monitoring procedures should be included where appropriate.

Rather than undertaking a comprehensive review of the generic EIA process as it could be applied to development-oriented research, this study focuses on the distinctive issues raised by the EIA in this context. One way to achieve this objective is through a review of the relevant literature.

The natural starting point would be a review of the literature directly addressing EIA in the context of development research. Our investigation has determined, however, that there is little or no literature dealing specifically with this topic. Even expanding the search to the EIA of research in general yielded only one article, a discussion of EIA procedures applicable to research in the Antarctic (Bonner, 1989). The approach taken, however, was to examine the application of standard EIA procedures to research and associated logistic activities. There was no discussion of the particular EIA issues raised by research. Consequently, it is necessary to proceed by way of analogy. The following sections of the literature review therefore address topics selected because they raise technical, procedural or ethical issues that provide useful analogies with the distinctive features of EIA of research activities, particularly research undertaken in developing countries.

The distinctive features of the application of EIA to research activities, and the justification of the analogies selected, are explained in each section of the literature review. However, it is perhaps useful at this time to illustrate this approach with an example.

One distinctive characteristic of research activities is that, by definition, results of research are uncertain at the outset. Research hypotheses may evolve over the course of a project, and the methods used to test these hypotheses may evolve as well. The research enterprise requires a degree of flexibility in this respect. In some cases it may also be difficult to identify precisely at the outset the ends to which the research will be put. This characteristic is, however, less pronounced in the case of applied research, as typically is funded in the development context, than it is in the case of pure research. The degree of uncertainty inherent in many research projects thus distinguishes them from conventional development projects where the parameters and application of the project are defined with greater precision from the beginning. This characteristic of research has implications for the scoping of EIAs of research activities, and arguably for the points of time in the project where EIA should be conducted. As a result, literature relevant to the scoping of EIA, and to the application of EIA as an "adaptive" process, is reviewed and applied to the particular context of development-oriented research.

Other distinguishing features of research will emerge in the course of the specific sections of the literature review. Each of the literature review sections on analogous EIA processes and issues:

- identifies (and explains) the aspects of the topic that are analogous to the application of EIA to research activities;
- discusses how these aspects are treated in the literature; and
- assesses the implications of the literature reviewed for the EIA of research activities.

### **3.5 EIA in the Development Context**

The literature regarding the EIA of development projects is extensive and raises a range of generic EIA issues going beyond the scope of this study (Biswas & Agarwala, 1992; Brown et al., 1991; Biswas & Geping, 1986). However, certain aspects of this literature can usefully be applied to the context of research activities in the development context.

EIA of research conducted in foreign countries, particularly if they differ substantially in socio-economic or cultural terms from the donor country, raises difficult technical and ethical issues. These issues concern the values and practices to be applied in assessing environmental impacts and the acceptable trade-offs between the environmental risks and the economic (or other) benefits that may be associated with the research. Once these factors are taken into account, it is clear that EIA methodology is not value-neutral. A useful analogy exists with the general EIA policies adopted by agencies, such as the World Bank, that fund international development projects. The accountability of development assistance agencies for the environmental effects of projects that they support, the types of projects requiring EIA, and the constraints on EIA processes in developing countries have been discussed in the literature. Also relevant is the considerable literature on the extraterritorial application of the U.S. *National Environmental Policy Act* (NEPA). The identification of valued ecosystem or social components, the inclusion of local participation and indigenous knowledge in the EIA process, and the problems associated with the monitoring and evaluation of projects by donor agencies have also been addressed in practice and in the literature. Finally, the objective of capacity building is relevant to the EIA of development-oriented research.

#### **3.5.1 The Accountability of Development Funding Agencies for Environmental Effects**

There is a significant literature dealing with the environmental consequences of development projects and debating the adequacy of EIA processes employed by development funding agencies (Klein-Chesivoir, 1990: 517; Plater, 1988: 121; Rich, 1985: 681; Appelbaum, 1976). Much of this literature has focused on examples of development "mega-projects", such as large dams, and on lending priorities that have been alleged to contribute to such problems as deforestation, erosion, and desertification (Muldoon, 1986: 2-5). These development projects exhibit environmental effects of a different order of magnitude than would typically result from research projects. Nonetheless, several aspects of this literature are relevant to the EIA of development research activities.

First, a strong case has been made that development agencies should be held accountable for the environmental effects of the projects that they finance (Horberry, 1985: 817). In fact, the duty to integrate environmental management into development policies has been widely recognized since the early 1980s as an "ecodevelopment norm" for development



assistance agencies (Muldoon, 1986: 30-37). There is no obvious reason to exempt agencies funding development research from this duty.

Second, commentators have focused specifically on EIA as an obligation of development agencies. Writing in 1986, Muldoon documented an emerging "ecodevelopment norm" obliging development agencies "to institute procedures to systematically screen projects for their environmental impacts and, if necessary, subject them to a more detailed environmental assessment" (Muldoon, 1986: 43-49). As with general environmental accountability, this norm seems equally applicable to agencies funding research activities.

Third, it has been noted that incentives operating within development funding agencies may result in some resistance to subjecting proposed projects to EIA (Horberry, 1985: 828; O'Riordan, 1981: 15). Horberry (1985: 828) summarizes the situation as follows:

"The integration of environmental analysis into the regular project cycle is a technically demanding process, requiring methods of predicting the effects of what is always an uncertain undertaking. It is also an activity that often complicates and sometimes delays the process of preparing and approving projects for funding. In organizations that place a premium on extending their programs and sustaining their volume of disbursements, it is likely that the staff responsible for managing the project cycle will resist an additional layer of project analysis, particularly one that explicitly looks for the negative effects of projects".

Horberry also suggests that the much of the project staff of development agencies (e.g., economists, engineers, and agronomists) are "not always sympathetic to environmental issues," and have professional orientations that are often ill-suited to evaluating unquantifiable environmental damage or systemic interactions within or among natural systems (Horberry, 1985: 828). It has also been suggested that the environmental professionals in some development agencies are not well enough placed in the decision-making process to have a significant impact (O'Riordan, 1981: 20). To the extent that these incentives and characteristics are also observed in development agencies funding research activities, they may have to be addressed in implementing EIA.

Fourth, it has been suggested in the literature that development agencies frequently play a leading role in initiating, designing and implementing projects in developing countries (Klein-Chesivoir, 1990: 528; Plater, 1988: 135-136; Muldoon, 1986: 51). As a result, their activities "present concerns that are quite similar to those raised with regard to private international trade and investment" (Klein-Chesivoir, 1990: 528). This perspective could have important implications for the design of EIA processes, to the extent that development agencies (whether they fund projects or research) operate in large measure like project proponents. While project proponents do play a major role in conventional EIA processes (which frequently include a substantial self-assessment component), external checks are built

into the system to ensure that the EIA does not become a self-serving process of project justification. Examples of these checks include initial review of the proponent's self-assessment by regulatory authorities, opportunities for presentation of information and argument by other parties, opportunities for participation by the general public, and decision-making by an independent panel or individual.

Finally, a particular area of concern is public access to environmental information on development projects. The U.S. Congress has taken some steps to ensure that environmental information on projects under consideration by multilateral development banks is made available to concerned citizens in the United States and abroad (Young, 1992: 325). The issue appears not to have been completely resolved, however, and it has been suggested that a mandatory policy of public access prior to project approval would help to ensure that environmental concerns are adequately addressed (Young, 1992: 326). In the EIA process, as elsewhere, public scrutiny may ultimately be the most effective mechanism for ensuring accountability.

For many research projects, however, the role for public involvement may be more limited. A major effort to disseminate information and gather public comments would likely be justified only for projects where significant public concern may exist. It may be that public scrutiny is more effectively focused through periodic reviews of the record of a donor agency as a whole, rather than being directed at individual research projects during the pre-approval stage.

### **3.5.2 Identification of Types of Projects Requiring EIA**

Some work has been done to identify the types of aid projects and programs that would benefit most from EIA (Kennedy, 1988: 273). In part, this literature simply records development projects that can be categorized as failures because of unanticipated environmental effects. Examples include agricultural projects that lead to increased salinity in topsoil, deforestation to create arable lands that results in floods and droughts, or dam projects that increase waterborne disease or disrupt downstream agriculture that depends on sediment disposition (Muldoon, 1986: 2-5; Comment, 1982: 357). To the extent that development-oriented research activities can also lead, directly or indirectly, to unanticipated environmental degradation, this literature provides powerful arguments for effective EIA of these activities.

From the perspective of EIA methodology, this approach is a useful screening technique for three reasons. First, the scale of environmental impacts varies significantly among types of projects. Second, the amount and kind of information required for EIA depends on the project size, type, and location. Third, limited resources available for EIA mean that detailed assessment cannot be conducted for all projects.

As noted above, inclusion or exclusion lists can be developed to screen projects. In addition, screening criteria can be developed for use on a case-by-case basis. These criteria focus on significance of impact (if any) in terms of "changes in the natural, physical or social environment; pollution levels; cumulative effects; endangered species; sensitive ecosystems; and the level of public controversy" (Kennedy, 1988: 273-274).

Work by the Organization for Economic Co-operation and Development (OECD) has resulted in the identification of seven types of aid projects and programmes most in need of EIA (OECD, 1986). The OECD categories are: renewable resource use; farming and fishing practices; exploitation of hydraulic resources; large infrastructure; industrial activities; extractive industries; and waste management and disposal (Kennedy, 1988: 275). Research activities are not included on the OECD list.

A similar categorization process might be used to develop a screening process for the EIA of research activities in the development context. In fact, the work already done in the area of development projects may provide useful guidance in identifying types of research activities most in need of EIA.

### **3.5.3 Constraints on Conducting EIA in Developing Countries**

Analysis has also been done on general obstacles to EIA in developing countries (Mayda, 1985: 998). While considerable variation between regions and countries is observed, the following constraints have been identified (Kennedy, 1988: 274):

"a lack of political will or awareness of the need for environmental assessment; insufficient public participation; lacking or inadequate legislative frameworks; lack of an institutional base; insufficient skilled manpower; lack of scientific data and information; and insufficient financial resources."

These constraints vary considerably in their relevance to EIA of research activities. In particular, if the EIA is conducted (and financed) by the donor agency, these problems can be avoided in many respects. Another variable is whether the research activity originates with a proposal from the recipient country, or an initiative directed by the donor agency itself. Particularly in the latter case, the host country may insist on conducting its own EIA, or reviewing the EIA undertaken by the funding agency or project proponent. Involvement in the EIA process may be seen as a means of retaining decision-making power.

The literature suggests two general perspectives on the application of EIA in developing countries. First, deficiencies in baseline data, institutional structure, and local expertise will have to be taken into account by donor agencies to the extent that they seek to rely on research partners in developing countries as part of the EIA process. Second, these same deficiencies suggest a potential for using EIA in the research context as a capacity-building exercise. This second point is discussed in more detail below.

### **3.5.4 Application of EIA Requirements in Developing Countries: The Case of the U.S. *National Environmental Policy Act***

The U.S. *National Environmental Policy Act* of 1969 was the first major EIA statute to be enacted and has had enormous influence on the development of EIA throughout the world. Its application to activities in other countries has been a matter of controversy since its enactment, and has also been addressed in the EIA literature (Young, 1992; Yost, 1991; Comment, 1982; Pincus, 1981). The debate has focused in part on the particular wording of the statute and on its judicial interpretation. More relevant to the issues raised in this study, however, is the general discussion of the appropriateness of applying EIA procedures of developed countries to projects occurring in developing countries.

The debate about NEPA's application abroad has focused in part on the concern that the application of EIA requirements to projects abroad may be perceived as an imposition of law or values within another sovereign state (Young, 1992: 332; Comment, 1982: 367). Commentators have responded to this argument in four ways.

First, it is noted that the NEPA merely imposes requirements on U.S. officials (Young, 1992: 309-310; Yost, 1991: 29). Its operation in this respect is identical to EIA requirements that development funding agencies could impose on research activities. These EIA requirements thus differ significantly from the types of legislation that have been criticized as constituting "legal imperialism" (Comment, 1982: 370). They bind only decision-makers in the donor country, and there is no need to seek enforcement in a foreign jurisdiction (Comment, 1982: 371).

Second, the purpose of EIA is to provide a process whereby decision-makers in the donor country can "reach an enlightened policy decision by taking into account foreign environmental effects" (Yost, 1991: 29; Comment, 1982: 370). Decision-makers may, however, choose to subordinate environmental considerations to other policy priorities of either donor or recipient countries. EIA does not regulate activities abroad or impose substantive environmental standards; rather, compliance is merely a step in the administrative process of the donor country (Comment, 1982: 371).

Third, it has been argued that the requirement to prepare an EIS under NEPA is in fact "an attempt to respect foreign sovereignty by providing information to the foreign nation" (Comment, 1982: 368). A publicly available EIA of research activities in developing countries could generate useful information on the environmental implications of those activities and on alternatives that may better preserve environmental quality. According to Yost (1991: 29-30):

"Another country's sovereignty is not constrained by making such information available to it; indeed, it may very well be intrusive to deprive that country of such information. Such a dual standard--environmental disclosure for us,

environmental ignorance for them--does not belong in the relationship among nations in the 1990s."

By increasing the range of choice available to policy-makers in developing countries, the ability to exercise sovereignty effectively is increased.

Fourth, some commentators discount the argument that EIA requirements for development projects affect sovereignty on the grounds that real decision-making is in the hands of the funding agencies in any case (Muldoon, 1986: 51; Comment, 1982: 367; Appelbaum, 1976: 347). Development funding practices have evolved since some of these comments were written. Nonetheless, to the extent that development agencies still act as project proponents, taking the lead in project initiation, design, and implementation, imposing EIA requirements on these activities appears less like an infringement on the autonomy of recipient countries.

The "NEPA-abroad" literature also highlights advantages of applying domestic EIA procedures to overseas projects. As above, these arguments are equally applicable to research projects having potential environmental effects. EIA has the potential to improve development programs through a careful evaluation of environmental implications, to help the donor country avoid diplomatically and politically embarrassing program failures, to inform other nations of the impact of the donor country's foreign actions, and to protect the donor country itself from environmental harm (e.g., the "boomerang" effect where, for example, pesticides promoted by development agencies return to the donor country through atmospheric transmission or the food chain) (Comment, 1982: 356-360; Appelbaum, 1976).

The literature on NEPA's application to development assistance thus provides two types of arguments relevant to the EIA of research activities. First it addresses sovereignty concerns by noting both that EIA requirements apply to actions by decision-makers in the donor country, and may in fact enhance the exercise of sovereignty by recipient countries by making environmental information on development activities more widely available. Second, it highlights advantages of subjecting development projects to systematic EIA.

### **3.5.5 EIA Practice and Research in Developing Countries — The Identification of "Valued Ecosystem or Social Components"**

A widely-recognized ethical issue in the development context concerns the applicability of values and approaches originating in the industrialized world to projects, activities, and institutions in developing countries. This relativity of values and approaches has important analogies with the EIA of research since certain key aspects of EIA methodology are not value-neutral (Hyman & Stiffler, 1988; Abel & Stocking, 1981: 277-278).

At the most general level, this issue has been characterized as centring on "uncertainty about what constitutes the good life and what role an outsider has in defining it" (Nelson and Knight, 1987: 14). More specifically, the issue arises in the context of setting appropriate environmental protection standards for development projects. Should environmental requirements (such as emission standards) designed for industrial projects in a developed country be required of similar projects in the developing world? Clearly, economic and environmental trade-offs are implicit or explicit in environmental standards. Whether the application of standards from industrialized countries to developing countries is a form of "eco-imperialism", or constitutes a way of counteracting pressure for the creation of "pollution havens", is a matter of considerable debate. This issue has recently been addressed in the literature on international trade (Robertson, 1992; Saunders, 1992).

This debate about appropriate environmental values and practices frequently arises in the context of development projects having significant environmental effects. In the case of EIA, it is increasingly recognized that cultural diversity must be taken into account, and that the norms of industrialized countries cannot be uncritically built into assessment mechanisms (Meredith, 1992). The issue of differing values is particularly relevant to two aspects of the generic EIA process.

First, as noted above, the identification of "valued ecosystem or social components" (VECs) is an important part of both the screening and the issue scoping and impact analysis stages of an EIA. Since it is often impractical (or impossible) to examine all possible effects of a project, and since both efficiency and effectiveness criteria dictate the focusing of EIA resources on effects that are considered important, it is essential to select certain potentially affected features of the ecosystem and the social context for study (Hyman & Stiffler, 1988: 25-26). It is evident, however, that the identification of VECs, and hence the EIA process as a whole, is not value-neutral. For example, certain features of the environment (e.g. certain species) may be valued in one context or culture, and not in another. Differing environmental values are evident both among donor countries, and between donor and developing-country partners. Consequently, EIA of development activities, including research, must come to grips with the issue of which values should be applied in identifying VECs.

The second point where the ethical issue of differing values and standards arises is at the project decision-making stage of the EIA. At this point, the decision-maker must determine whether the environmental impacts identified at the issue scoping and impact analysis stage are "acceptable". Once again, the EIA process has an important element of subjectivity, since judgements of acceptability will inevitably reflect trade-offs between the costs and benefits of the project in question. Acceptable trade-offs between economic development, the advancement of science, and alterations in the social or ecological environment may differ significantly among donors and between industrialized and developing countries. When conducting an EIA of research, as when deciding on a major development project, the question arises of what trade-off is appropriate.

Another dimension of the debate on EIA practice in the cross-cultural context centres on the degree of diversity that is appropriate for evaluation criteria. Lipton et al. (1993) have argued that a single paradigm for ecological risk assessment is not realistic for making informed decisions. Instead, pluralistic criteria need to be recognized, varying with the physical, cultural, and economic context in which the review is to take place. Generic EIA guidelines should offer a "template against which analysis may be compared to ensure that key steps have not been omitted" (Lipton et al., 1993: 4).

In the context of development-oriented research, the EIA process must accommodate the distinctive values and priorities of both the recipient and donor countries. The perspective of developing-country partners is important given the fundamental purposes of research in the development context and the need to adapt EIA to the particular ecological, economic, and social contexts where the research occurs and will be applied. However, donor agencies are also accountable through political and administrative mechanisms to the governments and taxpayers that finance their activities. Final decisions on projects are usually made by officials of the donor agency, using a decision-making process that is designed and operated in the donor country. Consequently, research projects should be judged from the perspective of the donor country as well. Integrating the two perspectives successfully is a significant challenge for development work in general, and for the EIA of development-oriented research in particular.

### **3.5.6 Local Involvement and the Use of Indigenous Knowledge in EIA**

The ethical issue of differing values and standards has as its technical counterpart the question of the role of indigenous knowledge in development projects. Methods of acquiring and systematizing environmental knowledge may differ significantly between industrialized and developing countries. The contrast is particularly great between the methodology and technical standards of western science, and the environmental knowledge of indigenous people. Since a critical aspect of the EIA process is the analysis and prediction of effects, the question of how one accumulates and evaluates information about the local environment is of considerable importance. Direct analogies can be drawn with the literature on indigenous knowledge or "traditional ecological knowledge" in the context of development projects, research, and EIA.

