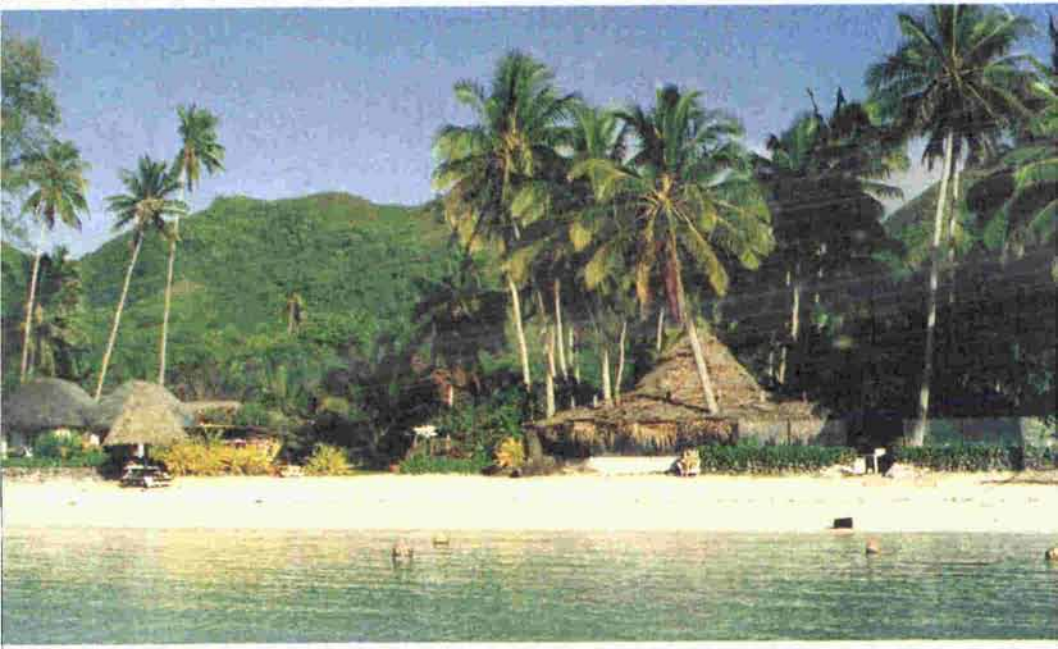
A Guide to

Environmental Impact Assessment

in the South Pacific



South Pacific Regional Environment Programme

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Original text: English

ISBN 982-04-0063-5

Prepared with financial support of the United Nations Environment Programme (UNEP) and the Australian International Development Assistance Bureau (AIDAB)

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Cover photo: *Muri Beach, Rarotonga: hotel development among the dunes*

Published in October 1993 by:

South Pacific Regional Environment Programme
P.O. Box 240
Apia
Western Samoa

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Printed by the Printing Department, University of Otago, P.O. Box 56, Dunedin, New Zealand.

FOREWORD

This guide is the first of a series to be produced by the South Pacific Regional Environmental Programme dealing with environmental planning and management in the South Pacific. This series aims to create awareness of environmental planning and management and to promote the integration of environmental dimensions into development activities, so encouraging sustainable development.

This booklet deals with Environmental Impact Assessment (EIA) which is a rapidly evolving tool for planning and management. However, it is only now gradually being accepted by island countries of the South Pacific. EIA deals with the effects that a development project will have, not only on the natural but also the human environment.

SPREP acknowledges the assistance of Komeri Onorio of SPREP, Dr. Richard K. Morgan of the University of Otago, Dr. David Green and Mr. Remi Odense of the University of the South Pacific and Messrs. Alisdair Hutchison and David Hill of the New Zealand Ministry for the Environment in preparing the guidelines.

Production and publication of this guide has been made possible through funding assistance from the United Nations Environment Programme and the Australian International Development Assistance Bureau.

Vili A. Fuavao,
Director

PREFACE

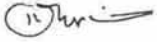
The main purpose of this booklet is to provide a ready and simple guide for using Environmental Impact Assessment as a planning and management tool for decision making in the South Pacific Region. It is primarily for government officials who are normally too busy to look at voluminous reference manuals, and also for private developers, non-government officials and interested individuals.

The guide also discusses the value and importance of the EIA process for government decisions about development, outlines the main steps involved in an EIA study, and assists in implementing EIA procedures.

A consistent approach was used to prepare this Guide, similar to that used in the SPREP EIA In-Country Workshops conducted in 14 island member countries in 1992 and 1993. As with these workshops, this booklet is targeted at decision-makers as well as technical officials and development planners. The booklet not only deals with the practical applications of EIA, but also with the broader, more conceptual issues.

In maintaining this approach, SPREP could be trying to achieve too much with one publication at the risk of losing senior government readership. However, it is vital that readers first understand the conceptual framework of EIA before they divert their attention to the practical elements of environmental assessment. So the two parts of this booklet are therefore designed with this in mind. The whole document provides a complete, though brief, account of EIA and its applications.

This *Guide to Environmental Impact Assessment in the South Pacific* draws on the extensive experiences gained from the EIA in-country workshops. However, it is nevertheless expected that it will need revision as more experience with EIA accumulates. The Director of SPREP would appreciate comments, criticisms, and, especially, more examples of EIA applications in island member countries.



Komeri Onorio,
Environmental Impact Assessment Officer
August 1993

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INTRODUCTION

There are two parts to this Guide. The first part deals with the concepts of EIA, how it fits in with the idea of sustainable development, and looks at some of the common misconceptions about impact assessment.

The second part focuses on the practical side of EIA, looking at the steps in the EIA process, considering the way EIA might be implemented by governments, and then spending some time reviewing some of the major environmental themes that recur in South Pacific impact assessment studies.

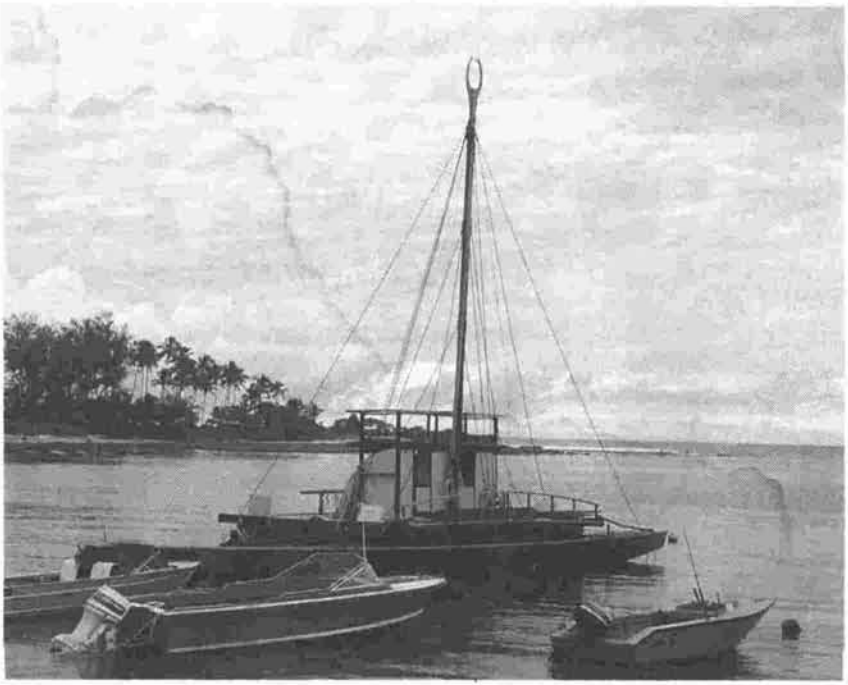

PLATE 1: The task facing many island nations is to achieve a balance between development and the need to protect the essential cultural values of the community. This means having regard for possible effects of development on both the social and natural environment, and EIA has an important role to play in this process

PLATE 2: Tourism development brings welcome economic benefits, but can have unwanted effects. Run off from construction sites, for instance, can lead to silt build up in local rivers or lagoons, damaging fishing sites, coral and other valued features of the local environment. These effects have to be anticipated and managed properly.

PLATE 3: Tourism also leads to more refuse, one of the most important side effects of development activities in the Pacific. Disposal poses many problems in countries where land resources are limited.

THE CONCEPT OF EIA

What is EIA?

