

## 13.0 Future Trends in Environmental Impact Assessment in Asia

The practice of environmental impact assessment (EIA) is evolving. Major problems exist, and many question its overall effectiveness. The recently completed International Study of the Effectiveness of Environmental Assessment focused on ten organizing themes (Table 13-1). The Effectiveness Study was based primarily on developed country experiences in North America and Western Europe, however, these ten basic themes have much in common with many of the emerging trends in the development of EIA principles, procedures, and practices in developing Asia.

### 13.1 Examining the Foundations

Most countries in Asia have established EIA processes. Some countries have considerable experience with EIA. The early focus in the region was on controlling pollution and restricting industrial development that was clearly detrimental to human health and the natural environment. Today, environmental assessments must deal with a wide range of environmental, economic, social, and cultural issues. As living standards increase, people are demanding better environmental quality and a greater say in development decisions. In addition to considering a broad range of issues, EIAs are becoming more inclusive with respect to the participation of interested stakeholders. Most national governments are thus being forced to reexamine the basic principles embodied in their EIA processes. This reexamination is creating increased impetus to ensure that EIA processes are effective.

The biggest single constraint on the effectiveness of EIA is the timing of the assessment in the development project cycle. In spite of attempts to ensure that EIA information reaches decision makers early in the development planning cycle, many EIAs occur only after major decisions (for example, site selection and investment) have been made. As a result, any EIA findings that may result in delays, major project modification, or outright cancellation are difficult to accept.

The practice of EIA is not without other shortcomings. For example, EIA has not been very useful in addressing environmental degradation caused by the development or continued operation of small- and medium-scale industrial production. Similarly, it has not been very effective in planning rural development/agriculture projects. To apply EIA in the planning of small-scale/dispersed developments, governments need to (i) strengthen the regional environmental planning practices and enable institutions responsible for monitoring regional developments to use EIA for regional as well as project specific developments, and (ii) strengthen industrial permit systems and enable environmental agencies to use EIA as one of the key permitting parameters for new as well as existing industries.

### 13.2 Sustainability

EIA has been accepted as an essential tool for implementing the principles of sustainable development. In this light, there is an increasing trend to assess the sustainability of projects. In some cases, this is merely an extension of traditional approaches (for example, a raw material supply analysis for a pulp and paper mill, a water supply analysis for a new industrial park). In other cases, it may mean incorporating an examination of the capacity of a water body or an airshed to provide a sustainable flow of economic, social, and environmental benefits to people.