The under-utilization of indigenous knowledge has been noted in the development literature. For example, Warren's paper on "Linking Scientific and Indigenous Agricultural Systems" describes the evolution from a lack of interest in indigenous agricultural knowledge and practices to the recognition that attention to these matters has the potential "to help research and by extension improve national agriculture and the quality of life for small-scale agriculturalists" (Warren, 1989: 153). He argues that development programs will be more cost-effective if they are based on an understanding of the indigenous technical knowledge and decision-making systems underlying existing production practices.

In a paper on "Research Priorities for Planning Water Resource Development", Jayal argues that the decrease in availability of water, in spite of increases in investment in water projects, is in part a result of the "temperate bias" (Jayal, 1987: 57). He defines this bias as "the extension of knowledge of temperate ecosystems to the management of tropical ecosystems" (Jayal, 1987: 57-58). As a result of this bias, indigenous knowledge of the tropical world tends to be ignored. He concludes that:

"Water resources research for Third World development needs to take more seriously the scientific and ecological value of indigenous knowledge and technology and it needs to be more cautious while extrapolating knowledge from temperate zones to the tropical world" (Jayal, 1987: 61).

The importance of local participation is also emphasised in the literature on EIA and development. For example, non-governmental organizations have been noted as a useful source of information on environmental conditions (Plater, 1988: 141). Participation in EIA by local officials and professionals can assist in understanding local conditions and infrastructural constraints and can address the complaint of developing countries that some assistance programs are imposed without regard to their suitability (Klein-Chesivoir, 1990: 537). Similar arguments have been advanced for the incorporation of "traditional ecological knowledge" into the EIA process for projects affecting aboriginal peoples in Canada (Cole, 1993).

Some commentators argue that a principal obstacle to the use of indigenous knowledge has been scientific scepticism (Johnson, 1992: 6-10; Chambers, 1984). According to Chambers (1980: 2):

"Modern scientific knowledge is centralized and associated with the machinery of the state; and those who are its bearers believe in its superiority. Indigenous technical knowledge, in contrast, is scattered and associated with low prestige rural life; even those who are its bearers may believe it to be inferior. It is difficult for some scientists to accept that they have anything to learn from rural people, or to recognize that there is a parallel system of knowledge to their own, which is complementary, usually valid, and in some respects superior".

Scientific scepticism is not, however, simply a matter of hierarchy, power, and prejudice. Like other systems of knowledge, indigenous knowledge has certain limitations.

A principal disadvantage of indigenous knowledge is the difficulty of recording and organizing it in a manner that is useful to, or complementary with, scientific approaches. There are no established standards or methods for recording, categorizing, or analyzing



indigenous knowledge (Cole, 1993: 418). It may also be difficult to test its validity. In addition, while "spiritual" explanations may conceal scientifically verifiable conservation strategies, this is not always the case. One commentator cautions that "some researchers tend to be overly romantic and uncritical" of indigenous knowledge (Johnson, 1992: 14). Finally, external influences on traditional cultures, coupled with the loss if elders fail to pass on knowledge to younger generations, can erode both the information base of indigenous knowledge and the ingrained social values and balances that make it an effective way of understanding human interactions with the environment (Cole, 1993: 410; Johnson, 1992: 9).

To address these problems, it has been suggested that specific strategies be adopted to identify, recover, and apply knowledge (Johnson, 1992: 11-12; Compton, 1989: 128-130). For example, indigenous knowledge specialists could be identified and included in program planning and implementation in ways that can make use of their expertise. Another approach is more systematic experimentation with, and cataloguing of, indigenous knowledge.

Clearly, integrating indigenous knowledge and western science is a formidable challenge (Johnson, 1992: 10). Nonetheless, indigenous knowledge could play a significant role in most aspects of the EIA process, notably the identification and understanding of VECs, issue scoping and impact analysis, and monitoring and follow-up. In fact, effective use of indigenous knowledge is increasingly acknowledged to depend upon incorporating these perspectives into each stage of EIA, rather than segregating indigenous perspectives into a category of alternative assessment. Meredith (1992: 133) notes that:

"a narrow study is less likely than a broad one to include incidentally the inferred or imputed concerns of a range of interest groups. Thus a 'scoped' study may be of little relevance to a community unless they themselves determined the scoping constraints."

Local participation thus has a potentially important contribution to make to EIA in the development context generally, and with respect to research activities in particular.

### **3.5.7 EIA and Follow-up Activities for Research in Developing Countries**

One section of the literature on development assistance focuses on project monitoring and evaluation (Binnendijk, 1989; Lawrence, 1989). While this material addresses monitoring and evaluation in terms of general project objectives, it is also applicable to the monitoring and follow-up stage of the EIA process.

One major conclusion of this analysis is the need to tailor monitoring and evaluation procedures to considerations of practicality and necessity. Developing "ideal" processes will achieve little if they are "overly sophisticated, costly, and impractical for the evaluation of development projects" (Binnendijk, 1989: 209). Procedures should also focus on providing

information specifically needed for decision-making on project modification, or the design of subsequent projects. Binnendijk (1989: 209) draws the following conclusions from experience with the evaluation of development projects in the 1970s:

"In the few cases where evaluation efforts attempted to assess project impacts, they tended to suffer from overly sophisticated designs and too much emphasis in getting statistically representative proof of impact. These efforts, often based on quasi-experimental designs and multiple rounds of sample surveys, were very expensive and long term, and ultimately suffered from methodological weaknesses, inconclusiveness, and *an orientation of little practical usefulness to project managers*. Other complaints frequently heard about evaluation efforts were that they lacked focus, either collected too little data or too much data of poor quality, suffered from limited data processing and analytical capabilities, and were frequently left incomplete. In addition to the methodological and data collection problems encountered, M&E [monitoring and evaluation] efforts of the donor agencies also encountered a host of management, organizational, and other procedural problems." (emphasis added)

An important theme is that monitoring and evaluation must be carefully planned and carried through to completion. Another theme is that they should be directed specifically to the needs of project managers and other decision-makers. The importance of focusing EIA process development and implementation primarily on the contribution of EIA to decision-making is a principal theme of this study. This focus is as important at the follow-up and monitoring stage of EIA as it is in screening and impact assessment prior to project approval.

Initial experience with monitoring and evaluation of development projects also revealed a host of more specific conceptual, methodological, and organizational problems (Binnendijk, 1989: 210-214). Binnendijk's discussion of improvements in this area throughout the 1980s raises five principal points of relevance to the EIA of research activities.

First, a diversity of methodologies and data sources should be encouraged in monitoring and evaluation. While quasi-experimental design and rigorous statistical analysis are appropriate in some cases, the need for a more flexible approach to evaluating many development projects was recognized. According to Binnendijk (1989: 216): "The concept of one standard or 'blueprint' methodology was replaced by a philosophy of using multiple data collection techniques and sources to address a variety of management-oriented questions." When conducting EIA of research activities, there are also advantages in allowing flexibility to choose among alternative methods. This flexibility, however, should be coupled with a systematic analysis to evaluate the relative utility of different methods to the decision-making process.

Second, it was recognized that "to increase the quality of evaluations and their relevance to management, the responsibility for various evaluation tasks should be functionally and organizationally as close as possible to the appropriate management decision-making point" (Binnendijk, 1989: 217). This approach implied continuous evaluation as an integral component of the management information system, with special evaluations linked to key decisions. Furthermore (Binnendijk, 1989: 217):

"More emphasis was being given to explicit planning and funding of M&E [monitoring and evaluation] activities at the project design stage, and of treating M&E as a special project component. In addition, there was growing recognition that M&E functions, just like other project components, required technical support and training to become institutionalized."

Developing awareness of environmental concerns among researchers and project officers, and ensuring that EIA produces useful results, may both be furthered by integrating some aspects of EIA into ongoing project management.

Third, it was recognized that monitoring and evaluation could also play a useful role at the policy level in donor agencies (Binnendijk, 1989: 217). To be useful at the management level, individual project evaluations required comparative analysis and synthesis. For this type of analysis, centralized evaluation staffs and procedures were required. According to Binnendijk (1989: 218), donor agencies have found that addressing evaluation concerns at the program or policy level is useful for:

- "● influencing donor agency resource allocation decisions among sectors or project approaches
- influencing agency aid policies and procedures so that guidance reflects experience
- improving new project designs
- serving an accountability function of showing legislative bodies and constituents that foreign aid expenditures are achieving desired development results
- serving as a basis for policy dialogue between donor and host government officials."

This analysis directly parallels the discussion elsewhere in this study of EIA as applied to policies, plans and programs. It suggests that EIA of research activities could be applied not just to individual projects, but also at the program and policy level within donor agencies. EIA could be used to ensure that decisions at this level are based on a systematic consideration of potential environmental effects.

Fourth, greater coordination and information sharing among donor agencies was achieved in the area of monitoring and evaluation. This cooperation concerned both evaluation techniques and actual experiences with the evaluation of projects. For example, the Development Assistance Committee of the Organization for Economic Co-operation and Development (OECD) established an expert group on aid evaluation (Binnendijk, 1989: 218)

"to strengthen members' exchange of information and experience, to contribute to improving the effectiveness of aid by drawing out the lessons learned from evaluation, and to seek ways of supporting developing countries' own evaluation capabilities."

As donor agencies in the research area begin to consider implementing EIA procedures, the opportunity exists for early and fruitful cooperation.

The fifth point is that donor agencies have made increasing efforts to include participants from developing countries in project, program, and policy evaluation (Lawrence, 1989: 249-250). According to Binnendijk (1989: 212) the reasons for this approach include:

- A realization that local expert involvement can improve the quality of evaluation results by their superior understanding of important contextual and policy factors, as well as contributing local language skills.
- A recognition that host countries' involvement in evaluation efforts will enhance their institutional capacity to conduct evaluations in the future. Thus not only is the project M&E [monitoring and evaluation] more likely to be sustained, but the benefits may go beyond the immediate project being evaluated, to benefit the evaluation efforts of other host country programs and policies.
- As donors undertake more 'ongoing' evaluation efforts within project management structures, the use of local staff becomes more and more necessary. An increasing concern with keeping the costs of evaluation efforts down has also led to a greater emphasis on using local evaluation talent."

Inclusion of host-country participants in the evaluation process is facilitated by building this process into the project from the outset and by providing technical assistance and training to transfer skills in evaluation methods (Binnendijk, 1989: 219-220). One potential obstacle that may have to be overcome, however, is the perception of the host country staff that project evaluation is a form of audit, that is therefore threatening (Lawrence, 1989: 249, 251).

Involvement of developing-country partners in evaluation thus results in a more effective and efficient evaluation process. In addition, it promotes capacity building in evaluation expertise within developing countries. This experience is directly relevant to evaluation conducted as part of the EIA follow-up and monitoring stage, as discussed in the section of this study dealing with indigenous knowledge and EIA. The lessons learned in the context of general evaluation of development projects would appear to apply with equal force to application of EIA to research activities.

### **3.5.8 EIA and Capacity Building in the Development Context**

The duty to improve environmental capabilities is an "ecodevelopment norm" supported by numerous declarations, conventions, and international recommendations (Muldoon, 1986: 38-39). It implies that development assistance agencies should develop their own environmental capabilities and should also assist developing countries "to build up the indigenous physical, managerial, and institutional capacity to plan and manage their environment and natural resources" (Muldoon, 1986: 38). Muldoon argues that this duty has four principal dimensions.

First, development agencies must themselves have sufficient personnel, resources and procedures in place to develop their capacity for ecological, social and natural resource management. Second, these agencies should undertake projects to increase the environmental capacity of developing countries. Examples include education and training programs, assistance with developing and implementing environmental legislation, and encouraging the establishment of information networks. Third, agencies should assist developing countries with natural resource inventories and other measures to collect baseline environmental data and monitor environmental change. Finally, development agencies should promote specific programs designed to protect and rehabilitate the environment and natural resources (Muldoon, 1986: 38).

International development agencies have increasingly recognized capacity building as a critical part of their mandate (IDRC, 1991). Opportunities for furthering this objective through development projects, including research activities, should therefore be explored. The EIA role in project design, approval, implementation, and follow-up offers considerable potential for capacity building in EIA, in addition to its direct function of ensuring that decisions taken regarding specific projects are environmentally sound.

Capacity building encompasses a broad range of objectives. Clearly, developing technical competence and institutional structures are important components. However, the first stage of capacity building is awareness of issues and approaches. This point has been made in the general literature on EIA and development projects, where it is argued that "the use of EIAs would begin to raise the consciousness of economic development planners to environmental concerns, encouraging a long term, systematic incorporation of environmental concerns into development planning" (Klein-Chesivoir, 1990: 518). Incorporating systematic

EIA into development research, whether at the initial planning and approval stages or as an integral component of the research process, can thus play an important role in heightening awareness among researchers of the environmental implications of their activities.

In addition, it provides an important opportunity for developing expertise in EIA. The efficiency and long-term viability of EIA processes in developing countries depends to a great extent on the availability of local expertise, and on the resources (e.g., money and equipment) available to apply it effectively (Biswas and Geping, 1986: 215). Local expertise may benefit from easier access to indigenous knowledge, it will frequently be less costly than relying on foreign advisors, and it will remain in place after the completion of the project. Research projects that require ongoing EIA and provide the required financial and technical support could thus be used to promote the development of local EIA expertise.

Finally, EIA may play a role in a broader process of capacity building by promoting legal and institutional arrangements for environmental management in general. Mayda argues that the development of effective systems of environmental law in developing countries must be part of "a progressive integration of economic planning and ecomanagement functions", and that:

"On the international level, this integration can be encouraged by lending and donor agencies that insist on competent environmental impact assessments to demonstrate the environmental feasibility of projects as a precondition for funding" (Mayda, 1985: 1019-1020).

EIA requirements for research activities thus promote EIA and environmental management norms in general.

### **3.6 EIA as Applied to Policies, Plans, and Programs**

Policy review is a new but expanding field of EIA. Canadian experience in this area is limited, a notable exception being the environmental review of the North American Free Trade Agreement (NAFTA) (Canada, 1992). However, EIA processes for policies have been developed in Canada (FEARO, 1992; FEARO, 1993) and there is a growing literature on this subject. Policy review is relevant to the EIA of development research in two ways.

First, some research involves no direct disturbance of the physical environment but may nonetheless have significant environmental implications through its potential application. An analogy exists with the EIA of policies, plans and programs. Like policies, research of this type may not be amenable to the same quantitative or predictive analyses that are possible for physical projects such as mines or factories (Canada, 1992: 3). The clearest example is policy research itself; policy research can be viewed as preceding policy-making on a continuum leading towards implementation and direct environmental effects.

Second, EIA could be applied to the research funding policies and programs of donor agencies. Since these policies establish general funding priorities and criteria, they have a direct influence on the types of research that are funded, and an indirect influence on the environmental effects of those research activities. Funding programs implement these policy directions across categories of individual projects. Agency funding policies and programs are thus analogous to general policies of any kind in that their environmental effects are felt through specific projects or activities. Arguably, they should be subject to some kind of EIA.

There are three principal rationales for policy EIA (Hanebury, 1993; FEARO, 1992: 10-12; Wathern et al., 1987: 322; Biswas and Geping, 1986: 192). First, because many individual project decisions (and their consequent environmental effects) are the result of broader policies, it makes sense, at least from the point of view of government, to begin considering environmental impacts at the policy stage. Policy assessment can ensure that the full range of biophysical, social, economic, and cultural considerations are taken into account in setting policy directions.

Second, policy EIA is a way of considering certain cumulative effects. The implementation of policies, plans or programs often requires a number of individual projects. Policy EIA can permit an examination of the cumulative environmental effects of these individual projects, something that might be lost if they are examined in isolation. Equally, the cumulative effects of individual projects may themselves influence future policy directions, the environmental effects of which should be considered.

Third, EIA at the general policy level can result in issue scoping and data production that can be useful in more detailed project-level EIAs. Policy EIA can be "an efficient and effective means to establish *clear and consistent terms of reference* for the subsequent assessment of various programs or projects implemented under the general policy umbrella" [emphasis in original] (FEARO, 1992: 11). It can therefore produce a general framework for ensuring that individual policies and decisions within an organization are consistent with sustainability goals. Systematic prior examination of the underlying policy issues can also reduce duplication in the review of related projects. Policy EIA can therefore increase the cost-effectiveness of project-specific EIAs.

In the case of policy review, the challenge for EIA arises in part from the separation between the policy level and the associated projects or activities that result directly in effects on the environment. Wathern (1988: 19) describes the issue as follows:

"The nature and practicality of EIA at various levels differ. The policy to project sequence can be regarded as a theoretical hierarchy. Passing up through the hierarchy is characterized by increasing uncertainty and generality. This means, for example, increasing difficulty in determining the informational requirements for appraisal and less precise predictions concerning the consequences of change. These should not be insurmountable

problems, because decision makers may have lower expectations regarding precision. Furthermore, progressively longer lead times are subsumed in the hierarchy which will allow feedback between data generation and impact prediction, permitting greater clarification of the areas of uncertainty. This iterative process, for example, will allow policies to be more precisely formulated and their impacts more narrowly defined over time."

EIA of policies can therefore be viewed as a hierarchical process.

While the rationale for policy EIA is well recognized, and the relationship to project decision-making and assessment has been described, less progress has been made on specific methodology (Hanebury, 1993: 115; Wathern et al., 1987: 329). The environmental review of NAFTA noted that "The process of reviewing policies for their environmental implications is very much in its infancy" (Canada, 1992: 3). Questions raised by this review concerned "methodology, the lack of baseline and other data, the consultation process, and the need for an overall framework for the assessment" (Hanebury, 1993: 115). The Federal Environmental Assessment Review Office's guide to *The Environmental Assessment Process for Policy and Program Proposals*, published in 1993, states when policy EIA should occur but has nothing to say on methodology except that it is "still evolving" (FEARO, 1993: 6). More detail is provided, however, in the unpublished *Environmental Assessment in Policy and Program Planning: A Sourcebook* (FEARO, 1992).

Despite its preliminary treatment of methodological issues, the literature on policy assessment does provide a sufficient basis for considering the EIA of the policies of donor agencies regarding research activities. The implications of donor agency policies (e.g., general funding policies, standardized evaluation criteria, and program design requirements) for the funding of particular research activities should be fairly clear in most cases. EIA of this type would provide information about the environmental effects of policy choices, thereby improving the policies themselves and the specific projects that flow from them. By addressing environmental effects at the strategic level within agencies funding development research, policy EIA could also increase the efficiency and effectiveness of project-specific EIAs. Applying EIA to the funding policies of a donor agency may, however, raise practical problems depending on the dynamic nature of the policy development process. This process may be a product of decisions and initiatives at the political level, by the agency's board of directors, and by the central and regional offices.