Environmental Impact Assessment is the name given to the prediction and evaluation of the likely effects that an activity will have on the environment, before that activity starts. The reason for using EIA is to avoid adverse and costly changes in the natural and human environment as a result of human actions.

It is useful to think of EIA as another management activity, like project design, economic assessment, and market research. Indeed, it is now seen as an integral part of the whole project development cycle. However, EIA is not only used to examine project proposals. Policies can also benefit enormously from environmental assessment.

Box 1

In 1985, Fiji's Housing Authority decided to establish a low income housing area at Davuilevu near Suva. Because statutory bodies in Fiji are not subject to EIA, no attempt was made to determine the likely environmental effects of this proposal.

An area of 20 hectares of rainforest was bulldozed and divided into suburban lots. Seven years later, most of the plots are unoccupied and the area is a wasteland of bare red soil. The soil was so seriously disturbed that nothing has grown since. An EIA would have pointed out the folly of removing all the forest cover over such a wide area.

Development and the environment: the importance of EIA

EIA was formally introduced in the USA in 1970, to review the environmental implications of government-sanctioned development activities. The procedure has now spread to most of the countries in the world, regardless of political persuasion, as concern about the environment has grown.

In the early days, EIA was seen simply as a method for predicting the environmental changes likely to occur if a proposed project went ahead. The

intention of the EIA process was to alter designs, and perhaps even the location of the project, to minimise unacceptable changes in the environment. This view is still important, but over the last five to ten years there has been a move to view EIA in a much wider setting.

It is now being used by many countries as a key tool in achieving the sustainable development of natural resources.

Box 2

The concept of sustainable development, as popularised in the report of the Brundtland commission in 1987, *Our Common Future*, means little in the South Pacific region. To an islander, this Pacific interpretation, tabled at the UNCED Earth Summit in Brazil in 1992, makes more sense:

"...the object of the exercise of 'sustainable development' is to survive on the atolls for ever.....
Sustainability is the idea that we can survive from day to day, and....ever after!"

Hon. Ieremia Tabai, GCMG
former President of Kiribati

Since then this has become a major policy objective of many island governments and international environmental organisations.

Sustainability and the Pacific

Sustainable development refers to developing resources in such a way that:

- it avoids major long term or continuing damage to environmental systems;
- renewable resources, such as fisheries and forests, have the chance to replenish themselves;
- non-renewable resources, such as fossil fuels, minerals, and sand and stone, are depleted in a managed way to permit substitutes to be developed ; and

- it will leave the environment for our children in the same or better condition than when the project started.

In the Pacific, human societies have traditionally come to terms with nature through a long term, "trial-and-error" process. They had an impact on the environment but because populations were relatively small, the effects were usually very localised. Certain social customs and practices evolved to cope with particular resource problems. An example of such a mechanism is the placing of a ban on taking small fish in order to preserve stocks for future seasons. Pacific societies have certainly altered the natural environment, but they have been able to achieve a new, settled relationship with their environment. That relationship allowed the continued use of resources without further major changes in the environment. This is the principal goal of sustainable development.

In recent times, however, there have been major changes to the pace and extent of resource development in the South Pacific. Natural resources are being used in greater quantities than ever before, often with totally different technology from that used in the past, and they are usually being sent overseas rather than being used by the local population. All this means that the previous "trial -and-error" process of human adjustment to the environment is not appropriate given the faster, larger-volume resource development of modern times. Severe environmental problems can be caused in a very short time, as has been seen in many countries in Europe, North America and Asia. The scale and speed of the development means that serious harm can be done before the problem is even recognised.

Box 3

Logging in the Solomons has been going on for a hundred years. Logging techniques used to be localised enough not to cause much damage to the overall forest. However, with the advent of modern logging techniques in the last fifteen years, the rate of logging has increased dramatically, and the destruction in the forests is far more serious than in previous decades. These activities threaten the very future of the forests, and the logging industry, so modern logging concessions require EIAs to ensure road construction, clear-cutting and rates of wood removal are in fact sustainable.

EIA is now seen as the main tool to replace the old trial-and-error processes of managing the environment. Rather than waiting to see what happens when a particular project starts to operate or, even worse, ignoring what might happen, EIA provides decision-makers with a specific mechanism for trying to predict the likely effects on the environment, and then to make the appropriate decisions about the proposal. They need to answer the key question: *is the proposal a sustainable activity?* EIA is the obvious tool for such a job.

PLATE 4: Soil erosion is common in many Pacific island countries, often resulting from clearing land for forestry, road building or other activities. Careful use of EIA can reduce such occurences markedly.

General principles of EIA

In this section, some of the central ideas of EIA are discussed. It is important to appreciate these if EIA is to be implemented and used properly.

EIA is not confined to projects

It is important to recognise that EIA is not only used to assess project proposals. Projects are normally the result of wider policy decisions; for instance, a fish farm proposal might reflect a government's desire to increase the fisheries resource. Therefore, EIA can be used to consider the environmental implications of the policy decision itself: the issues are broader than for specific projects, but there are important implications for governments to consider when making such resource-based policy decisions. Historically, economic considerations have been considered, usually in a narrow sense, but it is now more important that wider environmental issues are also considered.

EIA is part of the project planning and design process

EIA is most effective when used as a part of the project planning and design process. When a concept is formulated and initial feasibility studies are carried out (this may be for a major policy initiative, or for a specific prokect), environmental considerations should automatically be part of the study. So companies, donor organisations and government departments involved in resource development, should carry out their own internal EIA studies as they develop policy or project proposals. This also helps their own design and planning processes and speeds up subsequent decision-making by government departments.

EIA is about predictions

The main job of EIA is to predict the environmental results of actions yet to take place. Not surprisingly, there is always some uncertainty about the predictions made, mainly because we do not always understand just how an activity will interact with the environment in reality. Uncertainty can arise because we do not know enough about the environmental processes involved, or because other factors might intervene during the period of interest. As with economic forecasting, we can only base our predictions on the best information available for foreseeable conditions.

EIA emphasises indirect impacts

In EIA work, particular emphasis is placed on the identification of the less obvious effects of proposed activities. The direct effects are often reasonably well known and understood, and can be allowed for in project designs and siting. However, many environmental problems are the result of indirect, and so unforeseen, effects of project actions on the environment. These are often missed, and resultant problems can cost local communities, and the whole country, a great deal economically and socially. Much of the skill in carrying out EIA relates to this part of the process: identifying the indirect effects, and deciding how important each one will be in contributing to the environmental impacts of a proposal.

EIA and local communities

A major task of EIA is to examine how local communities might be affected by a proposal and to encourage decision-makers to take this information into account when reaching a decision. Most countries that use EIA now tend to view the environment as more than simply the natural world. They include human settlements, agricultural systems, cultural practices and beliefs, and so on. So, while changes to the natural world will usually be studied, the direct impacts on the local communities should also be examined. These will often be the impacts of most concern to local people.

EIA and monitoring

EIA is currently viewed as a continuing process, initiated when proposals are first being discussed and developed, and becoming more focused and specific as proposals themselves become more detailed. Once approval has been given for a proposal, the EIA process focuses on monitoring the operation of the project or policy.

The main reasons for monitoring are:

- to ensure the mitigating measures required by the planning authorities have been implemented; and
- to check for changes not predicted by the impact assessment, allowing a quick response to them.

One major problem with monitoring seems to be deciding who should pay for the work, and another is the lack of understanding of EIA and how

monitoring fits into the overall process of assessing development policies and projects.

EIA does not make the decision

EIA is not, in itself, a decision-making procedure. It generates particular types of information that are then supplied to the appropriate decision-makers, including developers and politicians. If EIA is to work properly, the people using the information to make decisions must be committed to the basic principles that underpin EIA—the need to avoid changes in the environment that result in net harm to local people and their environment.

EIA is not anti-development

It is very important to recognise that EIA is not anti-development. This view has been particularly strong in some island governments with national plans geared for fast-track economic development. They therefore see the introduction of EIA as slowing the approval process of development programmes. However, as stated above, EIA serves the decision-making system and does not contain any biases for or against development.

Determining what is *significant* change

Most environmental changes affect people, directly or indirectly. A key part of EIA is representing the concerns of those people likely to be affected by a proposal and notifying the decision-maker of their concerns. In particular, the judgements that are ultimately made about predicted changes revolve around what is socially acceptable and what is not. Such judgements should be made by those most affected by the changes. To some extent, experts can assess the nature of changes in terms of the well-being of particular parts of the environment. But social judgement of whether those changes should be tolerated in return for the gains from a proposal can not be made by the impact assessors themselves.