**Table 13-1:** Frames of reference for initial review of trends and innovations (*source:* Sadler, 1995).

Organizing Theme	Level and Focus of Review	Key Issues
<b>A. Foundations</b>		
<b><i>Adequacy of EA Systems</i></b>		
i) Guiding Values and Principles	<ul style="list-style-type: none"> <li>• purpose and orientation of EA</li> <li>• basic requirements for all effective processes</li> <li>• key values, objectives and principles of approach</li> <li>• procedural and methodological implications</li> </ul>	<p><b><i>What is the Role of "Second Generation" EA?</i></b></p> <p>How are the functions of EA changing? To what extent do the purposes and assumptions that guided the design and institutionalization of the process still hold? What are the characteristics of effective EA process and practice? How are / might they be expressed in law, policy and institutional arrangements?</p>
<b>B. New Dimensions</b>		
<b><i>Scope of EA Process</i></b>		
ii) Application of Sustainability Concepts	<ul style="list-style-type: none"> <li>• nature and implications of sustainability concepts</li> <li>• translation into operational guidelines and rules of thumb</li> <li>• incorporation into EA policy and practice</li> <li>• adjustments to procedures and methods</li> </ul>	<p><b><i>Where is EA Going?</i></b></p> <p>What is the value and relevance of sustainability concepts, such as biodiversity, natural capital and intergenerational equity? How might these be substantiated and applied in EA? What accompanying process adjustments may be necessary, e.g., to significance criteria, impact analysis and mitigation?</p>
iii) Strategic Environmental Assessment (SEA)	<ul style="list-style-type: none"> <li>• rationale and potential of SEA</li> <li>• linkages to project EA and other policy and planning instruments</li> <li>• recent approaches and arrangements for the conduct of SEA</li> <li>• institutional and methodological constraints and opportunities</li> </ul>	<p>What institutional frameworks are in place for applying SEA? How is the conduct of SEA similar to or different from project EA? Which methods and procedures are employed and what are their strengths and weaknesses? What are requirements for, and barriers to, an effective process?</p>
iv) Cumulative and Large Scale Effects	<ul style="list-style-type: none"> <li>• definitions and requirements for addressing cumulative effects</li> <li>• project oriented versus ecosystem approaches</li> <li>• frameworks for planning and monitoring</li> <li>• relationships to product assessment life cycle analysis and environmental audits</li> </ul>	<p>What is the status of the theory and the practice of assessing cumulative and large scale effects? How are incremental, regional or global changes addressed in EA processes? Which procedures and methods are employed and with what results? Where might immediate improvements be made to our approaches?</p>
<b>C. Process Strengthening</b>		
<b><i>Elements of Approach</i></b>		
v) Relationship to Decision Making	<ul style="list-style-type: none"> <li>• utility of inputs to decision making process</li> <li>• importance of evaluation of alternatives</li> <li>• EA documentation and quality review</li> <li>• implementation of terms and conditions</li> </ul>	<p><b><i>How Can EA Methods and Procedures Be Improved?</i></b></p> <p>How is EA related to types and levels of decision making? To what extent does this process focus on the justification for and to a proposal? How useful for decision making are EA reports in clarifying the pros and cons of proposed action? What changes might improve their relevance for this purpose?</p>
vi) Integrated Approaches to Impact Analysis	<ul style="list-style-type: none"> <li>• "best guess" science paradigms and practices</li> <li>• traditional knowledge</li> <li>• user-friendly tools, techniques and information technologies</li> <li>• relationship of socio-economic, biophysical, health and risk components</li> </ul>	<p>How well does impact assessment serve decision making under conditions of uncertainty? Which approaches and instruments are or can be applied for "policy integration" of cross-media and cross-domain impacts? How can we best deploy scientific analysis and interest-based negotiation to integrate knowledge and values in the form of advice to decision makers? What tool kits are available to facilitate problem solving by local communities and groups?</p>
vii) Public Participation and Dispute Settlement	<ul style="list-style-type: none"> <li>• conflict resolution in the EA process</li> <li>• provisions for public scrutiny and involvement</li> <li>• forms of participation and negotiation</li> <li>• relationship to decision making powers and responsibilities</li> </ul>	<p>What are the roles and scope of public participation in EA? What procedures are followed to ensure openness and fairness of processes? Which methods are employed and with what results? Are mediation and other alternative dispute resolution procedures being used and with what success?</p>

Organizing Theme	Level and Focus of Review	Key Issues
viii) Follow-up and Post Project Analysis	<ul style="list-style-type: none"> <li>• requirements for follow up to EAs</li> <li>• experience with effects monitoring and impact management</li> <li>• use and results of EA audits</li> <li>• ex-post review for process development</li> </ul>	What is the scope of EA review and follow-up? Which types of follow-up procedures are employed and with what results? How are the results incorporated into impact management, future project cycles, and EA policy and practice?
ix) Total Process Management	<ul style="list-style-type: none"> <li>• managing for quality, integrity and innovation</li> <li>• coordination of EA processes with other policy, planning and regulatory instruments</li> <li>• coherence of EA systems, including protocols and procedures for transboundary EA</li> <li>• information and communication media</li> </ul>	How can the cost-effectiveness of EA processes be improved? How is EA linked to other processes, such as sustainability strategies, land use planning and pollution control? What measures are followed to harmonize EA systems, nationally and internationally? How can administrators best communicate with EA users, including decision makers and the public?
x) Capacity Building	<ul style="list-style-type: none"> <li>• needs and demands</li> <li>• training, networking and cooperation</li> <li>• research, development and pilot projects</li> <li>• EA skills and competencies for the 21st century</li> <li>• international standards</li> </ul>	What are the needs of industrial and developing countries, and how do they vary regionally and by country? What is the actual and potential contribution of EA training to professional and institutional strengthening? How might cost-effective support and cooperation be established? What are the priorities for EA research and development?

Inclusion of sustainability criteria often forces examination of the very difficult questions of the maintenance of biodiversity and ecosystem integrity. For example, the development of tourist facilities and aquaculture facilities in the coastal zone has often been at the expense of mangrove and other coastal ecosystems that have provided a sustainable flow of benefits to coastal peoples over countless generations.