Finally, the evolving methodology for EIA of policies, plans, and programs could provide guidance on how EIA could be incorporated into policy research itself. The difficulties of accurately predicting impacts for this research will likely be considerable, however, since research on policies usually involves no physical disturbance of the environment, and is one step further removed from implementation (and consequent environmental effects) than are the policies themselves. In fact, certain types of policy research might be candidates for exemption lists, on the grounds that the absence of direct or proximate environmental impacts makes detailed EIA unnecessary.



### 3.7 Class Assessment

Class assessment is the application of EIA to categories or "classes" of activities or projects. It has been developed over the past 15 years in Ontario (Gibson, 1993: 84), and a similar approach has been used by the Government of Canada (FEARO, 1986: 14). Class assessment is used for projects that "are relatively small in scale, recur frequently, and have a generally predictable range of effects which, though significant enough to require environmental assessment, are likely to cause relatively minor effects in most cases" (Ontario, 1981: 16). In general, these effects can be addressed adequately through standard mitigation measures. Class assessments may also be used to evaluate groups of activities that, while individually insignificant, may have important overall effects (Gibson, 1993: 84). If a project falls within a category for which a class assessment has already been conducted, it may be partially or completely exempted from the more onerous elements of the project-specific EIA process (Gibson, 1983: 92-93). Even if a standard project-specific EIA is required, the class assessment will provide useful information and narrow the issues to be examined.

Class assessment has many of the same purposes and methodological characteristics as policy EIA (Gibson, 1993: 84, 99). According to Gibson (1993: 84):

"Both class and policy/plan assessments address sets of related activities whose joint overall character and effects may be worthy of attention. Both involve consideration of future projects, for which the specific design, location, and potential effects can be only roughly anticipated and for which some kind of case-specific subsequent planning and approval process may often be needed. Finally, both class and policy/plan assessments have been initiated to improve the efficiency of environmental assessment work as well as to extend the scope of undertakings covered by assessment requirements."

Given these similarities and the above discussion of policy EIA, class assessment will not be examined in detail here.

The potential application of class assessment to research activities should, however, be noted. Some types of research may not warrant a full EIA for each project, but may have sufficient potential environmental risks that they should not be exempted entirely from the EIA process. Where categories of research activities having relatively standard characteristics and predictable environmental effects can be identified, a class assessment may be appropriate. This approach would provide a efficient way of ensuring that the basic principles of sound environmental planning are applied to developing these research projects. The class assessment process could also provide for a more intensive project-specific EIA of research activities that, although generally within a class, raise particular concerns.

### **3.8 The Ethics Review Process for Research Proposals**

The EIA of research proposals raises particular procedural issues. For example, should the EIA process be separate from the general review of the research proposal, or should the two be integrated? If a separate EIA process is established, what is its relationship to the general review process? Will a separate EIA review create different incentives regarding the environmental components of project design than would an process integrating environmental considerations with general review criteria?

One approach to addressing these questions is through a comparison with ethics review of scientific and medical research involving human subjects. Unfortunately, there appears to be little literature on research ethics committees. According to a Law Reform Commission of Canada study published in 1990: "there is a serious shortage of information about the operation of such committees in Canada, the differences between them, the hierarchy of standards they impose and their effectiveness in monitoring compliance" (Baudoin et al., 1990: 17). Nonetheless, the model provided by these committees highlights three issues of relevance to the EIA of research.

First, it should be noted that ethics review is generally separate from the review of a research proposal's technical or scientific merit. One reason for separating the two processes may be the need for different types of expertise. While research ethics committees often consist largely, if not exclusively, of scientists (Baudoin et al., 1990: 16), members tend to be drawn from a broader range of disciplines than is found on committees reviewing the scientific and technical aspects of proposals. It has also been argued that research ethics committees should place even greater emphasis on interdisciplinary membership, and should include non-specialist members such as lawyers, lay members, and experts on ethical issues (Baudoin et al., 1990: 16; Kirk, 1986: 187). The ethics review model thus suggests one possible rationale for establishing separate EIA processes within agencies that fund development research. The strength of this analogy depends on whether the EIA of research activities requires special expertise and a broader disciplinary mix than is needed for standard project evaluation. The analogy may be extended to consider whether research funding agencies are developing special expertise in the EIA component of project review, as has occurred within the research ethics context.

A second point regarding the separation of ethics review from general project evaluation concerns the objective of research ethics committees, and the resulting incentives for researchers. Writing in the context of medical research, Baudoin et al. (1990: 15) state that:

"The primary objective of research ethics committees is to ensure that proposed research protocols are consistent with the standards prescribed by the Medical Research Council of Canada and those of the hospital, university or other institution where the research is being conducted."

Research ethics committees thus appear to serve a threshold function, ensuring compliance with minimum standards and eliminating projects that are ethically unsound. An analogy can be drawn with EIA processes intended only to prevent unacceptable environmental harm. In both cases, the incentives created for researchers are simply to meet the threshold requirement.

A different incentive structure might be produced if the review process, either ethical or environmental, is integrated with general project review. Particularly where there is competition for limited research funding, this integration might encourage researchers to view ethical or environmental characteristics of their projects as integral to project ranking. Rather than seeking merely to meet minimum environmental standards, for example, researchers might be motivated to maximize the positive environmental features of their projects. It is thus arguable that the model of research ethics committees is less desirable than an integrated approach if EIA of development research activities is intended to improve the environmental performance of all research projects, as opposed simply to preventing or mitigating environmentally harmful ones.

Third, Baudoin et al. (1990: 15-16) state that the role of self-discipline and professional norms, enforced notably through the dissemination of published research results to the scientific community, must be taken into account when considering the effectiveness of research ethics committees. In their view: "There clearly exists a direct link between compliance with ethical research standards and approval and recognition of the research results by that [scientific] community" (Baudoin et al., 1990: 15-16). Compliance is generally in the self-interest of researchers. This factor should be noted when considering the research ethics committee as a model for the EIA of development research activities. If the incentives of professional scrutiny and self-interest are not as effective in the environmental area as they are in medical ethics, the EIA process may require additional measures to ensure compliance with environmental standards for research.

The models for EIA processes discussed in this section are not, of course, mutually exclusive. The ethics review model could be used to set threshold criteria, in parallel with an integrated process designed to encourage competition among proposals on environmental grounds and to assess the longer term environmental implications of research activities. In fact, donor agencies may wish to experiment with a dual approach that would enforce minimum standards, match the EIA process with the availability of specialized expertise, and also achieve EIA's full potential for improving the environmental performance of development-oriented research projects.

### **3.9 Cumulative Effects Assessment**

Cumulative effects assessment (CEA) seeks to assess the environmental impact of a given project in relation to other activities at work in an ecosystem. CEA arose as an analytical tool to assist in meeting legislative and administrative mandates for more

comprehensive, yet focused, forms of EIA. For example, the U.S. NEPA requires that EIAs move beyond considering a given project in isolation from other ecological disturbances that exist, or can be forecast to occur, within an ecosystem. CEA's objective of organizing EIA around all relevant perturbations at work in an ecosystem raises issues of ecosystem definition and scoping that are germane to a research context.

The analogy between CEA and the EIA of development-oriented research centres on the scoping issue. In the case of CEA, the cost and complexity of the EIA may increase dramatically if it must evaluate not only the direct effects of the proposed project, but also its impact when combined with all existing and possible developments within a given ecosystem (however defined). The same type of problem may arise if the EIA of a research proposal is extended to cover all possible applications of the research product(s). In cases where these applications are numerous, uncertain, and complex, it may be extremely difficult and costly to predict and evaluate all of the potential environmental impacts at the outset. A scoping procedure must be adopted to ensure that the EIA remains manageable.

The achievements and limitations of CEA suggest that successful scoping is not an easy accomplishment. The longer the time horizon involved and the greater the range of valued ecosystem components (VECs) that are to be addressed, the more problematic any scoping process will become. The more effects that must be addressed, the greater the risk that a discrete scoping exercise will fail to capture the appropriate relationship between relevant causes and plausible effects.

Almost any CEA can be criticized for not having taken all relevant perturbations into account, for having omitted significant interactions among perturbations, and for having missed critical pathways in its causal model. McDonald (1993) criticizes the Natural Resources Conservation Board of Alberta (NCRB) for such shortcomings in its decision on the Three Sisters Golf Resort project. After noting that the NCRB undertook to consider cumulative effects in its deliberation, McDonald claims that the EIA produced by the petitioner fell short in producing needed data, identifying plausible interactions, and thus missed likely pathways of cumulative effects. In McDonald's words, "a simple awareness of cumulative effects does not constitute 'a reasonable consideration of cumulative effects'" (1993: 130). When uncertain about the inputs, interactions, and causes of cumulative effects, the analyst would thus be responsible for including all possible data that could not be shown to have no connection to change in a given ecosystem. Like first generation EIA practice, the presumption would always be in favour of more information.

The best way to address critics who insist on including, rather than excluding, information of unknown value to the EIA process is to develop scoping procedures that allow for new information to be incorporated into a CEA as and when issues arise that can identify its value. In other words, CEA should be an adaptive process that focuses on the information needs of the decision-maker (Yarranton & Hegmann, 1994). Such insights would presumably enhance the CEA's value by helping to formulate hypotheses about the nature and extent of interaction and causal pathways necessary to interpret the data. The

understanding of what data to add to a CEA, and how to interpret it, is itself cumulative and should not be compartmentalized into discrete pre- and post-analytical stages of practice.

When considering the criteria that can best assess the complex interactions and causal paths found in development research, CEA's experience should caution against establishing guidelines that treat scoping as a discrete step in the assessment process. Instead of being a simple means to a more sophisticated end, scoping must match the intricacy of the analytical process at hand. If that analysis turns out to be as, or even more, demanding than the ambitions surrounding CEA, then an effective scoping procedure will prove to be crucial to success.

### **3.10 Adaptive Environmental Assessment and Management**

Adaptive Environmental Assessment and Management (AEAM) is an EIA technique developed by Holling and his associates at the Institute of Animal Resource Ecology at the University of British Columbia (Holling, 1978). It responds to a number of perceived weaknesses in other EIA techniques. In particular: environmental impact statements (EISs) were seen as becoming excessively long and complicated; EIA was attempting to estimate too many impacts (so as not to be challenged for failing to be comprehensive); EISs were inadequate in terms of impact prediction; and inadequate communication between EIA personnel and decision-makers responsible for future projects was reducing the influence of EIA on decision-making (Bisset, 1986: 50).

AEAM represents both a formal EIA technique and a more generalized approach to the EIA process as a whole (Jones & Greig, 1985: 21-22). The technique involves the use of small workshops of scientists, decision-makers and experts in computer modelling to construct a simulation model of the system(s) likely to be affected by a development (Bisset, 1986: 50). The specific AEAM methods may in fact be directly applicable to the EIA of research activities, a matter returned to below.

In terms of the process-oriented focus on this study, however, AEAM is interesting primarily because of its general approach to EIA. The key aspects of AEAM have been enumerated as follows (ESSA, 1982: 2-3):

- "1. Ecological and environmental knowledge is incorporated with economic and social concerns at the beginning of a strategic analysis rather than at the end of a design process.
2. Since linked resource/social systems are dynamic rather than static and linear, techniques of simulation modelling, qualitative modelling and policy design and evaluation are chosen to reflect these features.

3. Scientists, managers, and policy people are involved and interact from the beginning and throughout the process of synthesis, analysis, and design so that learning becomes as much of a product as does problem solving.
4. Direction, design, and understanding are in the hands of those from the region who analyze, select and endure policies rather than in the hands of a separate group of analysts who lack the knowledge of needs, the responsibility and the accountability.
5. Although prediction can be improved, the uncertain and unexpected lie in the future of every design. Hence policies are designed both to explore opportunities and pitfalls as well as to fulfil immediate social needs."

This approach is relevant to the application of EIA to development research for three principal reasons: the treatment of uncertainty, the ongoing and participatory nature of the assessment process, and the relationship to decision-making.

First, AEAM specifically recognizes that uncertainty is a principal concern when addressing environmental issues, and is designed both to reduce uncertainty directly and to deal with unexpected events in a satisfactory manner (Jones & Greig, 1985: 21, 23-26). This approach to EIA is consistent with the inherent uncertainty and adaptive nature of research, and AEAM methodology could therefore be integrated directly into the research and reporting process. Furthermore, as Holling notes, the emphasis on uncertainty is particularly relevant to developing countries. In his view (Holling, 1978: 19):

"Considering the needs for rapid socioeconomic development, the existence of unexploited natural resources, and the availability of technology for wide-scale projects, the uncertainties involved are not only great but are often of a qualitatively different nature than in developed countries."

Coupled with the vulnerability of significant segments of the population in many countries, these factors suggest that the EIA of development projects should make addressing uncertainty, and responding to unexpected change, a high priority.

The second point is the ongoing and participatory nature of AEAM. The usefulness of simulation models does not end when a project becomes operational. In fact, AEAM can be integrated directly into follow-up and monitoring. According to Bisset (1986: 54):

"Should monitoring indicate detrimental impacts occurring from an operational project, then the implications of various strategies to prevent or ameliorate the impacts can be easily seen from the model. Moreover, such occurrences will

indicate a weakness in the model and aid its improvement and the ability of the model to predict more accurately in the future".

One result of integrating AEAM into ongoing research activities would be a process for improving implementation, and addressing unexpected environmental effects, during the course of the research. The lessons learned from AEAM could also be incorporated into the research conclusions, thus providing important environmental information for subsequent research activities or the application of research products. Finally AEAM provides for direct involvement of researchers in the EIA process. As Holling argued, the AEAM conceptual framework "tends to promote the generation of self-reliant and endogenous approaches to the environmental problems — approaches appropriate to local conditions, needs and socioeconomic structures" (Holling, 1978: 18). This attribute is particularly important in the case of developing-country partners, for reasons discussed earlier in the sections dealing with indigenous knowledge and capacity building.

Third, AEAM methodology addresses directly the relationship between EIA and the overall decision-making process (Wathern, 1988: 5). While EIA may serve primarily an information-gathering function, in some cases EIA methods themselves impinge directly on decision-making. As Wathern notes: "In the extreme case of adaptive environmental assessment and management (AEAM), these two facets have become firmly intermeshed" (Wathern, 1988: 5). As a means of conducting EIA that integrates evaluation of environmental effects with an iterative process of decision-making, AEAM is consistent with the theme in this study that EIA must be designed and evaluated in terms of its contribution to decision-making. AEAM also mirrors the adaptive decision-making required for a successful research project, particularly where the focus is on applied research in the development context. In fact, most if not all of the "key aspects" of AEAM enumerated above are characteristics that donor agencies would look for in good research design.

These observations regarding the compatibility of AEAM and research methodology are confirmed in a study of AEAM conducted by ESSA Environmental and Social Systems Analysts Ltd. for Environment Canada (ESSA, 1982). According to that study (ESSA, 1982: 27):

"The effectiveness of AEAM in facilitating the planning and management of research programs is well established. The major result, better and more cost effective research, is delivered in the form of a number of products, including a simulation model, a research plan, and reports. Other, less tangible products, include the development of a common understanding, increased communication amongst researchers and managers, a list of gaps in data and knowledge, and support for the research plan based on consensus and knowledge of its strengths and weaknesses.

The success of a research program can be enhanced by using AEAM throughout the course of the research program. During the initiation stage,

AEAM should be used to help with problem definition and the determination of what and what not to consider. During the operation stage of the program, workshops held at regular intervals should be used to evaluate and redesign research. Finally, the procedures are appropriate during the termination stage to integrate the results of the program."

The ESSA report notes the importance of including scientists, managers, and policy-makers in the process "to ensure that a credible, rigorous, and usable product is produced" (ESSA, 1982: 27). It also emphasises the usefulness of AEAM to ensure that research is "continually evaluated and adaptively redesigned in response to new knowledge and changing conditions" (ESSA, 1982: 27). The report concludes that AEAM is a cost-effective way of planning and managing research.

In addition to considering AEAM as a component of research itself, the ESSA report also reviewed AEAM from the EIA perspective (ESSA, 1982: 25-26). It found that AEAM modelling workshops could be useful at the initial stages of the EIA, and that it has a particularly useful role in the impact assessment and the follow-up and monitoring stages. In particular, the report concluded that the AEAM approach to EIA could provide (ESSA, 1982: 26):

- "● a more integrated analysis
- a clarification of the significant issues and identification of the insignificant issues and why
- an evaluation of alternative options
- a prescriptive analysis rather than descriptive
- a coordinated, open assessment with continuity from start to finish
- an iterative reporting procedure demonstrating the proponent was open to new insights and could adapt and learn as the analysis progressed."

In summary, the ESSA report provides strong support for the view that the AEAM approach to EIA may be particularly appropriate for application to research activities. As Holling argued, it is also well suited to problems facing developing countries (Holling, 1978: 17-19). Development agencies may therefore wish to promote the incorporation of an adaptive EIA methodology into research projects that they fund.



### **3.11 Conclusion**

The EIA of development-oriented research has yet to be examined in the literature dealing with EIA or international development. However, as this literature review has shown, the practical experience and the systematic analysis already undertaken in these other areas is of direct relevance to the subject of this study. In particular, the literature provides significant insights into both the challenges that confront the EIA of development-oriented research, and the approaches that might be taken in the design and implementation of EIA procedures in this context.

#### **4. REVIEW OF DONORS' THINKING AND PRACTICE ON THE APPLICATION OF EIA TO DEVELOPMENT-ORIENTED RESEARCH ACTIVITIES**

Donor agencies face the challenge of translating the theories and techniques discussed in the literature into practical programs and effective projects. Their experience with policy implementation in general, and with the application of EIA to research contexts in particular, can both serve to clarify and qualify the insights gained from reviewing literature. Our consultation with public and private development agency officials offers the chance to confront opportunities and constraints facing EIA applications to research from a different perspective.

Instead of considering methodological options in the aggregate, or generic theories about EIA practice, the respondents we consulted provide direct evidence of donor agency practices at the present and suggest future options for research EIAs. Because our sampling was selective, and not random, the views expressed below may not be representative of the full range of donor agency perspectives. Our consultations should be viewed as a window on the range of issues and methods that are of concern to the donor community. While this window may not provide a panoramic view that includes every part of the policy landscape, it does offer a chance to assess the lay of the land.

In general, donor responses can be seen to reflect three states of understanding about the EIA of research. On some matters, we have found a convergence of opinion among donor representatives that we contacted. On other matters, they have revealed a divergence of opinion. Finally, some of the issues that we raised in our consultations did not reveal any discernible pattern, with respondents reporting that little or no consideration had been given to that particular concern. These reactions will be covered in 11 subsections below, grouped around the themes of formulating environmental review indicators for research activities, implementing EIA in a research context, and evaluating both the EIA's influence on project outcomes and the assessment process itself.