Some common questions about EIAs

Before moving on to the practical aspects of EIA, it is useful to look at some of the questions that are most frequently asked about the process.

Who pays?

The most successful arrangement for paying for an EIA is that the developer pays. If the developer is a government department, then that department must allocate the funds for the EIA.

How much does an EIA cost?

If an EIA is completed by consultants, the minimum cost is about US$3,000, no matter how small the project. For very large developments with complex EIA requirements, such as major resorts, fish processing plants, etc, EIAs cost about US$100,000. The average cost for an EIA in Fiji, based on about 25 EIAs done over the last two years, is about US$10,000. In rare cases, such as open-pit mines and extensive baseline studies, other unusual requirements might push the cost of an EIA much higher. The cost of an EIA is seldom significant as a proportion of total development costs. However, it is an "upfront" cost that must be paid for in the planning stages. This can be a problem for a small developer.

Box 4

Example costs of EIAs

The following are approximate costs of EIAs conducted in Fiji between 1990 and 1992, in 1992 US Dollars:

Savu Savu marina	$11,000
Vuda marina	$11,000
Vatuele resort	$ 4,000
Tavua tailing disposal	$35,000
Valani resort	$14,000
Forestry concession	$75,000
Korotoga highway bypass	$20,000

How long does an EIA take to do?

Again, based on the Fiji experience to date, an average-sized EIA for a modest project (e.g. for developing a marina) takes about two months to complete. A larger EIA, such as the EIA for the Denarau resort project in Fiji, takes from six months to one year.

Who does the EIA?

The most common method of completing an EIA is by using consultants. The key reason for using consultants instead of government staff is that the cost, time of delivery, and terms of reference of the EIA can be tightly controlled, and the performance monitored. At present most consultants will be from overseas, and it is important that each country nurtures its own local expertise to take on more of this work.

How is bias controlled?

Since most EIAs are done by consultants hired by the proponent, there is the danger of a pro-development bias in the EIA. This raises questions about the reliability and objectivity of the EIA. However, experience shows that as long as the EIA process is open to public scrutiny, most studies are carried out in a reasonable manner, and any remaining bias can be dealt with in the review process. In general, consultants fear for their reputation, and will not let developers influence their opinions too severely. Furthermore, most developers have some self-interest in avoiding environmental damage, even if only for liability reasons. Where expertise is available within government, one option for minimising bias is for the developer to pay for the consultant and the government oversees the study.

How often is a project cancelled because of EIA findings?

Internationally, it is rare to cancel a project because of an EIA report. Usually, bad projects are screened out at the earlier stages of the EIA process, and the proponent is told that the project is unlikely to survive. However, there are examples of project cancellations (see Box 5 below). Usually, EIAs result in changes to a proposed development to minimize environmental effects. As long as the EIA is done before planning has gone too far, changes can be very cheap and cost-effective. The later the EIA is done, the more clumsy and ineffective the whole procedure becomes.

Box 5

Emperor Gold Mines in Fiji investigated using a coastal area for tailings disposal, as a way of reclaiming land for subsequent agricultural use. An Environmental Impact Assessment carried out for the company by consultants established that the environmental controls required to make the tailings safe for agriculture made the project uneconomic, and the proposal was dropped.

PLATE 5: Forestry projects need careful design, if long term damage to local communities and ecosystems is to be avoided. EIA is an essential tool in that design process.

(SPREP)

PRACTICAL ASPECTS OF EIA

In this part of the Guide, some practical issues of setting up and using EIA procedures are discussed. The first section looks at setting up national procedures, followed in the next section by a brief description of the actual EIA process. This sets the scene for the section on the role of the Environmental Unit in the EIA process. Finally, some recurring environmental issues often encountered in South Pacific EIA studies, are outlined, before a brief comment on the factors that are necessary for EIA to be used successfully.

PLATE 6: The pressure to convert rural land uses to .....

PLATE 7: .....urban land uses leads not only to change in the natural environment. Just as important are the changes that occur in the local community as rural lifestyles are replaced by more urban ones. Social impact assessment addresses these changes and seeks ways of reducing the social costs of development.

Establishing the EIA process

The present situation

Most of the countries in the SPREP region do not have formal EIA procedures. However, much is happening without formal legislation. Fiji has only guidelines, but they have been surprisingly effective. Over the last two years, there have been about 25 EIAs of development projects in Fiji—mostly resorts and marinas, but also a government irrigation project, a Ports Authority reclamation, a fish cannery expansion, and a proposed mine. This compares favourably with the Philippines, where there is comprehensive legislation, but only 58 projects have undergone EIA in eight years, out of 3853 projects which were submitted.

Establishing a formal process

To establish a formal EIA process, two administration levels are required. First, an Environment Unit is needed to carry out the government functions of screening, scoping, reviewing, and enforcing EIAs. In many countries in the South Pacific, these units now exist with a staff of one to three people. The Environment Unit can be located in a number of different departments, such as Town and Country Planning, or Fisheries and Forestry. One full-time person should be able to handle the various EIA functions required of government for a population of 500,000. A larger population would require a second officer.

A second more, senior body to the Environment Unit is required with the authority to set policy and make decisions about controversial projects. The senior body needs authority over other departments, to require them to adhere to EIA policies. The type of structure needed is an Environment Commission made up of permanent secretaries or ministers from the major departments that influence the environment, such as Public Works, Primary Industries, Health, Tourism, and Energy, and serviced by a secretariat. This council would meet perhaps four times a year and deal with setting policy, and with deciding on whether certain major, controversial projects should proceed.

Finally, each government department concerned with natural resources and therefore the environment, which is most of them, should appoint a middle management person to ensure that the projects initiated by that

department follow EIA procedures, in both their own internal procedures and the national EIA procedures.

Getting started

The most important part of establishing an EIA process is to make a start, even a modest one. For instance, Cabinet might issue guidelines to ensure that each development proposal is accompanied by an EIA. The Cook Islands use a very simple project approval process that includes EIA. The process simply requires that any project brought to the Island Council must have an EIA dealing with the environmental and social effects of the project.

EIAs do not have to be elaborate, and do not necessarily need experts. If the project is small and has limited effects, then it does not need an extensive EIA—but an EIA should still be required. The simplest rule is that all projects need EIAs: for projects with very limited impacts, only a couple of pages considering environmental and social effects is required.

PLATE 8: EIAs of mining proposals should include proposals to rehabilitate land and return it to a natural or productive state, avoiding the worse effects of past mining projects, such as this old nickel mine.

The main steps in an EIA

The five main steps in an EIA are now briefly described. The steps are summarised in Figure 1 which emphasises that the success of an EIA depends on decisions made at a number of stages during the process. The following discussion mainly relates to project assessment, but assessing policies and plans would follow similar steps.

This is an overview of the whole process. Later sections of the booklet discuss specific aspects in more detail.

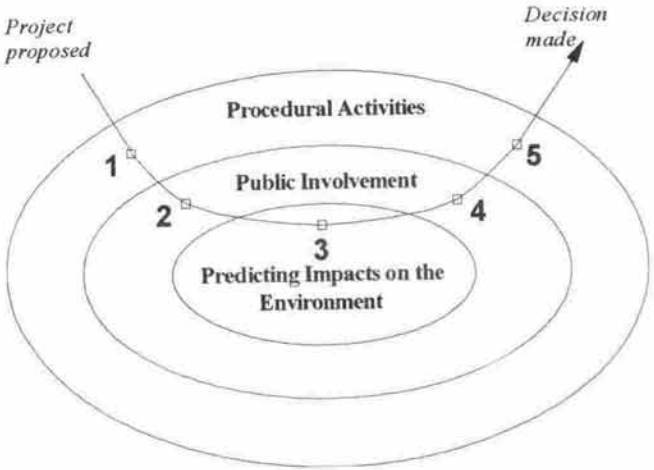

Figure 1. The main steps in the EIA process

1. Starting the EIA process

- When a project is proposed, many questions arise in relation to the environmental assessment of the proposal: Which government agency is responsible for considering the proposal for approval? Is an EIA required? Who will carry it out? How much time is required, for both the study and the approval process?

- The brief for the EIA study is decided---the Environmental Unit would normally help with this. Specific responsibility for the study could be given to an in-house team or to consultants.