EIA is expected to play an increasing role in ensuring that projects meet sustainability criteria. To achieve this, EIA of the future must take a lead planning role in orienting industry, tourism, urban infrastructure and other developments toward cleaner production, waste minimization, and pollution prevention. The analysis should compare proposed processes to alternative, cleaner technologies. Similarly a life cycle analysis should be incorporated in the EIA and impacts should be evaluated for alternatives. It will be appropriate for EIA reports of the future to evaluate requirements for selected projects to meet ISO 14000; to recommend self monitoring potentials and integrate such with recommended command and control monitoring; and to recommend voluntary compliance alternatives. It is likely that these approaches to environmental management will be realized in developing countries only if industry/developers take the lead. This possibility will become more likely if the project EIA quantifies the benefits and prescribes the steps and inputs required.

### 13.3 Strategic Environmental Assessment

Strategic environmental assessment has been defined as:

The formalized, systematic and comprehensive process of evaluating environmental impacts of a policy, plan, or program and its alternatives, the preparation of a written report on the findings, and the use of the finding in publicly accountable decision making (Therivel, 1995).

The European Commission is scheduled to publish a draft of its directive on strategic environmental assessment. This directive applies to plans and programs “which are being adopted as part of the land use decision making process for the purpose of setting the framework for subsequent development consent decisions which will allow developers to proceed with projects” (Explanatory Memorandum accompanying the draft Directive). The proposed directive provides a procedural framework for carrying out a strategic

environmental assessment of plans and programs. An environmental statement containing the following items is required:

1. contents of the plan;
2. environmental characteristics of any area to be significantly affected by the plan/program;
3. any existing environmental problems relevant to the plan/program;
4. likely significant direct and indirect environmental effects of implementing the plan/program on people, biota, soil, water, air, climate, landscape, material assets, and cultural heritage;
5. alternative ways which have been considered for achieving the objectives, and the reasons for not adopting the alternatives;
6. measures to prevent, reduce, and where possible offset significant adverse environmental effects;
7. difficulties encountered in carrying out the environmental assessment; and
8. a non-technical summary of the environmental statement.

Strategic environmental assessment is a response to the recognition that project-focused EIAs are not adequate for all levels of decision making. Many of the new approaches to EIA are designed to extend beyond its more traditional project focus. These new approaches include:

- **Class Assessments**, which cover the common impacts of similar projects that are unlikely to vary with location. For example, dredging in riverine environments will generate similar impacts in many different rivers and estuaries. The EIA for any particular project may draw upon a generalized impact analysis. As experience has grown, the efficiency of class assessments has increased with their use.
- **Programmatic EIAs**, which address the impacts of large scale projects at many sites (e.g., strip mining of coal in a region of generally homogeneous terrain). An overall assessment may suffice for many individual project localities.
- **Sectoral EIAs**, which highlight the impacts of development in an industrial sector by comparing different technologies that may eventually be chosen. For example, if the initiating project is a highway, the sectoral approach would assess alternative transportation modes (e.g., light rail transit) to accomplish the same goal.
- **Regional Master Planning**, which is the most attractive level for managing the environment. In this case, an entire river basin, a watershed, an air quality district, a managed ecosystem, a coastal zone, or an island is analyzed for the probable environmental impacts of all types of economic development. Current and future pollution controls are estimated. Vulnerable and valuable natural areas are marked for conservation. Industrial parks are sited in appropriate areas where wastes and infrastructure can be concentrated for the most cost-effective management. In the context of regional master planning, ecologically sensitive areas should be identified, research begun on the major ecosystems, cumulative effects of past, current and future development analyzed, and rough carrying capacity established. To fund such studies of these natural systems, contributions are solicited from all development interests. Programs are coordinated and organized by the local government.
- **Development Strategies**, which require environmental assessments because they select technologies, and set priorities and timetables for large financial investments. For example, in considering whether to exploit some natural endowment of mineral resources, potentially great environmental consequences should be assessed at the outset. The usefulness of comprehensive assessment can also be illustrated by examining the effects of our strategy of dependence on large

hydro power projects around the world — including the effects of displacing many persons from reservoir zones.