##### **4.1 Formulating EIA Criteria for Development Research**

In asking donors about the criteria that would guide EIAs, we focused on issues of the purpose and structure of EIA, either as applied to development research or to development assistance projects with analogous qualities. Fundamental goals and objectives for EIA were discussed, as was the substance of criteria, guidelines, or organizational principles that would be passed along to whoever was charged with carrying out the EIAs themselves. Issues such as the meaning of research in a development context and the qualities by which to judge sustainability were also raised.

Overall, we noted a convergence of opinion on the desire to integrate EIAs into existing project development and evaluation procedures. We also identified a divergence of

opinion on the rules and organizational characteristics that would best accomplish such integration. When it came to the substantive principles that would guide EIA practice, donors had yet to address these concerns, at least in practice. Thus, while many donors have started to explore EIA options for development research, and some are testing out procedures that would incorporate EIA procedures into program or project development, none of our contacts reported a fully-developed EIA practice already in operation.

Donors' perceptions of the opportunities and problems posed by EIA procedures suggest that considerable potential exists for a coordinated, multi-lateral approach to EIA policy development. At present, divergent opinions about the means of applying EIAs to research appear to arise from a lack of clear and compatible objectives. This diversity does not imply incompatible goals, as much as it reflects the lack of experience that most donors admit with extending EIAs to research. The donor input that follows suggests that collaborative development of EIA policies among donors would facilitate convergence on effective EIA criteria. Such convergence would, in turn, open up a valuable opportunity to coordinate these assessment efforts in the future.

#### **4.1.1 The Purpose of Applying EIA to Research**

We found convergence around the goal of using EIA to facilitate sustainability in development research. Although respondents attributed different shades of meaning to the term sustainability, all of them shared a vision of using EIA to develop greater environmental awareness and sensitivity among both researchers and the wider public within developing nations. Introducing EIA practices into development research was thus viewed as more than an end in itself. Whereas industrial nations now use EIA procedures to achieve accepted environmental objectives, their role in development research was seen to extend into generating awareness about, and adoption of, environmental objectives themselves. In brief, implementing EIA would offer a means for developing nations to define their own vision of environmental sustainability in addition to providing a way to safeguard that vision.

In fostering an environmentally positive research culture and linking it to public awareness of environmental policy options, donors sought to guide development research towards an evolving notion of sustainability without compromising the freedom of investigators to set their research agendas. To accomplish these goals, our respondents agreed that research EIAs would have to become more than isolated add-ons or appendices to existing research proposals and project evaluations.

Utilizing EIAs solely as a "pass-fail" method to screen out unacceptable risks was judged to send researchers the wrong signals about the significance of environmental objectives. Instead of leading to integration of ecological objectives into research strategies, such stand-alone EIAs would encourage the perception that such information was a "sunk cost" of the approval process, or just another bureaucratic hurdle where process was

divorced from substance. Assessments that generated value for money would be those that combined the ability to identify unacceptable risks while simultaneously encouraging researchers to consider new opportunities for sustainability in each aspect of their work.

The convergence of opinion about the importance of making the most out of EIAs in research reflects both the pull of rising international environmental priorities and the push of growing scarcity of resources for development aid. None of our donor respondents expected that the costs of research EIAs would be offset by additional funding. If EIAs were introduced as an isolated exercise in data collection and analysis, the cost of this activity was seen to come at the expense of existing budgets. Designing EIAs to do double or triple duty, in capacity building, incorporating environmental benefits into development research, as well as screening out unacceptable risks, was seen to offer the best hope of "doing more with less."

#### **4.1.2 Drawing Jurisdictional and Temporal Boundaries**

When it came to identifying the boundaries that would define research EIAs, donor agencies exhibited a moderate level of divergence regarding the physical and temporal lines that they would draw to delimit EIA practice. Defining the legal and administrative jurisdictions where different aspects of assessment would occur elicited a range of responses. Some agencies adopted the host nation's jurisdiction as the operative arena for most aspects of EIA practice; all acknowledged that primary data would be collected in the host's jurisdiction. Other organizations treated the donor's jurisdiction as the appropriate forum for evaluation and adjudication, and some donors looked to hybrid arrangements, such as bilateral or multilateral assessment panels, or even third party institutes or independent committees, to manage the EIA process.

Jurisdictional issues were linked to substantive concerns about the standards that would be applied in EIAs, discussed in Section 4.1.3. below. Yet the concern over maintaining acceptable EIA standards and retaining jurisdictional authority in the donor nation turned out to be inversely correlated. In other words, agencies that worked through either the host nation's jurisdiction or assigned jurisdiction to third parties reported a lower level of concern about EIAs (often in development projects more generally rather than research) compared to agencies that evaluated and adjudicated projects under domestic jurisdiction. Relying upon host nations and third parties to manage EIAs appears to have facilitated processes that work by consensus and lead to higher levels of donor satisfaction than processes regulated exclusively within the donor nation's jurisdiction.

Disputes about development programs and policies at a more general level were acknowledged by agencies that delegated EIA responsibilities to other jurisdictions, but these differences were resolved more systematically, leaving an unobstructed field for EIAs to occur at the project level. Being free of such obstacles, respondents that decentralized EIA practice to host jurisdictions reported satisfaction with the opportunities for collaborative

learning. These donors noted that the trust and mutual understanding built up during EIAs often contributed real value to the project's implementation. It is also possible that resolving differences over policies and programs at a strategic level served to screen out projects where EIAs would have created controversy and tension.

Donors that pursued EIAs largely within their own jurisdictions appeared more concerned with the conflicts and potential disputes that arose from seeking to reconcile their practices with those found in host nations. Domestic pressure from environmental advocacy groups, courts, and the media added an adversarial dynamic to the relationship between donor and recipient. Some respondents were of the opinion that such pressures were beneficial, or at least justified, in keeping agencies in tune with the environmental priorities of the society that provided the resources. However, the same dynamic that held agencies accountable to their own nation's environmental laws also appeared to inhibit compromise and cooperation with host nations.

When officials discussed the training and education programs used to broaden the shared knowledge base of hosts and donors, noted in Section 4.2.3, it became clear that jurisdiction also played a part in the location of such capacity-building efforts. Agencies focused on conducting development EIAs in their own national jurisdiction appeared more likely to import engineers and scientists for training, while agencies working through host jurisdictions tended to send resources and personnel in the other direction, exporting the technical skills used in EIA to jurisdictions where they would be put to use. If nothing else, the latter method appeared to avoid the problem of host nationals resettling in the donor nation after their training was over and thus not transferring the skills where intended.

Setting a time frame for assessing the environmental effects of research revealed diversity, but not much disagreement, among donors. For many respondents the issue of how to balance the assessment of research activities' past, present, and future impacts had not yet been addressed. At one extreme, a respondent suggested that the appropriate temporal horizon for assessment must extend back well before the research proposal. Applicants should be expected to justify the formulation of their projects in terms that showed relevant and significant involvement beyond the laboratory from the project's inception. From community consultation to the incorporation of indigenous knowledge in establishing the hypothesis to be tested, it would be up to researchers to reach back to a project's formative stage, or to reformulation in the case of multi-phase activities, and demonstrate that input from non-scientists was not treated as an obstacle to the pursuit of research activity.

Some respondents focused their temporal horizon on the present, judging research by its current and immediately foreseeable effects. If use of a new chemical was proposed, for example, researchers must demonstrate a plan to safely dispose of it during and after the project. Agencies that oriented their EIA practice to the present time tended to identify international standards (e.g., in chemical safety, biotechnology, and other scientific practice) as necessary components for project approval. Instead of replicating these judgements for

an EIA, one respondent suggested that they be adopted at face value from these generic contexts.

Another donor illustrated how temporal boundaries had been drawn to assess research on the genetic modification of potatoes. The project sought to create a potato that was resistant to a particular form of herbicide. EIA was directed at the research process itself, while longer term concerns (e.g., the results of increased herbicide use on groundwater) were identified and assigned to another agency with particular expertise in water quality assessment. An EIA of increased pesticide use would be required if the research proved successful. This donor acknowledged that such a temporal segmentation of EIAs required the technical and administrative capacity to carry out more specialized analyses. More generally, forecasting efforts were judged to be justified in proportion to the perception of risk involved.

#### **4.1.3 Standardized versus Specialized EIA Criteria**

Responses on the appropriate criteria for research EIAs diverged most on the question of standardization. We found two distinctive norms in donor practice that suggested alternate paths for extending EIAs to research. While some donors worked with a standard set of criteria (e.g., the attributes that would be used to screen project submissions, rules of standing and participation in scoping, selection and weighting of valued ecosystem components, and thresholds of unacceptable disruptions) that all funding applicants were expected to address, other agencies adopted project-specific criteria based on consultation with applicants, evaluators, and other stakeholders.

Those who pursued EIAs using a standard set of criteria cited equity, effectiveness, and accountability to responsible authorities (e.g., elected officials, ministers, or courts) as justifications. Using the same criteria was seen to be fairer than adopting different, and perhaps incommensurable, standards for evaluation. A uniform list was also judged to be more economical in time and resources than *ad hoc* negotiations over project criteria. Uniform standards were viewed as the most effective means of ensuring that the priorities set by responsible authorities were translated into practice. Legal constraints were cited as mandating treatment that could be demonstrated to be consistent.

Proponents and practitioners of selecting criteria within a specific program or project's context justified their approach on the grounds of accommodating cultural pluralism, facilitating cooperation, and responsiveness to change. Creating assessment criteria within the context of a project or program offered both donor and host representatives the opportunity to incorporate distinctive values into both the project and its evaluation. Working out these differences in a setting where the opportunities were concrete and immediate was viewed as facilitating tolerance and mutual respect, both between host and donor representatives, and within the host nation (e.g., by creating an opportunity for including non-traditional stakeholders such as indigenous peoples, women, and community

representatives). Reconciling potential differences would also be facilitated by avoiding the adjudicatory dynamic inherent in a predetermined check-list of criteria. Several donors expressed a growing respect for methods and practices that could accommodate the unforeseen factors that often emerged as crucial problems in the implementation of development projects. An adaptive or *ad hoc* approach to EIA would better position all those concerned with a project to detect the unexpected and to respond to it in an effective manner.

In seeking to account for the variance between preferences for independent versus contextual criteria for EIAs, the status and experience of donor agencies stand out as relevant categories. In terms of status, donors which are run or funded exclusively by governments exhibit a greater preference for uniform and independent EIA criteria than private funding agencies. When it comes to experience with EIAs of development projects, the donors who had been conducting evaluations longer and more extensively were more likely to support heterogenous and contextual EIA criteria than agencies that had a more limited history of EIA involvement.

Part of governmental donors' orientation toward uniform criteria can be explained by the greater public scrutiny that their decision-makers face. These respondents indicated that greater public input in the donor nation constrained administrative discretion in areas such as the setting of assessment criteria. While some public sector respondents indicated a desire for flexibility in evaluation and adjudication, the plan of investigation had to be followed in a uniform manner.

Agencies with more experience in conducting EIAs appeared more confident in relying on the professional norms of those engaged in development work than on the predictive abilities of those drafting generic EIA standards to produce valuable information and enhance project outcomes. The longer the working relationship between a donor and a program or project recipient, the greater the level of trust was placed in that relationship to address environmental concerns and adapt to unforeseen circumstances. One respondent cited such adaptability as essential to proceeding with projects that were controversial, either because of high impact or high risk.

After concluding that tropical rain forests could not be preserved without viable economic activity for their inhabitants, one donor launched a project to develop sustainable forestry practices in the Amazon basin. Since this research would involve logging, the donor planned the project to run in a number of two year phases, with an EIA conducted for each phase. By adapting EIA criteria based upon experience in each phase of the project, the donor felt confident that unforeseen circumstances would not create unacceptable risks. The time period between reviews in this project was also significantly shorter than for standard projects.

## 4.2 Implementation of Research EIAs

The input we received on implementing research EIAs came almost exclusively from donors who did not practice such reviews. Only one respondent identified an operational EIA procedure that it applied to development-oriented research projects. This limited experience certainly contributes to the divergence of opinions that we discovered among donors. It also explains the degree to which certain issues that we raised were largely or completely novel to our respondents. We explored five broad aspects of EIA implementation: the efficacy of screening projects; the norms for scoping ecological concerns into an assessment; achieving appropriate levels of technical and administrative capacity; the methods and procedures for adjudication; and what role self-assessment should play in research EIAs.

### 4.2.1 Screening

Donors' hypotheses on appropriate screening ranged from elaborate exercises with numerous gradations of resulting activity to blanket policies that did not distinguish between EIA expectations at a project's outset. One respondent suggested that projects be screened using an eight point scale of assessment categories. Each category would entail successively greater responsibilities and expectations for EIA practice. Another donor indicated that no screening should occur before a project got underway. In order to be approved, research would have to meet standard EIA criteria, with further evaluation to be dictated by the research results.

For agencies that were currently practising EIA, screening appeared attractive because it allowed for control over how new activities would be implemented. Agencies could thus develop an initial set of screening criteria that allowed them to manage the flood of new responsibilities, testing out alternative practices along the way. Another appeal of screening procedures was their perceived opportunity to contain EIA costs. Projects with significant risks, or those with widespread social and ecological disturbances, were seen to merit major assessment efforts which were perceived to be costly in both time and money. Respondents expressed the desire to regulate the intensity of assessment so that resources could be allocated in proportion to risks.

The World Bank's well documented EIA implementation process provides an example of how devoting resources to screening efforts can yield a considerable payoff in the total assessment budget. The Bank's three volume *Environmental Assessment Sourcebook* (International Bank for Reconstruction and Development, 1991) illustrates the operative principle of linking expectations to the anticipated impacts of a project. The larger the magnitude of impacts, the greater detail and sophistication that is expected from EIA efforts. One of the architects of this process has noted that projects judged to have "serious and multidimensional environmental concerns" require the creation of an advisory panel of independent and internationally recognized environmental experts (Goodland, 1992: 12). This panel then works with both the Bank and the applicant to review and advise on the



terms of reference for the assessment, the evaluation's findings, the implementation of recommendations, and the development of requisite environmental capacity in the implementing agency or ministry. Goodland goes on to note that EIAs generally account for 5 - 10% of the costs of project preparation. This suggests that a well developed screening process can result in dramatic differences in the practices and expectations of EIA, and yield considerable savings over a uniform assessment process.

#### **4.2.2 Scoping**

The issue of scoping revealed no middle ground between reactions based upon familiarity and those reflecting uncertainty. A few respondents revealed considerable insight into scoping issues based upon first hand experience in their agency. But the majority of those whom we talked with felt they had little or nothing to add on how scoping should be implemented. This divergence suggests that donors' ability to assess scoping methods requires a level of experience with both EIA practices and research activities that is not currently widespread.

Agencies that did have experience in scoping EIA research were all those where experience had led to decentralized patterns of assessment and adjudication (see Section 4.1.2 for discussion of the relationship between experience in development EIAs and a preference for delegating responsibility). Scoping was conducted in the host environment, often by local EIA practitioners working in conjunction with local or jointly-appointed evaluation panels. Respondents claimed that scoping criteria were not contentious. Ecological values and the tolerance for risk were substantially the same among host and donor participants. When possible, *ex ante* impact assessments were carried out on the potential products and byproducts of research programs.

One respondent noted that scoping criteria were tied to strategic research policy reviews, formulated through a process of widespread consultation among allied donors, project recipients, and host nation representatives. As a result of fashioning strategic goals and objectives, the values used to orient scoping became clear and uncontested among those charged with EIA. Perhaps because scoping posed broad questions to those contemplating the EIA of research, it also appears to draw forth answers to the substantive issues raised in raised in Section 4.1 once agencies begin to implement EIAs.

#### **4.2.3 Technical and Administrative Capacity**

All our respondents acknowledged that technical and administrative limitations posed a very considerable obstacle to implementing successful EIAs, both in research and more generally. The importance of capacity had been underscored by years, and in some cases decades, of experience in development work, usually as a result of evaluating programs that had fallen short of their goals.

While all donors saw the need to fill gaps in capacity, their approach to capacity building diverged on the question of training. For some, training was a parallel process that sought to build skill levels and expertise among host representatives at the same time that development projects were implemented. Other agencies, however, treated at least some development projects as training exercises with an applied context. In such an approach, each development research project was valued in terms of the technical education it offered in addition to the potential contribution of its outcome. Thus projects with modest ambitions in their research objectives could be funded if they provided a high level of technical exposure and skills enhancement to a research community.

Those respondents who pursued training strategies within the context of research projects suggested that such a strategy recognized, and capitalized upon, the educational dynamic that was inherent in research. Acquiring skills development and administrative upgrading "on the job" was seen to enhance the learning experience. Furthermore, integrating training into development projects offered a greater opportunity to balance the skills provided with those that would be needed to carry on with the project. Thus, EIA procedures could themselves serve as training opportunities in environmental measurement, administration, and assessment techniques.

Other respondents practised parallel capacity-building efforts by bringing administrative and technical training directly to the host nation. Providing a "menu" of training options appeared most successful in dealing with the uneven distribution of skills among host nations, regions, or even different professions. Advance consultation over training allowed for customized programs to be drawn from this larger menu.

A key question posed by these alternative understandings of the relationship between building technical capacity and development research is whether the EIA process can also be conceived in these terms. If the EIA is also viewed as an opportunity to build technical and administrative skills directly, then the role of host participants would necessarily be far greater. Even if such input raised the costs, or slowed the implementation of EIAs to research, these drawbacks would have to be weighed against the benefits of capacity building. On the other hand, if capacity building can be effectively achieved in parallel, then local participation in EIAs would be judged by the same standard as any other option for data gathering and analysis.

A third option for capacity building would involve third parties in either parallel or integrated capacity-building efforts. Some donors have funded institutes or educational institutions to provide environmental outreach programs. If these programs were focused on EIA practices, then researchers in developing nations could partake of training and consultative services in order to gain experience with environmental standards and assessment techniques. This exposure would then be integrated into research proposals and EIA submissions, either through self-assessment (see Section 4.2.5 below), cooperation with external assessors, or peer review. Sponsors of such initiatives expressed confidence that funding third-party resource providers offered valuable returns on investment. The overall

objective was to incorporate environmental skills into the professional norms of the research community in developing nations.

#### **4.2.4 Adjudication**

Donors did not exhibit a clear pattern of opinion on adjudicating research EIAs. Like scoping, experience was a prerequisite for a fully-developed position on adjudication. But even those agencies with considerable experience in EIAs did not exhibit marked preferences for a particular approach to adjudication. Experienced respondents indicated that they were continuing to experiment with different methods, ranging from project-specific assessment panels to building EIA adjudication into multi-year reviews of research programs. Adjudication preferences appeared to be in a state of flux.

#### **4.2.5 Self Assessment, Peer Review, and External Review**

Donors agreed that assessment options posed significant implications for EIA costs. External review was seen to be the most costly option. While respondents agreed that the expense of external assessment was justified in cases of high risk activities, the question of how far to extend external assessments triggered divergent feedback. Some donors expressed a desire to include external assessment as a component of all EIAs, using in-house resources where possible to keep costs down. Others suggested that more generic forms of common external assessment, such as multi-year program reviews, could provide a clean bill of health, and thus satisfy the need for independent input. Some respondents stated that there was no need for uniform assessment practice, so that many EIAs could be handled through peer review and self-assessment.