- The EIA team is set up, with decisions made on personnel, available resources, and so on. A preliminary assessment is carried out and the overall EIA approach is devised, identifying information needs and the broad boundaries of the problem.

2. Going public: the scoping process

- The EIA team consults members of the public, and agencies and organisations, with a particular interest in the area. The preliminary assessment of the likely scope and main topics for the study is presented and comments and reactions invited, especially about aspects of special significance for local and regional communities. The team invites and considers suggestions for other topics to include in the EIA study.

3. Undertake specific predictive work

- More detailed work is carried out, structuring the assessment and focusing studies on key aspects; the team designs appropriate studies, and implements them. Activities might include data collection and analysis, use of experiments and/or models, interviews, or social observation.

- From these activities come clear statements about the likely changes to environmental systems due to the proposed actions, with estimates of the severity, and the probability of occurrence, of the predicted effects.

4. Assessing social significance of predicted changes.

- The predicted effects are discussed with the local communities, and with other interested parties, to determine the social significance of the possible changes. Material must be provided to explain any scientific/technical detail; the findings should be presented in summary form, but with reference to more detailed sources for interested individuals or groups to follow up.

- The consultation can take variety of forms, such as public meetings open to all community members or meetings with key individuals in the local communities. The results of the consultations form part of the final report on the environmental impacts, providing a social perspective on the identified impacts.

5. Reporting to the decision-makers and the public, and subsequent activities.

- The information on likely impacts and the public evaluation of that information is provided to the decision-makers, the project proposers, and the public. The form of communication is important—it must be appropriate to the audience. The information can be reported in a number of ways, but usually one or more technical reports are produced, containing the detailed information about the studies. These reports should always be accompanied by a short report in which the main findings are summarised with reference to the more detailed technical reports for interested people to follow up. Explanatory material should be provided for any unavoidable scientific and technical detail.

- Public presentations of the main findings (e.g. display material, newspaper ads and public meetings) can be effective for an EIA of a major project.

- The adequacy of the EIA, especially of the information produced, should be assessed by the Environmental Unit or an independent group. The results of that assessment should be made available to the public, not just to the decision-makers.

- Impact information can be used to improve the proposal, inform the decision-makers, provide the basis for setting conditions on the operation of the project, identify ways of mitigating unavoidable effects on the environment, and perhaps assist in establishing financial bonds.

- When the decision is made by the responsible agency, it should be explained to the public in the context of the EIA findings.

- A programme for monitoring the environment during the construction and operation of the project should be established.

Decisions would be needed on the key indicators to monitor, frequency of reporting to the responsible agency, and allocation of responsibility for, and costs of, the monitoring programme.

Typical contents of an environmental impact report (or statement) are described in Annex 2.

PLATE 9: Water quality is of great importance, for the health and welfare of local people and for important natural resources, especially food supplies. Proposed developments must be assessed for their potential to affect water quality.

(SPREP)

The role of the Environment Unit in EIA

Most of the island governments of the South Pacific have now established an Environment Unit. This unit would normally be responsible for most government activity surrounding the management of EIAs. The role of the Environment Unit in the EIA process is to:

- screen projects to decide if an EIA is necessary;
- assist in scoping the EIA;
- review the completed EIA and make recommendations to minimize environmental effects; and,
- monitor/enforce any environmental requirements resulting from the EIA.

Before looking at these each of these functions, a few general comments can be made about the Environmental Unit. The role of the Environment Unit staff is to ensure that the required steps in the EIA process are followed. Perhaps more importantly, the Unit should also ensure that each EIA study is the best possible. The impact assessors must be encouraged to carry out the study according to the underlying principles of EIA, many of which are not written down in legislation or guidelines.

Consequently, the EIA Officer should sit down with the EIA team and develop an agreed brief for the EIA study, covering issues such as a timetable for the overall approval process, the likely scope of the EIA study, and how the information will be reported to the decision-making bodies and the public. They may also need to persuade and encourage the assessment team to consult local communities, and to listen and respond to their opinions. They should be willing to provide specific advice on issues such as local information sources, the availability of local specialists with the necessary expertise to work on aspects of the study, and how best to approach the local community.

Overall, Environment Unit staff involved with an EIA ensure compliance with EIA procedures and also help the EIA team achieve the best possible assessment of the environmental effects of a proposal. Therefore, they should not think of themselves as "policing" the EIA process but rather as facilitating it.

Screening

Some countries try to specify in legislation when an EIA is required and when it is not. This can lead to problems. For instance, one South Pacific country requires that all proposed hotels larger than 80 rooms must undergo an EIA. This has led to a proliferation of 79-room hotels. On the other hand, if the decision is left to a person at the Environment Unit, that person will be under much pressure to grant waivers. For example, in the Philippines, which has a comprehensive but burdensome EIA procedure, 3853 projects were submitted to the Environmental Management Bureau, but only 58 needed to submit EIAs. The best solution is to require that all projects need EIAs, but to expect only small EIAs for small projects. Of course, routine projects like road maintenance would not require an EIA, nor would routine building applications in areas covered by building and zoning regulations. But all projects larger than these should be subject to an EIA: it is a good management tool.

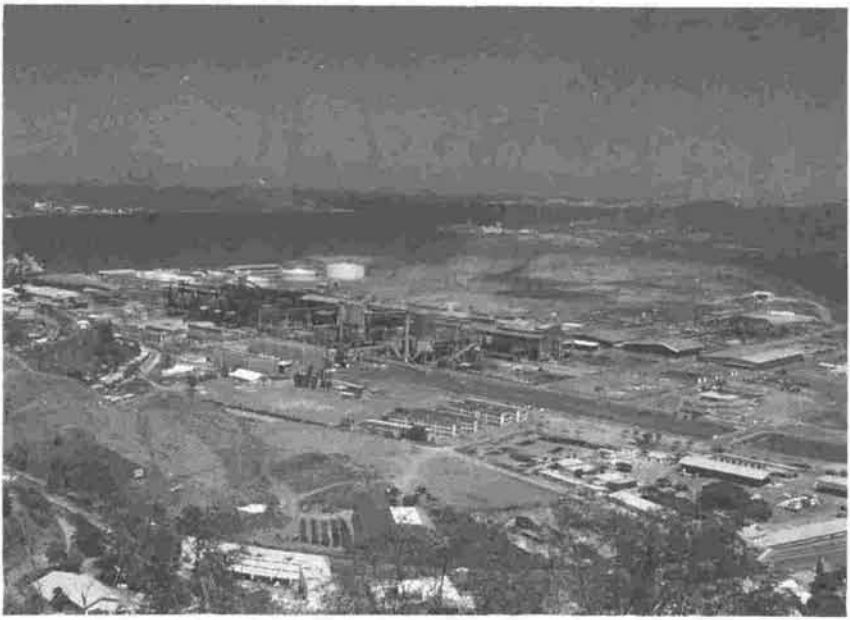

PLATE 10: The Pacific islands are not heavily industrialized, but where industry does occur it is often an important feature of the local environment. Industry is often located in coastal areas, and proposals for new industrial activities need to examine possible marine effects, as well as land, air, social and other effects.

Scoping

Assume that the Public Works Department (PWD) in Vanuatu wants to dredge a small river on Santos Island to make a safe dock for fishing boats. The Department decides to "do the right thing" and carry out an EIA on the project proposal. However, they are uncertain about what they should study in the EIA, so the PWD engineer approaches the Environment Unit to ask for advice. The answer to the PWD's question about "what is required" is called **scoping**. The EIA officer works with the PWD to develop a brief for the EIA.

Since the EIA officer cannot be an expert on all the possible EIAs needing scoping, the officer has to have some help. The best place to start is with a basic checklist of environmental concerns for the project type being assessed. The most commonly used book is the Asian Development Bank book on environmental guidelines for its project officers. This checklist is a good starting point, but must be adapted to the local situation.

The next step is to visit the site with the PWD engineer in charge of the project and with the PWD staff working on the EIA. The EIA officer might spend half a day at the site, with the engineer explaining where the dredging will take place, where the dredge spoil will go, where the docks will be built, and so on. The EIA Officer should probe the engineer continually about why the site was chosen, what alternatives were considered, who wants the prokect, and so on. This information on reasons and alternative sites will be important if there are problems with the present site.