- **National Budgets**, which should have specific reference to environmental protection expenditures and environmental degradation costs. The availability of full environmental cost accounting is growing and is based on the same quantitative bio-geophysical indicators and measurements as are generated in the basic EIA. So called "green report cards" are being considered by both the Organization for Economic Cooperation and Development and the World Bank for noting the environmental management performance of various countries.

Methods and procedures for conducting EIAs for these higher levels of decision making are not well developed. Few of the large body of EIA practitioners that are well qualified to conduct project level assessments can claim expertise in the various facets of strategic environmental assessment.

### 13.4 Cumulative and Large Scale Effects

Cumulative impact assessment (CEA) allows for interest in the valued environmental resources, not simply the impacts of a single project. The problem with CEA is how to practically limit the scope of its application. In the absence of guidance on how to bound the CEA, the EIA practitioner will claim to have inadequate resources and will thus limit their assessment to the project direct impacts.

Examples of cumulative effects problems encountered in developing Asia are:

- long range transport of air pollutants;
- urban air quality and airshed saturation;
- mobilization of persistent or bio-accumulated substances;
- climate change;
- habitat alienation;
- habitat fragmentation;
- reduction in soil quality and quantity;
- reduction in ground water supplies and ground water quality;
- effects associated with agricultural, silvicultural, and horticultural chemicals;
- increased sediment, chemical, and thermal loading of freshwater and marine water;
- accelerated rates of renewable resource harvesting;
- long term containment and disposal of toxic wastes; and
- productive land loss due to infrastructure development.

Consideration of the potential of new projects to exacerbate these problems has not been effectively integrated into EIAs in developing Asia. This is partly because "cumulative effect" is one of the most confusing of all EIA concepts. Cumulative effects are difficult to analyze and there are few agreed upon methods for their assessment.

Canter (1996), following the United States' approach, defines cumulative impact as:

“the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non federal) or person undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period time.”

Another view (Sonntag *et al*, 1986) states: “Cumulative effects can be characterized as impacts on the natural and social environments which: 1) occur so frequently in time or so densely in space that they cannot be assimilated; or 2) combine with effects of other activities in a synergistic manner”

Most EIA practitioners and EIA processes in Asia are not well suited to the assessment of cumulative effects. It is, however, anticipated that much greater consideration of concepts such as “sustainability,” “assimilative capacity,” “ecological thresholds,” and “carrying capacity” will be used in future EIAs. There will likely also be much greater understanding of the need to place EIA of individual projects in the context of regional planning.

### 13.5 Decision Making

There is every reason to believe that the results of the EIA process will have increasing influence over development decision making. National governments and international assistance agencies (IAAs) are increasingly recognizing the environmental costs associated with failure to account for the environmental impacts of projects. EIA processes have been criticized for lack of effectiveness by many quarters. In most cases, the response has been to strengthen the legal, regulatory, and institutional capability of EIA agencies.

Most development assistance, whether multilateral or bicameral, is now subject to the environmental assessment requirements of the donor's jurisdiction. In addition, some countries (e.g., The Netherlands) are implementing procedures within their embassies to assess the environmental impacts of all their activities in developing countries. Developing countries, while actively encouraging foreign and domestic investment, are very conscious of ensuring that investors incorporate environmentally sound technologies into their projects. Procedures and practices at two major decision points in the EIA processes are constantly changing. The trend toward improvements in 1) screening and scoping; 2) EIA report quality and EIA review; and 3) environmental monitoring will continue.

#### 13.5.1 Screening and Scoping

Screening is necessary to avoid overwhelming the EIA administrative agencies with unnecessary assessments. Screening helps limit the number of projects that require detailed scrutiny within the EIA process. Screening criteria have been developed based on experience with the environmental impacts of various types of projects gained over many years. These criteria will continue to be refined to ensure increased efficiency in defining the EIA requirements of development projects. The EIAs of those projects that do require more detailed environmental assessments will be better prepared. Greater emphasis during the scoping stage is being placed on the terms of reference for the EIA being jointly developed by the EIA administrative body, the project proponent, and the EIA practitioners.

### 13.5.2 EIA Report Quality and EIA Review

Better terms of reference will increase the likelihood that high quality EIA reports are prepared. The scientific and technical quality of impact analysis will naturally increase as the capability of the EIA practitioners increases. Increased participation by the public and other stakeholders in the EIA process will also raise the quality of EIA reports. Public participation, however, is likely to have a more dramatic effect on the nature of EIA review. There will be increased demands for accountability of EIA reviewers, EIA administrative agencies, EIA practitioners and proponents alike. This will increase the care and attention taken in the scrutiny of EIA reports.

