



ROYAL GOVERNMENT OF BHUTAN
NATIONAL ENVIRONMENT COMMISSION



Environmental Management Tools and Techniques

A Learning Material



National Environment Commission
P.O. Box 466, Thimphu, Bhutan
www.nec.gov.bt

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Environmental management tools & techniques – National Capacity Self Assessment Project

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National Environment Commission Secretariat

Royal Government of Bhutan

Post Box 466

Thimphu

www.nec.gov.bt

Report design and layout:

Shatu Consulting Service

Printed by:

Phama Printers

ACKNOWLEDGEMENT

The NEC wishes to convey special gratitude to the Global Environment Facility (GEF) for providing funding for compilation of the National Capacity Self Assessment and further towards providing the financial support for its implementation. Furthermore the United Nations Development Programme, the Bhutan Country office which provided support throughout the project and assisted in a great manner to making this initiative a success.

The completion of this assessment would not have been possible without the dedication of the NCSA project management team, and the staff of the NEC, who have worked hard to ensure that the project goals and objectives are met. Support received from the other ministries and agencies is also appreciated. The role played by the local consultants has also been pivotal and the support provided by their experts has also been of great value.

ENVIRONMENTAL MANAGEMENT CONCEPTS

WHAT IS ENVIRONMENTAL MANAGEMENT?

Environmental management (EM) is a subject that combines science, policy, and socioeconomic applications. It primarily stresses on finding solution to practical problems that people face in cohabitation with nature, resource exploitation, and waste production. In a purely anthropocentric sense, environmental management is all about dealing with the fundamental issue of how to innovate technology to evolve continuously while limiting the degree to which this process alters natural environment. Thus, Environmental management is closely linked with issues regarding sustainable economic growth, ensuring fair and equitable distribution of resources, and conserving natural resources for future generations.

Environmental management is a response to human actions considering the increasing seriousness and significance of today's disastrous human impact on natural ecosystems. It is comforting to know that with a smaller global population base and a less pervasive use of technology, the environment might be able to recuperate on its own from human misuse and abuse, but it is now widely recognized fact that in many cases positive intervention is necessary if the environment is to recover in view of the fact that people have bestowed more importance on economic growth than preservation of the natural ecosystems.

Nonetheless, there is substantial disagreement and divergence about the course that such intervention should take, which has created a myriad of approaches to managing the environment. "Deep ecology" surfaced in the 1960s with the wave of movements that renounced technological development and decried the political basis of power and autocracy. However, "shallow ecology" and for that matter, 'shallow ecologists' sought a compromise with those who argued that the solution to the world's environmental problems can come only through the generation of more technology. Environmental managers therefore fall within a broad spectrum that extends from conservationists to technocrats, from those who would limit human interference in nature to those who would increase it in order to guide natural processes along benign paths. Hence both conservationists and developers are represented.

It is indeed expected that both conservationists and developers will come and work together over the need to make economic development sustainable, without it being undermined by long-term damage to natural resources and vital habitats. This is the

intention of the United Nations Convention on Environment and Development (the process that began at the Earth Summit in Rio de Janeiro in 1992). However, underfunding and lack of commitment at the national level have severely limited the extent to which it has changed the global course of environmental management.

Any business or developmental activity has a substantial impact on the environment.

- i. The manufacture of products involves extracting raw materials from the environment and processing them to produce saleable items. As a result of the production process, various forms of waste (solid, liquid and gaseous) enter the environment.
- ii. The activities surrounding the manufacturing process, such as maintenance of plant and infrastructure and the packaging and transport of goods, all have environmental impacts.
- iii. In addition, the products that are produced will eventually be disposed of and enter the environment as waste.
- iv. The provision of services also results in a significant environmental impact. Service companies use various products and also energy to deliver their services, both of which result in waste entering the environment. The provision of services also entails resource exploitation whilst rendering environment unstable.

Simply put, the environment acts as a 'source' of raw material inputs to the industrial process and as a 'sink' for its waste outputs.

Although all companies or organizations produce waste, not all companies or organizations extract raw materials from the environment. This is done only by those companies at the beginning of the supply chain. These raw materials are then processed in various ways as they move along the supply chain. Eventually products emerge and are distributed to wholesalers and retailers.

By over-extracting raw materials from the environment and by overloading it with waste, the environment becomes degraded and unstable. Environmental management aims to find ways of carrying out business activities that reduce or halt this degradation. By doing this we can enjoy a better environment and make sure we preserve it for future generations.

WHY UNDERTAKE ENVIRONMENTAL MANAGEMENT?

There are a number of business advantages to undertaking environmental management. The central message of this learning material is that Environmental Management will make good business sense and improving our environmental performance can improve our business performance.

There are a number of advantages to undertaking environmental management and these include:

- i. Cost savings
- ii. Ensuring legislative compliance
- iii. Anticipating future legislation
- iv. Reduced environmental risk
- v. Meeting supply chain requirements
- vi. Improved relations with regulators
- vii. Improved public image
- viii. Increased market opportunities
- ix. Employee enthusiasm

Each of these benefits is now examined below:

COST SAVINGS

Most, if not all people, wish to protect the environment. However, many businesses fear that protecting the environment by improving their environmental performance will cost money. They fear there will be a conflict between their desire to protect the environment and their desire to keep down costs and run a successful business.

The good news is that many businesses have discovered that far from increasing costs, improving environmental performance actually reduces costs. Many companies have found that it is possible to save money, sometimes large sums of money, by improving their environmental performance.

Cost savings within a company or a firm can be achieved through changes in areas such as:

- i. process efficiency
- ii. product design

- iii. waste disposal
- iv. sourcing of raw materials
- v. infrastructure
- vi. packaging and transport

Various ways of achieving cost savings are described briefly below:

PROCESS EFFICIENCY

Improving the efficiency of existing processes

Optimizing the performance of existing processes minimizes the use of raw materials and energy and the production of waste. Reduced use of raw materials and energy and reduced waste production are all good for the environment and the reduced resource costs and waste disposal costs are good for business. Proper maintenance of equipment is important as it minimizes costly downtime and the resource waste often associated with shutdown and start-up periods.

Introducing more efficient processes

Introducing new and more efficient processes also reduces resource use and waste production. Many companies have been able to make large cost savings by reducing the amount of raw materials, energy and water that they use.

PRODUCT DESIGN

It may be possible to redesign a product so as to reduce the amount of resources it contains whilst still maintaining the level of service it provides.

WASTE DISPOSAL - MAKING MONEY FROM WASTE

As mentioned above, improving process efficiency will reduce the amount of waste that a process produces. Once waste has been generated, it is often possible to reuse it or pass it on to other companies that can use it and so avoid the costs of waste disposal.

SOURCING OF RAW MATERIALS

Changing the source of raw materials used in a particular process can result in cost savings. Companies could make large savings by using recycled wool rather than virgin wool to manufacture its products, or use recycle paper rather than manufactured paper that could save substantial number of trees being felled.

INFRASTRUCTURE

It is also possible to make savings by making efficiency changes to infrastructure e.g. installing energy efficient lighting, insulating buildings, improving the efficiency of heating systems.

PACKAGING AND TRANSPORT

Once goods have been produced, they need to be packaged and transported. It is possible to make cost savings in these areas at the same time as improving environmental performance.

ENSURING LEGISLATIVE COMPLIANCE

By ensuring that it complies with relevant environmental legislation, a company or a firm can avoid the possibility of being fined by the regulatory authorities for noncompliance and the adverse media publicity and public criticism & outrage that can accompany such fines.

ANTICIPATING FUTURE LEGISLATION

Developing an awareness of likely changes in environmental legislation allows companies to plan for these changes and make appropriate investment decisions. If a company or an organization is not aware of proposed legislation it may make investments that are futile when the new legislation is enacted. Alternatively, a company may find out about a legislative change at the last minute and be forced to undertake rapid investment to comply with its requirements. Prior knowledge of likely changes allows a longer time period over which to make the necessary investment and prevent possible cash flow problems.

REDUCED ENVIRONMENTAL RISK

Environmental risk is the single largest hidden risk for many companies. By undertaking environmental risk assessment as part of the environmental management process it is possible to reduce the risk of the occurrence of events that could have adverse environmental consequences. Banks, insurance companies and investors all base their decisions on an assessment of risk. The higher the risk, the less likely a bank is to lend, the less likely investors are to invest and the higher insurance premiums are likely to be. Therefore a reduction in environmental risk is likely to be viewed favorably by all these parties, putting a company in a better position to obtain loans and insurance cover and to attract investment.

MEETING SUPPLY CHAIN REQUIREMENTS

An increasing number of large organizations are requiring their suppliers to demonstrate sound environmental management and are prepared to delist those that fail to do so. In some cases having an environmental policy is not considered sufficient proof of sound environmental management and evidence is required that a company is taking action to meet the commitments set out in their policies. Hence, undertaking effective environmental management will increasingly be necessary to gain or maintain supplier status with large organizations.

IMPROVED RELATIONS WITH REGULATORS

The ability to demonstrate sound environmental management may lead to environmental regulators taking a more “hands-off” approach to regulation e.g. a reduction in the number of inspection visits required per year.

IMPROVED PUBLIC IMAGE AND COMMUNITY RELATIONS

By publicizing its efforts to improve environmental performance, a company can improve its public image, thereby enhancing its position in the market place. And by demonstrating sound environmental management, a company can reassure the local community about its activities and thus build up good community relations.

INCREASED MARKET OPPORTUNITIES

Lower production costs resulting from environmental management and good public image resulting from publicizing good environmental performance can result in a company increasing sales and gaining a larger market share.

EMPLOYEE ENTHUSIASM

The environment is an issue about which many people are concerned. Undertaking environmental management can generate a lot of enthusiasm within a company as it allows employees to express their environmental concern in a practical way by contributing towards improving environmental performance.

ENVIRONMENTAL MANAGEMENT PRINCIPLES

GUIDING PRINCIPLES FOR ENVIRONMENTAL MANAGEMENT

There are many International Agreements and Declarations that contain notable statements. Principle 1 of the 1992 Rio Declaration on Environment and Development, for example, states that “*Human beings are at the centre of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature.*” Principle 17 calls for impact assessment to be undertaken. Article 1 of the 1986 Declaration on the Right to Development states that:

‘The right to development is an inalienable human right by virtue of which every human person and all peoples are entitled to participate in, contribute to, and enjoy economic, social, cultural and political development, in which all human rights and fundamental freedoms can be fully realized. The human right to development also implies the full realization of the right of peoples to self-determination, which includes, subject to the relevant provisions of both International Covenants on Human Rights, the exercise of their inalienable right to full sovereignty over all their natural wealth and resources’.

In International Agreements and Declarations on social issues are often implied but rarely given adequate emphasis. Nevertheless, the statements that are given in those Declarations can be rewritten to refer to social issues more specifically. The following is a list of international principles in common usage rewritten to apply more directly to social issues.

PRECAUTIONARY PRINCIPLE

In order to protect the environment, a concept which includes peoples’ ways of life and the integrity of their communities, the precautionary approach shall be applied. Where there are threats or potential threats of serious social impact, lack of full certainty about those threats should not be used as a reason for approving the planned intervention or not requiring the implementation of mitigation measures and stringent monitoring.

UNCERTAINTY PRINCIPLE

It must be recognized that our knowledge of the social world and of social processes is incomplete and that social knowledge can never be fully complete because the social environment and the processes affecting it are changing constantly, and vary from place to place and over time.

INTRA-GENERATIONAL EQUITY

The benefits from the range of planned interventions should address the needs of all, and the social impacts should not fall disproportionately on certain groups of the population, in particular children and women, the disabled and the socially excluded, certain generations or certain regions.

INTER-GENERATIONAL EQUITY

Development activities or planned interventions should be managed so that the needs of the present generation are met without compromising the ability of future generations to meet their own needs.

RECOGNITION AND PRESERVATION OF DIVERSITY

Communities and societies are not homogenous. They are demographically structured (age and gender), and they comprise different groups with various value systems and different skills. Special attention is needed to appreciate the existence of the social diversity that exists within communities and to understand what the unique requirements of special groups may be. Care must be taken to ensure that planned interventions do not lead to a loss of social diversity in a community or a diminishing of social cohesion.

INTERNALIZATION OF COSTS

The full social and ecological costs of a planned intervention should be internalized through the use of economic and other instruments, that is, these costs should be considered as part of the costs of the intervention, and no intervention should be approved or regarded as cost-effective if it achieves this by the creation of hidden costs to current or future generations or the environment.

THE POLLUTER PAYS PRINCIPLE

The full cost of avoiding or compensating for social impacts should be borne by the proponent of the planned intervention.

THE PREVENTION PRINCIPLE

It is generally preferable and cheaper in the long run to prevent negative social impacts and ecological damage from happening than having to restore or rectify damage after the event.

THE PROTECTION AND PROMOTION OF HEALTH AND SAFETY

Health and safety are paramount. All planned interventions should be assessed for their health impacts and their accident risks, especially in terms of assessing and managing the risks from hazardous substances, technologies or processes, so that their harmful effects are minimized, including not bringing them into use or phasing them out as soon as possible. Health impacts cover the physical, mental and social wellbeing and safety of all people, paying particular attention to those groups of the population who are more vulnerable and more likely to be harmed, such as the economically deprived, indigenous groups, children and women, the elderly, the disabled, as well as to the population most exposed to risks arising from the planned intervention.

THE PRINCIPLE OF MULTI-SECTORAL INTEGRATION

Social development requirements and the need to consider social issues should be properly integrated into all projects, policies, infrastructure programs and other planning activities.

THE PRINCIPLE OF SUBSIDIARITY

Decision making power should be decentralized, with accountable decisions being made as close to an individual citizen as possible. In the context of SIA, this means decisions about the approval of planned interventions, or conditions under which they might operate, should be taken as close to the affected people as possible, with local people having an input into the approval and management processes.

DEVELOPING GUIDELINES

Because guidelines are specific recommendations for action, they need to be developed in the context in which they are to be applied and they need to be addressed to a specific audience. Therefore, they need to be developed in conjunction with the relevant parties. They need to become accepted as the guidelines of that group rather than being imposed.

There are many different groups who are potentially interested in guidelines for impact assessment (IA). They include:

- i. Impact Assessment practitioners – require guidelines to improve their practice;
- ii. Regulatory agencies – require guidelines in order to specify or audit the scope of IA activities they commission as well as the quality of IA reports they receive;
- iii. Policy and program developers – require guidelines to ensure that policy and program development considers social and other relevant impacts;
- iv. Affected peoples and NGOs – require guidelines to be able to participate effectively in IA processes. Local action groups (resident action groups) and NGOs often act like a regulatory agency in checking the appropriateness of IA processes.
- v. Developers (proponents) and Financiers – require guidelines to be committed to good practice in environmental and social impact assessment, to adequately resource such practice, to liaise effectively with practitioners and interested and affected parties, and with regulatory agencies.
- vi. Development agencies (multilateral and bilateral aid organizations) – require guidelines to ensure that the most benefit is obtained from their aid projects, that IA components are adequately resourced, and that the aid projects themselves do not have unintended environmental or social consequences.
- vii. In addition, various sectors of the community may have special interests, and it may be appropriate for guidelines to be developed to address those special interests, such as Indigenous or Tribal Peoples.

ENVIRONMENTAL MANAGEMENT TOOLS & TECHNIQUES

HOW DOES A FIRM/COMPANY PUT INTO SERVICE ENVIRONMENTAL MANAGEMENT?

Considering the significance of sound environmental management we are now in agreement that that environmental management is worth investing. Now there is a need for a company or an organization to know how to go about it. To undertake any task one needs appropriate tools. This learning material describes a range of environmental management tools - tools that a company or an organization can use to effectively manage its environmental and social affairs.

In the early 1990s the International Organization for Standardization (ISO) recognized the need for standardization in the field of environmental management tools and in 1993 it set up a committee to write standards relating to the following environmental management tools:

- i. environmental management systems
- ii. environmental auditing
- iii. environmental labeling
- iv. life cycle assessment
- v. environmental indicators
- vi. environmental policies
- vii. eco-balances
- viii. environmental reporting
- ix. environmental charters

By reading the sections on the above tools you will be able to gain an understanding of what tool or tools would be the most appropriate to use. To introduce these tools, each is described briefly below.

Environmental Policy

An environmental policy is a document which clearly sets out the overall aims and intentions of a firm/company with respect to the environment. Developing an environmental policy is often the first step taken by firms/companies who wish to undertake environmental management. An environmental policy signals a commitment to

environmental management and can prepare the way for further environmental management activities.

Environmental Management Systems

An environmental management system (EMS) enables a firm/company to manage its environmental affairs in a planned and systematic way and thus identifying ways of improving its environmental performance that most benefit its business performance. This section focuses on the requirements of two EMS schemes: 1) ISO 14001, the international environmental management system standard and 2) EMAS, the European Community's ecomanagement and audit scheme. (Note: It is highly likely that in the future ISO 14001 and EMAS will come to be the key tools in the field of environmental management.)

In order to develop an EMS that meets the requirements of these schemes a firm must take the following steps.