After getting to know the project, the EIA officer and the PWD EIA staff should spend the second half of the day meeting the local people. First, the people in the nearby villages, to get their opinions of the project; second, the local fishermen who will be using the new dock. At the end of one day spent in this way, the EIA Officer will have a pretty good idea of the site, the project, and the problems. The PWD staff working on the EIA and the EIA Officer consult the Asian Development Bank checklist and turn it into an appropriate list for the specific site and project. This list might be circulated through other government departments and local NGOs for comments and suggestions and modified if necessary. The EIA is now "scoped". However, this should be seen as a "minimum" requirement for the EIA study. Once the EIA team has started to examine things more closely, it may be necessary to include other aspects not previously identified.

Box 6

Getting into the routine of scoping EIAs

Given the size of the Vanuatu economy, the Environment Unit would probably recieve about one EIA scoping request per month if every prokect in Vanuatu was referred to them. As time goes on, the Unit will inevitably notice that similar concerns re-occur and the whole process will be easier and more routine.

Reviewing

The EIA team carries out the assessment of a project and the likely environmental consequences, and usually prepare a report, or a series of reports, on the findings. The Environment Unit is responsible for examining the results of the EIA study to ensure it is thorough. The first step in reviewing an EIA is to compare the report with the requirements made during the scoping process, and with the general outline of an EIA described in Annex 2. In so doing, the following questions should be asked:

- Did the EIA follow the agreed brief set out by the Environment Unit after scoping?
- Are there obvious gaps in the coverage of the study now that the EIA is completed (did the scoping miss issues which should have been included)?
- What evidence is there that affected people were consulted?
- Are social impacts included?
- Are long and short term effects considered?
- Are direct *and* indirect effects considered?
- Are clear and sound predictions made about possible impacts, and their severity?
- Does the EIA identify beneficial effects, as well as adverse effects?
- Are there suggestions for mitigating adverse effects? Are alternative methods, sites, disposal methods, etc., considered and evaluated?

- Is there a proposed monitoring programme and have key indicator variables been identified for the monitoring programme?
- Is there evidence of bias in the handling of the conclusions?
- Can members of the local community understand the information?
- Is technical information easily available to those wishing to follow up on specific points?
- Is there a clear and concise summary outlining potential effects, both beneficial and adverse, on the environment?

For major developments, an important part of the review process is provided by the comments from the local community when the findings of the EIA study are circulated. This can either be through written submissions or through public meetings, where people can question the EIA team, the developer, and the government agency responsible for approving the project, about the impact assessment study. Public comments might lead to further work on matters of particular concern not covered in the original study.

From this review, the Environment Unit must decide if the EIA is satisfactory, and if the environmental effects are sufficiently controversial enough to send to the Environment Commission for a decision. If the project or the impacts are minor, then the Environment Unit can give the go-ahead, subject to any other approvals required by legislation.

Monitoring and enforcement

Monitoring and enforcement are difficult issues. For example, when the Tropic Wood Drasa sawmill in Fiji was built, the EIA stated that all of the waste wood would be used in the boiler for making electricity. However, someone was over-optimistic: five years after the construction was completed, there is an immense pile of waste wood which is continually on fire, growing everyday and which will be a major environmental liability by the time the plant reaches the end of its natural life. How can such non-compliance with the promises of an EIA be dealt with?

The solution is not easy. In part, the answer is that EIAs are not perfect, and sometimes the predictions are wrong. However, there are other more blatant examples where the promised construction practices are avoided or ignored. The first line of defence is for the government to monitor the

construction phase of the project. This can be done by an Environment Unit officer visiting the site from time to time and asking pointed questions related to the EIA, or it can be done by requiring the developer to fund a monitoring programme. An independent consultant, hired to monitor the project, can then report to the Environment Unit any incidents of non-compliance.

However, when non-compliance occurs, what can the Environment Unit do? The best solution is to have environmental legislation that defines penalties for non-compliance. One effective solution is to require the posting of an Environmental Bond at the outset of a project. These funds are then kept in trust by the Environment Unit, and are not released until all the environmental requirements have been satisfied.

Box 7

The Pacific Fishing Company (PAFCO) is a tuna cannery owned by the Fiji government in Levuka, Fiji. In 1990, after extensive negotiations, the Australian aid organization, AIDAB, agreed to provide $10 million to upgrade the cannery. However, AIDAB insisted that an EIA be completed for the development, paid for by PAFCO, before the proposed project could go ahead. The EIA identified several environmental concerns, including:

- an outfall to remove the wastes from the lagoon area to beyond the reef;
- reclamation of the quarry;
- leaving a strip of park beside the container yard.

These three concerns were dealt with in the project planning. A monitoring programme was established to check if the company maintained its commitments on these and other items. However, no enforcement mechanism was included to deal with non-compliance.

At the present time the construction is complete, but the outfall is not working (an engineering fault causes the pipeline to float to the surface); the quarry has not been reclaimed; and the park was created, but has died from lack of attention. This is a case where an environmental bond should have been required to ensure that the environmental work got finished as promised.

Conducting an EIA in the South Pacific

1. Issues in the natural environment

This guide does not give details on how to do an EIA, because the actual assessments are usually carried out by consultants. However, government officials should have some background in environmental matters to be able to scope, write terms of reference, and review EIAs effectively. Some issues recur in almost every EIA in the South Pacific, and some generalities can be made on these issues. This section will give certain basic environmental information about issues that will appear often in EIAs in the South Pacific.

Effects of sediment on coral reefs

Virtually every EIA in the South Pacific must make reference to the issue of sediment on coral reefs. This is because almost every project generates suspended sediment, at least during the construction phase, and countries in the region are surrounded by coral.

Projects as diverse as ginger farming, mining and reef dredging may result in sediment impacts on coral. Corals have a number of characteristics which make them sensitive to sediment, including:

- corals use their tentacles to feed on plankton, and sediment interferes with feeding, requiring the coral to expend energy clearing the sediment;
- corals are permanently attached and cannot avoid sediment exposure;
- free-floating coral larvae will only settle and attach to clean, sediment-free surfaces;
- corals also have algae growing as part of their structure and the algae aid coral growth by their photosynthesis; this process is reduced in turbid, sediment-laden water.

Some corals are more sensitive to sediment exposure than others. The coral's shape and the way it clears sediment determines this sensitivity. For example, plate- and cup-shaped corals trap sediment and are generally more sensitive than the branching staghorn corals. The coral surface and the

PLATE 11: Activities such as reef blasting can have a devastating effect on large areas of reef. Not only is the coral community severely damaged; so are the livelihoods of people dependent on these areas, such as fishermen and tourist operators.

(SPREP)

shape of the individual coral polyps (i.e. the individual building blocks of the coral) also influence sediment retention.

High sediment deposition smothers corals from the top down. Lower rates of deposition can also lead to smothering, this time from the bottom up. Long term exposure to sediment will kill all or part of the colony. Even if the exposure does not kill the coral directly, it will reduce coral growth as energy is diverted to clearing sediment. Sediment exposure has also led to coral "bleaching"—the loss of the algae. This has many effects, including slower growth and less deposition of the coral skeleton. Sedimentation rates of 50 to 100 mg of sediment per square cm per day will cause less species diversity and percent coral cover.

Sedimentation rates can be measured using tubes with a diameter of approx. 10 cm and a length at least four times the diameter. These tubes are then closed at one end and are either moored in the water column or positioned upright on the bottom. After several days, or weeks, depending on

the sedimentation rate, the tubes are retrieved and the sediment filtered, dried and weighed.

Effects of sediment on coral can be easily monitored by establishing permanent sites on the reef and measuring the percentage of live cover of coral. The *Coral Reef Monitoring Handbook* (SPC/UNEP, 1984) is a useful guide.

Box 8

Mitigating sedimentation

- Avoid soil erosion in the first place (see the following section).
- Revegetate denuded land quickly.
- Use temporary settling ponds for runoff from construction sites which cause sedimentation.
- Schedule soil disruption in the dry season and halt operations during storms.
- Use silt screens in open water and dykes on shallow reef flats when dredging in coral.

Soil erosion

Soil erosion is a common consequence of construction projects, agriculture and forestry, especially on steep slopes. High islands, with their water courses, steep slopes, and high rainfall are prone to soil erosion, even without the influence of man. However, poor landuse practice is the most common reason for soil erosion.