A related problem is the institutional weakness of governments (and institutions such as IFIs) to efficiently and accurately determine prescriptions for environmental management and monitoring which are affordable, achievable and meet environmental quality management needs. It may be that the routine review process does not take advantage of local government knowledge or selected individuals' expertise. Future changes to the EIA process should include improvements to ensure key individuals or institutions are included in this aspect of the review process.

### 13.5.3 Monitoring

Current problems with the use of EIA for environmental planning have little to do with shortcomings in the planning approach and more to do with the reliance on monitoring and enforcement by governments to see that recommended mitigation/management measures are effectively implemented. The EIA report can address this shortcoming by including an assessment of the capabilities of designated responsible parties to implement the measures. Where there are risks of noncompliance, the EIA should recommend alternative implementation measures (e.g., giving responsibility through contracts to independent parties).

The most widely recognized weakness in the EIA process is the apparent inability of governments and IFIs to follow approval of project EIAs with monitoring. The EIA could include an institutional evaluation of the capabilities of the approving agencies to monitor the implementation of mitigation and/or management measures and recommend how a) to strengthen their capacity to do so, or, b) probably more realistically, how to achieve the measures through alternative approaches (again through contracting or other alternatives).

## 13.6 Improvements in Methods and Approaches

### 13.6.1 Best Practices

Developing Member Countries (DMCs) must build their own databases and make use of past EIAs. Usually, past EIAs are not available to those preparing subsequent ones; sometimes they are treated as confidential. In addition, some map-based data are only available for military purposes. Continued efforts to develop and make accessible libraries, inventories and databases of best EIA practices will lead to increased capability of EIA professionals in DMCs.

### 13.6.2 Sectoral Guidelines

In the short term, improvements to EIA methods and approaches will focus on developing technical guidance for the preparation of environmental assessments. Sectoral guidelines help proponents more clearly understand the scope and required level of detail for EIA reports. The trend is toward each country preparing its own set of guidelines for each sector; certainly most ASEAN countries are moving this way (e.g., Malaysia is well advanced in guideline preparation). IAAs like the Asian Development Bank (ADB) have also

developed sectoral guidelines for most major project types. Other countries will benefit greatly from adapting these guidelines and preparing guidelines in their own languages suitable to their own special needs.

### **13.6.3 Disciplinary Guidelines**

Sectoral guidelines will be complemented by disciplinary methodological guidelines. These will also be provided in each DMC. Guideline development will be coordinated by national working groups composed of selected experts from throughout each country. Initial work on national guidelines should concentrate on the following: 1) ecological impact assessment, 2) social impact assessment, 3) environmental economic analysis, 4) regional development impact assessment, 5) public consultation, and 6) environmental risk assessment.

### **13.6.4 Environmental Information Systems**

There will be increased use of information technologies in all aspects of environmental assessment. There are some redirections required for EIA to optimize availability of “new” technologies and environmental management practices. For regional environmental management, EIA must take better advantage of GIS-based planning and monitoring systems. Remote automatic monitoring systems should also be considered at the project level and linked to national or regional monitoring systems. Other examples include use of CD-ROM technologies to deliver EIA knowledge through training, EIA tracking systems for managing the administrative aspects of the EIA process, computer models to help provide more rigorous predictions of impact, and expert systems to provide EIA procedural and technical knowledge to a wide range of EIA stakeholders.

## **13.7 Public Participation and Dispute Resolution**

Public participation is becoming increasingly more important in EIA processes in Asia. A recent ADB technical assistance project, “Strengthening Environmental Impact Assessment in Thailand,” was tasked with both incorporating public participation requirements into the environmental assessment process and developing guidelines for public participation. The approach taken in the guidelines is consistent with the participatory development approaches being used by IAAs in project design, development, and implementation.

## **13.8 Follow-up and Post Project Analysis**

Post audit and evaluation of environmental management plans and monitoring programs provides a means to learn from experience. Systematic evaluation of monitoring results allow EIA practitioners to understand strengths and weaknesses in existing approaches. This understanding will naturally lead to better techniques and approaches to impact assessment. Monitoring information is essential in helping to determine the effectiveness of mitigation measures. Without the essential feedback on “what works” and “what does not work” provided by monitoring programs, each new project will be designed like the last one. There will be little opportunity to learn from previous mistakes, and to apply new and better mitigation techniques.