- i. First it must produce an environmental policy that contains commitments to legislative compliance and to continually improving its environmental performance.
- ii. Next it must set targets relating to these commitments and devise a programme for meeting these targets. Targets for improving environmental performance should be based on a comprehensive review of its environmental activities.
- iii. It must then take the measures necessary to implement the programme.
- iv. Having implemented the programme, it needs to check that it has been successful in meeting its targets. Corrective action must be taken in instances where this is not the case. The EMS must be audited periodically to check it is functioning as it should.
- v. Finally, the firm needs to carry out a management review of the EMS, making any changes necessary in light of the audit results and changing circumstances. Having met its first set of targets the firm must set itself a new set of targets so as to meet its policy commitment to continual improvement.

Environmental Auditing

Environmental auditing is a tool for checking whether a firm or an organization is doing what it should be doing. For instance a legislative compliance audit checks that those activities of the firm covered by environmental legislation (i.e. what it is doing) actually comply with that legislation (i.e. what it should be doing). An environmental audit will tell a firm or an organization whether its waste management practices (i.e. what it is doing)

conform with the industry sector best practice guidelines it has committed itself to following (i.e. what it should be doing).

Auditing is an important part of an environmental management system. ISO 14001 requires that an audit to be undertaken to check whether a firm's EMS meets its requirements and the same is true for EMAS. Given the importance of environmental management systems, a detailed explanation of the EMS audit process is given in this learning material.

Environmental Indicators

Environmental indicators allow a firm to measure both its environmental performance and its efforts to improve its performance. Indicators can be used within an environmental management system to check that a firm has met the targets it is required to set for itself, but can equally well be used in firms that have not developed an EMS.

Eco-balance

A company eco-balance records the various raw materials, energy, resources, products and wastes entering, held within and leaving a company over a specified period of time. In other words, it provides a record of a company's physical inputs, stock and outputs. Once a company knows exactly what is coming in and going out, it can begin to assess the particular environmental impacts of those inputs and outputs. An eco-balance therefore enables a firm to undertake the comprehensive environmental review of its activities required by ISO 14001 and EMAS and to go on and set targets for improving its environmental performance.

Life Cycle Assessment

Life cycle assessment (LCA) is a tool for identifying and assessing the various environmental impacts associated with a particular product. LCA takes a "cradle to grave" approach looking at the impacts of the product *throughout its life cycle* i.e. from the raw materials acquisition (the "cradle") through its production and use to its final disposal (the "grave"). LCA allows manufacturers to find ways of cost-effectively reducing the environmental impact of a product over its life-cycle and to support their claims about the environmental impact of their products.

Environmental Labeling

Environmental labeling schemes award an environmental label to those products that are judged to be less harmful to the environment than others within the same product group. Firms that wish for their products to be considered for a label must apply to the scheme organizer. To be awarded a label, a product has to meet a set of environmental criteria drawn up for its product group by the labeling scheme organizer. The criteria relate to the complete product life-cycle and are drawn up using LCA. They are set so that only a certain percentage of products within a group, say 20-30%, can meet them. Hence environmental labels can be used as marketing tools as they signify that a product is one of the least environmentally harmful products in its group.

Environmental Reporting

Having undertaken various environmental management initiatives to improve its environmental performance, a company or an organization may wish to communicate the results of these initiatives to the outside world. One way of doing this is by publishing an environmental report. Issuing an environmental report can improve a firm's public image and lead to improved relationships with stakeholders. To date, it is mainly large companies that have issued such reports but small and medium scale companies may also find environmental reporting a useful tool.

Environmental Charters

There are a number of environmental charters and guidelines to which a firm/company or an organization can subscribe in order to demonstrate its commitment to responsible environmental management.

HOW CAN A FIRM/COMPANY MAKE USE OF THESE TOOLS?

If a firm wishes to make use of these environmental management tools, it has a number of options. It can,

- i. read the relevant literature on the tools
- ii. get staff trained to use them
- iii. use external experts/consultancy

ENVIRONMENTAL POLICY

WHAT IS AN ENVIRONMENTAL POLICY?

An *environmental policy* is a document prepared by a company or an organization which clearly sets out its overall aims and intentions with respect to the environment. An environmental policy provides a sense of direction for a company and shows that it is committed to managing its environmental affairs in a responsible way. The policy should be endorsed by the company's senior management and should be publicly available. It should be an integral part of the business strategy and be compatible with company's other policies (e.g. on quality and on health and safety).

NEED TO FORMULATE AN ENVIRONMENTAL POLICY

There are a number of reasons for producing and formulating an environmental policy.

Producing a policy is an important first step towards achieving effective environmental management.

Setting out your aims and intentions with respect to the environment is an important first step towards achieving effective environmental management. Having done this, a company can then take the measures necessary to achieve them. By taking appropriate measures i.e. by carrying out effective environmental management, a company can gain the benefits that such management brings.

An environmental policy provides important information to external stakeholders on company's aims and intentions with respect to the environment.

Having an environmental policy can enhance company's reputation with external stakeholders such as customers and the local community. It shows that an organization have made a start on dealing with environmental performance. However, to make sure a company's reputation isn't tarnished in any way, it is important that all stakeholders see evidence that a company is taking action to realize the aims and intentions set out in environmental policy.

OTHER IMPORTANT ASPECT OF PRODUCING A POLICY

Large organizations are becoming increasingly concerned to ensure that the environmental management of their suppliers is of an acceptable standard. It is therefore becoming increasingly common for such organizations to require that their suppliers have an environmental policy. As a responsible company, a company may not have the luxury of sitting back and deciding whether or not it wishes to produce an environmental policy. If a major customer requires a company to produce a policy, it will need to do so or risk losing business. Rather than waiting until they are asked, it makes sense to prepare a policy in its own time. That way a company is prepared for any customer that requires it to have one.

WAYS AND MEANS TO PRODUCE AN ENVIRONMENTAL POLICY

This section is divided into five parts:

- i. Before a company commence's
- ii. Sources of information when preparing a policy
- iii. Guidelines on format, style and content
- iv. Disseminating policy
- v. Implementing policy

Before a company begin to develop a policy it is important to get the backing of the company's senior and executive management. This will help to ensure that the policy is effectively implemented once it has been written. One way of making management's commitment visible is to have the policy signed by, for instance, the company chairman/women and/or the chief executive officer/managing director.

There are a number of sources of useful information that could be used when developing a policy.

Table 1. Sources for developing environmental policy

Sl. No.	Source	Remark
1	Other companies' environmental policies	Looking at policies developed by other companies will give company ideas on content, format, style, wording etc. Policies developed by companies in the same or similar industrial sector will be of particular interest.
2	Company's employees	A company's employees are a good source of ideas and information. Including them in the policy development process will mean they have a greater sense of ownership of the policy.
3	Other relevant stakeholders	A company may want to consider any opinions that their customers and members of the local community have about the contents of your policy.
4	Environmental management system (EMS) schemes	Both ISO 14001 and EMAS, (the environmental management system schemes require a company to produce an environmental policy, and lay down various requirements about what the policy must contain. In addition ISO 14004 provides general guidance on writing an environmental policy for an EMS. A company may find this information useful, particularly if it may wish to establish an EMS at a later date.
5	Environmental charters	The charters can provide ideas for the content of a policy.

Guidelines on format, style and content

When writing an environmental policy the following points should be considered:

Be bright but short

A policy sets out your aims and intentions regarding the environment - it is not intended to be a detailed action plan. So ideally an environmental policy statement should be brief - no more than one or two pages. This means it can be easily disseminated and increases the likelihood of it being read.

Simple and careful language

The policy will be read by a wide variety of people so it is important that it is written in such a way that it can be easily understood. Technical and specialized language should be

avoided. As a company will be using a limited number of words to communicate important issues, the words chosen should be chosen with care. Consider, for example, the following phrases relating to reduction of environmental impact. Although they deal with the same issue, they all communicate slightly different meanings:

- i. Our company will aim to reduce...
- ii. Our company will endeavor to reduce...
- iii. Our organization will strive to reduce...
- iv. Our organization is committed to reducing...
- v. Our organization will reduce...

It is important that a company neither commits itself to goals that are unrealistic nor conversely, makes statements that are weak and noncommittal.

Specific objectives and targets should be published separately.

An environmental policy is a broad statement of aims and intentions. In order to achieve these, a company may wish to set itself detailed objectives and targets. However these are generally not included in the policy document itself. In the beginning, a company may not have done the necessary investigation into its environmental activities to be in a position to formulate objectives and targets. And even if it has, the fact that there may be a large number of such objectives and targets and these will change from year to year, would mean that including them in the policy document would make it unnecessarily long and complicated. It is best to separate the statement of aims and intentions from the specific measures a company intends to implement in order to realize them.

Making sure that a policy is relevant to a company

Whilst a company should avoid making its policy too specific, one should also avoid making it too general. A common problem with many environmental policies is that they are written in such a general manner that they could apply to almost any company. It is important to make the environmental policy relevant to the activities that a company carries out in order to show those who read it that it is aware of the particular environmental issues that a company needs to address. The phrases set out below may help out to draft a policy appropriate to a business. Our organization or business will...

- i. seek to improve its environmental performance continuously.
- ii. foster the commitment of all management and staff to improving the environmental performance of the business.

- iii. adopt a total “cradle-to-grave” assessment and responsibility of our products and services.
- iv. aim to minimize the use of all materials, supplies and energy. Wherever possible we will use renewable or recyclable materials and component.
- v. minimize pollution produced in all parts of the business, and aim for “pollution-free” processes.
- vi. adopt an environmentally sound transport strategy.
- vii. assess the environmental impact of all our operations past, present and future.
- viii. expect similar environmental standards to our own from all third parties involved with our business viz. suppliers, vendors, contractors.
- ix. assist our customers to use our products and services in an environmentally sensitive way.
- x. liaise on a continuous basis with the local community.
- xi. include environmental consideration in investment decisions.
- xii. assist in developing economically-viable solutions to environmental problems in our industry.

DISSEMINATING AN ENVIRONMENTAL POLICY

Having developed the environmental policy, it is important to ensure that all key stakeholders receive copies. These stakeholders may include customers, suppliers, shareholders, regulators and key persons and organizations in the local community. A company should also be ready to post out the policy to those people that hear about it and approach you for a copy. One can also publish the policy in the company’s annual report and website, and all staff should receive a copy of the policy and the company should ensure that all staff understands the policy and their role in implementing it.

IMPLEMENTING AN ENVIRONMENTAL POLICY

It would be wrong to view the production of an environmental policy as an end in itself. A policy has to be implemented i.e. action has to be taken to achieve its aims and intentions. If a company’s policy is to become a practical reality, a company will need to:

- i. be familiar with those elements of its activities, products and services which affect the environment
- ii. set itself specific objectives and targets relating to these elements especially those that have or could have a significant impact on the environment. The aim here is to

- find ways of improving its environmental performance that also improve its business performance.
- iii. take action to meet these objectives and targets
 - iv. measure its environmental performance to check its objectives and targets have been met.

To do this, it will be necessary for a company to manage its environmental affairs in a systematic way. The following sections describe various environmental management tools that will allow a company to do this and so gain the benefits that such management can bring.

ENVIRONMENTAL MANAGEMENT SYSTEMS

WHAT IS AN ENVIRONMENTAL MANAGEMENT SYSTEM?

A system can be thought of as a number of interrelated elements functioning together to achieve a clearly defined objective.

We can therefore say that an *environmental management system (EMS)* consists of a number of interrelated elements that function together to achieve the objective of effective environmental management.

So what are the elements that make up an environmental management system? Many larger companies have had environmental management systems in place for a number of years. As each company has designed its system to meet its particular needs, these systems have differed widely i.e. they contain a differing combination of elements. Recently, however, a common model for an environmental management system has been formulated by the International Organization for Standardization (ISO) which standardizes the elements that an environmental management system should contain. The model has been designed to be applicable worldwide and to organizations of all types and sizes and is set out in the standard.

ISO 14001 ENVIRONMENTAL MANAGEMENT SYSTEMS

The environmental management system model set out in ISO 14001 is described below. The section then goes on to look at a second environmental management system scheme - *EMAS - the EC Eco-management and audit scheme*.

The elements of ISO 14001 are organized around 5 steps, each of which is briefly described below.

STEP 1 - ENVIRONMENTAL POLICY

A firm drafts a policy setting out its intentions in relation to the environment. The policy must contain commitments to:

- i. continual improvement
- ii. prevention of pollution
- iii. compliance with relevant environmental legislation and other legal requirements.

ISO 14001 defines “continual improvement” as the process of enhancing the environmental management system in order to achieve improvements in environmental performance in line with the organization’s environmental policy

STEP 2 – PLANNING

The firm must then set itself objectives and targets relating to its policy commitments and devise a plan to meet these objectives and targets.

STEP 3 - IMPLEMENTATION AND OPERATION

Having devised its plan, the firm must then put in place the various elements necessary for its successful implementation and operation.

STEP 4- CHECKING AND CORRECTIVE ACTION

Having implemented its plan, the firm must then check to see it has been successful in meeting its objectives and targets. If any have not been met, then corrective action must be taken. The entire management system must be periodically audited to see that it meets the requirements of the standard.

STEP 5 - MANAGEMENT REVIEW

Management must periodically review the system to ensure its continuing effectiveness and suitability. Changes are made to the system as and when necessary.

THE ELEMENTS OF ISO 14001

The various elements of ISO 14001 within each of the 5 steps are described below.

STEP 1 - ENVIRONMENTAL POLICY

As mentioned above, a firm's environmental policy must contain commitments to continual improvement, prevention of pollution and to comply with relevant environmental legislation. In addition the policy must provide a framework for setting objectives and targets that must be communicated to all employees and must be publicly available.

STEP 2 – PLANNING

Environmental aspects

The first thing the firm must do is to identify what the standard calls its '*environmental aspects*'. These are defined as, '*elements of an organization's activities, products or services which can interact with the environment*'.

Once its environmental aspects have been identified, the firm must establish which of them are '*significant*' i.e. which of them have a significant impact on the environment. To identify its significant environmental aspects, the firm needs to undertake an '*environmental review*' (see Table 1 for details). *It should be emphasized that the environmental review is the foundation upon which the rest of the management system is built and should be conducted as thoroughly as possible.* Brief guidance on evaluating significance is given in Table 2.

Table 2. Environmental aspects: significant or not?

<i>Although ISO 14001 requires firms to identify their significant aspects it gives no guidance on how to do so. It is up to an individual firm to find a method for doing so. Judgments about whether aspects are or are not significant will always to some extent be subjective but should be made as consistent as possible by establishing and documenting a methodology for evaluation. Below are two approaches that can be used.</i>		
Environmental aspects are assessed for significance against a scale such as the one below.		
Scale	Description	Criteria
1	Negligible	Very small environmental impact. Low probability of occurrence.
2	Minor	Abnormal conditions would cause breach of legislation. Impact and probability of occurrence both small.
3	Significant	The activity has an impact under normal operating conditions and results in a breach of legislation under abnormal operating conditions. Effect and probability of occurrence are moderate.
4	Major	The activity under abnormal conditions is a breach of legislation. Impact is extensive

Legal and other requirements

Given that the firm has made a commitment in its policy to comply with legal and other requirements, the firm must establish what these actually are. This is done during the environmental review (refer Table 1). The firm should consider how it can keep track of changes in legal requirements so it can remain in compliance.

Objectives and targets

In order to meet its commitment to legal compliance a firm must set itself the objective of identifying and correcting any non-compliance. In order to meet its policy commitment to continual improvement and prevention of pollution, the firm must set objectives and targets in relation to its significant environmental aspects.

Environmental management programme

Having set its objectives and targets the firm must now devise a programme for achieving them. The programme must state the time-frame in which the objectives and targets are to be achieved and identify the people responsible for achieving them.

STEP 3 IMPLEMENTATION AND OPERATION

The following elements are necessary to successfully implement and operate the environmental management programme.

Structure and responsibility

The role, responsibility and authority of everyone involved with the EMS must be defined. Management must provide the resources necessary for the implementation of the EMS. (Resources include human resources, technology and financial resources). The firm's management must appoint someone who is ultimately responsible for ensuring that the EMS is established, implemented and maintained in accordance with the requirements of ISO 14001.