Peer review was described as a balanced option that combined cost-effectiveness and independence. Donors familiar with peer review highlighted its interdependence with the technical capacity of a given research community. In order for peer review to be effective, a certain level of technical capacity had to be available among researchers in a host nation. Yet once that threshold had been crossed, peer review was seen as a valuable opportunity to improve upon a research community's environmental skills by creating an ongoing need for practising those techniques. Peer review could thus help stretch development resources further by generating spin-offs in enhanced capacity within a research community.

Self-assessment was judged to be a necessary component of future EIA practice, once policy implementation had reached a critical mass of administrative and technical effectiveness. One respondent noted that self-assessment was inevitable as the net of EIA was cast ever more broadly. Neither donors nor recipients would have the resources to assess every project through external or peer review. Another respondent noted that self-assessment techniques would be most effective when linked to project evaluation procedures that included post-approval review of the EIA process (see Section 4.3.2 below).

While respondents' opinions converged on the need for all three approaches to assessment, the long term balance envisioned for these methods differed. External review would maintain predominance where and when the magnitude of projects under review was greater than local capacities. Peer review would emerge as a significant component of EIA practice as the balance of technical and administrative capacities became proportional to the risks and disruption of projects under review. Self-assessment would take on an increasing share of such review once local capacities exceeded the analytical challenges posed by many projects.

### **4.3 Evaluating EIA's Results**

Since very few donors have mechanisms in place for evaluating the outcome of development project EIAs, either in research or more generally, we received highly speculative responses to this topic. While respondents acknowledged the importance of evaluating EIA practice, both to monitor its influence on the environmental effects of development research and to enhance future EIA practices, few had reached the stage of experience where EIA evaluations were in place. The uncertainty about what EIA practices would emerge in development research was seen to pose a challenge to planning for evaluation. Yet certain sources of information were identified as necessary ingredients for whatever evaluation mechanisms might evolve.

#### **4.3.1 Research Reporting**

Only a few respondents required any feedback on the environmental impacts to be included in research reports. When asked to consider what kind of environmental information should be requested from researchers, donor opinion diverged. Some donors expressed concern with precipitating more information than needed, noting that EIAs tended to produce more environmental data than agency staff knew what to do with.

Other respondents indicated a preference for wide-ranging input, at least in the initial phase of developing research EIAs. All acknowledged the difficulty of setting an appropriate standard in the formative stage of EIA application. Some respondents identified emerging information technology (e.g., on-line data bases for project and program information, and results reporting) as a means of lowering the cost of such information, thus allowing for more ambitious reporting requirements to be pursued.

#### **4.3.2 Program Evaluation and Review of the EIA Process**

Program evaluations and post-approval review of EIA process were recognized as valuable means of building feedback on research impacts into donor practice. As EIA procedures moved off the drawing board, the value of program evaluation was judged to be

especially important. Decision-makers would need good diagnostic tools to help them compare the *ex post* results of different EIA approaches systematically.

At later stages of EIA's application to development research, reviews of the EIA process were seen to complement an increasing reliance on self-assessment. Once researchers were well versed in EIA techniques and exposed to the procedural and substantive standards in place through participating in externally managed reviews, they could then contribute a greater share of the data and analysis used by decision-makers. In such a devolution of responsibility to the research community, general reviews of EIA practice would come to serve as a cost-effective check on an increasingly self-directed process.

Respondents with experience in this area underscored the need to plan EIA procedures with a post-approval review function in mind. They noted that it was virtually impossible to recreate the paper trail of information needed to carry out a successful review unless advance provision had been made for documenting and conserving needed inputs. Advance planning also served to harmonize objectives and avoid any stigma attached to this mode of investigation.

#### **4.3.3 Multilateral or Multi-Disciplinary Coordination of EIAs**

Another means of containing EIA costs that appealed to a number of our respondents was the potential for coordinating practices among donor agencies that crossed national or disciplinary bounds. Such coordination could range from pooling resources to establish and maintain a common data base of environmental information to creating joint assessment teams for projects or programs. The option of two or more donors conducting joint EIAs could facilitate a division of labour where agencies focusing on particular regions or disciplines could team up with counterparts having different specialties to mutual advantage.

Respondents agreed that the promise of such coordination justified an extensive consultation on and exploration of possibilities, since no such model yet exists in practice. To some degree, the lack of entrenched EIA practices in research, with their inevitable differences, was seen to create an opportunity for coordinating and integrating EIA practice among donors. The present state of flux in this policy area was seen to present an opportunity for joint development of standards and practices that would lead to coordinated and integrated EIA procedures in the future.

#### **4.4 Conclusion**

Our consultation of donors on applying EIA to development-oriented research revealed considerably more theory than practice. One respondent has developed a focus on environmental impacts in its program and project assessments to the degree that its activities

constitute an EIA by default. Some respondents have started to consider filling this gap, but have yet to formulate policy options. Many respondents have not even considered taking up this issue.

This extremely limited state of practice creates an opportunity to develop criteria and procedures that can serve more than one donor's needs. If policies are developed through consultation that crosses agency, disciplinary, and geographic boundaries, then potential for collaborative, efficient, and effective EIA practices will increase. But given the diversity of opinion we encountered on certain key points, ranging from jurisdictional concerns to the appropriate level of standardization for evaluation criteria, such coordination appears unlikely to emerge without leadership. Thus one of the first issues that a donor agency contemplating the application of EIA to research ought to contemplate is whether the benefits of coordinated EIA implementation would be worth the costs of providing leadership in policy formation on the application of EIA development-oriented research.

## **5. REVIEW OF RESEARCHERS' THINKING AND PRACTICE ON THE APPLICATION OF EIA TO DEVELOPMENT-ORIENTED RESEARCH ACTIVITIES**

Our objective in contacting development researchers was to offer the perspective of those whose work would be subject to new EIA procedures and standards. By testing researchers' reactions to the issues and concepts that we had discussed with donors, we hoped to identify the dimensions of consensus as well as to flag areas of potential conflict. While our limited contact with researchers can only be suggestive, the candid feedback that we received raises issues that were not articulated elsewhere. In following the same organization as used in the previous section, we only discuss issues where researchers were either strongly supportive of, or greatly at odds with, the position of donor agencies. In a number of topics, the researchers we spoke with had no opinion.

### **5.1 Formulating EIA Criteria for Development Research**

Researchers were open to the prospect of identifying the environmental impact of their work. They expressed apprehension that if standards and procedures were inspired by inappropriate administrative or legal requirements, then research EIAs would be neither effective nor efficient. Respondents were unanimous in hoping that donor agencies would resist the temptation to adopt criteria and procedures from standard EIA practices before adapting them to the unique context of development-oriented research.

#### **5.1.1 The Purpose of Applying EIA to Research**

A precondition that appeared necessary to gaining support for EIA requirements among researchers is the identification of clear objectives and commonly-accepted problems with development research that could be addressed through the use of EIA. The increasing focus on sustainable and equitable development within the international funding community may provide a starting point for meeting this precondition. If researchers believe that EIA will contribute to the quality of their work and will avoid undesirable (i.e., environmentally unsound or inequitable) applications of research products, then they are more likely to view EIA of development-oriented research as a positive step forward. The link between EIA and research outcomes should not, however, be taken for granted. One researcher suggested that establishing the credibility and usefulness of EIA requirements, and overcoming scepticism that it constitutes simply another bureaucratic hurdle for researchers, would require measures to educate researchers about the need for EIA. Once initiated, EIA would have a limited period of time to prove its value in the eyes of researchers.

### **5.1.2 Drawing Jurisdictional and Temporal Boundaries**

Respondents did not articulate a clear pattern of opinion about how the jurisdictional and temporal parameters for research EIAs should be set.

### **5.1.3 Standardized versus Specialized EIA Criteria**

Researchers saw a need to articulate EIA criteria that would accommodate the unique nature of research. These criteria must address the high level of unpredictability inherent in research. This unpredictable relationship between hypotheses, experimentation, and discovery would have to be accommodated by principles that did not necessarily equate uncertainty with excessive risk.

## **5.2 Implementation of Research EIAs**

The issue of implementation triggered concerns about transparency, adaptability, flexibility, and openness. Incremental approaches to policy development, including extensive pilot or demonstration projects, were favoured over the introduction of uniform, fully fledged methods and procedures. Researchers appeared willing to assist in implementing EIAs, through peer review and self-assessment. In general, collaboration rather than coercion was argued to yield more enthusiasm for procedures and better results.

### **5.2.1 Screening**

Researchers indicated equal or greater enthusiasm for project screening than donor representatives had done. The objective of making efficient use of time and resources appeared to be mutual, and the link to screening appeared consistent. Although screening procedures would benefit both donors and researchers, one respondent suggested that it should not become a substitute for integrating environmental awareness into the design of research projects. In other words, although screening offered a timely and efficient means to get EIAs off the ground by allowing for widely different project proposals to be addressed by appropriate evaluation procedures, the screening function should eventually serve to discriminate among projects on the basis of exogenous environmental risks rather than the variation in which researchers took environmental impacts into account.

### **5.2.2 Scoping**

Given the uncertainty accompanying development research, it's not surprising that respondents expressed considerable interest in the question of scoping. Researchers consider themselves to be engaged in scoping throughout their work, in choosing how to interpret



their data, which hypotheses to modify, and what alternatives to pursue. They supported the idea of scoping as a way to harmonize EIA with the logic of their activities rather than forcing their work into exogenous analytical constraints.

For example, rather than insisting upon an impact assessment of results that are exceedingly uncertain, respondents suggested that scoping procedures should be used to design an EIA that fits the parameters and timing of the project. Assessment of the initial research process could be handled by an ordinary EIA. Scoping could then identify environmental indicators that would be appropriate to evaluate subsequent phases of the investigation and build them into the research design. Scoping would thus allow researchers to justify their efforts on environmental criteria that were best suited to each stage of the logic of their discoveries. If done properly, scoping would thus facilitate both environmental and scientific objectives at the same time.

### **5.2.3 Technical and Administrative Capacity**

When it came to technical and administrative capacity, the researchers we spoke with (all in Canada) emphasized that a lack of resources to start partnerships with colleagues in developing nations constituted a major constraint on host participation in all aspects of project development. Researchers experience considerable difficulty in involving developing-country partners in the pre-approval stages of a project because of logistical and financial obstacles. Prior to a project's approval and funding, there is rarely money available to permit effective collaboration. This problem has important implications for the participation of developing country partners in the pre-approval EIA of research projects. Unless funding agencies are prepared to make seed money available to researchers, this type of involvement may be difficult to achieve. Researchers hoped that EIA standards would recognize this constraint on pre-approval contact and collaboration and factor it into the expectations for projects. Host participation in EIA procedures could be phased in during the course of the project as researchers in donor and host nations have more opportunities for interaction.

Donors and researchers diverged on their perceptions of how collaboration on projects contributes to capacity-building strategies. Donors had suggested that building capacity was an integral part of many projects, but researchers suggested that transferring skills and technological ability in the implementation of a development project was much more the exception than the rule. Advisors from the donor nation frequently took primary or exclusive responsibility for implementation, because time constraints, logistical problems, or the existing level of partners' technical ability were seen to preclude collaborative learning. As a result, when the experts from donor nations depart, there is frequently inadequate technical expertise left behind to sustain the project or provide adequate follow-up.

Some researchers added that turnover among collaborators in host nations was high and that even successful efforts at skills transfer required constant retraining initiatives.

Researchers who were positively inclined towards capacity building, thus cautioned against unrealistic expectations that it would remove the technical and administrative constraints to implementing EIAs in host nations.

#### **5.2.4 Adjudication**

Most respondents did not express an opinion about how EIAs should be adjudicated. One researcher suggested that development funding agencies may be in something of a conflict of interest situation when practising internal adjudication of EIAs given their role, in many cases, as the project's initiator and sponsor. Project officers may thus be reluctant to implement an EIA process that would restrict their own work. Separating assessment from adjudication responsibilities would vastly reduce such temptation.

#### **5.2.5 Self-Assessment, Peer Review, and External Review**

Each of the three assessment options were viewed as being appropriate to a particular form of EIA. External review was seen as a useful means to prepare strategic studies of the environmental effects of national, regional, or sectoral, research programs. These findings could then be incorporated into all project-specific assessments prepared in that nation, region, or sector. Ongoing research activities, such as the advanced stages of multi-phase projects, were seen to benefit from peer review, where other researchers' perspectives would be a valuable addition to research. Self-assessment was judged to be most appropriate for the initial phase of most research projects, providing the opportunity for researchers to address the environmental impacts of their investigation, in light of the broader environmental concerns raised in externally reviewed strategic reports.

### **5.3 Evaluating EIA's Results**

The evaluation that counts most to researchers is the informal judgement that they and their colleagues will make of how EIA is affecting their own work. If a research community can share positive experiences in the early stages of such a program, the forward momentum of EIA efforts will be given a boost. Because the context by which researchers will evaluate EIAs differs from the one in which donors will do so, the potential for divergent interpretations must be recognized.

#### **5.3.1 Research Reporting**

Researchers were open to including environmental impact data in their reports to donor agencies. Some respondents suggested that donors should treat such information as

an opportunity to adjust their EIA criteria, and build this feedback into subsequent stages of EIA for multi-phase projects.

### **5.3.2 Program Evaluation and Review of EIA Procedures**

Follow up monitoring of any kind was far from the norm among researchers we contacted. A respondent noted that even the World Bank tried to minimize such *ex post* environmental assessment of projects it funded. Adding such a component to research projects was seen to require a major commitment of resources. New administrative structures would also have to be created. Researchers wanted clarification on what role follow-up monitoring would play before they supported what they perceived to be a demanding assessment objective.

### **5.3.3 Multilateral or Multi-Disciplinary Coordination of EIAs**

Researchers were eager to see reductions in the overlapping and duplicated efforts that they noted in the donor community in all aspects of program delivery. The less resources spent on parallel assessment, evaluation, and adjudication procedures, the more that would be available for program delivery. Tying EIA introduction to a broader pattern of donor coordination was seen to send the most positive signal that new requirements would contribute to making the development and funding of research projects more manageable.

## **5.4 Conclusion**

Researcher input at the policy formulation stage can contribute to the successful application of EIAs. Some issues that donors did not identify were raised in our very modest test of researcher opinion. Whether donors choose to adopt researchers' suggestions or not, awareness of these concerns will contribute to policy design. In order to facilitate the frank responses that we received, donors should consider pursuing researchers' input through third party investigation. Contact from those outside both the donor and development research community is most likely to elicit candid feedback that will add value to EIA policy development.

Since conferences form a natural venue for the scientific community, the possibility of a symposium or congress on emerging EIA experiences would present a good opportunity to bring researchers, donors, and EIA specialists together to focus on some success stories and interact on how to fine tune the inevitable shortcomings of research EIAs.

## **6. RECOMMENDATIONS AND CONCLUSIONS**

This section consolidates the principal recommendations and conclusions of the study. It is based on the literature review and the interviews with representatives of donor agencies and with researchers. Where more than one option warrants consideration, or where additional information is required before reaching a firm conclusion, the discussion is qualified appropriately.

### **6.1 The Need for EIA Procedures for Development-oriented Research**

The literature review and interviews with development agency personnel and with researchers leave no doubt that the consideration of environmental effects is widely accepted as an essential component of development projects. The origins of this acceptance go back at least to the Stockholm conference on the human environment in 1972. The close scrutiny accorded since the 1970s to a significant number of development projects having major, and often unintended, negative environmental effects has also underlined the need to take environmental effects into account in the project planning and approval processes. It is clear from our interviews and from the written material produced by development agencies that the United Nations Conference on Environment and Development (UNCED), held at Rio de Janeiro in June 1992, also contributed a significant impetus in this regard.

It must also be noted, however, that development agencies differ significantly in the formality and sophistication of their processes for the environmental evaluation of projects. For some agencies, there is merely an informal understanding that environmental effects will be taken into account. For others, something approaching a formal EIA process is in place. In most cases, there appears to be evidence of an increasing commitment to developing EIA procedures and the expertise required to implement them.

In the specific context of development-oriented research, the need for EIA is less widely recognized. We encountered a range of opinion, from strong support for formalized EIA processes for research to the view that EIA of research was a low priority for all concerned (i.e., funding agencies, researchers, and developing-country partners) and was, at best, something for the relatively distant future.

On balance, however, there is a strong case for subjecting development-oriented research to EIA. This case is based on two principal arguments. First, the use of EIA in this context is a logical extension of the accountability that funding agencies must show for the environmental implications of development projects in general. Agencies must answer to their political masters and public constituencies, and conducting EIA is increasingly viewed as an essential component of sound environmental practice. Agencies that fund research activities are unlikely to succeed in claiming exemption from this general standard of conduct.

Second, it is evident that research projects can have potentially serious direct and indirect environmental effects. For example, experimentation with dangerous chemicals, such as certain pesticides, may directly affect the natural environment and human health, and may also raise waste disposal issues following completion of the research. Research in biotechnology and genetic engineering, or using exotic (i.e., non-native) species, can pose significant environmental risks if the organisms or species escape or are released into the environment. Research may also have significant social or health effects if, for example, researchers introduce diseases into indigenous populations having no natural immunity, or alter traditional patterns of human-environment interaction (such as agricultural or other land-use practices). Certain research activities could also lead to the introduction and spread of disease in animals, including domesticated species. These examples show that research is not a category of activity that should be exempted from EIA requirements.

Clearly, all research activities should not be subjected to an extensive EIA process prior to approval. In fact, a guiding principle in EIA design should be the ability of the process to distinguish rapidly, and with minimum expenditure of time and money, between activities requiring detailed scrutiny and those that raise no environmental concerns. The findings of this study indicate, however, that EIA should be a component of decision-making regarding all development-oriented research.

## **6.2 The Generic EIA Process and the Research Context**

This study confirms that the generic EIA process, outlined in Section 3.3 of the literature review, provides a useful model for the EIA of research activities. There are both practical and methodological reasons for using this model. As a practical matter, our interviews indicate that the first step taken by most agencies in the application of EIA to research is the evaluation of the researchers' proposed activities using the agency's standard EIA process. The research activity is screened and, if necessary, evaluated in more detail in the same way as any other project.

The methodological reason for beginning with the generic process is that EIA of research shares many of the characteristics, and problems, of standard EIA. Since the generic EIA process has been developed to address these characteristics and problems, there is no need to invent a distinctive EIA process for research. Rather, effort should be directed towards the identification of particular issues raised by development-oriented research that must be addressed if the EIA process is to operate effectively and efficiently. The focus on the distinctive features of development-oriented research has guided this study, and explains why our recommendations and conclusions suggest ways to tailor the generic EIA process to this particular context.