In the future, increased emphasis will be placed on post-approval monitoring and post-project evaluation procedures, particularly within IFIs. In some DMCs, however, it will not be practical to incorporate strict provisions for post approval monitoring into the EIA process for some time. The costs and staffing needs for such a program may not currently be justifiable. Initially, educational programs will be needed to increase awareness of the role that post-project approval monitoring can play in the EIA process. As a first step, it will be desirable to provide training in environmental effects monitoring programs, including the design of such programs.

Post evaluation reports like those prepared by the ADB (see Chapter 9: Environmental Monitoring Program) are useful sources of information. Nonetheless, one further step is required. We must ensure that we learn from experience. From time to time, a formal and systematic post hoc evaluation of the effectiveness of environmental protection efforts on development projects must be undertaken. The results must be assembled and then disseminated, widely and rapidly, by an independent body. For example, the International Association of Impact Assessment or some other professional society should be mandated to conduct retrospective appraisals and report on the results.

### 13.9 Capacity Building

Capacity building in the context of EIA is far more difficult than most donor agencies realize. Current approaches to capacity building are being re-evaluated, yet there remains a great emphasis on training courses and seminars. These are very visible, but unfortunately, unless they are extraordinary well designed, many of these do not achieve tangible results. The focus on increasing the skills of those involved in EIA is correct, but the mechanism of delivery is often inappropriate. The best training programs are those developed in consultation with the EIA professionals in the country. Training materials should always be translated into the national language. In doing so, a set of teaching materials and a cadre of trainers is left behind. This provides the basic capital necessary to undertake training but does not provide for the operating funds. The next step is to provide the financial resources to deliver the training programs. The best programs are those that are able to access a substantial counterpart contribution and commitment. Future training courses will be increasingly well targeted at the four main groups that require training: those that manage the EIA process, those that prepare EIA reports, those that review EIA reports, and proponents who are responsible for environmental planning, assessment and management of their developments.

Guideline development (see section 13.6) is another major focus of capacity building. Here the trend is toward sectoral and jurisdictional guidelines. The trend is also to have these sectoral guidelines developed by a team or committee of national and international experts. The international experts bring a broad perspective and the latest knowledge, while the national experts best understand the local needs and context. Guideline development is often complemented by case studies. These case studies provide practical experience to a small group of practitioners, while allowing for EIA methods to be adapted to the local context.

Capacity building will continue to provide assistance in strengthening the public administration of EIA processes. In addition to increasing the skills of public servants, there will be increased help to develop standard operating procedural manuals, computer-based systems for tracking proposals, and databases for managing information.

### 13.10 References and Further Reading

- Canter, L.W.** 1996. Environmental Impact Assessment. McGraw-Hill, New York, NY.
- Sadler, Barry.** 1997. EIA process strengthening - perspective and priorities. Pages 1-29 in Report of the EIA Process Strengthening Workshop, Canberra 4-7 April, 1995. Published by the Environmental Protection Agency, Canberra, Australia for the International Study of the Effectiveness of Environmental Assessment.
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- Therivel, R. (ed).** 1995. Environmental appraisal of development plans 2; 1992-1995. Working paper 160, School of Planning, Oxford Brookes University.

## Appendix

### Using the Internet as an EIA Resource Tool

As more and more of the world becomes linked by computer and communications technology, the possibilities for using the Internet as a resource for environmental impact assessment (EIA) are growing. The purpose of this appendix is not to explain how to use the Internet, but rather to highlight some of the many types of information accessible through the World Wide Web (WWW). While some potentially useful web site addresses are provided, it is important to note that the WWW is a dynamic, constantly evolving place. As such, the addresses and the information available through the Internet are always subject to change. The best way to appreciate the utility of the WWW is to spend some time getting comfortable with search mechanisms and looking at what is available through various sites.

One of the features of the WWW is the ability to be linked electronically from one site to another. As such, once one finds a site of interest, many more relevant sites may be easily accessible without further searching. The International Association for Impact Assessment's (IAIA) home page, for example, contains an extensive index of useful Internet web sites, with links to most. This index, developed by the Environmental Assessment and Compliance unit of the Canadian International Development Agency, includes sites covering a wide range of EIA-related topics — everything from databases of EIA training courses to predictive models to strategic EIA. Some sites that may be of interest to practitioners of EIA in developing countries in Asia are listed below, along with brief descriptions of the type of information the sites contain.