Soil erosion leads to poorer soil productivity and to sedimentation downstream. Annual soil losses from agricultural areas in Fiji is estimated to be between 10 and 170 t/ha. The higher erosion measurements correspond to a loss of about one centimetre of soil per year, and cannot be sustained without loss of productivity: the natural rate of soil formation is much lower than this. Some erosion is inevitable with agriculture and a general acceptable rate of loss is thought to be about 11 t/ha/yr.

Box 9

Mitigation of soil loss

- Farm with contour ploughing, and avoid steep slopes especially with crops such as ginger which involve much soil disruption. Use erosion control practices, such as planting vetiver grass, and terracing.
- Determine the erodibility of soils in areas to be logged, and map out especially sensitive areas. Avoid clear cutting steep slopes with high erosion potential. Site logging roads to minimise erosion and use erosion control practices. Plan logging to reduce movements of heavy machinery, and rehabilitate the logged site to control runoff.
- Use settling ponds or other means to control sediment runoff around construction projects involving earth movement or disturbance.

Mangrove reclamation

Mangroves are a group of tree species adapted to living on the boundary of the marine and terrestrial environments. They grow at different heights along the tidal zone, depending on species. The richest mangrove forests are found in estuaries and river deltas.

In Pacific Island countries, mangrove areas are often the only areas which can be developed for use as garbage tips, since they are the only areas of land not jealously guarded by traditional land ownership. The view that mangroves are a wasteland has changed as their ecological role has been understood and the value of traditional mangrove use appreciated.

Mangroves have many ecological values:

- The tangle of mangrove roots provide excellent shelter for juvenile fish species, many of which are food fish when adult. The percentage of commercial fish species associated with mangrove at some time in their life cycle ranges from 60% to 80%.
- Mangroves, especially those receiving nutrients from river waters, are very productive and provide organic matter through their leaf litter.

This supports a rich community of micro-organisms in the surrounding waters, which in turn provide food for the young fish living in the mangroves.

- Established mangroves stabilise shorelines and help defend shorelines during storms. Mangroves slow water movement, aiding in sediment deposition and reducing sedimentation of reefs.

- Mangroves provide habitats for numerous wildlife species, from birds to molluscs and fish. They also provide construction materials, fuel, medicines, tannins, food, and dyes.

In 1990, a PhD thesis produced an economic analysis of mangroves reclaimed in agricultural schemes in Fiji. It was found that the economic value of a natural, unreclaimed mangrove was about F$2,900/ha/yr, of which $2,700 was attributed to its value to "off-site" fisheries and $200 to its value for "on-site" forestry uses. Other valuations have produced figures of F$1550/ha/yr for mangroves in Puerto Rico, and F$1980/ha/yr for Moreton Bay, Australia. These figures emphasise the need to recognise the

PLATE 12: The result of bad land use practices over wide areas of a country are seen in the river estuaries: extensive banks of silt from eroding land surfaces, which alter the nature of the estuary, affecting navigation, fish nurseries, mangroves and so on. The silt also finds its way into coral reefs, damaging those valuable and productive ecosystems.

economic importance of mangroves in their natural state, as well as their ecological and conservation values.

Sewage and industrial effluent

Disposing of sewage and industrial effluent is a perennial problem for humanity, both within and beyond the South Pacific region. In EIAs dealing with effluent, it is important to distinguish between "organic" effluent (sewage, plant and animal waste) and industrial effluent (such as zinc from galvanizing plants, and lead from a battery manufacturing facility)

Organic effluent

Organic effluents (such as sewage, fish wastes, slaughterhouse wastes, and food processing wastes) act as fertilizers in aquatic systems, and they are not intrinsically harmful. However, too much effluent, such as in American Samoa where two tuna canneries discharge into Pago Pago harbour, can change the ecosystem, for instance stimulating algal growth at the expense of coral growth. With very severe nutrient enrichment, so much algal growth occurs that the dissolved oxygen in the water is used up by decaying algae. The result is an ecological catastrophe: nearly everything will die if oxygen is depleted. For organic effluent, the EIA should consider:

Dilution

Can the receiving waters (stream, river, or bay) cope with the additional nutrient load from the proposed project? This discussion inevitably leads to the amount of dilution that can be expected. In a river or stream, the volume of flow controls the amount of dilution. In a marine discharge, the amount of flushing controls the dilution. The flushing rate of a bay can be determined from the tidal range and the water currents through the passes in the reef. If there is insufficient dilution to reduce the nutrient loading to near background levels within a few hundred meters of the outfall, then sewage treatment is needed to reduce the nutrients and organic loading.

Bacterial contamination

Wastes affect the bacterial counts in the river or bay. Organic wastes in general, and sewage wastes in particular, cause higher bacterial counts that can cause the spread of water-borne diseases such as cholera. Bacteria survive for much longer in warm tropical waters than

in temperate waters. The EIA must address the expected effects of the proposed development's effluent on bacterial levels in the receiving water, and the possible effects of these bacterial levels on other users of the water. If bacterial levels are likely to be a problem, then they must be reduced by treating waste with chlorine or ultraviolet radiation.

Industrial effluent

The EIA for a proposed development that has industrial effluent should describe the average chemical content of the waste, and the average and peak volumes. The environmental impact of industrial waste is complex, since there are so many possible contaminants. Once released into the environment, toxic chemicals follow a variety of pathways, depending on their chemical characteristics. One path of particular concern is concentration up the food chain, as happens with the insecticide DDT. There is now a *Handbook of Ecological Parameters and Ecotoxicology*, by Sven Jorgensen (see the reference list at the end of the Guide) that allows an EIA practitioner to obtain information easily on the pathways that each chemical will take in the environment, and on its approximate toxicity to humans and to other organisms.

An EIA dealing with industrial wastes should comment on the state of knowledge about the particular industrial effluent under consideration, and review the known hazards to humans and to aquatic life. However, since most industrial effluents are similar around the world, it is not necessary to be involved in original research: that is not normally the role of EIA. The EIA should instead deal with how the industrial effluent compares in quality and quantity with industrial standards in other parts of the world, and how the proposed effluent treatment compares with situations elsewhere. The EIA should also explain how the effluent will meet the country's effluent treatment requirements now and in the foreseeable future.

Cyclones and storm surges

Much of the population of the South Pacific lives on the coast, within a few meters of sea level. The coastal zone is often the main area of flat land in many countries and so there is often a concentration of development in this area. The coastal zone is also very vulnerable to certain natural hazards, including cyclones and storm surges. Consequently, projects in this zone must be designed and constructed with these potential dangers in mind.

Most EIAs in this region have a section dealing with the issue of cyclones and storm surges, even though it is not technically an environmental effect of the project. The reason is that if the development is damaged or destroyed by a natural hazard, this damage might then cause important environmental problems: for instance, the release of toxic chemicals into waterways.

These issues are part of the process of **risk assessment**, an important part of many EIA studies. Risk assessment asks "what will happen to the environment (including workers and the local community) if an accident occurs with the project?" The cause of the accident might be a natural hazard such as a cyclone, or it might be due to human negligence. Risk assessment tries to assess how vulnerable a project is to this disruption, and then to determine the likely consequences for the local environment of such catastrophes.

Cyclones tend to start in areas ranging from 10 to 17°S in latitude, over water of at least 27°C. They then move in a broadly southerly direction, losing strength when they reach cooler southern waters. Cyclones are more common in the western South Pacific, with Vanuatu, New Caledonia, and Fiji averaging more cyclones than Tonga and the Cook Islands. Cyclones seldom occur north of 10°S. Tropical cyclones are classed on a scale of mild (1) to catastrophic (5), and the scale is related approximately to storm surge and other physical measurements (see the table below).

Cyclone Scale	Pressure (millibar)	Wind speed (knots)	Surge max (m)
1. Mild	>990	40-60	0.0-1.0
2. Moderate	970-985	79-90	1.5-2.5
3. Severe	950-965	100-120	3.0-4.0
4. Very severe	930-945	130-150	4.5-5.5

Apart from the wind, the most destructive element of cyclones is the resulting storm surge. Low barometric pressure in the centre of a cyclone results in a rise in sea level of about 1 cm for every millibar of pressure drop below 990 millibars. In a severe cyclone, this results in a rise of over 50 cm in sea level. Further increases are caused by wind stress, and wave action,with the total increase in sea level reaching as high as several meters in the most severe cyclones.