Table 3. Understanding an object and a target

<p>An environmental objective is defined as an: 'overall environmental goal, arising from the environmental policy, that an organization sets itself to achieve, and which is quantified wherever possible'.</p> <p>An environmental target is a: 'detailed performance requirement, quantified where practicable...that arises from the environmental objectives and that needs to be set and met in order to achieve those objectives'.</p> <p>According to ISO 14004 objectives can include commitment to:</p>
<ul style="list-style-type: none"> i. reduce waste and the depletion of resources ii. reduce or eliminate the release of pollutants into the environment iii. design products to minimize their environmental impact in production, use and disposal iv. control the environmental impact of raw material sourcing v. minimize any significant adverse environmental impact of new developments vi. promote environmental awareness among employees and the community <p>Progress towards an objective can generally be measured using environmental indicators such as:</p> <ul style="list-style-type: none"> i. quantity of raw material or energy used; ii. quantity of emissions such as CO₂; iii. waste produced per quantity of finished product; iv. efficiency of material and energy use; v. number of environmental incidents/accidents; vi. % waste recycled; vii. % recycled material used in packaging; viii. number of vehicle kilometers per unit of production; ix. specific pollutant quantities e.g. NO_x, SO₂, CO, HC, Pb, CFCs; x. investment in environmental protection; xi. number of prosecutions; xii. land set aside for wildlife habitat.
<p>For Example:</p> <p>Objective: reduce energy required in manufacturing process Target: Achieve 10% reduction compared with previous year Indicator: quantity of fuels and electricity per unit of production</p>

Training, awareness and competence

All staff whose work may create a significant impact on the environment must receive the appropriate training. The firm must make them aware of:

- i. the importance of conformance with the requirements of the EMS
- ii. the significant environmental impacts of their work activities and the environmental benefits of improved personal performance
- iii. their roles and responsibilities in the successful functioning of the EMS

Staff performing tasks which can cause significant environmental impacts must be deemed competent to do so. (Competence is assessed on the basis of their education, training and/or experience).

Communication

The firm must establish and maintain suitable procedures for communication between various parts of the firm regarding the EMS. It must also make provisions for receiving and responding to relevant communications about its EMS from external parties.

Environmental management system documentation

The firm must establish and maintain information - in paper or electronic form to;

- i. describe the elements of the management system and their interaction
- ii. provide direction to related documentation

Document control

The firm must establish procedures for controlling all the documents required by ISO 14001 to ensure, for instance, that they can be located and that they are periodically reviewed, revised as necessary and approved by authorized personnel.

Operational control

The firm is required to identify those of its activities that are associated with the significant environmental aspects covered in its objectives and targets. The firm then needs to produce documented operating procedures for these activities to cover situations where, if no procedures existed, the objectives and targets might not be met.

The firm must also establish procedures relating to the significant aspects of goods and services used by the organization. All relevant procedures must be communicated to suppliers and contractors.

Emergency preparedness and response

The firm must establish and maintain procedures to;

- i. to identify potential accident and emergency situations
- ii. to respond to these situations should they arise, and

- iii. for preventing and mitigating the environmental impacts that may be associated with them

The firm must periodically test these procedures where practicable and review and revise them where necessary particularly after the occurrence of accidents or emergency situations.

STEP 4 CHECKING AND CORRECTIVE ACTION

Monitoring and measurement

The firm must establish and maintain documented procedures to monitor and measure on a regular basis, those areas covered by the objectives and targets in order to see if the objectives and targets have been met. The firm must also establish and maintain a documented procedure for periodically evaluating compliance with relevant environmental legislation and regulations.

Non-conformance and corrective and preventive action

The firm must establish and maintain procedures for defining responsibility and authority for;

- i. investigating and handling instances of non-conformance with the targets and objectives it has set for itself
- ii. taking action to mitigate any impacts caused, and
- iii. for initiating and completing corrective and preventive action.

The organization must record any changes it makes to its procedures as a result of any corrective and preventive action that it undertakes.

Records

The organization must establish and maintain procedures for the identification, maintenance and disposal of its environmental records. These records must include training records, the results of audits and management reviews.

Environmental management system audit

The firm is required to establish and maintain a programme and procedures for periodic environmental management system audits to be carried out. The audit seeks to determine whether or not the EMS;

- i. conforms with the requirements of the ISO 14001
- ii. has been properly implemented and maintained

The audit programme and procedures should cover;

- i. the activities and areas to be considered in audits
- ii. the frequency of audits
- iii. the responsibilities associated with managing and conducting audits
- iv. the communication of audit results
- v. auditor competence
- vi. how audits will be conducted

STEP 5 - MANAGEMENT REVIEW

The firm's management must periodically review the environmental management system to ensure it continues to meet the needs of the firm. The review must address the possible need for changes to the firm's policy, objectives and other elements of the environmental management system in light of the following;

- i. the audit results
- ii. changing circumstances, and
- iii. the firm's commitment to continual improvement.

The commitment to continual improvement and prevention of pollution will mean that new objectives and targets will have to be set and changing circumstances, for instance, the introduction of new products and processes, will mean that new procedures need to be written and new roles and responsibilities designated.

EMAS - THE EC ECO-MANAGEMENT AND AUDIT SCHEME

ISO 14001 is not the only environmental management system scheme existing in Europe. A second scheme, the EC eco-management and audit scheme (EMAS), has been operating since 1993.

DIFFERENCES BETWEEN ISO 14001 AND EMAS

- i. Whereas ISO 14001 is applicable worldwide, only EU member states can participate in EMAS.

- ii. Unlike ISO 14001, EMAS is not a standard but a Regulation (A Regulation is a type of EU legislation).
- iii. Whereas a whole company, a specific site or a specific activity can be certified to ISO, only individual sites can be registered under EMAS.
- iv. Whereas ISO 14001 is applicable to all organizations, only companies performing industrial activities specified in the EMAS Regulation can participate in EMAS.
- v. Whereas ISO 14001 only contains requirements for an environmental management system, the EMAS Regulation;
 - i. contains requirement for an environmental management system
 - ii. requires a firm to produce an environmental statement, and
 - iii. requires that a firm's EMS and statement be independently verified.

These 3 requirements are discussed below.

ENVIRONMENTAL MANAGEMENT SYSTEM

The requirements of EMAS regarding an environmental management system are very similar to those of ISO 14001 and so will not be discussed further here. For information on the difference between the requirements see Table 4.

ENVIRONMENTAL STATEMENT

EMAS requires that a firm produces an environmental statement that describes the firm's environmental management system and its environmental performance. The statement must be publicly available and must include the following:

- i. a description of the company's activities at the relevant site
- ii. an assessment of all the significant environmental issues of relevance to the activities concerned
- iii. a summary of the figures on pollutant emissions, waste generation, consumption of raw materials, energy and water, noise and other significant environmental aspects as appropriate
- iv. other factors regarding environmental performance
- v. a presentation of the company's environmental policy, programme and management system implemented at the site
- vi. the deadline set for the submission of the next statement
- vii. the name of the accredited environmental verifier

VERIFICATION

Not just anyone can verify that a firm's environmental management system and environmental statement meet the Regulation's requirements. The verification must be done by an independent accredited environmental verifier. EMAS requires each member state of the EU to "*establish a system for the accreditation of independent verifiers and for the supervision of their activities*". In most EU countries it is the same accreditation organization that accredits both ISO 14001 certifiers and EMAS verifiers.

Each EU member state has appointed an organization known as a "*competent body*" to administer EMAS. One can also obtain a copy of the EMAS Regulation and further information regarding the scheme.

WHY IMPLEMENT AN ENVIRONMENTAL MANAGEMENT SYSTEM?

Whilst there are obviously costs involved in setting up and operating an environmental management system, the system can also bring great benefits. A firm should establish an environmental management system if it believes that the benefits from doing so will outweigh the costs involved.

COSTS

The costs involved can include:

- i. staff time spent establishing and maintaining the system
- ii. payment of consultants, if used to help establish the system
- iii. payment of ISO 14001 certifier/EMAS verifier

BENEFITS

Some of the benefits that arise from establishing an EMS are set out below:

A COST EFFECTIVE APPROACH

An EMS takes a systematic approach to environmental management and a systematic approach is a *cost-effective* approach. The environmental review highlights *all* the areas of the firm where improvement in performance is possible. With this information, a firm can assess which improvements will produce the greatest benefits in terms of cost savings and

reduction of risk, and deal with these areas first. *The firm can then set targets that benefit both itself and the environment.*

TARGETS NOT JUST SET BUT MET

An EMS not only requires firms to set themselves targets but ensures that they meet them. A firm must devise a management programme for achieving its targets, ensure that the resources are available for it to be carried out, monitor its environmental performance to check if it has met its targets and take corrective action if it finds it has not.

LEGISLATIVE COMPLIANCE ENSURED

As well as bringing about a continual improvement in environmental performance, an EMS enables a firm to ensure it is complying with relevant legislation and regulations. The environmental review identifies all the legislation and regulations with which the firm should be complying and the firm must then establish procedures for checking compliance and for taking corrective action should it discover instances of non-compliance.

IMPROVED PUBLIC IMAGE AND INCREASED MARKET OPPORTUNITIES

Not only do ISO 14001 and EMAS enable a firm to meet its environmental policy commitments and its objectives and targets, they also enable the firm to demonstrate sound environmental management to stakeholders. There may be considerable public relations benefits and increased market opportunities for a firm that can demonstrate to the outside world that it has a sound system of environmental management.

Table 4. The relationship between EMAS and ISO 14001

If a firm has an ISO 14001 environmental management system and wants to become registered under EMAS, what must it do?

In order to make its environmental management system meet the requirements of EMAS it must modify its management system slightly. The changes that need to be made are set out in a guidance document (to obtain a copy contact relevant national standards body). The firm must also meet the EMAS requirements regarding the environmental statement and verification described above.

If a firm is registered under EMAS and want to become certified to ISO 14001 what must it do?

Meeting the requirements of EMAS means that it is almost certain that all the requirements of ISO 14001 have been met. The ISO 14001 certifier will have to check that this is the case which will in all probability, just be a paper exercise and certify your company to ISO 14001.

VIEWED MORE FAVORABLY BY THE REGULATOR AND THE FINANCIAL SECTOR

Having a management system can mean less supervision from environmental regulators and preferential treatment from banks and insurers. And the fact that an EMS demonstrates sound environmental management may well improve your ability to attract investment.

HOW SHOULD A FIRM GO ABOUT SETTING UP AN ENVIRONMENTAL MANAGEMENT SYSTEM?

As the first section of this chapter has shown, a firm has a number of options when it comes to establishing an environmental management system.

ENVIRONMENTAL MANAGEMENT SYSTEM OPTIONS

A firm can

- i. establish a management system based on the guidelines set out in ISO 14004;
- ii. establish a management system that meets the requirements of ISO 14001 and self-declare;
- iii. become certified to ISO 14001 by an accredited third party certifier;
- iv. become site registered under EMAS;
- v. both iii and iv

Note: Of course, a firm may decide that due to its small size or its minimal impact on the environment, it does not require a formal management system. In this case the firm may choose to manage its environmental performance by developing a simple set of environmental indicators.

WHICH OPTION SHOULD A FIRM CHOOSE?

By developing an EMS based on the ISO 14004 guidelines (option 1), a firm can improve its environmental performance and at the same time ensure legal compliance, reduce its environmental risk and achieve cost savings. However, because ISO 14004 is a guidance document and not a set of requirements it is not possible to demonstrate compliance either by self-declaration or third party certification.

By following one of options 2-5, it is possible to demonstrate compliance with the requirements of ISO 14001 and/or EMAS and demonstrating compliance to the outside world can bring with it the additional benefits of;

- i. improved public image and community relations

- ii. improved relations with regulators
- iii. preferential treatment from banks and insurers
- iv. an increased ability to attract business and investment

If a company is not seeking such benefits or feels that none of them would result from pursuing options 2-5 then it should pursue option 1.

It is worth noting that a management system based on the guidance in ISO 14004 can easily be upgraded to meet the requirements of ISO 14001 or EMAS, should changing circumstances make it advantageous to do so.

As discussed earlier in the chapter, options 3-5 are likely to be seen as more credible demonstrations of sound environmental management than option 2 and thus they are likely to bring greater external benefits. On the other hand options 3-5, unlike option 2, involve the costs of certification/verification.

If a firm is of the view that there are likely to be no extra benefits from options 3-5, or if a firm feels that the possible additional benefits do not justify the expense of certification/verification, then chose option 2.

If, however, a firm feels that the benefits of ISO 14001 certification/EMAS registration are likely to outweigh the additional costs you will chose one of options 3-5. Whereas EMAS is applicable only within the EU, ISO 14001 is applicable worldwide.

If most of the business is in Europe this may sway you in the direction of EMAS. If, on the other hand, you export widely outside Europe then ISO 14001 may be preferable.

A firm may of course decide that there is good business reasons why a firm wishes to become both ISO 14001 certified and EMAS registered. If so, a firm could either;

- i. become certified to ISO 14001 and take the additional steps to gain EMAS registration at a later date. (As pointed out in Table 4, it is fairly straightforward to gain registration under EMAS once a certified ISO 14001 is in place.) In this case it may be sensible to use the same consultants to verify compliance with EMAS as were used to certify compliance with ISO 14001 as they will already be familiar with the firm's management system
- ii. become certified to ISO 14001 and registered under EMAS at the same time.

TIME AND COST INVOLVED IN INSTALLING AN ENVIRONMENTAL MANAGEMENT SYSTEM

As mentioned earlier, the cost of establishing an environmental management system includes staff time and may also include consultancy fees. During 1995, consultants Coopers and Lybrand conducted a study involving 19 firms between 20 and 300 employees of the resources required to obtain EMAS registration. The study found that a minimum of 40 person days (including both staff and consultancy time) were required to achieve registration and for some companies subject to extensive environmental regulation the number of person days was substantially higher. One highly regulated company with 250 employees estimated that it would take up to 240 person days to achieve registration. (Note: Becoming certified to ISO 14001 will require similar amounts of time to those quoted above.)

SHOULD EXTERNAL HELP BE USED?

There are guides/manuals available that are designed to enable firms to establish their own environmental management system. A firm may want to take this approach, perhaps using external expertise to provide guidance where appropriate. Alternatively, a firm may feel more comfortable with using external experts to establish the system. To whatever degree, a firm may use external expertise, investigate thoroughly the options for obtaining low cost/free external help. In the UK, for instance, some environmental business clubs offer free environmental reviews for their members.

There may also be schemes available to subsidize the cost of using consultants. In the UK the government has set up the *Small Company Environmental and Energy Management Assistance Scheme (SCEEMAS)* that provides SMEs with up to 50% of the cost of hiring consultants to guide them to EMAS registration.

Remember, if you are using external experts;

- i. make sure that the system they set up is tailored specifically to the firm's needs and is as simple and easy to maintain as possible.
- ii. work with them to ensure that a firm becomes familiar with the system and feel competent to maintain it.

ENVIRONMENTAL AUDITING

WHAT IS AN ENVIRONMENTAL AUDIT?

An **environmental audit** is a tool that is used to check whether a company is doing what it should be doing.

Environmental auditing originated in North America in the 1970's as a management tool to determine whether or not companies were complying with the increasingly numerous and complex laws and regulations that were coming into force at that time. Checking whether the activities of a company that are covered by environmental legislation (i.e. what your company is doing) actually comply with that legislation (i.e. what it should be doing) is called a *legislative compliance audit*.

Both EMAS and ISO 14001 require companies to carry out an *environmental management system audit*. This means that a company must check to see whether its environmental management system fulfils the requirements of these documents.

Perhaps a company has a waste management policy, or has agreed to abide by its industry sector guidelines on waste management. In this case the company may want to carry out an audit to check that its waste management activities conform with the requirements of its policy or the industry sector guidelines. Or maybe a company has in place certain procedures for carrying out important operations. In this case the company may want to carry out an audit to check that the relevant staff members are adhering to these procedures.

Perhaps a company is thinking of purchasing another company. In this case it may want to do a *preacquisition audit* to check, for instance, that this company is doing what it should be doing in terms of complying with all relevant legislation and any industry guidelines which it has signed up to.

SOME AUDIT TERMINOLOGY

Whatever it is that is being audited e.g. activities covered by legislation, an EMS or waste management practices is referred to as the *subject matter* of the audit. The policies, procedures, guidelines, standards or other requirements against which the subject matter of the audit is checked are called *audit criteria*. Therefore, 'An environmental audit seeks to determine whether or not the audit *subject matter* conforms with the *audit criteria*'.

For example, the audit criteria in a legislative compliance audit will be the environmental legislation that applies to a company and the subject matter of the audit will be the environmental activities and conditions covered by this legislation. And in an environmental management system audit, the subject matter of the audit will be the company's EMS and the audit criteria will be the requirements of EMAS or ISO 14001.

Now how does an auditor determine whether or not the subject matter of the audit conforms with the audit criteria?

In order to determine whether or not the audit subject matter conforms with the audit criteria an auditor has to collect *audit evidence* which is defined as *verifiable information, records or statements of fact*. The important point to make here is that the audit process involves using *existing* information to determine conformity. Auditors do not go out and generate new information.

Take the example of a legal compliance audit. If, for instance, the emissions of a particular substance from a chimney or stack are required by law to be less than so many parts per million, then an auditor will examine existing monitoring records to see whether the emissions are within legal limits. If the emissions have not been monitored then the auditor will conclude that there is insufficient audit evidence to verify compliance. The auditor will *not* measure the emissions from the stack himself or herself in order to see if the emissions are within the required limits.

An environmental audit consists of *collecting and assessing audit evidence* in order to determine whether or not the audit subject matter conforms with the audit criteria.

If an auditor does not think enough evidence exists to undertake an audit, then the audit should not take place. ISO 14010, the international standard on the general principles of environmental auditing is very clear that an audit should take place only if "*there is sufficient and appropriate information about the subject matter of the audit*".