#### **ACCESS EPA: An Environmental Directory**

(<http://earth1.epa.gov/Access/>)

This site provides a directory of the U.S. Environmental Protection Agency and other public sector environmental information resources. There is an extensive list of environmental topics.

#### **Australian EIA Network**

(<http://www.erin.gov.au/net/eianet.html>)

This is an extensive site managed by Environment Australia's Environmental Protection Group which includes contact names and addresses, case studies; information on EIA training resources (for example, the UNEP EIA Training Resource Manual, the IAIA training course database), EIA in Australia, and legislation and agreements; discussion and policy documents (on such topics as social impact assessment, public participation, strategic assessment, cumulative impact assessment, etc.).

#### **Bibliography of Biodiversity Assessment Methodologies**

([http://www.erin.gov.au/life/general\\_info/biodiv\\_assess\\_intro.html](http://www.erin.gov.au/life/general_info/biodiv_assess_intro.html))

This site provides a large bibliography of methods for assessing biodiversity.

#### **Canadian Environmental Assessment Agency**

(<http://www.ceaa.gc.ca>)

In addition to information about the Canadian Environmental Assessment Act, this site contains reports of the study on environmental assessment effectiveness and links to numerous other relevant sites.

### **Ecological Risk Analysis: Tools and Applications**

(<http://www.hsrdo.ornl.gov/ecorisk/ecorisk.html>)

Information, provided by the Oak Ridge National Laboratory, which can be used to conduct ecological screening and baseline risk assessments. The site includes a database of benchmarks for aquatic organisms, wildlife, and sediments; guidance documents for performing environmental assessments; and links to other good assessment sites.

### **Envirolink**

(<http://envirolink.org/>)

This site provides a compilation of comprehensive, up-to-date environmental resources available through the WWW. It has links to sites covering just about any topic related to the environment field, including risk assessment.

### **Envirosense**

(<http://es.inel.gov/>)

This site is the U.S. Environmental Protection Agency's pollution prevention forum; a repository of information related to pollution prevention, compliance, pollution control technologies, etc. It has numerous databases.

### **International Association for Impact Assessment**

(<http://www.ext.NoDak.edu/IAIA/>)

This site contains information about the IAIA, selected references on various aspects of EIA, and numerous links to relevant sites, including the Impact Assessment Journal and the IAIA Newsletter.

### **International Institute for Sustainable Development**

(<http://iisd1.iisd.ca/>)

This homepage has a number of documents relevant to EIA, including an EIA database. It also contains ISO 14,000 information.

### **U.S. Environmental Protection Agency's Air Pollution Database**

(<http://www.epa.gov/dics/airs/airs.html>)

This is a repository of resources relevant to airborne pollution in various countries. The extensive list of resources includes data from monitoring systems, a list of air pollution point sources, reference data, and a technology transfer network.

### **U.S. Environmental Protection Agency/Purdue University Software for Environmental Awareness**

(<http://www.epa.gov/glnpo/seahome/>)

More than 40 of the EPA's environmental software programs can be found at this site, as well as an Environmental Assessment Resource Guide (a generic source of information for conducting EIA for many types of projects, this document covers scoping, alternatives identification, impact identification and analysis, mitigation measures, and decision-making) and a Comparative Risk Assessment methodology.

**University of Manchester, EIA Centre**

(<http://art.man.ac.uk/eia/EIAC.html>)

This homepage contains EIA newsletters, an EIA leaflet series, discussion papers, lists of the Centre's publications and training activities, and documents regarding developing country initiatives in EIA.

**Water Quality Assessment**

(<http://www.ncl.ac.uk/~nxc/EIA.html>)

This site provides an on-line computer modeling program for water quality assessment; it predicts the two-dimensional concentration distribution of pollutants in a river downstream from a discharge point. The model adopts an approximate solution identified as a standard EIA calculation method by environmental authorities in many countries for new and extension construction projects.

**World Bank**

(<http://www.worldbank.org>)

A search on environmental assessment retrieves a number of documents, including papers detailing EIA case studies in developing countries.