### **6.3 Adaptive EIA and Decision-making**

The importance of focusing the EIA process on decision-making is a central theme of this study. This theme has important implications for EIA in general, and for the EIA of development-oriented research in particular.

When designing and implementing EIA processes, it is important to keep in mind that the purpose of EIA is to improve decision-making. Considerations of effectiveness and efficiency dictate that the information collected, the analysis conducted, and the application of that information and analysis, be closely related to the decision-making process. The approach taken to the EIA must be a function of the decision-maker's mandate. It is therefore essential to identify the needs of the decision-maker and the general parameters (or objectives) that will guide the decision. Agencies funding development research should have clear answers to these questions before embarking on the design or implementation of EIA processes for research activities.

The generic EIA process, described in Section 3.3 of this study, includes both a "decision-making paradigm" and a set of four stages, one of which is "project decision-making". It should be emphasised, however, that decision-making occurs at all stages in the EIA process. Even before a project is formally considered, informal discussions with the funding agency may establish general parameters, or lead to a decision that the research project should not be pursued because of its potential environmental implications. The next decision point, to use Wathern's term (Wathern, 1988: 6) occurs at the screening stage, where initial decisions are made regarding potential effects and the need for an EIA. Issue scoping and impact analysis also result in a range of possible decisions regarding the importance of issues and the type of analysis required to resolve uncertainty and provide the basis for decision-making on project approval. When an EIA is required, the next decision point occurs when the decision-maker determines, on the basis of the EIA and other considerations, whether or not the project should proceed and, if approval is granted, under what conditions if any. Finally, the follow-up and monitoring stage can itself involve important decision points regarding improvements in project implementation. It may also have implications for the design of future projects and the EIA process itself.

This ongoing decision-making process is the key to the adaptive approach to EIA that we are suggesting. Making the EIA process adaptive is essential if it is to deal adequately with uncertainty, a particularly important consideration in the context of development-oriented research. Furthermore, it is necessary if the EIA is to be conducted efficiently, since the adaptive methodology allows for the continual discarding of trivial information and the re-focusing of the EIA on significant impacts. As emphasised in the discussion of the literature on Adaptive Environmental Assessment and Management (AEAM), successful implementation of the adaptive approach requires that the appropriate range of expertise be involved in the EIA, and that the EIA process explicitly provide for decision-making at every stage.

In addition to the methodological reasons noted above, the adaptive approach to EIA is well suited to the context of development-oriented research because it complements the adaptive methodology typical of many research activities. It is particularly appropriate for research that progresses through several stages and that has a strong applied focus. For these reasons, a principal recommendation of this study is that agencies funding development-oriented research should consider the adaptive model as a basis for their EIA processes. This model may usefully be combined with a quicker threshold evaluation at the initial screening stage.

#### **6.4 The Purpose of EIA**

The core function of EIA is undeniably the early identification of proposed projects having unacceptable environmental effects. Decision-makers in funding agencies can then refuse to support these projects, or can require modifications in design or implementation to meet environmental concerns. From this perspective, EIA is intended primarily to screen out environmentally unacceptable projects. This core function is essential for sound decision-making about development-oriented research. It provides a sufficient justification for the EIA of research activities.

The interviews conducted for this study with personnel from development agencies suggest, however, that EIA of development-oriented research may be viewed by some as serving a broader function. Several individuals stressed that the consideration of environmental implications was, or should be, integral to all activities supported by their agencies. Concepts such as sustainability are also providing a general framework for the design and evaluation of development projects, including research. As a means of formalizing these priorities and values, EIA is potentially relevant to all projects with direct (or, in some cases, indirect) impacts on the natural or human environment.

This use of EIA also corresponds with the general objectives and institutional culture of development agencies. Since the philosophy underlying development projects is the improvement of conditions in developing countries, and since the interrelationships between economic, social and environmental conditions are increasingly recognized, EIA may be attractive as a means of maximizing the benefits from development research, rather than merely being a management tool for minimizing environmental harm or identifying possible environmental trade-offs in project design and implementation.

EIA may serve this broader function in two ways. First, the establishment of formal EIA requirements can increase the general awareness among researchers and development agency personnel of the environmental implications of research activities. This effect is in a sense indirect, since it should be observed even if EIA is in fact applied only to projects that raise environmental concerns. Second, EIA may be used directly to identify ways of improving the design and implementation of research activities in general, including those without serious negative environmental effects. To play this role, more stages of the EIA

process would be applied to more projects than would be the case if EIA is limited to the basic screening out of potentially harmful projects.

As a result, using EIA to promote directly the broader objective comes with a price. Application to a range of projects beyond those having potentially serious negative environmental effects means that the cost and complexity of the EIA process will increase. Subjecting environmentally benign projects to EIA with a view to improving environmental performance still further may meet resistance from researchers and others who must bear the administrative and financial burden of the process. There is also a risk that the effectiveness of EIA as a decision-making tool could be diluted, if its role is extended from a focus on preventing environmental harm to a much broader mandate of promoting overall improvement of projects in environmental terms.

Some caution is required, therefore, in extending the purpose of EIA. While EIA may be used to increase overall environmental performance in research activities, establishing guidelines for researchers and assessing the environmental implications of agency decisions at the policy and program level (itself a form of EIA) may be more effective and efficient ways of achieving this objective. Further investigation of this issue in the context of specific EIA procedures is required before a firm conclusion can be reached.

## **6.5 Screening**

Screening is an important component of the EIA process for reasons of efficiency. A key element of the adaptive approach is the flexibility of the process to identify and exclude environmentally insignificant projects. Equally, screening may be used to identify projects that clearly have unacceptable adverse effects and therefore require no further EIA because they have no chance of being approved. Effective screening is particularly important for research activities, many of which will have no discernable environmental effects. Furthermore, additional administrative and financial burdens will meet resistance if they are seen to apply without distinction to all projects.

As noted in the literature review, a common screening technique is the use of exclusion and inclusion lists. This technique is found in general EIA legislation, such as the *Canadian Environmental Assessment Act*, and has also been proposed for development projects. Donor agencies might consider the use of these lists when designing EIA processes for research. A general criterion would be the exclusion from the EIA process of projects having no impact on natural or social systems. For example, research of the type undertaken for this study (i.e., literature review and interviews) could be screened out using an exclusion list. Equally, an inclusion list could identify other types of projects that should automatically pass through a more detailed EIA.



It should also be noted that screening needs not be a simple binary process of project exclusion or inclusion. In fact, there may be advantages in devising a screening procedure capable of classifying research activities in terms of their potential environmental consequences, and then assigning them to an appropriate EIA procedure. The objective would be to tailor the intensity of scrutiny under the EIA to the extent of the environmental risks associated with the research project.

## **6.6 Issue Scoping and Impact Analysis**

The issue scoping and impact analysis stage raises a host of specific issues for EIA methods. A generalized response to these issues cannot be formulated for an area as diverse as development-oriented research. However, this study does raise three general points that should be kept in mind.

First, the scoping process is not value-neutral. The need to identify specific valued ecosystem and social components (VECs) opens the door to cultural and professional values. In the context of EIA in a cross-cultural context, particularly where the relationship is between donor agencies and developing-country partners, sensitivity to these issues is important.

Second, indigenous knowledge may play a useful role in both issue scoping and impact analysis. While the challenge of integrating indigenous and scientific knowledge should not be underestimated, the contribution of the former to understanding the environmental implications of research activities has the potential to be significant.

Third, efficiency gains at the issue scoping and impact analysis stage may be achieved through class assessment procedures. These procedures may be used for types of research activities that are relatively uniform in terms of their environmental impacts and the appropriate mitigation measures. For these activities, preparation of a class assessment may greatly simplify, if not eliminate altogether, the issue scoping and impact analysis stage of the EIA process.

## **6.7 Project Decision-making**

The project decision-making stage is the point at which a decision is taken whether or not the proposed project will be approved. If it is approved, conditions and monitoring procedures may also be specified at this time.

A properly structured EIA process will generate the information necessary to reach an informed decision at this stage. The EIA requirements should therefore be designed with particular attention to the needs and objectives of the decision-maker. The decision itself should be made in an open and transparent manner, with adequate reasons provided to researchers whose projects are rejected or modified. In this way, the EIA process itself will

gain legitimacy and will serve as a means of increasing researchers' awareness of the environmental implications of their activities. It should also be emphasised that although this stage is the final decision in terms of project approval, it need not be the end of adaptive decision-making within the EIA process as a whole. Changes in project implementation, and decisions regarding the design of subsequent research projects, may result from the follow-up and monitoring stage of the EIA.

## **6.8 Follow-up and Monitoring**

There are four principal reasons for emphasising the importance of follow-up and monitoring in the EIA process. First, it is important to ensure that any conditions and mitigation measures specified as part of project approval are complied with during the implementation phase. Second, follow-up and monitoring may be used to continuously improve the research project and to make it more environmentally acceptable throughout the implementation phase. Third, without careful attention to this stage, it is difficult or impossible to verify the accuracy of the predictions of environmental effects on which project design and approval decisions were made. Verification of these predictions is necessary for systematic improvements in EIA methods or project design in subsequent projects. This learning process is particularly important in the context of development-oriented research, since projects often have an applied focus and may go through a number of phases of increasing magnitude, leading to large-scale application. Finally, project follow-up and monitoring has been identified as a weakness of development projects in general. In part, this problem arises because the follow-up and monitoring stage of the project cycle has not been properly planned, and funded, from the outset.

This last point warrants special emphasis. Monitoring of the environmental effects of research activities requires planning. Without systems in place to collect and analyze relevant information, it is often difficult or impossible to retrieve such information after the fact. Furthermore, follow-up requires time and money. Project funding should therefore take account of these requirements from the outset if the follow-up and monitoring stage of EIA is to be completed and integrated successfully into the project planning and approval process.

## **6.9 EIA Methods and Research Activities**

The range of activities included in the category of development-oriented research is too broad to be amenable to a blueprint of specific EIA methods at this stage. This study has highlighted, however, the methodological advantages of an adaptive approach as illustrated by the procedure known as Adaptive Environmental Assessment and Management (AEAM). Within that general methodological framework, the choice of specific EIA methods will be determined by the nature and context of the activity to be reviewed and by the objectives established for the EIA process and for the decision-makers.

In fact, the importance of flexibility in EIA methods should be emphasised. The process should accommodate a range of methods, depending on the specific context. Furthermore, for experimentation with different methods to yield satisfactory results from the perspective of process development, procedures must be implemented to verify the accuracy of predictions and compare the relative merits of different approaches. This study suggests a "toolbox" approach to EIA methods, rather than a totally linear and standardized EIA procedure.

#### **6.10 EIA, Environmental Management, and Public Scrutiny in Agencies Funding Development-oriented Research**

The principal focus of this study is the application of EIA to development-oriented research projects. However, another application of EIA and a related environmental management issue for donor agencies should be noted.

First, the discussion of EIA of policies, plans, and programs showed that donor agencies might usefully subject their funding policies, and their general research programs, to environmental review. Clearly, EIA at this level is more general than the evaluation of specific projects. Nonetheless, it may provide useful guidelines for projects, identify environmentally unsound biases or incentives at the policy or program level, and provide information that can simplify the EIA of specific activities.

Second, consideration should be given to the potential role of public scrutiny in the assessment and monitoring of the environmental performance of development-oriented research projects, or donor agencies themselves. Public participation is an important component of many EIA processes, particularly as applied to major projects. The appropriate public role in the case of development-oriented research is, however, somewhat less clear. As noted in Section 3.5.1, it may be that public involvement is most usefully directed to review at the agency, rather than the project-specific, level. Review and monitoring of donor agencies is also achieved through their boards of directors and, in the case of governmental agencies, accountability to their political masters. These issues of public scrutiny and accountability, both within in EIA process and as a more general matter of environmental management, are worthy of further examination.

#### **6.11 Potential for Collaboration Among Donor Agencies**

EIA of research activities offers potential for useful collaboration among donor agencies. This potential is underlined in the discussion of project monitoring and evaluation in Section 3.5.7 of the literature review, and was also mentioned in several of the interviews with donor agency officials. Experience with EIA procedures and methods could be shared, as well as information regarding the environmental effects of specific types of research activities. In some cases, collaboration on the preparation of inclusion or exclusion lists, or

class assessments, might be possible. Although it is unlikely that a standardized EIA procedure could be developed to satisfy the needs of all major donor agencies, some degree of harmonization might be possible. This approach could yield benefits both to donor agencies, that could learn from each others' experience, and to the researchers who must comply with the EIA requirements. Finally, the endorsement of major donors will be required if the EIA of research activities is to become part of generally accepted practice in the development community. While this result could be achieved on an *ad hoc* basis, collaboration among agencies might be a more effective means of establishing EIA as a standard element of development-oriented research.

### **6.12 Researchers' Attitudes Towards EIA Requirements**

Our interviews revealed a range of responses by researchers to the prospect of EIA requirements. While one view was that any additional administrative burden would be strongly resisted, another individual said that EIA would rapidly be accepted as part of the "rules of the game." It was suggested that acceptance of EIA requirements would depend in part on their being viewed as useful by the research community. To this end, implementation of EIA procedures should be accompanied by a clear explanation to researchers of the rationale for the requirements. Evidently, procedures that minimize unnecessary expenditure of time and money, and that are clearly focused on potential problem areas, will be better accepted than a broad brush approach that subjects all projects to an extensive EIA process.

### **6.13 Stand-alone versus Integrated Processes for EIA of Research Activities**

The EIA of research activities, particularly at the pre-approval stage, could be based on two models. One is the specialized and stand-alone review process typified by the ethics review committees that are used to screen medical and scientific research involving human subjects. The other model is to integrate consideration of environmental impacts into the general project evaluation process.

Each of these approaches has different advantages, disadvantages, and implications. The stand-alone model facilitates the use of individuals having specialized EIA expertise, and perhaps with a more diverse disciplinary background than would typically be found on committees evaluating the scientific and technical aspects of research projects. It should be noted, however, that a stand-alone EIA committee would still have to obtain specialist advice and analysis in many cases. In particular, practitioners with specialized knowledge would sometimes be required to conduct the EIA beyond the screening stage. The stand-alone committee model may also facilitate a more standardized approach to EIA, since the EIA function within any agency would be centralized to some degree within the specialist committee. If the stand-alone EIA process operates in similar ways to ethics review

committees, it may also be viewed as a threshold mechanism. Projects would be required to meet minimum environmental standards to pass the EIA review.

The alternative model incorporates the EIA function into the general project evaluation. Reviewers would rank projects on environmental and other criteria as part of a single process. The problem of adequate expertise in EIA issues could be addressed by including environmental experts in the general review process as required. EIA guidelines could also be established to provide some consistency of review across different programs within donor agencies. One possible implication of the integrated approach is that EIA might be more readily viewed as a central part of project design and approval, rather than simply as an add-on. However, our research did not allow us to reach a conclusion as to whether medical researchers, for example, view ethical concerns as in some sense peripheral or secondary to the extent that they are dealt with separately. A more certain prediction can be made regarding the incentives created by an integrated model in the case of competitive research funding. If EIA is included in the general review process, environmental features of projects may be viewed as matters for competitive ranking, rather than simply as threshold requirements. If researchers can be induced to compete on environmental as well as technical and scientific grounds, overall environmental performance may improve. Finally, an integrated approach might facilitate the integration of sustainability as a guiding principle for development-oriented research.

Our research does not suggest strong reasons for recommending one model or the other for the EIA of research. The appropriate approach for a particular donor agency may well depend on the expertise available to it and the project approval process that it uses. When selecting an approach, however, consideration should be given to the issues discussed above.

#### **6.14 Scoping of EIA for Research**

Research raises a significant scoping issue for EIA because of the distinction between the research activities themselves (e.g., laboratory work, field work, pilot studies, etc.) and the potential application of the research outcomes or results (e.g., products, technology, procedures, etc.). This issue is particularly important given the applied nature of much development-oriented research. There is little doubt that the specific activities undertaken by researchers should be subject to EIA. Like any other project, these activities may produce direct effects on the environment. The more difficult issue is whether, and when, to examine the longer term environmental implications of research outcomes.

The argument for looking beyond the immediate activities is that researchers and funding agencies should carefully scrutinize projects where application of research products could have significant environmental implications. It is inappropriate to view research in isolation from the use to which it may be put, particularly in the development context where research generally has a strong applied focus.

Extending EIA to include consideration of the applications of research products would likely lead to greater efficiency in the allocation of research funding. For example, if it can be anticipated that the risks of environmental harm are high should a particular technology or animal species be introduced into a region, then a decision can be made at the outset that money targeted for that region should not be spent on research to develop the technology or improve breeding practices for that species.

In some cases, however, there are significant obstacles to conducting an EIA of the application of research outcomes prior to approving the research project. These obstacles relate to the inherent uncertainty of the research process and to the wide variety of potential applications of many types of research. In fact, applications for the results of research may be developed by people outside of the research process itself. Identifying the research product (or products) and its possible uses, predicting and analyzing potential environmental effects, and evaluating mitigation measures may be difficult and costly in some cases. This scoping issue is further complicated if the research products may be implemented in different contexts (i.e., countries, political, institutional and cultural settings, ecological and socio-economic conditions, etc.)

Furthermore, a major concern is the burden that can be reasonably placed on the researcher to document and evaluate the potential effects of research activities. The situation is analogous to the burden on a project proponent that is required to conduct a cumulative effects assessment of actual and potential development. Another useful analogy is with the various levels of specificity possible in the EIA of policies or programs. At a certain point, the cost to the researcher or proponent becomes prohibitive, and potentially useful research or projects will not be undertaken.

Although research activities raise this scoping issue, they also provide a key to addressing it. Research is frequently an incremental process, progressing from initial study, through pilot projects, to eventual implementation on a broader scale. This characteristic of research suggests a parallel staged approach to EIA. Our analysis and several of the interviews indicate that, in many cases, EIA of research outcomes can most effectively and efficiently be conducted as part of the research process, rather than as a precondition to research.

To begin with, the proposed research activities would be subjected to EIA prior to approval. One donor agency official also suggested that international standards may be used to guide and assess the environmental performance of researchers. Any direct environmental effects would thus be identified and addressed, as required, prior to project approval.

The groundwork for EIA of research outcomes would also be put in place at this stage. As a condition of project approval and funding, the research protocol would have to include a process for addressing the environmental implications of possible research outcomes. EIA would thus be integrated into the research process. In that way, the researcher and the donor agency would be in a position at the completion of the research

to assess the results not only on technical or scientific criteria, but also in terms of their environmental implications should they be applied.

This recommendation follows directly from the adaptive approach to EIA discussed above. Rather than attempting to consider all possible effects at the outset, the EIA would progress in an adaptive manner over the course of the research. In this way, attention could be focused on significant potential problems associated with likely research outcomes, rather than adopting an inefficient and indiscriminate approach to predicting and evaluating possible environmental effects.