THE PARTIES INVOLVED IN AN AUDIT

The following terms are used to describe those parties involved in an audit:

- i. *Auditee* - the organization to be audited

- ii. *Audit team* - the group of auditors, or a single auditor designated to perform a given audit. The leader of the team is known as the *lead auditor*
- iii. *Client* - the organization commissioning the audit

NEED TO CARRY OUT ENVIRONMENTAL AUDITING

The simple answer is that it is always important to check that things are as they should be. Given that a company must comply with relevant environmental legislation and regulations, it is obviously important that your organization checks that it is actually in compliance. Only by auditing will one discover instances of non-compliance and be able to correct them.

If a firm is planning to purchase another firm it is important to know that this firm is complying with all relevant environmental legislation and all relevant codes of practice/guidelines. If it is not, then a company may decide that it represents too much of a liability to purchase.

And if a company has decided to develop and implement an environmental management system it is important to have in place an effective internal audit procedure to ensure that requirements of a standard are met. This is particularly important if a company wants to have its EMS certified. Accredited certifiers can only certify a management system *“if a firm’s internal audit system is fully operational and can be shown to be effective.”*

As mentioned previously in this learning material the environmental management system is likely to becoming increasingly important management tool in the future. In recognition of this fact, ISO gave priority to writing a standard on environmental management system auditing (ISO 14011). Given the likely future importance of environmental management systems, it may be helpful to a company to have some knowledge of EMS auditing. The next section therefore describes the process of carrying out an EMS audit.

PROCESS TO CARRY OUT AN EMS AUDIT

Both EMAS and ISO 14001 require companies to periodically carry out an audit of their environmental management system. These audits can be carried out by competent company staff or by external auditors.

If a company does not have suitably qualified in-house auditors it has two choices viz. it can either employ external auditors or get one/some of its staff trained in the necessary auditing

skills (Guidance on the type and level of education, work experience and training required to become an auditor is set out in ISO 14012). It is probably cheaper in the long run to get staff trained as auditors, rather than continually paying external auditors to audit your EMS.

And in addition, having in-house expertise will allow a firm to be more fully involved in maintaining its EMS and to more fully own the EMS process.

In order to give an idea of what an audit of an environmental management system would involve, an outline of the process is set out below. This description is based on the guidelines contained in ISO 14011, the international standard on environmental management system auditing.

THE EMS AUDIT PROCESS

An EMS audit can be divided into 4 stages;

- i. initiating the audit
- ii. preparing the audit
- iii. executing the audit
- iv. audit reports and records

The various elements within each stage are discussed below.

INITIATING THE AUDIT

Define audit objectives

The first step in the auditing process is to define the objectives of the audit. According to ISO 14011 it is the responsibility of the client (i.e. the organization commissioning the audit) to set the audit objectives. In this case it is the company that is commissioning the audit and ultimately it is up to the head of the company (referred to subsequently as the MD - Managing Director) to approve the audit objectives. If the audit is routine then its objective will be to determine whether the company's EMS (or a particular part of it) conforms to the relevant EMS requirements (e.g. those of ISO 14001 or EMAS) and had been properly implemented and maintained. However an audit may also be non-routine. Previous audits may have revealed frequent instances of non-conformance in a particular area of operations and an audit may be initiated to check the success of corrective actions.

Appoint the lead auditor

The next step in the audit process is the appointment of the lead auditor by the MD. The lead auditor will either be an external auditor or one of your employees who has been trained to fulfill this role (in many companies this is the environmental manager). Even though the person appointed as lead auditor may be an employee that the MD knows well, it is still important that he/she is appointed formally (for instance by an official letter or memo from the MD) rather than informally over a cup of coffee or by a phone call. If you wish to have the EMS certified/verified, the certifier/verifier will want to see evidence that proper audit procedures have been followed, so throughout the audit process it is important that such evidence is generated.

Defining the audit scope and the audit criteria

The lead auditor and MD should consult to define the audit scope and the audit criteria. It may be decided that the audit should be carried out in phases rather than the whole EMS being audited in one go. A company may want to audit by operational area (i.e. auditing a proportion of operational areas at each audit phase) or it may want to audit by requirement (i.e. auditing against selected requirements of ISO 14001/EMAS at each audit phase).

Preliminary document review

The lead auditor needs to review the company's EMS documentation e.g. environmental policy statements, programmes, records and manuals in order to assess whether or not there is sufficient and appropriate information about the EMS to undertake the audit. If the lead auditor judges that there is not, then he/she must inform the MD.

Appointing the audit team

Having decided that the audit can go ahead, the lead auditor should, if they are needed, appoint other auditors to assist in carrying out the audit. These appointments to the audit team need to be approved by the MD.

Depending on a company's approach, the audit team will consist of either external auditors or staff members that have received the necessary auditing training.

PREPARING THE AUDIT

Audit plan

The lead auditor should prepare an audit plan in consultation with the MD and any audit team members. The plan should include, if applicable

- i. the audit objectives and scope
- ii. the audit criteria
- iii. identification of the organizational units to be audited
- iv. identification of those elements of the EMS that are of high audit priority
- v. the audit procedures to be used
- vi. identification of reference documents
- vii. the expected time and duration for major audit activities
- viii. the dates and places where the audit is to be conducted
- ix. identification of audit team members
- x. the schedule of meetings to be held with management
- xi. confidentiality requirements
- xii. content, format, structure, expected date of issue and distribution of the audit report
- xiii. document retention requirements

Audit team assignments

The lead auditor, in consultation with audit team, should assign the various members to specific EMS elements or activities and instruct them on the audit procedures to be followed.

Working documents

The lead auditor needs to coordinate the preparation of the working documents required to undertake the audit. These may include,

- i. forms for documenting supporting evidence and audit findings
- ii. procedures and checklists used for evaluating EMS elements
- iii. records of meetings

Executing the audit

Opening meeting

This stage of the audit should start with an opening meeting. The purpose of the opening meeting is to:

- i. introduce the members of the audit team to the company's management;
- ii. review the scope, objectives and audit plan and agree on an audit timetable;
- iii. provide a short summary of the methods and procedures to be used to conduct the audit;
- iv. establish the official communication links between the audit team and the MD;
- v. confirm that the resources and facilities needed by the audit team are available;
- vi. confirm the time and date for the closing meeting;
- vii. promote the active participation of company staff in the audit;
- viii. review relevant site, safety and emergency procedures for the audit team.

Collecting evidence

Sufficient audit evidence should be collected to be able to determine whether or not the EMS conforms to the EMS audit criteria. Audit evidence should be collected through:

- i. interviews
- ii. examination of documents
- iii. observation of activities and conditions

Information gathered through interviews should be verified by acquiring supporting information from independent sources, such as observations, records and results of existing measurements. Non verifiable information should be identified as such. Auditors should examine the basis of relevant sampling programmes and the procedures in place for ensuring effective quality control of sampling and measurement processes. Indications of nonconformity with any EMS audit criteria should be recorded.

Auditing findings

Having collected the audit evidence, the audit team needs to review it in order to determine instances where the EMS does not conform to the audit criteria. The non-conformities should be documented in a clear, concise manner and supported by audit evidence. The audit findings should be reviewed with the person responsible for the EMS with a view to

obtaining acknowledgement from him/her of the factual basis of all findings of nonconformity. Findings of conformity can also be documented, if within the agreed scope of the audit. However care needs to be taken that no absolute assurance of conformity is given or implied. As pointed out in earlier, it is not possible to give such an assurance as the audit will inevitably be based on a limited examination of the EMS and its implementation.

Closing meeting

Prior to preparing the audit report, the audit team should hold a meeting with the MD and those responsible for the functions audited (e.g. relevant site/line/plant managers). The main purpose of this meeting is for the team to present the audit findings to the management with a view to ensuring that they are fully understood and to obtaining an acknowledgement of the factual basis of the findings.

The closing meeting is an opportunity to resolve any disagreements between the auditing team and the MD. The final decision on the significance and description of the audit findings rests with the lead auditor, though the MD may disagree with these findings.

AUDIT REPORTS AND RECORDS

Audit report preparation

The audit report is prepared under the direction of the lead auditor, who is responsible for its accuracy and completeness. The topics to be addressed in the report should be those determined in the audit plan. Any changes to these topics which are desired at the time of preparation of the report should be agreed by all the parties concerned.

The audit report should contain the audit findings (or a summary of these findings) with reference to supporting evidence. Subject to agreement between the lead auditor and the MD, the audit report may also include the following:

- i. the identification of the organization audited and of the client
- ii. the agreed objectives, scope and plan of the audit
- iii. the agreed audit criteria including a list of reference documents against which the audit was conducted
- iv. the period covered by the audit and the date(s) the audit was conducted
- v. the identification of the audit team members
- vi. a statement of the confidential nature of the report contents
- vii. the distribution list for the audit report

- viii. a summary of the audit process including any obstacles encountered
- ix. audit conclusion i.e. EMS fully conforms/does not fully conform with audit criteria and has/has not been properly implemented and maintained.

The audit report should be dated and signed by the lead auditor.

Report distribution

The audit report should be sent to the MD by the lead auditor. Distribution of the audit report should be determined by the MD in accordance with the audit plan. Audit reports are the sole property of the company and confidentiality should be respected and appropriately safeguarded by the auditors and all recipients of the report.

The audit report should be issued within the agreed time period in accordance with the audit plan. If this is not possible, the reasons for the delay should be formally communicated to the MD and a revised issue date established.

All working documents, and draft and final reports pertaining to the audit should be retained by agreement between the MD, the lead auditor and in accordance with any applicable requirements.

Audit completion

The audit is completed once all activities defined in the audit plan have been concluded.

THE 7 PRINCIPLES OF ENVIRONMENTAL AUDITING

ISO 14010 sets out 7 general principles that should govern the environmental audit process.

OBJECTIVES AND SCOPE

An audit should be based on objectives defined by the client. The scope of the audit (i.e. its extent and boundaries) is determined by the lead auditor and must be adequate to meet the audit objectives. The objectives and scope of the audit should be communicated to the auditee prior to the audit.

Objectivity, independence and scope

An environmental audit should be as objective as is possible. In order to ensure this, the members of the audit team should be independent of the activities they are to audit. If an

internal audit is being performed (i.e. the audit team consists of employees of the company being audited) then none of the audit team members should be accountable to those directly responsible for the subject matter being audited.

The audit team members should, of course, have the knowledge, skills and experience necessary to carry out the audit. Guidance on these matters is provided in ISO 14012, the international standard on qualification criteria for environmental auditors.

Due profession care

- i. When conducting an audit, auditors should exercise the care, diligence, skill and judgment expected of any auditor in similar circumstances.
- ii. The audit team/client relationship should be one of confidentiality and discretion. Unless required to do so by law, the audit team should not disclose information/documents obtained during the audit or the final audit report to any third party without the approval of the client.
- iii. The audit team should follow procedures that provide for quality assurance.

Systematic procedures

To enhance consistency and reliability, an environmental audit should be conducted according to documented and well-defined methodologies and systematic procedures. It should be carried out in accordance with any guidelines developed for that particular type of environmental audit. (For example ISO have published guidelines for conducting environmental management system audits - ISO 14011.)

Audit criteria, evidence and findings

Audit criteria should be determined at an early stage of the audit process. They should be agreed between the lead auditor and the client and communicated to the auditee. Audit evidence should then be collected and evaluated in order to determine whether the audit criteria have been met.

Reliability of audit findings and conclusions

The audit evidence collected during an environmental audit will inevitably only be a sample of the information available, as audits are conducted over a limited period of time and with limited resources. There will therefore be an element of uncertainty inherent in all audits and the users of the results of environmental audits should be aware of this uncertainty. The

auditing process should be designed to provide the client with the desired level of confidence in the reliability of the audit findings.

Audit report

The client should be provided with a written report of the audit findings (and/or a summary thereof). Unless the client states otherwise, the auditee should also receive a copy of the report. Information that may be contained in an audit report includes (but is not limited to),

- i. the identification of the organization audited and of the client
- ii. the agreed objectives and scope of the audit
- iii. the agreed criteria against which the audit was conducted
- iv. the period covered by the audit and the date(s) the audit was conducted
- v. the identification of the audit-team members
- vi. the identification of the auditee's representatives participating in the audit
- vii. a statement of the confidential nature of the contents
- viii. the distribution list for the audit report
- ix. a summary of the audit process including any obstacles encountered
- x. the audit conclusions

The lead auditor, in consultation with the client, should determine which of these items, together with any additional items, should be included in the report. Normally it is the responsibility of the auditee to determine any corrective action needed in light of the audit findings. However the auditor may provide recommendations when there has been prior agreement to do so with the client.

ENVIRONMENTAL INDICATORS

What are environmental indicators?

Environmental indicators express useful and relevant information about a firm's environmental performance and its efforts to influence its performance.

So what is environmental performance?

Environmental performance can be defined as, '*the results of an organization's management of its environmental aspects*' and, as noted in before, an environmental aspect refers to, '*an element of an organization's activities, products or services that can interact with the environment*'.

Examples of indicators include:

- i. Tonnes of SO₂ released per year
- ii. Tonnes of CO₂ released per unit of production
- iii. Litres of water used per year
- iv. Kilogrammes of hazardous waste produced per year
- v. Number of legislative breaches per year
- vi. savings achieved through energy efficiency measures
- vii. number of environmental improvement suggestions from employees and number taken up by management
- viii. number of complaints received about environmentally related matters
- ix. number of employees trained versus number needing training

Need to use indicators

There are several good reasons for using indicators:

- i. Using indicators to measure a firm's environmental performance is necessary to determine whether or not it is complying with the relevant legislation.
- ii. Indicators enable a company to track its performance over time. For example an environmental review (see Table 4) may have identified a number of areas where measures can be taken that will improve a company's environmental performance in a cost effective manner. By using EPIs a company will be able to measure exactly how much its performance has improved after these measures have been implemented.
- iii. Perhaps a company has set itself some environmental targets. By using indicators to measure its performance a company will be able to know whether it has successfully met those targets.
- iv. Indicators can signal areas where attention is needed. A significant change in an indicator reading relating to an environmental aspect can indicate a problem in an operational process or the procedures governing that process.
- v. Not only do indicators measure environmental performance, they can measure management's efforts to improve performance. This information provides useful feedback for management, employees and shareholders.
- vi. Increasingly, stakeholders want firms to provide information about their environmental management and environmental performance. A local community may want the information to reassure itself about the safety of a company's

activities and potential investors may want the information to assure them that the firm is a sound investment. By selecting the appropriate indicators a company can generate the information it needs to satisfy its various stakeholders.

DEVELOPMENT AND USE OF SUITABLE INDICATORS

This section shows how a company can get started in designing and choosing its environmental indicators and has 5 parts:

- i. describes the three indicator areas and associated indicators
- ii. looks at the various types of indicators
- iii. offers some guidelines for choosing indicators
- iv. provides an indicator starter pack
- v. briefly describes how companies can use existing information systems to gather data required to develop indicators.

The three indicator areas

ISO 14031 sets out 3 indicator areas viz. the operational and management areas of a firm and the environment. These areas and their associated indicators are described below.

The operational area and OPIs

The operational area consists of the operations of the firm's physical facilities and equipment i.e. those activities that have an environmental aspect.

Examples of operational activities include manufacturing processes, the heating and lighting of buildings, transport activities, the operation of office equipment. As the activities in the operational area are those which have environmental aspects, they are the activities that determine the firm's actual environmental performance.

The indicators used to measure the environmental aspects of operational activities are known as *operational performance indicators (OPIs)*. Examples of OPIs include:

- i. Total energy use per year
- ii. Waste production per year
- iii. Emissions of NO_x per unit of production
- iv. Water use per unit of production

The management area and MPis

The management area consists of the various planning, administrative and decision-making processes that make up management. Management decisions relating to the environment include:

- i. deciding how much money to spend on environmental management activities
- ii. deciding how much training to provide to employees
- iii. deciding whether to develop an environmental management system

Obviously management activities can have a considerable influence on the actual environmental performance of the firm. The indicators used to measure the environmental aspect of management activities are called *management performance indicators (MPis)*. Examples of management performance indicators include:

- i. number of environmental objectives and targets achieved
- ii. number of employees trained
- iii. number of suppliers and contractors questioned about their environmental management practices
- iv. frequency of review of operating procedures

One important category of MPis is *financial indicators*. Financial indicators aim to measure the effects of environmental management activities on a firm's financial performance. (The aim here is to integrate the environmental dimension of a firm's activities into traditional cost accounting and business management considerations.)

Examples of financial indicators include:

- i. cost (both capital and operational) over time of activities related to environmental performance
- ii. savings achieved over time through waste recycling, reductions in resource use or resource substitution
- iii. return on investment for environmental improvement projects

Note: Operational performance indicators and management performance indicators are referred to collectively in ISO 14031 as *environmental performance indicators (EPis)*.

The environment and ECIs

As their name suggests, *environmental condition indicators (ECIs)* measure the condition of the environment.