2. Effects on people

Social impact assessment looks at the direct effects that the development will have on people, their lives and their livelihoods, and their culture and is at least as important as the biological and physical impact assessment reviewed in the previous section. It attempts to answer the question: *who will benefit, and who will suffer from this development?*

Box 10

Some common social concerns in the South Pacific

These are some of the issues that commonly cause concern to local people when development projects are being planned.

- Land use change; loss of traditional land.
- Permanent population changes:
  - -influx of people of different age, sex, culture, and race
  - -contribution of project to urban drift of rural peoples.
- Employment changes; influx of temporary workers.
- Health effects; health services.
- Housing.
- Improvement of, stress upon, existing infrastructure.
- Disruption of daily patterns of movement.
- Cultural change; religious beliefs.
- Family dislocation.
- Alteration of social structure:
  - - creation of economic inequities or a new social class.
- Opportunities for training, developing new skills.
- Effects on educational opportunities for children.

There are, of course, many other issues that might arise in particular situations, but these indicate the kinds of topics that often need looking at in social impact assessments.

The following steps are involved in studying the social concerns listed above:

- Establish which concerns apply to the development. This is often best achieved through a process of consultation with the potentially affected community.

- Develop a list of information that is required for each concern including social baseline information and project data.
- Develop predictions of the effect that project implementation will have on each relevant concern.
- Develop measures to minimise adverse effects and maximise beneficial effects.
- Through community consultation obtain opinions on the impacts and the proposed mitigating measures.

Data for social impact assessment can come from sources such as prokect information; census and other demographic data; data on resource use; and information on infrastructure and utilities. However, the most important source of information is community consultation.

PLATE 13: Ultimately all EIAs are about people and the values they wish to protect. So all assessments have to involve members of the local communities most likely to be affected by a proposed development. Assessing social significance can not be left to the impact assessors or bureaucrats.

Community consultation

Community consultation is an essential part of social impact assessment. It can play an important role in determining the outcome of a development proposal and in minimising conflict with the community. By taking community concerns into consideration in the early stages of project planning it is possible to address issues by either providing accurate information to the community and/or by implementing appropriate measures to minimise impacts. The main objectives of community consultation are:

- to inform the public fully about the development proposal before it is approved and correct misunderstandings;
- to obtain opinions from the public on the proposed development;
- to use the information from the community to minimise the negative social impacts of the project

Conducting community consultations

The first step in a community consultation programmes is to identify who will be affected by the proposal. This is not as easy as it sounds, since a development may affect many people in different ways: Box 10 above will help with this problem.

The next step is to work out how best to consult the people who will be affected. The aim of community consultation is not just to explain the development: it is also to obtain opinions about the development. The best means of obtaining opinions from people has to be thought out carefully, particularly in traditional communities where the chief's role has to be considered, and the various other traditional roles understood. There is the problem of language, of the race of the questioner, of the inability of the people concerned to be able to read or to understand maps and plans. A traditional people, who have never travelled or seen development before, may need to be taken to see a development so they can understand what will happen when the development begins. Whatever the difficulties, any information flow between the developer and the community is better than no information.

The advantages of public consultation

From the point of view of the developer, there are numerous examples of the problems that developers get into if public consultation is not carried out. Vandalism, roadblocks, and even violence, can result if a community feels a

development has gone ahead without its approval. Some examples from the South Pacific are:

- Denarau Island tourist development: roadblocks over fishing rights
- PAFCO fishing company: lawsuit over fishing rights
- Vanuatu logging operation: permits cancelled due to local protests
- Vanuatu Malacoula mine: theft of equipment caused the company to leave
- Bougainville mine: civil disruption

From the point of view of the public, the advantages of public consultation are clear. The people affected by a development get accurate information, and they get a chance to express their opinions on the development. Direct consultation with the people affected is most likely to produce development that is of overall benefit to everyone concerned. Some developers have a basic distrust of public consultation, seeing it as a way that potential objectors can slow down a project. However, experience shows that the majority of people will appreciate an honest effort to seek their concerns at an early stage. It is important that the person organising the public consultation understands the local language and culture, and clearly explains the nature of the proposed development. If a project is not well described or well understood, then the result can be more misunderstanding instead of less.

Box 11

Some ways of consulting with people affected by a development:

- Invite village leaders to see a similar development elsewhere, and to talk to people affected by that development.
- Show videos of similar development elsewhere.
- Spend time with village men during social periods.
- Meet with womens' groups.
- Use the church and its leaders.

Conclusion: making EIA work

Political commitment

It was suggested a little earlier that legislation alone does not guarantee good EIA by impact assessors. This is because legislation cannot contain all the necessary directions that would ensure good impact assessments. The process is dependent on the people carrying out EIA being committed to the spirit and purpose of the process. This is obviously true of the people administering the EIA process in a given country. Less obvious, but perhaps even more important, EIA needs political commitment. If the national political system does not support EIA, then it quickly loses potency: proposals begin to side-step the requirements under special arrangements, the bureaucracy are not given sufficient resources to operate the system, and so on. It is critical that the political system is committed to the cause of EIA for it to be effective.

Involving the community

There is a danger that technically skilled people set themselves up as representatives of the local populations, perhaps believing that the issues involved are too technical for less educated people to cope with. This leads to a technocratic approach to EIA and is not desirable. A fundamental part of the EIA process is to incorporate social values, as a means of distinguishing socially acceptable changes to the environment from socially (and politically) unacceptable changes. It is critical that the populations likely to be affected by a proposal should have the opportunity to express their value judgements, and to have their evaluation of the possible changes considered by the decision-makers. Making these judgements on their behalf only leads to resentment and distrust of the EIA process, and of the whole decision-making process. Moreover, major developments rely heavily on the good-will of local communities, often in intangible ways such as maintaining good worker relations to keep productivity high. It is always in the interest of the developer to deal sympathetically with local communities, and thereby retain their good-will and support for the proposal.

Therefore, public involvement in the EIA process is vital. Where technical issues are complex, time must be spent spelling out the implications for the environment of particular actions, through meetings, school visits,

visual displays, and so on. The major contribution of the local communities is in defining the trade-offs they are prepared to make between environmental change and increased access to jobs, money, health facilities, and so on.

Training

The management of EIA requires people with specific skills: an understanding of the EIA process, a broad understanding of national biophysical and socio-economic systems, and good problem-solving skills. They need to be trained to tackle EIA studies in an effective and efficient manner, to produce substantive conclusions about the possible environmental effects of a proposal.

In most South Pacific countries, one or two persons in the Environment Unit would be needed to deal with the government's role in the EIA process. More people are needed in private enterprise, with expertise in various fields, to act as consultants when the need arises, and actually to conduct the EIAs. Another group is also needed: this group is made up of those people, one in each government department, who handle the proposals undertaken by their department. So, in most South Pacific countries, there will need to be *at least* 12 to 15 people knowledgeable about EIA to operate an effective EIA process.

SPREP is working on behalf of member countries to meet this training need. Initially, key personnel in government agencies and NGOs are being trained in EIA, and it is anticipated that these people will, in the future, be able to pass their knowledge on to others in their organisations. More workshops will be held to develop the practical skills for those actually doing the environmental studies and impact predictions. It is important that as many people as possible who deal with resource development issues are familiar with the spirit and purpose of EIA, as soon as possible. It will be a major mechanism for managing our use of the environment into the foreseeable future.

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Annex 1

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Environmental Impact of the Bua Irrigation Project Institute of Natural Resources, University of South Pacific, for Drainage and Irrigation Department Ministry of Primary Industries, October 1990. 106 pp.

Environmental Impact of the Extension of the PAFCO Cannery Institute of Natural Resources, University of South Pacific, for the Pacific Fishing Company, Levuka. August, 1990. 45 pp.

An Environmental Impact Assessment of the Marina at Vunda Point Environmental Consultants (Fiji) Ltd., for Pacific Marine Yacht Consultants, Suva. June, 1991. 85 pp.

Environmental Impact Assessment of a Proposal to Establish an Integrated Sawmill/Chipmill Complex at Drasa, Western Viti Levu, Fiji. Cawthron Technical Group, Nelson, New Zealand, for Fiji Pine Commission and BP South-West Pacific Ltd. Joint Venture. 188 pp.

Environmental Impact Assessment of the Korotogo Bypass Proposal. Environmental Consultants (Fiji) Ltd. for Ministry of Infrastructure and Public Utilities.