Within this adaptive framework or methodology, a variety of specific EIA techniques might be used to predict environmental effects and reduce the uncertainty inherent in examining the implications of research products. A detailed evaluation of particular techniques and determination of their most appropriate applications to various types of development-oriented research is a matter of process design that is beyond the scope of this study. It should be noted, however, that the use of EIA for this purpose is consistent with the general practice of donor agencies to assess the value of applied development research in terms of its ultimate impact on development. EIA techniques may therefore complement, or build on, procedures already in place to assess the long term consequences for development of research activities and of the application of research products.

Funding agencies have several ways of enforcing this adaptive approach to the EIA of research outcomes. First, this type of analysis should be explicitly provided for in the research protocol and funded as an integral part of the project. Second, the agency could require progress reports throughout the course of the research, with provision for modification of research activities in response to serious problems that are identified. Finally, researchers could be required to address fully the environmental implications of their work as part of their final report. Adequate EIA of research outcomes could be a precondition for the funding of subsequent stages of the research project, or for the support of projects applying the research results. Collaboration among donor agencies might be useful in ensuring continuity of this type.

One agency official noted that the reporting and funding renewal requirements can be adjusted in response to the environmental (or political) sensitivity of the research. Where research outcomes are likely to raise particular environmental problems or public controversy, the donor agency can commit funds for shorter periods of time than normal. These projects can thus be subjected to frequent reviews, and the adaptive EIA process monitored more closely.

There is one important caveat regarding this proposed phased approach to the EIA of research activities. In certain cases, the likelihood of producing particular research outcomes may be so great, and their potential environmental implications so serious, that it would be unacceptable not to address these issues prior to project approval. In this case, researchers should be required to look beyond the immediate research activities and consider

the potential applications in the pre-approval stage. It is unclear whether categories of research requiring this type of scrutiny can be identified in the abstract. In practice, making this determination may require a decision at the screening stage.

When describing the role of EIA in evaluating research activities and potential outcomes, a useful analogy may be drawn with the distinction between the EIA of projects and the application of EIA to policies, plans, and programs. EIA of research activities is essentially a project review. When considering potential applications, however, the level of analysis may be more general, and the process may be similar to an EIA of policies or programs. Of course, as research gets closer to applied results, just as when policy progresses to specific implementation, the EIA process will progressively converge with the approach adopted for projects.

### **6.15 Participation of Developing-country Partners in EIA of Research**

The literature review and interviews with agency personnel and researchers indicate that the inclusion of developing-country partners into the planning, implementation and evaluation of development projects is widely viewed as important. In fact, several agencies contacted specifically noted that their project review teams always consist of approximately equal representation from the donor and recipient countries.

Researchers noted, however, two important caveats. First, researchers often have considerable difficulty involving developing-country partners in the pre-approval stages of projects because of logistical and financial obstacles. Second, effective participation is often hindered by a lack of expertise and other resources in developing countries. Both of these obstacles could be addressed in some measure by donor agencies through improvements in project funding and planning.

Regardless of these difficulties, there are three principal reasons for including developing-country partners in the EIA of research activities. First, the EIA will be more sensitive to the particular environmental, social and cultural context if local participants are involved in identifying valued ecosystem or social components (VECs) and if indigenous knowledge can be applied at the issue scoping and impact analysis stage. Second, differences in values and priorities between donor and recipient countries can be addressed through a collaborative process. Third, involvement in the EIA process is an effective means of capacity building, creating both awareness and expertise relating to EIA. For these reasons, this study strongly recommends that developing-country partners be included in the EIA of research projects. Furthermore, donor agencies should identify, and take measures to overcome, the obstacles to effective participation of this type.



### **6.16 EIA of Research and Capacity Building**

Research in developing countries is valuable both for its specific results and for the capacity building achieved through the research process. In the same way, the application of EIA to development-oriented research promises benefits that go beyond preventing environmentally unacceptable projects. EIA of research offers opportunities for capacity building through the training of developing-country partners in EIA methods. More generally, the establishment of explicit EIA requirements by agencies funding development-oriented research could broaden the acceptance of EIA as an essential component of decision-making. Donor agencies should therefore use the establishment of EIA processes for research activities to promote broader objectives. As with other recommendations made in this study, achieving the full benefits of EIA in the context of development-oriented research will require planning, participation by developing-country partners, and funding from donor agencies.

### **6.17 Areas for Future Investigation of EIA as Applied to Research Activities**

This study has emphasised the importance of integrating the EIA process into general decision-making and policy formation within agencies funding development-oriented research. This approach stands in contrast to the view that EIA is an "add-on" to project development, approval, implementation, and follow-up. Having identified this objective and discussed it in general terms, it is clear that further work could be undertaken regarding the appropriate ways of achieving the desired integration. This issue could be addressed through an examination of EIA from the perspective of project and agency management, and organizational sociology. It could build on the work undertaken in this study, and provide further guidance regarding the design and implementation of EIA procedures with a view to their successful integration with agency decision-making. Some Canadian universities would be well placed to conduct this type of multidisciplinary study.

The implementation of EIA by agencies that fund development-oriented research will also require detailed examination of issues relating to process design. In particular, attention must be directed to selecting the appropriate EIA techniques or methods for use within the adaptive framework described above. These process-design issues are beyond the scope of this study, the purpose of which is to provide a general review of the literature relevant to the EIA of development-oriented research and a selective survey of donor practice and thinking in this area. On the basis of the issue identification and general methodological framework established through this study, more narrowly focused and detailed work could be undertaken to generate recommendations regarding the application of specific EIA techniques to particular types of development-oriented research.

For example, the EIA of potential applications of research products is an important topic that raises process design questions. The general model proposed above is that, in most cases, the EIA of research products could be incorporated into the research activities

themselves through an adaptive approach and subject to monitoring and reporting requirements imposed by donor agencies. Additional work, focusing on case studies and specific EIA techniques, is needed to design the detailed EIA processes that are required for donor agencies to implement this model. Other examples of the need for specific process-design work concern the application of approaches suggested in this study in various research contexts. For example, the use of inclusion or exclusion lists and the identification of valued ecosystem and social components (VECs) are promising approaches that were identified in the literature or through interviews. The practical application of these techniques to the variety of activities that are encompassed by the term "development-oriented research" is a matter that warrants further investigation. Some of this work could be based on existing literature, case studies, and comparative analysis. In addition, a project involving the design, implementation (perhaps on a pilot study basis) and testing of EIA methods in the context of specific development-oriented research activities would provide useful information for donor agencies.

In addition to the broad issues of integrating EIA into donor agency practice and designing specific EIA processes, a number of other topics for further investigation can be identified. For example, the role of developing-country partners in the EIA of research projects could be examined in more detail. One focus would be the potential contribution of research partners and indigenous knowledge to the EIA process. A second area worthy of investigation is the use of EIA as applied to development-oriented research to build EIA capacity in developing countries.

In the Canadian context, attention could be paid to the implications of the *Canadian Environmental Assessment Act* for development projects in general, and development-oriented research in particular. Approaches to EIA will have to be adopted that comply with the new legislation, and the effectiveness of these approaches tested to determine whether they lead to better decisions.

Finally, significant advantages could be realized through a project aimed at increased coordination among donor agencies regarding the EIA of development-oriented research. Establishment of EIA as a standard practice among agencies would be facilitated by a coordinated approach. In addition, coordination would facilitate the sharing of information, both at the level of methodology or process and with respect to particular types of projects. Workshops, conferences, or the circulation of discussion papers could be used to encourage greater inter-agency cooperation and coordination.

## **6.18 Conclusion**

The guiding principles for evaluating EIA are effectiveness and efficiency. The measure of effectiveness is the reliability of the process in identifying research projects with unacceptable environmental effects so that funding will be denied or mitigation measures required. Opportunities to increase the positive environmental effects of projects may also

be identified. The efficiency criterion concerns the resources expended on EIA. Proposals for environmentally benign research should be rapidly screened out of the EIA process and excessive information requirements and delays should be avoided. The EIA process should not constitute a significant general deterrent for research nor should it unduly divert resources from the substance of research into administrative and project approval processes.

EIA of development-oriented research raises a number of particular issues for the application of these guiding principles of EIA. These issues relate in part to the specific features of research as a subject of EIA, including the inherent uncertainty of some research projects and the scoping issue raised by the distinction between research activities themselves, and the potential applications of the products of research. The development context must also be taken into account through such measures as incorporation of developing-country partners and indigenous knowledge into the EIA process. Finally, development funding agencies must themselves adapt to formalization of EIA requirements.

This study has examined the principal issues raised by EIA of development-oriented research, and makes some suggestions regarding the application of EIA methodology in this context. EIA does not lend itself to blanket generalizations or fully standardized approaches, and we have steered away from both. Rather, our aim has been to lay the groundwork for the more detailed work that donor agencies will have to undertake if they are to establish and implement effective and efficient EIA processes for development-oriented research.

## 7. REFERENCES

**Abel, N. and Stocking, M. 1981.** "The Experience of Underdeveloped Countries," in Timothy O'Riordan and W.R. Derrick Sewell. eds., *Project Appraisal and Policy Review*. Chichester: John Wiley & Sons. p. 253.

After reviewing evidence of the failure of many development projects, this paper explores the reasons for this poor record and considers whether EIA processes could lead to better project appraisal. Problems relating to the values, goals, and organization of development projects are discussed.

**Abracosa, R. and Leonard, O. 1989.** "Environmental Impact Assessment in the Philippines: A Case Study of the San Roque Water Resources Development Project," in Robert V. Bartlett. ed. *Policy Through Impact Assessment: Institutionalized Analysis as a Policy Strategy*. New York: Greenwood Press. p. 65.

This article examines the interaction between domestic and donor-country EIA requirements in the context of project located in the Philippines.

**Appelbaum, G.D. 1976.** "Controlling the Environmental Hazards of International Development," in *Ecology Law Quarterly*. Volume 5. p. 321.

While somewhat dated, this article provides a useful general critique of international development projects from the environmental perspective.

**Baudoin, J-L., Ouellette, M. and Molinari, P.A. 1990.** *Toward a Canadian Advisory Council on Biomedical Ethics*. Ottawa: Law Reform Commission of Canada.

This study by the Law Reform Commission of Canada provides some useful insights into the operation of research ethics committees.

**Binnendijk, A.L. 1989.** "Donor Agency Experience with the Monitoring and Evaluation of Development Projects," in *Evaluation Review*. Volume 13, Number 3. p. 206.

While focusing on general issues of project monitoring and evaluation in the development context, this paper includes a wealth of material directly relevant to the follow-up and monitoring stage of EIA. It reviews the early experience with monitoring and evaluation in the 1970s, analyses the problems and lessons learned, and describes how development agencies responded in the 1980s to improve their practices in this area. The paper addresses concepts, definitions and methodologies in a very practical manner.

**Bisset, R. 1986.** "Methods for Environmental Impact Assessment: A Selective Survey with Case Studies" in Asit K. Biswas and Qu Geping, eds., *Environmental Impact Assessment for Developing Countries*. London: Tycooly International for the United Nations University.

This article provides a detailed and comprehensive review of EIA methods, tailored particularly to the context of developing countries.

**Biswas, A.K. and Agarwal, S.B.C., eds., 1992.** *Environmental Impact Assessment for Developing Countries*. Oxford: Butterworth-Heinemann Ltd.

This book contains papers presented at an international conference on EIA held in India in 1991. The articles provide general overviews, analyses of EIA case studies, and discussions of national experience. They provide a useful, and relatively recent, discussion of EIA focusing on developing countries.

**Biswas A.K. and Geping, Qu., eds., 1986.** *Environmental Impact Assessment for Developing Countries*. London: Tycooly International for the United Nations University. p. 215.

This collection of essays provides a detailed and technical discussion of EIA practice in developing countries. It includes papers on methodology and case studies.

**Biswas, A.K. and Geping Qu. 1986.** "Guidelines for Environmental Impact Assessment in Developing Countries" (Chapter 7) in Asit K. Biswas and Qu Geping, eds., *Environmental Impact Assessment for Developing Countries*. London: Tycooly International for the United Nations University.

This paper outlines general objectives and principles and specific EIA methods for application to developing countries. It also discusses institutional issues.

**Bonner, N. 1989.** "Environmental Assessment in the Antarctic," in *Ambio*. Volume 18. Number 1. p. 83.

Various proposals for the EIA of research activities in the Antarctic are reviewed in this paper. It includes commentary on the legal and political background to discussions, as well as descriptions of EIA models that were developed and adopted in this context.

**Brown, A.L., Hindmarsh, R.A., and McDonald, G.T. 1991.** "Environmental Assessment Procedures and Issues in the Pacific Basin-Southeast Asia Region," in *Environmental Impact Assessment Review*. Volume 11. p. 143.

This paper contains information from participants in an EIA training workshop for developing countries. It focuses particularly on the procedures and effectiveness of EIA in the Pacific and Southeast Asia region.

**Canada. 1992.** *North American Free Trade Agreement: Canadian Environmental Review*. Ottawa.

This report is the result of an ambitious attempt to conduct an environmental review of a major recent policy initiative of the Government of Canada. It provides useful lessons regarding the strengths and limitations of the application of EIA at the level of general policies.

**Canadian Environmental Assessment Act. 1992.** (Bill C-13). 3rd Sess, 34th Parl. (Assented to 23 June 1992.) S.C. 1992, c.37.

**Cerny, R.J., and Sheate, W.R.. 1992.** "Strategic Environmental Assessment: amending the EA Directive," in *Environmental Policy and Law*. Volume 22, Number 3.

**Chambers, R. 1980.** "Understanding Professionals: Small Farmers and Scientists" IADS Occasional Paper. New York: International Agricultural Development Service. p. 2. Quoted in Warren, 1989. p. 162.

**Chambers, R. 1984.** *Rural Development: Putting the Last First*. Harlow, England: Longmans.

**Cole, D. 1993.** "Traditional Ecological Knowledge of the Naskapi and the Environmental Assessment Process," in Steven A. Kennett, ed., *Law and Process in Environmental Management*. Calgary: Canadian Institute of Resources Law. p. 101.

This paper provides a case study of indigenous environmental knowledge and then discusses its application to EIA procedures and environmental management practices.

**Comment. 1982.** "NEPA's Role in Protecting the World Environment," in *University of Pennsylvania Law Review*. Volume 131. p. 353.

In addition to reviewing the law governing the application of NEPA in the international arena, this article reviews arguments regarding the purpose of EIA requirements in the development context and explores the sovereignty issue that is sometimes raised in this context.

**Compton, J.L. 1989.** "The Integration of Research and Extension" in J. Lin. Compton, ed., *The Transformation of International Agricultural Research and Development*. Boulder, Colorado: Lyne Reinner Publishers. p. 113.

This paper advocates the reorientation of development-oriented agricultural research towards the needs of the small farmer, operating with limited resources in a multi-crop system. It makes the case for incorporating local knowledge into the research process.

**EARP (Environmental Assessment and Review Process Guidelines Order). 1984.** SOR/84-467.

**ESSA (ESSA Environmental and Social Systems Analysts Ltd.). 1982.** *Review and Evaluation of Adaptive Environmental Assessment and Management*. Ottawa: Environment Canada.

This study provides a very useful description and evaluation of AEAM. It explores a range of applications for AEAM and includes practical recommendations for making it more effective.

**FEARO (Federal Environmental Assessment Review Office). 1986.** *Initial Assessment Guide*. Ottawa.

This guide outlines the initial assessment procedure developed by FEARO under the Environmental Assessment and Review Process.

**FEARO (Federal Environmental Assessment Review Office). 1992.** *Environmental Assessment in Policy and Program Planning: A Sourcebook*. Ottawa. (Unpublished).

This report explores a range of issues raised by the application of EIA to policies, plans, and programs.

**FEARO (Federal Environmental Assessment Review Office). 1993.** *The Environmental Assessment Process For Policy and Program Proposals*. Ottawa.

This short document explains the rationale and requirements for applying EIA to policies and programs, but says little about appropriate methodology.

**Gibson, R.B. 1993.** "Ontario's Class Assessments: Lessons for Policy, Plan, and Program Review," in Steven A. Kennett, ed., *Law and Process in Environmental Management*. Calgary: Canadian Institute of Resources Law. p. 101.

This paper reviews the class assessment process as it has developed in Ontario and suggests parallels between this process and the application of EIA to policies, plans, and programs.

**Giroux, L. 1993.** "La question de l'assujettissement dans le processus d'évaluation environnementale," in Steven A. Kennett, ed., *Law and Process in Environmental Management*. Calgary: Canadian Institute of Resources Law. p. 27.

This paper provides a comprehensive review of threshold mechanisms used in Canadian EIA legislation (both federal and provincial).

**Goodland, R. 1992.** "Environmental Priorities for Financing Institutions," in *Environmental Conservation*. Volume 19, Number 1. p. 9.

This article summarizes the World Bank's EIA methods. It explains the screening procedures used to classify the appropriate type of EIA review.

**Hanebury, J.B. 1993.** "Environmental Assessment as Applied to Policies, Plans, and Programs," in Steven A. Kennett, ed., *Law and Process in Environmental Management*. Calgary: Canadian Institute of Resources Law. p. 101.

This paper describes the issues raised by the EIA of policies, plans, and programs. It includes a discussion of the NAFTA review and a case study on gas export policy.

**Holling, C.S., ed. 1978.** *Adaptive Environmental Assessment and Management*. Chichester: John Wiley & Sons.

This collection of essays is the seminal work on the AEAM approach to EIA.



**Horberry, J. 1985.** "The Accountability of Development Assistance Agencies: The Case of Environmental Policy," in *Ecology Law Quarterly*. Volume 12. p. 817.

This article examines the environmental role of development assistance agencies and discusses the particular problems of ensuring accountability for the environmental effects of projects financed by multilateral development banks.

**Horberry, J. 1988.** "Fitting USAID to the Environmental Assessment Provisions of NEPA," in Peter Wathern. ed., *Environmental Impact Assessment: Theory and Practice*. London: Unwin Hyman. p. 286.

This article describes the effect on USAID of the application of NEPA's EIA requirements.

**Hyman, E.L. and Stiftel, B. 1988.** *Combining Facts and Values in Environmental Impact Assessment: Theories and Techniques*. Boulder, Colorado: Westview Press.

**IDRC (International Development Research Centre). 1991 (revised 1993).** *Empowerment Through Knowledge: The Strategy of the International Development Research Centre*. Ottawa: IDRC.

This brochure outlines IDRC's philosophy and strategy for the funding of development-oriented research.

**IDRC (International Development Research Centre). 1993.** *Meeting the Global Challenge: Themes and Programs of the International Development Research Centre*. Ottawa. IDRC.

This brochure outlines IDRC's response to UNCED and Agenda 21.

**International Bank for Reconstruction and Development, Environment Department. 1991.** *Environmental Assessment Sourcebook*. Volumes 1-3. Washington, D.C.: The World Bank.

These volumes provide a comprehensive manual for EIA practices used by the World Bank.