Examples of ECIs include:

- i. contaminant concentration in air/groundwater/surface water/soil/plant tissue/
animal tissue
- ii. number of coliform bacteria per liter of water
- iii. odor measured at specific distance from the organization's facility

Whereas OPIs measure a company's environmental aspects, ECIs can be used to measure a company's actual impact on the environment i.e. *any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's activities, products or services.*

The link between environmental aspects and environmental impacts is one of cause and effect relationship i.e. environmental aspects are the cause of environmental impacts (see the following table). It is possible to use indicators to measure both an environmental aspect and its related impact. For instance, the environmental aspect of phosphate emission can be measured using the OPI quantity of phosphates emitted per unit of time whilst the associated impact can be measured using the ECI the biological oxygen demand (BOD) caused by these phosphate emissions in the receiving aquatic environment.

Measuring environmental impacts can be very costly and in many cases it is just not possible to tell how much of a particular environmental impact is caused by one firm as opposed to one or more other firms within the same area. Most companies confine themselves to using OPIs in the knowledge that managing their environmental aspects will reduce the firm's environmental impact.

Table 5. The relationship between company environmental aspects, environmental effects and implications for human society

Company environmental aspects (examples)	Environmental impacts	Implications for society
CO ₂ emissions	Climate change, the greenhouse effect	Flooding of coastal areas, changes in agricultural conditions, population migration from affected areas
CFC and halon emissions	Depletion of the ozone layer	Skin cancer, effects on agriculture
Nitrogen and phosphates emissions	Eutrophication of lakes and rivers	Reduced fisheries, algae growth, potential toxification of surface water
SO _x , NO _x , and NH ₃ emissions	Acidification of surface water and rain, tree death, deterioration of urban environmental quality	Forest death, loss of architectural heritage, health effects on urban population
Heavy metal emissions	Toxic contamination of soil	Human health effects including loss of reproductive capability and cancer risk
Intensive land use, land conversion, land fragmentation	Biodiversity	Loss of pest resistance of ecological systems, loss of potential genetic resources
Water use	Demand on surface or ground water resources	Potential water shortage, potential conflict issue.

TYPES OF EPIS

There are 4 types of indicators

- i. absolute indicators
- ii. relative indicators
- iii. aggregated indicators
- iv. indexed and weighted indicators

Absolute indicators

Absolute indicators measure basic data. Examples of absolute indicators include:

- i. Tonnes of CO₂ emitted per year
- ii. Tonnes of wastes generated per year
- iii. Liters of cooling water used per year

Whilst absolute indicators provide useful information, care must be taken not to draw false conclusions from this information. For example, the fact that CO₂ emissions in year 2 have fallen when compared to the emissions in year 1 does not necessarily mean that a firm's efficiency has improved. It could be that the level of production has remained constant and that CO₂ emissions per unit of output have fallen but the fall in emissions may simply be due to a downturn in business i.e. the firm is operating at the same level of efficiency but producing less. If CO₂ emissions have fallen because of an increase in efficiency we could reasonably claim that environmental performance has improved. However, if efficiency had remained the same and it is just production that has fallen, such a claim would not be justified. CO₂

In the above example, we would need to know about CO₂ emissions per unit of production to make any claim about changes in efficiency. "CO₂ emissions per unit of production" is an example of a *relative indicator*.

Relative indicators

Relative indicators can be used by comparing absolute consumption or emission figures with meaningful reference data. They can be separated into efficiency ratios and quotas as mentioned below;

- i. *efficiency ratios* describe the use of resources or the amount of emissions in relation to production inputs or production outputs, e.g. CO₂ emissions per unit of production, water use per unit of production or quantity of waste produced per unit of input material
- ii. *quotas* describe the sub-section of a measure in relation to the whole measure, e.g. the proportion of company vehicles running on unleaded fuel.

Aggregated indicators

Aggregated indicators bring together data from a number of separate categories into a more general category. An example of an aggregated indicator is annual waste disposal. Annual waste disposal is a general category and consists of the sum of all the separate waste streams. Other examples of aggregated indicators include:

- i. Total energy consumption.
- ii. Total hazardous waste produced.
- iii. Total annual vehicle mileage.

Annual vehicle mileage, for example, is made up of the annual mileages of the different types of vehicles used (lorries, vans, cars) and the mileage done on different fuels (petrol, diesel, electric vehicles).

Aggregated indicators are useful as they can bring together a large amount of data and express it as a single value, thereby providing an overview of a particular area. However because aggregated indicators paint a broad picture there is a limit to how much detail they can show. If total vehicle mileage stays constant from one year to the next, then without a further breakdown of the figures one would not know that perhaps car mileage had fallen whilst lorry mileage had increased by the same amount (meaning that even though mileage stayed constant, overall fuel consumption increased). So whilst useful, aggregated indicators should be used to complement disaggregated indicators and not as an alternative.

Weighting and indexes

If a firm wishes, it can combine information on all of its environmental aspects into a single number representing its environmental performance. This is usually done by multiplying each aspect by a weighting relating to its environmental significance and then adding all the weighted aspects together. Weighting can be done using a simple scale like the one below.

Most significant aspect: weighting factor 10

Least significant aspect: weighting factor 1

Take the following example where a firm has 6 aspects - all of them emissions. The number representing its environmental performance is calculated by adding all the weighted emissions together.

Table 6. Example for calculating environmental performance

Emission	Quantity of emission released per unit of production (A)	Weighting factor (B)	Weighted emission (AxB)
Emission A	200	4	800
Emission B	5000	2	10000
Emission C	700	10	7000
Emission D	4000	1	4000
Emission E	400	8	3200
Emission F	900	3	2700

The performance number obtained for one year can then be compared with the performance number for the previous year to see whether environmental performance has improved or deteriorated. *This comparison of a piece of data to another baseline piece of data is known as indexing.* Hence if the previous year's performance number was 32400, then the environmental performance index = current year' performance number/previous year's performance number = $27700/32400 = 0.854$

An index value of less than 1 means that the firm's environmental performance has improved when compared with the previous year. Conversely, a value greater than 1 means that environmental performance has deteriorated.

It is generally accepted that there is no universal weighting scheme that will meet the needs of all firms. Weighting environmental aspects is to some extent a subjective factor and judgments relating to the significance of environmental aspects will vary from firm to firm. (For example, a company in a smog laden city may put more emphasis on reducing emissions to air than a similar company located out of the city). Therefore each industry sector and/or company should develop a scheme that suits its particular circumstances.

ENVIRONMENTAL ACCOUNTING & CLEANER PRODUCTION

To calculate and evaluate the environmental impact caused by the production processes, Environmental Accounting (EAc) and Cleaner Production (CP) are frequently used. The CP methodology is quite similar to the guidelines for Environmental Accounting (EPA, 1995). This outlines procedures for conducting a preliminary assessment to identify opportunities for waste reduction or elimination. Further it describes how to use the results of this pre-assessment to give priority to areas for detailed assessment, how to use the detailed assessment to develop pollution prevention options, recycling and recovery, and how to implement those options that withstand feasibility analyses. However, there is no environmental impact assessment evaluations built into this method.

LIFE CYCLE ASSESSMENT (LCA).

The LCA-methodology is the most extensive method for studying environmental impacts throughout a product's life cycle. It is now being standardized by the International Organization of Standardization. The main steps are *Goal and scope definition, Inventory analysis, Impact assessment* and *Interpretation*. According to goal and scope definition, the application,

depth and subject of the study, the functional unit and the system boundaries must be defined. In line with the defined goal and scope, interpretation is the phase of an LCA in which a synthesis is drawn from the findings of either the inventory analysis or the impact assessment, or both. The findings of this interpretation may form conclusions and recommendations to decision makers.

The ongoing debate over disposable diapers versus washable diapers centers on the assertion that the disposable product is less desirable from an environmental perspective. It uses more natural resources to manufacture, and it takes up more room in landfill when discarded. On the other hand, the reusable diaper consumes energy, water and detergents every time it is cleaned for reuse. So what is the answer and where is the tradeoff?

This is where life-cycle assessment (LCA) comes in. It is a method of checking the facts about the environmental burden of a product, from its design through to production and then to final disposal. An LCA can be used in the design of a new product or the evaluation of an existing product, but it attempts to make sense of environmental information.

The need to clarify the assumptions and methods on which LCA depends has led to a great deal of interest in LCA techniques.

The life-cycle method considers the air, water and solid waste pollution that are generated when raw materials are extracted. It examines the energy used in the extraction of raw materials, and the pollution that results from manufacturing the product. It also accounts for environmental harm that might occur during the distribution and use of the product. Finally, LCA considers the solid and liquid wastes that enter the environment following final use of the product.

EVALUATION AND POLICY-MAKING

- i. Supply information for evaluating policies that affect resource use and releases;
- ii. Develop regulations on materials use and environmental releases where a comprehensive inventory and impact analysis have been conducted;
- iii. Identify gaps in information and knowledge, and help establish research priorities and monitoring requirements;
- iv. Evaluate product statements of quantifiable reductions in energy, raw materials, and environmental releases.

PUBLIC EDUCATION

- i. Develop materials to help the public understand resource use and release characteristics associated with products, processes, and activities;
- ii. Design curricula for training those involved in product, process, and activity design.

INTERNAL DECISION-MAKING:

- i. Compare alternative materials, products, processes, or activities within an organization;
- ii. Compare resource use and pollution information with those of other manufacturers;
- iii. Train staff responsible for reducing the environmental burdens associated with products, processes, and activities, including product designers and engineers.

PUBLIC DISCLOSURE OF INFORMATION:

- i. Provide information to policy makers, professional organizations and the general public on resource use and pollution.
- ii. Help substantiate product-related statements relating to energy, raw materials, and environmental releases.
- iii. Life-cycle assessment helps companies to look at all aspects of their operations and integrate them into the overall decision-making process.

LIFE CYCLE SCREENING (LCS) AND THE MET-MATRIX.

When the intention is to identify key issues for further investigations, e.g. identify parts of a life cycle that needs further research, an LCS should be carried out. An LCS is a simplification of an LCA, but it can never claim to substitute a full LCA. Similarly, the MET-matrix is a tool that helps to quickly draw up a list of a product's main environmental aspects. It is a simple input-output model combined with the product's life cycle, Brezet (1995). Three categories of environmental aspects viz. material cycle, energy consumption, and toxic emissions, are distinguished in this input-output model (therefore the name MET-matrix).

MATERIAL INPUT PER SERVICE UNIT (MIPS).

The MIPS concept (Liedtke, 1994) is a life cycle tool for analyzing material inputs per service unit. In this concept, the product is conceived as the "service delivery machine", or "service machines", and it focuses on the use of resources and less on waste streams. By

calculating material and energy flows and the number of products produced, it is possible to calculate the material intensity related to the function of a particular product. Thereby a picture of the environmental performance related to that product is achieved. The concept is based on the philosophy that a better utilization of materials and resources is needed to achieve sustainable development.

LIFE CYCLE COSTING (LCC)

The economic issues are the driving forces in the industry, and the results from an LCA study are very often linked to LCC information. Traditionally, cost effectiveness implies “most performance for least cost”. LCC normally do not focus on environmental issues. However, a cost examination tool that takes environmental issues into account is the Value Added Analysis (VAA), Liedtke (1994). This is related to the MIPS concept and by VAA the sale opportunities of different products and their constituents can be estimated from both an ecological and an economic point of view.

PRODUCT DEVELOPMENT AND DESIGN FOR ENVIRONMENT

Based on information drawn from environmental life cycle assessment studies, the traditional list of product design criteria should be supplemented with environmental conscious design requirements. There are several models for stepwise product development, and perhaps the life cycle design approach developed by the US Environmental Protection Agency, is the most comprehensive (EPA, 1992). The main activities are *needs analysis*, *statement of requirements*, *design* and *implementation*.

ECO LABELING (EL)

Eco-labels are used to provide information about the environmental impact of a product. Eco-labels must take life cycle considerations into account. In environmental claims it is important that verification is properly conducted.

RESOURCE MANAGEMENT

Another environmental management instrument is the Resource Management (RM), a management system to combine eco- and cost-efficiency, Liedtke (1994). This includes material flow management, product management and eco-design. By such resource management the material flows can be reduced and in many cases the de-materialization

factor is expected to be 5 to 10 as per researchers. This system is built upon the same principles as the MIPS concept.

ENVIRONMENTAL PERFORMANCE EVALUATION (EPE)

EPE is the process that organizations can use to measure, analyze and assess their environmental performance against a set of criteria. EPE helps to understand what their environmental aspects are, and determines what their significant environmental aspects may be. This lets the organization form a baseline from which objectives and targets for improvements can be derived. Therefore EPE is central to improvements of environmental performance and to compare an organization's performance against another similar organization (benchmarking). An organization that is committed to improving its environmental performance needs to be able to measure its performance level. By means of Environmental Performance Indicators (EPIs) a company will be able to do so. An EPI must reflect changes over a period of time, be reliable and reproducible, and be calibrated in the same terms as the policy goals or targets they are linked to.

OTHER BEST KNOWN ENVIRONMENTAL MANAGEMENT TOOLS AND PROCESSES

The other best-known environmental management and environmental performance improvement tools are discussed below:

1. Public Participation
2. Environmental Impact Assessment (EIA)
3. Strategic Environmental Assessment (SEA)
4. Social Impact Assessment (SIA)
5. Biodiversity Impact Assessment (BIA)

PUBLIC PARTICIPATION

Public participation may be defined as the involvement of individuals and groups that are positively or negatively affected by, or that are interested in, a proposed project, program, plan or policy that is subject to a decision-making process (International Association for Impact Assessment).

Introduction

The International Association for Impact Assessment (IAIA) *Public Participation Best Practice Principles* document aims to promote a meaningful practice of public participation (PP) amongst impact assessment (IA) practitioners.

It:

- i. Defines the prerequisites for an effective and appropriate public involvement in IA.
- ii. Identifies the conditions required to make the participation process credible and to maximize interest and commitment from the stakeholders.

This document collates the principles for a state-of-the-art public participation practice. It is primarily designed for reference and use by those involved in public participation in IA. It is built on the experience in PP of many IAIA members, and has been written for IAIA members from different backgrounds and IA domains to improve ethics and quality in their practice. Accordingly, the principles presented here are broad, generic, and non-prescriptive. They emphasize PP as a pillar of IA, and are intended to be applicable at all levels and types

of planned interventions (including at the strategic level), and with respect to the constraints of time, information and resources.

Public participation, as well as IA generally, is expanding in use all around the world. This evolving context enables more and more IA practitioners from the humanities, medicine and social sciences, and applied and natural sciences to get involved or even to coordinate public participation. IAIA hopes that these principles will be used for improving the practice of PP in IA, as well as to stimulate discussion between stakeholders that will result in better projects, better development, collaborative governance and ultimately a more sustainable world.

This topic comprises three main sections which:

- i. Define the concept of public participation.
- ii. Emphasize PP objectives in IA.
- iii. Provide principles of PP best practice.

What is Public Participation?

Public participation may be defined as the involvement of individuals and groups that are positively or negatively affected by a proposed intervention (e.g., a project, a program, a plan, a policy) subject to a decision-making process or are interested in it. Levels of participation in IA vary, from passive participation or information reception (a unidirectional form of participation), to participation through consultation (such as public hearings and open-houses), to interactive participation (such as workshops, negotiation, mediation and even co-management). Different levels of PP may be relevant to different phases of an IA process, from initial community analysis and notice of the proposed intervention, to approval decision making, to monitoring and follow-up.

Objectives of Public Participation

Public participation is essential for good governance and may empower local communities. IA is *multi-purposive*, aiming specifically to:

- i. Invite the affected and interested public into the decision-making process to foster justice, equity and collaboration.

- ii. Inform and educate the stakeholders, (which include the proponent, public, decision-maker(s) and the regulator) on the planned intervention and its consequences.
- iii. Gather data and information from the public about their human (including cultural, social, economic and political dimensions) and biophysical environment, as well as about the relations (including those related to traditional and local knowledge) they have with their environment.
- iv. Seek input from the public on the planned intervention, including its scale, timing and ways to reduce its negative impacts, to increase its positive outcomes or to compensate impacts which may not be mitigated.
- v. Contribute to better analysis of proposals leading to more creative development, more sustainable interventions and consequently greater public acceptance and support than would otherwise be the case.
- vi. Contribute to the mutual learning of stakeholders and to improvement of the PP and IA practice for a proposal.

Principles of Best Practice

Three tiers of PP Principles are included in this document: *Basic Principles*, *Operating Principles* and *Developing Guidelines*.

Basic Principles apply to all stages of PP in IA processes from strategic to operational levels. It is important to recognize that these levels are interdependent and, in some cases, may conflict. A balanced approach is critical when applying the PP Principles to ensure that IA fulfills its purpose and is carried out in what would constitute best practice.

Operating Principles describe how the Basic Principles should be applied to the main steps and activities of the IA processes.

Developing guidelines identify key directions for the improvement of public participation in IA. It is envisaged that subsequent tiers of Principles could evolve, e.g., “activity-specific,” “state-of-the-art” or “next generation” PP principles. However, their development would constitute a separate effort, building on and extending the Basic and Operating Principles presented here.