Environmental Impact Assessment of the Navau and Navautulevu Forestry Concession FAO (Rome), for Fiji Forest Industries/Government of Fiji

Environmental Impact Assessment of the Laucala Bay Sewage Outfall for AIDAB

The Potential Impacts of a Namosi Copper Mine: A Case Study of Assimilation Planning. Centre of Applied Studies in Development, University of South Pacific, Suva, Fiji 1982.

Environmental Impact Statement - Tailings Pretreatment (Revised to Include Toko NW Tailing Dam) Lyco Resources Ltd., for Fiji Tailings Retreatment Joint Venture, 1991.

Western Samoa

Afulilo Hydroelectric Power Project Environmental Impact Assessment . South Pacific Regional Environment Programme and Department of Conservation New Zealand. December 1991. 83 pp.

Annex 2

Contents of an EIA

EIAs often follow a similar format. The main sections that tend to occur in EIAs of South Pacific development proposals are outlined below. It is important to remember that these topics are not intended to be a framework for an EIA study: that should be developed carefully, as described earlier in the booklet. The topics described below indicate what information from the EIA study should go in the final report.

Description of the project

The first section of the EIA should summarize the nature of the project that is being proposed, including the following:

- The management structure of the project: who is in charge (the developer), who is the engineering consultant, the names of other consultants. The projected time scale for the development: what approvals have been obtained, when construction would start, when it would be completed.
- A map showing the location of the project and drawings showing what is proposed. A discussion of the construction methods, and the resources that will be required during construction (number of labourers and trucks, amount of top soil, etc.).
- A summary of the resources to be used once the project is operational, waste produced, alteration of land use required, amount of product to be produced, transportation arrangements, and other logistical information having implications for environmental impacts.

Description of the environment

This section describes the environment before the impact of the project:

- Climate in the area (including the incidence of cyclones and other extreme events).
- Landuse (agricultural, industrial, unused, etc.).
- Foreshore description (including information on waves).

- Biological information (flora and fauna on the land and in the inshore zone, including special or unique species).
- Social information (who owns the land, nearby villages, local customs and type of work, main sources of income).
- Cultural heritage (any historical or culturally significant features about the proposed site).

Resources required by the project

An examination of the necessary resources, and where they will come from. This section needs to be divided into two sections: the resources required during the construction project, and the resources required during the normal operation of the development. The resources required for normal operation need to be examined for their "sustainability".

Effects on other users of the resources

The purpose is to examine if the resources to be used by the project will deplete resources that other users depend upon. For example, a resort on an atoll might use too much water from the groundwater lens, and cause a water shortage for everyone. A cement plant might require sand resources that are already in high demand for existing construction activities.

Sustainability

This is were the sustainability of the project needs to be discussed. How long can the resources be expected to last? How long can the project be expected to function? If the project is fisheries or forestry related, are the fishing or logging methods sustainable, or will they exhaust the resource?

Waste produced by the project

Water pollution:

A summary of the type and quantity of effluent to be produced, the effluent treatment to be installed, and where the effluent will go. A discussion of the effect this waste will have on the receiving water quality. This section can be technical. See the section on *Conducting EIAs* for more guidance on what to expect in an EIA concerning water pollution.

Air pollution:

A description of any air pollution that will be produced. Air pollution can be divided into broad categories: smell (fish plants), smoke (coal burning), dust (cement plants), toxic gases (industrial processes), and exhaust fumes (diesel generators). Air pollution is not a widespread problem in the South Pacific. The region arguably has the best air quality in the world, but air pollution can be a localized problem. For example, the Lami cement plant near Suva has been the subject of complaints for ten years because of the dust it generates, which settles on nearby houses, cars, gardens, etc. The buses in Suva, Fiji, generate clouds of diesel smoke that make the roads black with soot during rush hour.

Solid waste:

A summary of the garbage and other solid or hazardous waste that will be produced. How will it be handled, and where will it go? If it is to go in the municipal tip, how much will it add to the waste disposal problems of the municipality? In nearly every country in the South Pacific region, solid waste is disposal is a problem. Municipal tips are usually underfunded and overworked. Any development should be appropriately taxed or levied to cover the real costs of solid waste disposal.

Changes in land use

Most development projects require a change in land use. This section should describe how much land will be affected by the project, in both the construction and operational phases. In the South Pacific there is much less crown land than in most other countries, and landowners jealously guard their rights. Often there is a separate mechanism for dealing with land rights, leases, etc. (In Fiji, this is done through the Native Lands Trust Board). If this is so, the EIA can be very brief in this section. Nevertheless, the EIA should state the land use change that will occur, and the approval steps that have or will be taken to get approval from the landowners.

Changes in foreshore uses

Because of the island nature of South Pacific countries, projects often involve construction on the foreshore. Many countries have mechanisms in place to deal with loss of fishing rights. If this is so, then the EIA need only

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be very brief in this section, but a description of the foreshore changes and the status of the required permit must be included.

Social effects

The key question that this section must answer is "who will benefit and by how much; and who will suffer, and by how much?" The discrepancies between who benefits and who suffers are where problems begin.

Box A2.1

Social effects of the Bougainville mine

The Bougainville mine generated enormous wealth, providing about 30% of the tax revenue of the government of Papua New Guinea. However, the distribution of benefits from the mine did not offset the negative effects for many local people. The mine became the focus of discontent, leading eventually to civil war. A skillfully performed social impact assessment, with more careful attention to the flow of benefits from the mine might have prevented this social and economic calamity.

Theoretical calculation of who will benefit and who will suffer is not good enough. Consultation is required. It is not enough to talk with landowners, chiefs or District Officers. All groups likely to be effected deserve the right to be informed and offer opinions in a meaningful way. This includes Non-Governmental Organizations (NGOs). The World Bank, after decades of ignoring inconsequential people and NGOs, and paying for it later in environmental catastrophes, now requires EIAs with hard evidence of who in the community has been consulted.

Cost-benefit analysis:

Sometimes a cost-benefit economic analysis is included in an EIA. The cost-benefit analysis attempts to put a price on the social costs associated with the project, and the social benefits. This technique can be very useful, but it is difficult to calculate the economic cost of something like river pollution. An EIA officer should be wary of the issues that were omitted or undervalued in a cost-benefit analysis.

Box A2.2

Cost-benefit analysis of reclaiming mangrove:

In a much quoted analysis of the wisdom of reclaiming mangrove for rice paddies at the Dreketi rice growing area on Vanua Levu, Fiji, Ms. Lal of the East-West Center, Hawaii, estimated the value of hectare of mangrove at F$2900 /year of which F$2700 was attributed to the "off-site" fisheries, and F$200 to the "on-site" forestry values. Since most of the reclaimed land was too saline for effective rice production, Ms. Lal's conclusion is that the land was more valuable left as mangrove, than as marginal rice paddies.

Global environmental problems

Global environmental problems such as ozone depletion, climate change, acid rain and so on are now more evident. It is now common to put brief sections in EIAs discussing the relationship of the project to these problems, and to international obligations that the country has undertaken. In South Pacific EIAs, acid rain and ozone depletion are seldom mentioned, since they are not problems as yet in the region. However, there is frequently a paragraph on climate change, dealing with the issue of sea level rise, which is commonly estimated at about 1meter over the next 100 years. This section points out that the development should be sited to avoid flooding by foreseeable sea level rise.

As the number of international treaties increases, EIAs will undoubtedly have to adapt to include references to the treaties, and how the proposed development meets the requirements of these treaties.

Box A2.3

Climate change and EIA: looking ahead

It may be necessary for future EIAs to have a section dealing with a project's expected contribution to carbon dioxide, and other "greenhouse gases", in the atmosphere. Projects which add carbon dioxide may be subject to a carbon tax, and those that reduce carbon dioxide may obtain tax credits or subsidies from international funds.

Annex 3

Evaluation form

In order to improve this booklet in future versions, it would be most useful if you would complete the following questions, perhaps on a photocopy of the page. Your help is greatly appreciated.

Overall do you feel the booklet helped your understanding of EIA?

Do you think the booklet is too long, too short, or about right?

Are there particular sections that you think should be extended?

Are there particular sections that you think should be left out?

Are there any specific topics you think should be included that are not covered at present?

Would you like more case-study material?

What other specific changes you would like to suggest?

Thank you for you assistance. If you are attending a SPREP seminar/workshop on EIA please hand this form to the SPREP organiser. Otherwise, please post or fax the form to:

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