**Jayal, N.D. 1987.** "Research Priorities for Planning Water Resource Development" in J.G. Nelson and K. Drew Knight, *Research, Resources and the Environment in Third World Development*. Waterloo, Ontario: Department of Geography, University of Waterloo. p. 57.

This paper argues that development projects in the water resource area have reflected three biases: the temperate bias, the departmental bias, and the engineering bias. The result has been projects that are inappropriate to the developing-country context, that ignore the value of traditional practices and indigenous knowledge, and that fail to take a holistic view of the environment. Recommendations are made for development-oriented research to address these issues.

**Johnson, M. 1992.** "Research on Traditional Ecological Knowledge: Its Development and Its Role" in Martha Johnson, ed., *Lore: Capturing Traditional Environmental Knowledge*. Ottawa: Dene Cultural Institute and International Development Research Centre. p. 3.

This collection of essays provides a very useful overview of the issues surrounding traditional environmental knowledge. A number of case studies are included.

**Jones, M.L. & Greig, L.A. 1985.** "Adaptive Environmental Assessment and Management: A New Approach to Environmental Impact Assessment," in Virginia W. Maclaren & Joseph B. Whitney, eds., *New Directions in Environmental Impact Assessment in Canada*. Toronto: Methuen. p. 21.

AEAM is summarized and important issues highlighted. Applications of AEAM are also reviewed.

**Kennedy, A.J., and Ross, W.A. 1992.** "An Approach to Integrate Impact Scoping with Environmental Impact Assessment," in *Environmental Management*. Volume 16, Number 4. p. 475.

This paper examines scoping methods that can be used to focus the EIA process.

**Kennedy, W.V. 1988.** "Environmental Impact Assessment and Bilateral Development Aid: An Overview" in Peter Wathern, ed., *Environmental Impact Assessment: Theory and Practice*. London: Unwin Hyman. p. 272.

This article provides an excellent overview of issues raised by the EIA of development projects. It also includes brief descriptions and analyses of case studies.

**Kirk, E. 1986.** "The Role of Research Ethical Committees in the National Health Service," in *Professional Negligence*. November/December. p. 186.

**Klein-Chesivoir, C. 1990.** "Avoiding Environmental Injury: The Case for Widespread Use of Environmental Impact Assessments in International Development Projects," in *Virginia Journal of International Law*. Volume 30. p. 517.

This paper provides a relatively recent and comprehensive examination of the law and practice of EIA in the development context. It also includes a case study of a development-oriented refugee project.

**Lawrence, J.E.S. 1989.** "Engaging Recipients in Development Evaluation: The 'Stakeholder Approach,'" in *Evaluation Review*. Volume 13, Number 3. p. 243.

This paper focuses on the inclusion of recipients in the evaluation of development projects and suggests steps for enhancing recipient involvement.

**Lee, N. and Walsh, F. 1992.** "Strategic environmental assessment: an overview," in *Project Appraisal*. Volume 7, Number 3.

Lipton, J., Galbraith, H., Burger, J., and Wartenberg, D. 1993. "A Paradigm for Ecological Risk Assessment," in *Environmental Management*. Volume 17. Number 1. p. 4.

**Mayda, J. 1985.** "Environmental Legislation in Developing Countries: Some Parameters and Constraints," in *Ecology Law Quarterly*. Volume 12. p. 998.

**McDonald, M-L. 1993.** "Considering Cumulative Effects," in *Journal of Environmental Law and Practice*. Volume 3. p. 122.

**Meredith, T. 1992.** "Environmental Impact Assessment, Cultural Diversity, and Sustainable Rural Development," in *Environmental Impact Assessment Review*. Volume 12. p. 133.

**Muldoon, Paul R. 1986.** "The International Law of Ecodevelopment: Emerging Norms for Development Assistance Agencies," in *Texas International Law Journal*. Volume 22. p. 1.

This excellent article provides a comprehensive and well-documented review of the emerging "ecodevelopment norms" that apply to development assistance agencies. It describes the emergence and legal basis for ecodevelopment norms in general. It then discusses in detail the duty to integrate environmental management into development policies, the duty to improve environmental capabilities, the duty to assess environmental impacts of development projects, and other emerging ecodevelopment norms.

**Nelson, J.G. and Knight, K.D. 1987.** "Ontario Research, Resources and Environment in the Third World: A Workshop Introduction and Overview" in J.G. Nelson and K. Drew Knight, eds., *Research Resources and the Environment in Third World Development*. Waterloo, Ont.: Department of Geography, University of Waterloo. p. 14.

This introduction to a collection of essays on development-oriented research provides a useful overview of issues raised in this context.

**(OECD) Organization for Economic Co-operation and Development. 1986.** *Recommendation of the Council on Measures Required to Facilitate the Environmental Assessment of Development Assistance Projects and Programmes*. C(86)26. Paris: OECD. (Cited in Kennedy. 1988. p. 274.)

**Ontario (Ministry of the Environment). 1981.** *General Guidelines for the Preparation of Environmental Assessments*. 2nd ed. Toronto.

**O'Riordan, T. 1981.** "Problems Encountered when Linking Environmental Management to Development Aid," in *The Environmentalist*, Volume 1. p.15.

This paper discusses the difficulty of incorporating environmental management into growth-oriented development projects. Obstacles identified include: the administrative structure of agencies; attitudes of recipient governments; and the expense and risk of certain environmentally-appropriate programs.

**Pincus, G. 1981.** "The 'NEPA-Abroad' Controversy: Unresolved by an Executive Order," in *Buffalo Law Review*. Volume 30. p. 611.

This article reviews the legal history up to 1981 relating to the application of NEPA to foreign projects.

**Plater, Z.J.B. 1988.** "Damming the Third World: Multilateral Development Banks, Environmental Diseconomies, and International Reform Pressures on the Lending Process," in *Denver Journal of International Law and Policy*. Volume 17. p. 121.

Focusing primarily on loans from multilateral development banks for the construction of large capital-intensive dam projects, this article provides a comprehensive environmental critique of these development projects. It examines problems and possible reforms within the administrative process, and also considers legal avenues for reform and the question of donor-nation pressure. Particular attention is paid to the record of the World Bank.

**Preston, E.H. & Bedford, B.L. 1988.** "Evaluating Cumulative Effects on Wetland Functions: A Conceptual Overview and Generic Framework," in *Environmental Management*. Volume 12. p. 565.

**Reid, W. 1992.** "United Nations Development Program's Environmental Management and Sustainable Development in Technical Assistance (EMG). Four International Experts Respond," in *Environmental Impact Assessment Review*. Volume 12.

**Rich, B. 1985.** "The Multilateral Development Banks, Environmental Policy, and the United States," in *Ecology Law Quarterly*. Volume 12. p. 681.

This article provides a detailed examination of the environmental record of multilateral development banks and examines international and U.S. trends towards greater environmental controls over these agencies.

**Robertson, D. 1992.** "Trade and the Environment: Harmonization and Technical Standards," in Patrick Low. ed., *International Trade and the Environment*. World Bank Discussion Paper 159. Washington, D.C.: The World Bank. p. 309.

This paper examines environmental harmonization in the context of the GATT. It also considers the general relationship between trade and environmental issues and the arguments relating to international harmonization of environmental standards.

**Ross, W.A. & Elder, P.S. 1993.** "Defining the Scope of Environmental Assessment Reviews," in Steven A. Kennett. ed., *Law and Process in Environmental Management*. Calgary: Canadian Institute of Resources Law. p. 65.

This paper reviews legal and policy considerations relating to the scope of EIAs.

**Sadler, B. 1988.** "The Evaluation of Assessment: Post-EIS Research and Process Development," in Peter Wathern. ed., *Environmental Impact Assessment: Theory and Practice*. London: Unwin Hyman. p. 129.

This article makes the case for the evaluation of EIAs following project approval. The role, scope, and contribution of post-decision analysis and evaluation to improve EIA are described. A strategy for applying them is outlined, and research trends in this area are discussed.

**Saunders, J.O. 1992.** "Trade and Environment: The Fine Line between Environmental Protection and Environmental Protectionism," in *International Journal*. Volume 47. p. 723.

This article explores issues raised by the use of trade sanctions to promote environmental objectives.

**Serafin, R., Nelson, G. and Butler, R. 1992.** "Post Hoc Assessment in Resource Management and Environmental Planning," in *Environmental Impact Assessment Review*. Volume 12. p. 271.

This article compares three different modes of *post hoc* assessment. Using case studies, the authors argue that the choice of method is significant because it leads to significant differences in the conclusions drawn from EIA.

**Spaling, H. and Smit, B. 1993.** "Cumulative Environmental Change: Conceptual Framework, Evaluation Approaches and Institutional Perspectives," in *Environmental Management*. Volume 17, Number 5. p. 587.

This article offers an overview of theory and practice regarding Cumulative Effects Assessment (CEA). After comparing how these methods have been applied in Canada and the U.S., the authors conclude that regulatory and administrative contexts make a difference in the way in which CEA is utilized.

**Task Force on Environmental Impact Assessment Auditing. 1990.** *Post-project Environmental Impact Assessment*. New York: United Nations.

**Warren, D.M. 1989.** "Linking Scientific and Indigenous Agricultural Systems," in J. Lin Compton, ed., *The Transformation of International Agricultural Research and Development*. Boulder, Colorado: Lynne Rienner Publishers. p. 153.

This paper reviews the issues raised by combining scientific and indigenous knowledge in the context of development-oriented agricultural research. It focuses particularly on the perspectives of agricultural scientists and small-scale producers.

**Wathern, P., Young, S.N., Brown, I.W. and Roberts, D.A. 1987.** "Assessing the Impacts of Policy: A Framework and an Application," in *Landscape and Urban Planning*. Volume 13. p. 321.

A framework for policy appraisal is described and applied to a European Community policy on less favoured areas. Applicable EIA methods are discussed and the advantages of policy appraisal noted.

**Wathern, P. 1988.** "An Introductory Guide to EIA" in Peter Wathern, ed., *Environmental Impact Assessment: Theory and Practice*. London: Unwin Hyman. p. 3.

This paper provides a very useful overview of the EIA process in all of its variations. It includes key definitions, a discussion of major issues in the EIA process, and descriptions of different EIA methods.

**Yarranton, G.A. and Hegmann, G.L. 1994.** "A Decision-Maker's View of Cumulative Effects Assessment," presented at the Conference on Cumulative Effects Assessment in Canada: From Concept to Practice, April 13-14, Calgary, Alberta. (Environmental Research Centre Discussion Paper, The University of Calgary.)

This paper describes an adaptive approach to cumulative effects assessment that meets the needs of decision-makers in the EIA process. It draws on the experience of Alberta's Natural Resources Conservation Board.

**Yost, N.C. 1991.** "NEPA: A System that Works -- Everywhere," in *The Environmental Forum*. November/December. p. 28.

This brief article by the principal drafter of regulations under NEPA makes the case that it is both desirable and appropriate to apply U.S. EIA requirements to projects undertaken or sponsored by the U.S. government in foreign countries.

**Young, D. 1992.** "The Application of Environmental Impact Statements to United States Participation in Multilateral Development projects," in *American University Journal of International Law and Policy*. Volume 8. p. 309.

The application of the *U.S. National Environmental Policy Act* to multinational development projects is discussed in terms of existing legal requirements, current practices of the World Bank, and possible solutions to the problems identified by the author.

# **A P P E N D I X 1**

## **LIST OF QUESTIONS AND ISSUES FOR TELEPHONE INTERVIEWS**



# APPLICATION OF ENVIRONMENTAL IMPACT ASSESSMENT (EIA) TO RESEARCH ACTIVITIES

## LIST OF QUESTIONS AND ISSUES FOR TELEPHONE INTERVIEWS

This questionnaire will guide our telephone survey of research donors. We are providing you with a copy to indicate our areas of interest prior to arranging an interview. **Part 1** will be used for donor agencies that currently subject research activities to EIA. **Part 2** is intended for donors not currently conducting EIA of research.

### **Part 1      Agencies Currently Conducting EIA of Research Activities**

**Note:** Where an agency does not engage in the EIA activity identified in the question, we are also interested in views on the appropriateness and feasibility of that activity.

1. Does your agency have a formal and distinct EIA procedure for research, or are environmental effects considered informally or as part of the general project review?
2. If you have a distinct EIA process, how is it coordinated with the general project review.
3. What is your view of the EIA's purpose? Is the goal to screen out (or mitigate) unacceptable risks, to enhance environmental (or overall net) benefits of all projects, or a combination of the two?
4. What do you see as the principal technical and ethical issues raised by the EIA of research activities?
5. Do these issues differ from issues raised by the EIA of non-research development projects?
6. What particular issues are raised in situations where funded research and the application of its results will be in other (Third World) countries where specific EIA legislation is likely to be minimal or non-existent? How does your agency address these issues? Do you incorporate standards or include people from the recipient country in the EIA process?
7. What is the scope of the EIA of research conducted by your agency? Does it extend only to the research activities, or does it include the potential effects of the 'products' of the research?
8. If your EIA covers only the research itself, have you considered extending it to research products?

9. If your EIA does extend to the potential environmental impacts of research products, how do you delimit the scope of the EIA? Who pays for the broader study if a wide range of potential "products" and "effects" exist?
10. What are your current policies, practices, and operating procedures at all stages of the assessment? In particular:
11. What are your working definitions of "environment", "sustainability/sustainable development", etc.? Does EIA include socio-economic impact assessment or cumulative effects assessment?
12. What are your environmental impact statement (EIS) requirements?
13. What are your screening procedures and criteria?
14. If a full assessment is required, what is the EIA procedure? What issues are addressed (e.g., rationale, alternatives, mitigation, etc.)? What criteria are applied?
15. How are matters of factual uncertainty (and controversy) addressed in the EIA process?
16. What decision-making procedure is used in conjunction with the EIA?
17. What procedures do you have for monitoring and evaluating research activities following project approval?
18. Do you require that research reporting include a section on environmental impact?
19. What verification and follow-up evaluations of the EIA are conducted?
20. Is evaluation coordinated by an agency or an organization with a multi-national or multi-disciplinary perspective?
21. What is the nature and extent of peer review?
22. Can generic guidelines be used for criteria and/or procedures or must these issues be addressed at a discipline- or project-specific level? To what extent do you think that EIA procedures can be standardized and codified?
23. Under what circumstances should EIA follow a uniform procedure or be incremental (e.g., phased EIA through pilot studies)?

24. What triggers are used to invoke different standards and procedures for EIA and do they vary according to the technical attributes of each project?
25. Where should the boundary be set between self-assessment and independent evaluation of projects?
26. Is an appeal mechanism justified, and what should it allow for?
27. What procedure exists for monitoring the EIA process itself?
28. What is your agency's organizational structure for the EIA and decision-making (at head office and in the field)?
29. What are your staff training needs and programs for conducting EIAs of research activities?
30. Does your agency apply innovative EIA procedures to the research context (e.g., class assessment)?
31. What are some notable examples of successful and unsuccessful experiences with EIA of research conducted by your agency?
32. How important do you believe the EIA of research to be in relation to your agency's mission?
33. What would your agency ideally like to do in this area?
34. What, in your view, can realistically be done in the future in this area?

## **Part 2      Agencies Not Currently Conducting EIA of Research Activities**

35. Has your agency considered subjecting research activities to EIA? If you have, what are your reasons for deciding not to do so?
36. What do you see as the principal technical and ethical issues raised by the EIA of research activities?
37. Do these issues differ from issues raised by the EIA of non-research development projects?
38. What particular issues are raised in situations where funded research and the application of its results will be in other (Third World) countries where specific EIA legislation is likely to be minimal or non-existent?

39. Do you anticipate subjecting research activities to EIA in the future? What factors will influence that decision?
40. What would your agency ideally like to do in this area?
41. What, in your view, can realistically be done in the future in this area?

Mr. Steven A. Kennett  
Canadian Institute of Resources Law

Dr. Anthony Perl  
Department of Political Science

# **A P P E N D I X 2**

**LIST OF PEOPLE CONTACTED  
FOR THE STUDY**

## List of People Contacted for the Study

**Note:** Everyone on this list was interviewed by telephone unless indicated otherwise.

- H. Abaza, Chief, Environment and Economics Unit, United Nations Environment Programme, Nairobi, Kenya (written correspondence).
- Roy Crowther, Head, Environmental Planning, UMA Engineering Ltd., Calgary, Canada (interviewed in person)
- Carmen Drouin, Analyst, Process Development, Federal Environmental Assessment Review Office, Ottawa, Canada
- Gilles Forget, Director, Health Sciences Division, International Development Research Centre, Ottawa, Canada
- Robert Fournier, Research Office, Dalhousie University, Halifax, Canada
- Michel Gariépy, Dean, Faculty of Management, University of Montreal, Montreal, Canada
- Robert Goodland, Adviser, Environmental Assessment, Environment Department, The World Bank, Washington, D.C., U.S.A. (written correspondence)
- P.H. Gresham, Coordinator, Environmental Assessment Service, IUCN The World Conservation Union, Gland, Switzerland
- Guido Gryseels, Deputy Executive Secretary, Technical Advisory Committee, Consultative Group on International Agricultural Research, Rome, Italy
- Brent Herbert-Copley, Social Sciences Division, International Development Research Centre, Ottawa, Canada
- Robert W. Herdt, The Rockefeller Foundation, New York, U.S.A.
- Chuck Lankester, Director, Sustainable Development Network, United Nations Development Program, New York, U.S.A.
- Barry Lesser, Interim Executive Director, Lester Pearson Institute for International Development, Dalhousie University, Halifax, Canada

- Jan-Olof Lundberg, Environmental Research Program, Sarec (Swedish Agency for Research Cooperation with Developing Countries), Stockholm, Sweden
- Julia Marton-Lefèvre, Executive Director, International Council of Scientific Unions, Paris, France
- J.E. McComiskey, Chief, Biological Sciences Division, National Energy Board, Calgary, Canada
- Paul McConnell, Director, Information Sciences and Systems Division, International Development Research Centre, Ottawa, Canada
- W. Morbach, Head of Environment Division, Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ), Eschborn, Germany (written correspondence)
- Phil Paradine, The World Bank, Washington, D.C., U.S.A
- Martin Rapley, Overseas Development Administration (ODA), London, United Kingdom (written correspondence)
- Robert Robelus, Environmental Assessment Specialist, The World Bank, Washington, D.C., U.S.A. (written correspondence)
- Ebbe Schioler, Head of Research Section, Danida, Ministry of Foreign Affairs, Copenhagen, Denmark (written correspondence)
- Mats Segmestam, Swedish International Development Agency (SIDA), Stockholm, Sweden
- Amy C. Shannon, Program Assistant, John D. and Catherine T. MacArthur Foundation, Chicago, U.S.A.
- Robert Weir, Canadian International Development Agency (CIDA), Ottawa, Canada
- Anneke Wevers, Environmental Program, Ministry of Foreign Affairs, The Hague, The Netherlands
- Lyndsey A. Withers, Group Director, Documentation, Information & Training, International Plant Genetic Resources Institute, Rome, Italy (written correspondence)