Basic Principles

Contemporary public participation practice in IA should be:

- i. **Adapted to the context:** Understanding and appreciating the social institutions, values, and culture of the communities in the project area; and respecting the historical, cultural, environmental, political and social backgrounds of the communities which are affected by a proposal.
- ii. **Informative and proactive:** Recognizing that the public has a right to be informed early and in a meaningful way in proposals which may affect their lives or livelihoods. Increased interest and motivation to participate occur by diffusing simple and understandable information to the affected and interested public.
- iii. **Adaptive and communicative:** Recognizing that the public is heterogeneous according to their demographics, knowledge, power, values and interests. The rules of effective communication among people, in the respect of all individuals and parties, should be followed.
- iv. **Inclusive and equitable:** Ensuring that all interests, including those non-represented or underrepresented are respected regarding the distribution of impacts, compensation and benefits. The participation or defense of the interests of less represented groups including indigenous peoples, women, children, elderly and poor people should be encouraged. Equity between present and future generations in a perspective of sustainability should be promoted.
- v. **Educative:** Contributing to a mutual respect and understanding of all IA stakeholders with respect to their values, interests, rights and obligations.
- vi. **Cooperative:** Promoting cooperation, convergence and consensus-building rather than confrontation. Engaging conflicting perspectives and values as well as trying to reach a general acceptance of the proposal toward a decision that promotes and supports sustainable development should be pursued.
- vii. **Imputable:** Improving the proposal under study, taking into account the results of the PP process; including reporting and feedback to stakeholders about the results of the PP process, especially how their inputs have contributed to decision-making.

Operating Principles

With respect to the Basic Principles previously identified, public participation should be:

- i. **Initiated early and sustained:** The public should be involved early (before major decisions are made) and regularly in the IA process. This builds trust among

participants, gives more time for PP, improves community analysis, improves screening and scoping of the IA, increases opportunities to modify the proposal in regards to the comments and opinions gathered during the PP process, reduces the risk of rumors, and improves the public image of the proponent. It can also give the regulator more confidence in the approval decision they must make.

- ii. **Well planned and focused on negotiable issues:** All IA stakeholders should know the aims, rules, organization, procedure and expected outcomes of the PP process undertaken. This will improve the credibility of the process for all involved. Because consensus is not always feasible, PP should emphasize understanding and respect for the values and interests of participants, and focus on negotiable issues relevant to decision making.
- iii. **Supportive to participants:** The public should be supported in their will to participate through an adequate diffusion of information on the proposal and on the PP process, and a just and equitable access to funding or financial assistance. Capacity-building, facilitation and assistance should also be provided particularly for groups who don't have the capacity to participate and in regions where there is no culture of PP, or where local culture may inhibit PP.
- iv. **Tiered and optimized:** A PP program should occur at the most appropriate level of decision-making (e.g., at the policy, plan, program or project level) for a proposal. The public should be invited to participate regularly, with emphasis on appropriate time for involvement. Because PP is resource consuming (human, financial, time) for all the IA stakeholders, PP optimization in time and space will ensure more willing participation.
- v. **Open and transparent:** People who are affected by a proposal and are interested in participating, whatever their ethnic origin, gender and income, should have access to all relevant information. This information should be accessible to laypersons required for the evaluation of a proposal (e.g., terms of reference, report and summary). Laypersons should be able to participate in relevant workshops, meetings and hearings related to the IA process. Information and facilitation for such participation should be provided.
- vi. **Context-oriented:** Because many communities have their own formal and informal rules for public access to resources, conflict resolution and governance, PP should be adapted to the social organization of the impacted communities, including the cultural, social, economic and political dimensions. This shows respect for the

affected community and may improve public confidence of the process and its outcomes.

- vii. **Credible and rigorous:** PP should adhere to established ethics, professional behavior and moral obligations. Facilitation of PP by a neutral facilitator in its formal or traditional sense improves impartiality of the process as well as justice and equity in the right to information. It also increases the confidence of the public to express their opinions and also to reduce tensions, the risk of conflicts among participants, and opportunities for corruption. In a formal context, the adoption of a code of ethics is encouraged.

Developing Guidelines

For improving the outcomes of public participation, all actors should actively promote:

- i. Access to useful and relevant information for the public. Even if information is actually generally available, it might need some improvement to be useful to laypersons, or more focused and relevant to the decision-making process.
- ii. High-level involvement and participation in decision making;
- iii. Creative ways to involve people.
- iv. Access to justice and equity.

2. ENVIRONMENTAL IMPACT ASSESSMENT

UNEP defines Environmental Impact Assessment (EIA) as a tool used to identify the environmental, social and economic impacts of a project prior to decision-making. It aims to predict environmental impacts at an early stage in project planning and design, find ways and means to reduce adverse impacts, shape projects to suit the local environment and present the predictions and options to decision-makers. By using EIA both environmental and economic benefits can be achieved, such as reduced cost and time of project implementation and design, avoided treatment/clean-up costs and impacts of laws and regulations.

Although legislation and practice vary around the world, the fundamental components of an EIA would necessarily involve the following stages:

- i. Screening to determine which projects or developments require a full or partial impact assessment study;

- ii. Scoping to identify which potential impacts are relevant to assess (based on legislative requirements, international conventions, expert knowledge and public involvement), to identify alternative solutions that avoid, mitigate or compensate adverse impacts on biodiversity (including the option of not proceeding with the development, finding alternative designs or sites which avoid the impacts, incorporating safeguards in the design of the project, or providing compensation for adverse impacts), and finally to derive terms of reference for the impact assessment;
- iii. Assessment and evaluation of impacts and development of alternatives, to predict and identify the likely environmental impacts of a proposed project or development, including the detailed elaboration of alternatives;
- iv. Reporting the Environmental Impact Statement (EIS) or EIA report, including an environmental management plan (EMP), and a non-technical summary for the general audience.
- v. Review of the Environmental Impact Statement (EIS), based on the terms of reference (scoping) and public (including authority) participation.
- vi. Decision-making on whether to approve the project or not, and under what conditions; and
- vii. Monitoring, compliance, enforcement and environmental auditing. Monitor whether the predicted impacts and proposed mitigation measures occur as defined in the EMP. Verify the compliance of proponent with the EMP, to ensure that unpredicted impacts or failed mitigation measures are identified and addressed in a timely fashion.

Public Participation in EIA

Many researchers suggests that public participation in EIA has a critical role to play in helping to integrate economic, social and environmental objectives, *i.e. move towards more sustainable development by acting as a device to strengthen and increase public awareness of the delicate balance between economic and environmental trade-offs*. It also safeguards against bad or politically motivated decisions. Public participation is necessary for minimizing or avoiding public controversy, confrontation and delay, and can make a positive contribution to the EIA process. The general objectives of involving the public at different stages in the EIA process were considered by a recent European Commission research project (EC, 2001) as shown in the following table.

Formal opportunities for public participation in EIA are defined in legislation. While rights of involvement in many countries are limited to opportunities for viewing and commenting on finalized reports, in principle, public consultation and participation can occur at every stage in the EIA process. The table summarizes the main objectives of public involvement at each stage of the EIA process, including a detailed description of these objectives (EC, 2001).

In brief, literature shows that there are a number of advantages of involving the public early on in the EIA process. If participation does occur early on then interaction between the public, developer and decision-making body should continue throughout the EIA process if the full benefits are to be seen.

Practically in all national systems of EIA there are mandatory requests, which foresee:

- i. Publication of the EIA report, and making it available to the public in a public place
- ii. Offering the public the possibility to get acquainted with the documentation and to give comments;
- iii. Collection of public comments and notes;
- iv. Accounting for the public's opinion while making the decision.

These requests offer "a necessary minimum" of requirements for public participation in the EIA process.

In some countries the initiator of the project will publish EIA report allowing comments of the public for a final version of the document (USA). In other countries publications of the EIA report and public comments are the responsibility of state originations (Great Britain). In Bhutan, the publication of EIA report and solicitation of public comments is non-existent.

In most cases the "necessary minimum" appears insufficient for effectively accounting for public judgment on a project. Therefore, extension of possibilities for public participation is an important tendency in EIA procedures. In a number of countries the norms on mandatory public participation are spread over other stages of the process. For example in the Netherlands, public participation is mandatory, not only on the final EIA report, but also in the formulation phase of the report.

Table 7. EIA process stages & public involvement

Stage of EIA process	Objectives of public involvement
Screening	Identification of significant impacts
Scoping	Identification of public's interest and values Identification of priorities for assessment Encouraging public understanding of the proposed project
Assessment	The public can contribute local knowledge and values to the prediction, evaluation and mitigation of impacts Improvement in quality and acceptability of EIA report
EIA Report Review	Public contribute to evaluation of quality and acceptability of report
Decision	Public comment on acceptability of project impacts
Monitoring	Public evaluate impacts that occur and support project environmental management process

Summary of Objectives of Public Involvement in EIA

At IAIA'96 in Estoril, Portugal, a special session was held on "The Environmental Impact Assessment (EIA) Global Guidelines Project." The session discussed the need for principles of, and guidance on, impact assessment in response to an emerging interest in international standards.

Participants at the Estoril session recommended that IAIA should develop principles of "best practice" for environmental impact assessment, recognizing that a similar process had been followed successfully for social impact assessment. This initiative was undertaken in collaboration with the Institute of Environmental Assessment, UK.

This IAIA Principles of EIA Best Practice document is organized in two main parts:

- i. Part 1 describes the purposes, aims, and approach used to develop the Principles; and
- ii. Part 2 presents the definition of EIA, its objectives, and the Principles of EIA Best Practice.

Part 1. Purpose, aims and approach

Purpose

As the premier organization in the field, IAIA is expected to play a leading and proactive role in the improvement and dissemination of EIA concepts and practices. The Principles of EIA Best Practice are intended to provide widely agreed guidance to IAIA members and others involved in applying EIA processes.

Aims

The Principles of EIA Best Practice are designed primarily for reference and use by those professionally involved in environmental impact assessment. The aim is to promote the effective practice of environmental impact assessment consistent with the institutional and process arrangements that are in force in different countries. Accordingly, the Principles are broad, generic, and non-prescriptive, emphasize EIA as a process, and are intended to be applicable to all levels and types of proposals, having regard to the limits of available time, information and resources.

Approach

The Principles project was initiated by Pierre Senécal, a former President of IAIA; coordination and management was carried out by Bernice Goldsmith, Concordia University (Montreal, QC) and member of the IAIA Board during the time of the project; and workshop reporting and editing was done by Shirley Conover, Secretary of the IAIA Board. The Principles were drafted by Barry Sadler and Karen Brown, of The Institute of Environmental Assessment (IEA), UK, who produced successive drafts of the document and circulated them to a working group of international experts and to IAIA's News list serve for comment by the IAIA membership. They utilized the results of the International Study of the Effectiveness of Environmental Assessment, the UNEP document on Issues, Trends and Practice in EIA, other guidance materials on best practice in EIA, and the expertise and experience of IAIA members. Workshops on the project were also held at IAIA'97 (New Orleans, USA) and IAIA'98 (Christchurch, NZ); comments from workshop participants were incorporated into this document.

Part 2. Principles of environmental impact assessment

Two tiers of EIA Principles are included in this document: Basic and Operating.

“*Basic Principles*” apply to all stages of EIA; they also apply to Strategic Environmental Assessment (SEA) of policies, plans and programs.

The list of Basic Principles should be applied as a single package, recognizing that the Principles included are interdependent and, in some cases, may conflict (e.g., rigor and efficiency). A balanced approach is critical when applying the Principles to ensure that environmental impact assessment fulfills its purpose and is carried out to internationally accepted standards. EIA thus produces both complete analyses and the means of reconciling apparently conflicting principles.

“*Operating Principles*” describe how the Basic Principles should be applied to the main steps and specific activities of the environmental impact assessment process; e.g., screening; scoping; identification of impacts; and assessment of alternatives.

It is also envisaged that subsequent tiers of Principles could evolve, e.g., “activity-specific,” “state-of-the-art” and “next generation” of impact assessment principles. However their development would constitute a separate effort, building on and extending the Basic and Operating Principles presented below.

Basic Principles

Environmental Impact Assessment should be:

Purposive: the process should inform decision making and result in appropriate levels of environmental protection and community well-being.

Rigorous: the process should apply “best practicable” science, employing methodologies and techniques appropriate to address the problems being investigated.

Practical: the process should result in information and outputs which assist with problem solving and are acceptable to and able to be implemented by proponents.

Relevant: the process should provide sufficient, reliable and usable information for development planning and decision making.

Cost-effective: the process should achieve the objectives of EIA within the limits of available information, time, resources and methodology.

Efficient: the process should impose the minimum cost burdens in terms of time and finance on proponents and participants consistent with meeting accepted requirements and objectives of EIA.

Focused: the process should concentrate on significant environmental effects and key issues; i.e., the matters that need to be taken into account in making decisions.

Adaptive: the process should be adjusted to the realities, issues and circumstances of the proposals under review without compromising the integrity of the process, and be iterative, incorporating lessons learned throughout the proposal's life cycle.

Participative: the process should provide appropriate opportunities to inform and involve the interested and affected publics, and their inputs and concerns should be addressed explicitly in the documentation and decision making.

Interdisciplinary: the process should ensure that the appropriate techniques and experts in the relevant bio-physical and socio-economic disciplines are employed, including use of traditional knowledge as relevant.

Credible: the process should be carried out with professionalism, rigor, fairness, objectivity, impartiality and balance, and be subject to independent checks and verification.

Integrated: the process should address the interrelationships of social, economic and biophysical aspects.

Transparent: the process should have clear, easily understood requirements for EIA content; ensure public access to information; identify the factors that are to be taken into account in decision making; and acknowledge limitations and difficulties.

Systematic: the process should result in full consideration of all relevant information on the affected environment, of proposed alternatives and their impacts, and of the measures necessary to monitor and investigate residual effects.

Operating Principles

The EIA process should be applied:

- i. As early as possible in decision making and throughout the life cycle of the proposed activity;
- ii. To all development proposals that may cause potentially significant effects;
- iii. To biophysical impacts and relevant socio-economic factors, including health, culture, gender, lifestyle, age, and cumulative effects consistent with the concept and principles of sustainable development;
- iv. To provide for the involvement and input of communities and industries affected by a proposal, as well as the interested public;
- v. In accordance with internationally agreed measures and activities.

Specifically the EIA process should provide for:

Screening: to determine whether or not a proposal should be subject to EIA and, if so, at what level of detail.

Scoping: to identify the issues and impacts that are likely to be important and to establish terms of reference for EIA.

Examination of alternatives: to establish the preferred or most environmentally sound and benign option for achieving proposal objectives.

Impact analysis: to identify and predict the likely environmental, social and other related effects of the proposal.

Mitigation and impact management: to establish the measures that are necessary to avoid, minimize or offset predicted adverse impacts and, where appropriate, to incorporate these into an environmental management plan or system.

Evaluation of significance: to determine the relative importance and acceptability of residual impacts (i.e., impacts that cannot be mitigated).

Preparation of environmental impact statement (EIS) or report: to document clearly and impartially impacts of the proposal, the proposed measures for mitigation, the significance of effects, and the concerns of the interested public and the communities affected by the proposal.

Review of the EIS: to determine whether the report meets its terms of reference, provides a satisfactory assessment of the proposal(s) and contains the information required for decision making.

Decision making: to approve or reject the proposal and to establish the terms and conditions for its implementation.

Follow up: to ensure that the terms and condition of approval are met; to monitor the impacts of development and the effectiveness of mitigation measures; to strengthen future EIA applications and mitigation measures; and, where required, to undertake environmental audit and process evaluation to optimize environmental management.

It is desirable, whenever possible, if monitoring, evaluation and management plan indicators are designed so they also contribute to local, national and global monitoring of the state of the environment and sustainable development.

STRATEGIC ENVIRONMENTAL ASSESSMENT

Sadler (1996) defines Strategic Environmental Assessment (SEA) as, ‘the formalized, systematic and comprehensive process of identifying and evaluating the environmental consequences of proposed policies, plans or programmes to ensure that they are fully included and appropriately addressed at the earliest possible stage of decision-making on a par with economic and social considerations’.

Since this early definition the field of SEA has rapidly developed and expanded, and the number of definitions of SEA has multiplied accordingly. SEA, by its nature, covers a wider range of activities or a wider area and often over a longer time span than the environmental impact assessment of projects.

SEA might be applied to an entire sector (such as a national policy on energy for example) or to a geographical area (for example, in the context of a regional development scheme). SEA does not replace or reduce the need for project-level EIA (although in some cases it can), but it can help to streamline and focus the incorporation of environmental concerns (including biodiversity) into the decision-making process, often making project-level EIA a more effective process.

SEA is commonly described as being proactive and ‘sustainability driven’, whilst EIA is often described as being largely reactive.

Origin, benefits and rationale for SEA

The National Environmental Policy Act (NEPA) is the reference back to which we can find the first requirements for what became known as SEA. In fact, the action-forcing mechanism, shaped as a requirement and subsequently nominated EIA, to bring about substantive environmental reform through the US federal bureaucracy, imposed upon federal agencies to prepare an environmental impact statement for “legislation and other major federal actions significantly affecting the quality of the human environment“ (Section 102(2)(c), National Environmental Policy Act of 1969). Since then several international initiatives subscribe the need for SEA.

The following lists a series of key events that have contributed to the evolution and consolidation of SEA.

SEA key historical initiatives

1969: The National Environmental Policy Act (NEPA) passed by the U.S. Congress, mandating all federal agencies and departments to consider and assess the environmental effects of proposals for legislation and other major projects.

1978: US Council for Environmental Quality (USCEQ) issues regulations for NEPA which apply to USAID and specific requirements for programmatic assessments.

1989: The World Bank adopted an internal directive (O.D. 4.00) on EIA which allows for the preparation of sectoral and regional assessments.

1991: The UNECE Convention on EIA in a Transboundary Context promotes the application of EA for policies, plans and programmes.

1990: The European Economic Community issues the first proposal for a Directive on the Environmental Assessment of Policies, Plans and Programmes.

1991: The OECD Development Assistance Committee adopted a principles calling for specific arrangements for analysing and monitoring environmental impacts of programme assistance

1995: The UNDP introduces the environmental overview as a planning tool.

1997: The Council of the European Union adopts a proposal for a Council Directive on the assessment of the effects of certain plans and programmes on the environment.

2001: The UNECE issues a draft protocol on Strategic Environmental Assessment applying to policies, plans and programmes.

2001: Council of the European Union adopts the Council Directive 2001/42/CE on 27 June on the assessment of the effects of certain plans and programmes on the environment.

Despite the initial arguments in the prescriptive literature since the early 1990's, as stated above, the need for SEA does not result only from project's EIA insufficiencies. As more recently argued, SEA has the capacity to support the development of policy and planning practices with a stronger environmental component and, above all, may perform a fundamental role in promoting sustainable principles and practices and the consideration of cumulative effects (Sadler, 1996).

Aims and objectives of SEA

To help achieve environmental protection and sustainable development by:

- Consideration of environmental effects of proposed strategic actions
- Identification of the best practicable environmental option
- Early warning of cumulative effects and large-scale changes

To strengthen and streamline project EIA by:

- Prior identification of scope of potential impacts and information needs
- Clearance of strategic issues and concerns related to justification of proposals
- Reducing the time and effort necessary to conduct individual reviews

To integrate the environment into sector-specific decision-making by:

- Promoting environmentally sound and sustainable proposals
- Changing the way decisions are made

Source: UK-DETR, International Seminar on SEA, Lincoln, May 1998

Increasingly decision-makers believe that SEA has the capacity to influence the environmental, and sustainability nature of such strategic decisions, and provide for sound, integrated and sustainable policy and planning frameworks.

It is also suggested that, as a consequence of SEA, more sound and environmentally-sensitive policies and plans would incorporate the necessary requirements for the subsequent development of projects. Levett-Therivel (2002) and other researchers compare traditional reactive EA and strategic proactive EA, arguing that "traditional reactive project level EIA is necessary but not sufficient to exploit opportunities which exist today but which may be gone tomorrow".

The extension of project' EIA principles to the policy and planning levels did not succeed without some resistance. It was argued that broad principles of environmental assessment were already incorporated in the decision-making process at that level, and that the adoption of SEA in a systematic manner would represent only marginal advantages.

Particularly in physical planning, practitioners claimed that plans already covered project' EIA requirements, using similar methodologies such as scope of analysis (natural, social and economic issues), comparison of alternative solutions and conflict-resolution approaches.

Currently there seems to exist a good consensus as to the need for a new form of environmental assessment that runs at higher levels of decision-making, tiering to project's EIA.

SOCIAL IMPACT ASSESSMENT

The impacts of development interventions take different shapes. While significant benefits flow forth from different development actions, there is need to also identify and evaluate the associated negative externalities.

Social impacts are impacts of developmental interventions on human life, livelihoods and human settlements (IAIA).

Such impacts not only need to be identified and measured but also need to be managed in such a way that the positive externalities are magnified and the negative ones minimized.

There is a need to properly conduct appraisal of possible social ramifications through active stakeholder participation and their effective mitigation.

Social Impact Assessment (SIA) is predicated on the notion that development interventions have social ramifications and it is imperative that decision-makers understand the consequences of their decisions before they act and people affected get the opportunity to participate in designing their future. Social assessment helps to make the project responsive to social development concerns. Developmental initiatives informed by social assessment alleviate poverty, enhance inclusion and build ownership while minimizing and compensating for adverse social impacts on the vulnerable and the poor.

Social Impact Assessment can be defined in terms of efforts to assess or estimate, in advance, the social consequences that are likely to follow specific policy actions (including programs and the adoption of new policies), and specific government actions. It is a process that provides a framework for prioritizing, gathering, analyzing, and incorporating social information and participation into the design and delivery of developmental interventions. It ensures that development interventions: (i) are informed and take into account the key relevant social issues; and (ii) incorporate a participation strategy for involving a wide range of stakeholders.

International Association for Impact Assessment defines Social Impact Assessment (SIA) as, 'the process of analyzing, monitoring and managing the social consequences of development'.

Why have Principles for Social Impact Assessment?

There has been considerable interest in producing "International Guidelines and Principles for Social Impact Assessment". An international document produced under the auspices of a major organization such as the International Association for Impact Assessment could:

- i. Assist in the development of legislation and policy at the national level;
- ii. Provide standards for SIA practice in international contexts (transboundary projects, development cooperation, foreign investments, international banking);
- iii. Increase the appeal of SIA to a wider range of audiences, through increasing its legitimacy/standing;
- iv. Establish minimum standards for SIA practice;
- v. Provide an articulation of best practice in SIA as a model to aspire to;

- vi. Remove confusion over terminology by establishing a definitive glossary;
- vii. Establish the appropriate scope of the social component of impact assessments;
- viii. Promote the integration of SIA in all impact assessments (especially environmental impact assessment and strategic environmental assessment).

The process of developing international guidelines and principles however has been difficult. In a truly international context, there are many issues to consider and little can be taken for granted. The regulatory context varies, the cultural/religious context varies, and social and economic priorities for development vary. As the process of developing international guidelines and principles progressed, increasing pressure was placed on the conventional understanding of SIA, and a new concept of what SIA was about emerged. This resulted in a revised definition of SIA.

It also became apparent that a definitive document containing the “International Guidelines and Principles” was a flawed concept. Firstly, because most such documents tend to emphasize guidelines rather than principles. They fail to realize that guidelines need to be deduced from principles, and principles need to be derived from core values. Only by first establishing the core values of the community of practice, then deriving the principles, and only then developing guidelines, can truly appropriate guidelines emerge. The second flaw is that guidelines and principles are often developed in non-participatory processes. Even where participatory processes are involved, too often they do not include the people to whom the guidelines are directed. These are the people who ultimately need to develop 'ownership' of the guidelines if they are to be adopted and utilized.

This document serves as a discussion document for the impact assessment community. It promulgates a new understanding of SIA. It is intended that this be available to practitioners around the world. It can provide them with the basis for developing national guidelines in consultation with a range of stakeholders and users in its countries.

Defining and describing Social Impact Assessment

In general terms, SIA is analyzing, monitoring and managing the social consequences of development. However, there are different levels by which to understand the term ‘SIA’. SIA is a field of research and practice, or a paradigm consisting of a body of knowledge, techniques, and values. Various individuals identify themselves as SIA professionals, or list SIA as one of their disciplines or specialty areas. There is a community of individuals engaged in research and practice of SIA. These people practice the methodology of SIA and

undertake associated social and environmental research to inform the practice of SIA. As a methodology or instrument, SIA is the process that SIA professionals follow in order to assess the social impacts of planned interventions or events, and to develop strategies for the ongoing monitoring and management of those impacts. SIA should not be understood only as the task of predicting social impacts in an impact assessment process.

Social impact assessment includes the processes of analyzing, monitoring and managing the intended and unintended social consequences, both positive and negative, of planned interventions (policies, programs, plans, projects) and any social purpose is to bring about a more sustainable and equitable biophysical and human environment.

The important features of this understanding of SIA are that:

- i. The goal of impact assessment is to bring about a more ecologically, socio-culturally and economically sustainable and equitable environment. Impact assessment, therefore, promotes community development and empowerment, builds capacity, and develops social capital (social networks and trust).
- ii. The focus of concern of SIA is a proactive stance to development and better development outcomes, not just the identification or amelioration of negative or unintended outcomes. Assisting communities and other stakeholders to identify development goals, and ensuring that positive outcomes are maximized, can be more important than minimizing harm from negative impacts.
- iii. The methodology of SIA can be applied to a wide range of planned interventions, and can be undertaken on behalf of a wide range of actors, and not just within a regulatory framework.
- iv. SIA contributes to the process of adaptive management of policies, programs, plans and projects, and therefore needs to inform the design and operation of the planned intervention.
- v. SIA builds on local knowledge and utilizes participatory processes to analyze the concerns of interested and affected parties. It involves stakeholders in the assessment of social impacts, the analysis of alternatives, and monitoring of the planned intervention.
- vi. The good practice of SIA accepts that social, economic and biophysical impacts are inherently and inextricably interconnected. Change in any of these domains will lead to changes in the other domains. SIA must, therefore, develop an understanding of the impact pathways that are created when change in one domain triggers

impacts across other domains, as well as the iterative or flow-on consequences within each domain. In other words, there must be consideration of the second and higher order impacts and of cumulative impacts.

- vii. In order for the discipline of SIA to learn and grow, there must be analysis of the impacts that occurred as a result of past activities. SIA must be reflexive and evaluative of its theoretical bases and of its practice.
- viii. While SIA is typically applied to planned interventions, the techniques of SIA can also be used to consider the social impacts that derive from other types of events, such as disasters, demographic change and epidemics.

SIA is best understood as an umbrella or overarching framework that embodies the evaluation of all impacts on humans and on all the ways in which people and communities interact with their socio-cultural, economic and biophysical surroundings. SIA thus has strong links with a wide range of specialist sub-fields involved in the assessment of areas such as: aesthetic impacts (landscape analysis), archaeological and cultural heritage impacts (both tangible and non-tangible), community impacts, cultural impacts, demographic impacts, development impacts, economic and fiscal impacts, gender impacts, health and mental health impacts, impacts on indigenous rights, infrastructural impacts, institutional impacts, leisure and tourism impacts, political impacts (human rights, governance, democratization etc.), poverty, psychological impacts, resource issues (access and ownership of resources), impacts on social and human capital, and other impacts on societies. As such, comprehensive SIA cannot formally be undertaken by a single person, but requires a team approach.

The nature of SIA in an international context

The objective of SIA is to ensure that development maximizes its benefits and minimizes its costs, especially those costs borne by people (including those in other places and in the future). Costs and benefits may not be measurable or quantifiable and are often not adequately taken into account by decision-makers, regulatory authorities and developers. By identifying impacts in advance: (1) better decisions can be made about which interventions should proceed and how they should proceed; and (2) mitigation measures can be implemented to minimize the harm and maximize the benefits from a specific planned intervention or related activity.

An important feature of SIA is the professional value system held by its practitioners. In addition to a commitment to sustainability and to scientific integrity, such a value system

includes an ethic that advocates openness and accountability, fairness and equity, and defends human rights. The role of SIA goes far beyond the ex-ante (in advance) prediction of adverse impacts and the determination of who wins and who loses. SIA also encompasses empowerment of local people; enhancement of the position of women, minority groups and other disadvantaged or marginalized members of society; development of capacity building; alleviation of all forms of dependency; increase in equity; and a focus on poverty reduction. SIA complements the economic and technical models that characterize the thinking of many development professionals and agencies.

SIA can be undertaken in different contexts and for different purposes. This creates difficulties in defining or evaluating it. The nature of an SIA done on behalf of a multinational corporation as part of that company's internal procedures may be very different to an SIA undertaken by a consultant in compliance with regulatory or funding agency requirements, or an SIA undertaken by a development agency interested in ensuring best value for their country's development assistance. These, in turn, may be very different to an SIA undertaken by staff or students at a local university on behalf of the local community, or an SIA undertaken by the local community itself. Each of these applications of SIA is worthwhile, and none should pretend to be the definitive statement. Evaluation of an SIA needs to consider its intended purpose.

Some conceptualizations of SIA are related to protecting individual property rights, with clear statements of adverse impacts required to ensure that individual rights are not transgressed. Where these rights are violated, SIA could be seen as contributing to mitigation and compensation mechanisms. In these situations, SIA tends to concentrate on the negative impacts. In other contexts, however, particularly in developing countries, there should be less emphasis on the negative impacts on small groups of individuals or on individual property rights. Rather, there should be greater concern with maximizing social utility and development potential, while ensuring that such development is generally acceptable to the community, equitable and sustainable. SIA should also focus on reconstruction of livelihoods. The improvement of social wellbeing of the wider community should be explicitly recognized as an objective of planned interventions, and as such should be an indicator considered by any form of assessment. However, awareness of the differential distribution of impacts among different groups in society, and particularly the impact burden experienced by vulnerable groups in the community should always be of prime concern.

What are social impacts?

SIA is much more than the prediction step within an environmental assessment framework. Social impacts are much broader than the limited issues often considered in EIAs (such as demographic changes, job issues, financial security, and impacts on family life). A limited view of SIA creates demarcation problems about what are the social impacts to be identified by SIA, versus what is considered by related fields such as health impact assessment, cultural impact assessment, heritage impact assessment, aesthetic impact assessment, or gender impact assessment. The SIA community of practitioners considers that all issues that affect people, directly or indirectly, are pertinent to social impact assessment.

A convenient way of conceptualizing social impacts is as changes to one or more of the following:

- i. people's way of life: that is, how they live, work, play and interact with one another on a day-to-day basis;
- ii. their culture: that is, their shared beliefs, customs, values and language or dialect;
- iii. their community: its cohesion, stability, character, services and facilities;
- iv. their political systems: the extent to which people are able to participate in decisions that affect their lives, the level of democratization that is taking place, and the resources provided for this purpose;
- v. their environment: the quality of the air and water people use; the availability and quality of the food they eat; the level of hazard or risk, dust and noise they are exposed to; the adequacy of sanitation, their physical safety, and their access to and control over resources;
- vi. their health and wellbeing: health is a state of complete physical, mental, social and spiritual wellbeing and not merely the absence of disease or infirmity;
- vii. their personal and property rights: particularly whether people are economically affected, or experience personal disadvantage which may include a violation of their civil liberties;
- viii. their fears and aspirations: their perceptions about their safety, their fears about the future of their community, and their aspirations for their future and the future of their children.

Activities comprising Social Impact Assessment:

SIA comprises most of the following activities:

- i. participates in the environmental design of the planned intervention;
- ii. identifies interested and affected peoples;
- iii. facilitates and coordinates the participation of stakeholders;
- iv. documents and analyses the local historical setting of the planned intervention so as to be able to interpret responses to the intervention, and to assess cumulative impacts;
- v. collects baseline data (social profiling) to allow evaluation and audit of the impact assessment process and the planned intervention itself;
- vi. gives a rich picture of the local cultural context, and develops an understanding of local community values, particularly how they relate to the planned intervention;
- vii. identifies and describes the activities which are likely to cause impacts (scoping);
- viii. predicts (or analyses) likely impacts and how different stakeholders are likely to respond;
- ix. assists evaluating and selecting alternatives (including a no development option);
- x. assists in site selection;
- xi. recommends mitigation measures;
- xii. assists in the valuation process and provides suggestions about compensation (non-financial as well as financial);
- xiii. describes potential conflicts between stakeholders and advises on resolution processes;
- xiv. develops coping strategies for dealing with residual or immitigable impacts;
- xv. contributes to skill development and capacity building in the community;
- xvi. advises on appropriate institutional and coordination arrangements for all parties;
- xvii. assists in devising and implementing monitoring and management programs.

Guidelines, Principles and Core Values:

- i. Core Values: Fundamental, ideal-typical, enduring, statements of belief that are strongly held and accepted as premises (is-statements).
- ii. Principles: General statements of either a common understanding or an indication as to a course of action about what ought to be done (ought statements).
- iii. Guidelines: Statements by which to plan a specific course of action and which clarify how it should done (action statements).

Guidelines can be described as statements which provide advice or direction by which to plan a specific course of action. They are written as specific statements of instruction about what to do and/or how to do it. Typically they are “action-statements”. A principle is a macro statement that provides a general guide to a course of action about what ought to be done. They are written as “ought-statements”. Core values are statements about fundamental beliefs that are deeply held. They are typically “is-statements”. Values determine principles, from which guidelines can be written.

The core values of SIA

The SIA community of practice believes that:

- i. There are fundamental human rights that are shared equally across cultures, and by males and females alike.
- ii. There is a right to have those fundamental human rights protected by the rule of law, with justice applied equally and fairly to all, and available to all.
- iii. People have a right to live and work in an environment which is conducive to good health and to a good quality of life and which enables the development of human and social potential.
- iv. Social dimensions of the environment specifically but not exclusively peace, the quality of social relationships, freedom from fear, and belongingness are important aspects of people’s health and quality of life.
- v. People have a right to be involved in the decision making about the planned interventions that will affect their lives.
- vi. Local knowledge and experience are valuable and can be used to enhance planned interventions.

Fundamental principles for development:

The SIA community of practice considers that:

- i. Respect for human rights should underpin all actions.
- ii. Promoting equity and democratization should be the major driver of development planning, and impacts on the worst-off members of society should be a major consideration in all assessment.
- iii. The existence of diversity between cultures, within cultures, and the diversity of stakeholder interests need to be recognized and valued.

- iv. Decision making should be just, fair and transparent, and decision makers should be accountable for their decisions.
- v. Development projects should be broadly acceptable to the members of those communities likely to benefit from, or be affected by, the planned intervention.
- vi. The opinions and views of experts should not be the sole consideration in decisions about planned interventions.
- vii. The primary focus of all development should be positive outcomes, such as capacity building, empowerment, and the realization of human and social potential.
- viii. The term, 'the environment', should be defined broadly to include social and human dimensions, and in such inclusion, care must be taken to ensure that adequate attention is given to the realm of the social.

Principles specific to SIA practice

- i. Equity considerations should be a fundamental element of impact assessment and of development planning.
 - ii. Many of the social impacts of planned interventions can be predicted.
 - iii. Planned interventions can be modified to reduce their negative social impacts and enhance their positive impacts.
 - iv. SIA should be an integral part of the development process, involved in all stages from inception to follow-up audit.
 - v. There should be a focus on socially sustainable development, with SIA contributing to the determination of best development alternative(s) – SIA (and EIA) have more to offer than just being an arbiter between economic benefit and social cost.
 - vi. In all planned interventions and their assessments, avenues should be developed to build the social and human capital of local communities and to strengthen democratic processes.
 - vii. In all planned interventions, but especially where there are unavoidable impacts, ways to turn impacted peoples into beneficiaries should be investigated.
 - viii. The SIA must give due consideration to the alternatives of any planned intervention, but especially in cases when there are likely to be unavoidable impacts.
 - ix. Full consideration should be given to the potential mitigation measures of social and environmental impacts, even where impacted communities may approve the planned intervention and where they may be regarded as beneficiaries.
 - x. Local knowledge and experience and acknowledgment of different local cultural values should be incorporated in any assessment.
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- xii. There should be no use of violence, harassment, intimidation or undue force in connection with the assessment or implementation of a planned intervention.
- xiii. Developmental processes that infringe the human rights of any section of society should not be accepted.

BIODIVERSITY IMPACT ASSESSMENT

Biodiversity matters to all. Its loss impoverishes the environment and reduces its capacity to support people now and in the future. Impact assessment can help to ensure development is compatible with the conservation and sustainable use of biodiversity.

Biodiversity: The Basis of Our Existence

The first World Summit on Environment and Development in Rio de Janeiro (1992) emphasized the importance of biodiversity as the basis of our very existence, to be used wisely and sustainably and conserve for current and future generations. The main threats to global biodiversity are associated with human activities causing habitat loss or damage.

Impact assessment as a tool

The Convention on Biological Diversity (CBD), the Ramsar Convention, and the Convention on Migratory Species (CMS) recognize Impact Assessment (IA) as an important decision-support tool to help plan and implement development with biodiversity “in mind.”

The Conventions require Signatories (“Parties”) to apply EIA and SEA to proposals with potential negative impacts on biodiversity to help meet their objectives, so that development proposals respect mechanisms for the **conservation** of biodiversity, result in **sustainable use** of biodiversity resources, and ensure **fair and equitable sharing** of the benefits arising from use of biodiversity.

IA provides opportunities to ensure that biodiversity values are recognized and taken into account in decision-making. Importantly, this involves a participatory approach with people who might be affected by a proposal.

Considerable progress has been made in the application of IA to further the aims of the CBD and related conventions, but there is still a long way to go.

Challenges that need to be addressed include:

- i. Raising of awareness of biodiversity and its values and importance.
- ii. Building capacity to commission, carry out, and review assessments.
- iii. Obtaining and communicating reliable, up-to-date information on biodiversity in an accessible form.
- iv. Providing guidance to communities, governments and business.

The principles are set out in three sections:

- i. “**What is biodiversity?**” explains what biodiversity is and why it is important.
- ii. “**Guiding principles**” apply to all stages and types of IA and explain how a desired outcome can be achieved for biodiversity.
- iii. “**Operating principles**” explain how biodiversity concerns are best addressed in the main stages of the IA process.

What is biodiversity?

The CBD defines biodiversity as “the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.” It is the variety of life on earth at all levels, from genes to worldwide populations of the same species; from communities of species sharing the same small area of habitat to worldwide ecosystems.

Levels of biodiversity:

Countries that have signed the CBD (“Parties”) must implement policies to protect biodiversity at different levels, in particular:

- i. *Ecosystems* containing rich biodiversity, large numbers of threatened or endemic species, that are important for migrating species; have social, economic, cultural or scientific significance, or support key processes.
- ii. *Species* and communities of species that are threatened, related to domesticated or cultivated species, have medicinal, agricultural, or other economic, social, cultural or scientific significance, and indicator species.
- iii. *Genotypes* with social, scientific or economic significance.

To provide an understanding of how biodiversity is likely to respond to a proposed activity, impacts at each level of diversity can be best assessed in terms of:

- i. *Composition*: what biological units are present and how abundant they are.
- ii. *Structure* (or pattern): how biological units are organized in time and space.
- iii. *Function*: the role different biological units play in maintaining natural processes and dynamics.

The significance of these responses depends critically on uses and values of biodiversity.

Why biodiversity is important

Biodiversity supports many lives and livelihoods. It does this by providing essential services.

Biodiversity is:

- i. A source of harvestable goods including food, medicines and building materials.
- ii. Essential for regulation of natural processes and the earth's life support systems, e.g., carbon sequestration, soil formation, and purification of water.
- iii. Essential for pollination of commercially valuable crops and biological control of pests and diseases.
- iv. A source of spiritual and religious enrichment and well-being.

Perhaps most important of all, biodiversity is the basis for evolution and adaptation to changing environments, making it essential for survival of life.

Biodiversity values are often underestimated. They include:

- i. *Economic values*: biodiversity goods and products are sold for income or used as inputs to other economic activities, e.g. ecotourism. Replacement or substitution of the services provided by biodiversity (e.g., engineered flood defense to replace coastal protection by dunes or mangroves) often requires large financial investment.
- ii. *Social values*: employment, health, quality of life, social security, appreciation.
- iii. *Intrinsic values*: in many cultures and societies, all or some components of biodiversity have "intrinsic" value in their own right, irrespective of any material contribution to human wellbeing. Wherever this is the case, these values should be incorporated in socio-political decision making and should also be reflected in IA.

The biodiversity-related Convention

It is based on the premise that further loss of biodiversity is unacceptable. Biodiversity must be conserved to ensure it survives, continuing to provide services, values and benefits for current and future generations. Take the following approach to help achieve *no net loss* of biodiversity:

- i. Avoid irreversible losses of biodiversity.
- ii. Seek alternative solutions that minimize biodiversity losses.
- iii. Use mitigation to restore biodiversity resources.
- iv. Compensate for unavoidable loss by providing substitutes of at least similar biodiversity value.
- v. Seek opportunities for enhancement.

This approach can be called “positive planning for biodiversity.” It helps achieve no net loss by ensuring:

- i. Priorities and targets for biodiversity at international, national, regional and local level are respected, and a positive contribution to achieving them is made.
- ii. Damage is avoided to unique, endemic, threatened or declining species, habitats and ecosystems; to species of high cultural value to society, and to ecosystems providing important services.

Take an Ecosystem Approach:

The CBD advocates an “ecosystem approach” because people and biodiversity depend on healthily functioning ecosystems that have to be assessed in an integrated way, not constrained by artificial boundaries. The ecosystem approach is *participatory* and requires a *long-term perspective* based on a *biodiversity-based study area* and *adaptive management* to deal with the dynamic nature of ecosystems, uncertainty and the often unpredictable nature of ecosystem functions, behavior and responses. Biodiversity concerns are not limited to protected areas. Elements of natural systems remain in even the most urbanized cities and play an often important role in the quality of life in those cities.

Seek Sustainable Use of Biodiversity Resources:

Use IA to identify, protect and promote sustainable use of biodiversity so that yields/harvests can be maintained over time. Recognize the benefits of biodiversity in

providing essential life support systems and ecosystem services such as water yield, water purification, breakdown of wastes, flood control, storm and coastal protection, soil formation and conservation, sedimentation processes, nutrient cycling, carbon storage, and climatic regulation as well as the costs of replacing these services. In a developing country context, this principle is likely to be a key priority i.e., for biodiversity to be conserved and protected in this context, it is essential that it is linked to the issue of securing sustainable livelihoods for local people based on biodiversity resources.

Ensure Equitable Sharing:

Ensure traditional rights and uses of biodiversity are recognized in IA and the benefits from commercial use of biodiversity are shared fairly. Consider the needs of future as well as current generations (inter-generational needs): seek alternatives that do not trade in biodiversity “capital” to meet short term needs, where this could jeopardize the ability of future generations to meet their needs.

Apply the Precautionary Principle:

Apply the precautionary principle in any situation where important biodiversity may be threatened and there is insufficient knowledge to either quantify risks or implement effective mitigation. Application of the precautionary principle requires that development consent should be delayed while steps are taken to ensure that best available information can be obtained through consultation with local stakeholders/experts and/or new information on biodiversity can be obtained and consolidated.

Take a Participatory Approach:

Consult widely to ensure that all stakeholders have been consulted and that important biodiversity values are taken into account. Valuation of biodiversity can only be done in negotiation with the different groups or individuals in society (stakeholders) who have an interest in biodiversity. Use traditional and indigenous knowledge wherever appropriate. Work carefully with indigenous communities to ensure that knowledge of biodiversity is not inappropriately exploited.

Operating principles

Screening

Use biodiversity inclusive screening criteria to determine whether important biodiversity resources may be affected. Biodiversity screening “triggers” for IA should include:

- i. Potential impacts on protected areas and areas supporting protected species.
- ii. Impacts on other areas that are not protected but are important for biodiversity (Areas with important biodiversity are mentioned below).
- iii. Activities posing a particular threat to biodiversity (in terms of their type, magnitude, location, duration, timing, reversibility).
- iv. Areas that provide important biodiversity services including extractive reserves, indigenous people’s territories, wetlands, fish breeding grounds, soils prone to erosion, relatively undisturbed or characteristic habitat, flood storage areas, groundwater recharge areas, etc.

Areas with “important biodiversity” are those that:

- i. Support endemic, rare, declining habitats/species/genotypes.
- ii. Support genotypes and species whose presence is a prerequisite for the persistence of other species.
- iii. Act as a buffer, linking habitat or ecological corridor, or play an important part in maintaining environmental quality.
- iv. Have important seasonal uses or are critical for migration.
- v. Support habitats, species populations, ecosystems that are vulnerable, threatened throughout their range and slow to recover.
- vi. Support particularly large or continuous areas of previously undisturbed habitat.
- vii. Act as refuge for biodiversity during climate change, enabling persistence and continuation of evolutionary processes.
- viii. Support biodiversity for which mitigation is difficult or its effectiveness unproven including habitats that take a long time to develop characteristic biodiversity.
- ix. Are currently poor in biodiversity but have potential to develop high biodiversity with appropriate intervention.

Encourage development of a biodiversity screening map indicating important biodiversity values and ecosystem services. If possible, integrate this activity with the development of a

National Biodiversity Strategy and Action Plan (NBSAP) and/or biodiversity planning at sub-national levels (e.g., regions, local authorities, towns) to identify conservation priorities and targets.

SCOPING

Scoping leads to Terms of Reference for IA, defining the issues to be studied and the methods that will be used. Use scoping as an opportunity to raise awareness of biodiversity concerns and discuss alternatives to avoid or minimize negative impacts on biodiversity.

It is good practice to produce a scoping report for consultation. This should address the following issues (on the basis of existing information and any preliminary surveys or discussions):

- i. The type of project, program, plan or policy, possible alternatives and a summary of activities likely to affect biodiversity
- ii. An analysis of opportunities and constraints for biodiversity (include “no net biodiversity loss” or “biodiversity restoration” alternatives)
- iii. Expected biophysical changes (in soil, water, air, flora, fauna) resulting from proposed activities or induced by any socioeconomic changes
- iv. Spatial and temporal scale of influence, identifying effects on connectivity between ecosystems, and potential cumulative effects
- v. Available information on baseline conditions and any anticipated trends in biodiversity in the absence of the proposal
- vi. Likely biodiversity impacts associated with the proposal in terms of composition, structure and function
- vii. Biodiversity services and values identified in consultation with stakeholders and anticipated changes in these (highlight any irreversible impacts)
- viii. Possible measures to avoid, minimize, or compensate for significant biodiversity damage or loss, making reference to any legal requirements
- ix. Information required to support decision making and summary of important gaps
- x. Proposed IA methodology and timescale

IMPACT STUDY AND PREPARATION OF EIS

Address biodiversity at all appropriate levels and allow for enough survey time to take seasonal features into account. Focus on processes and services which are critical to human

well-being and the integrity of ecosystems. Explain the main risks and opportunities for biodiversity. Questions to ask:

At the gene level, to what extent will the proposal have significant effects on:

- i. Genetic diversity of species, particularly rare and declining species and those with identified as priorities in NBSAPs and/or sub-national biodiversity plans?
- ii. Opportunities for species populations to interact, e.g., by increasing habitat fragmentation and isolation?
- iii. Risk of extinction?
- iv. Persistence of locally-adapted populations?

At the species level, to what extent will the proposal:

- i. Alter the species-richness or species-composition of habitats in the study area?
- ii. Alter the species-composition of communities?
- iii. Cause some species to be lost from the area?
- iv. Affect species identified as priorities in NBSAPs and/or sub-national biodiversity plans?
- v. Increase the risk of invasion by alien species?

At the ecosystem level, to what extent will the proposal:

- i. Change the amount, quality or spatial organization of habitat?
- ii. Affect plans to enhance habitat availability or quality?
- iii. Damage ecosystem processes and services, particularly those on which local communities rely?

Finally:

- i. If habitats will be lost or altered, is alternative habitat available to support associated species populations?
- ii. Are there opportunities to consolidate or connect habitats?

Take an ecosystem approach and involve relevant stakeholders (including local communities). Consider the full range of factors affecting biodiversity. These include direct drivers of change associated with a proposal (e.g., land conversion and vegetation removal leading to loss of habitat—a key driver of biodiversity loss, emissions, disturbance,

introduction of alien and genetically modified species, etc.); and indirect drivers of change which are harder to quantify, including demographic, economic, socio-political, cultural and technological processes or interventions.

Evaluate impacts of alternatives with reference to the baseline situation. Compare against thresholds and objectives for biodiversity. Use NBSAPs, sub-national biodiversity plans and other conservation reports for information and objectives. Take into account cumulative threats and impacts resulting either from repeated impacts of projects of the same or different nature over space and time, and/or from proposed plans, programs or policies.

Biodiversity is influenced by cultural, social, economic and biophysical factors. Cooperation between different specialists in the IA team is thus essential, as is the integration of findings which have bearing on biodiversity. Provide insight into cause-effect chains. If possible, quantify the changes in quality and amount of biodiversity. Explain the expected consequences of any biodiversity losses associated with the proposal, including the costs of replacing biodiversity services if they will be damaged by a proposal.

How do these relate to relevant biodiversity priorities and objectives or any legal obligations? Indicate the legal issues that create the boundary conditions for decision making.

MITIGATION

Remedial action can take several forms, i.e., avoidance (or prevention), mitigation (including restoration and rehabilitation of sites), and compensation. Apply the “positive planning approach,” where avoidance has priority and compensation is used as a last resort measure. Avoid “excuse”-type compensation. Look for opportunities to positively enhance biodiversity. Acknowledge that compensation will not always be possible; there will still be cases where it is appropriate to say “no” to development proposals on grounds of irreversible damage to biodiversity.

REVIEW FOR DECISION-MAKING

Peer review of environmental reports with regard to biodiversity should be undertaken by a specialist with appropriate expertise, where biodiversity impacts are significant. Depending on the level of confidentiality of public decision-making, consideration should be given to the involvement of affected groups and civil society.

DECISION MAKING

Avoid pitting conservation goals against development goals; balance conservation with sustainable use for economically viable, and socially and ecologically sustainable solutions. For important biodiversity issues, apply the precautionary principle where information is insufficient and the no net loss principle in relation to irreversible losses associated with the proposal.

MANAGEMENT, MONITORING, EVALUATION AND AUDITING

It is important to recognize that all prediction of biodiversity response to perturbation is uncertain, especially over long time frames. Management systems and programs, including clear management targets (or Limits of Acceptable Change (LC)) and appropriate monitoring, should be set in place to ensure that mitigation is effectively implemented, unforeseen negative effects are detected and addressed, and any negative trends are detected. Provision is made for regular auditing of impacts on biodiversity. Provision should be made for emergency response measures and/or contingency plans where upset or accident conditions could threaten biodiversity.

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