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Using Environmental Indicators to Promote Environmentally, Ecologically, and Socially-Sustainable Resource Use: A Policy-Oriented Methodology

by Mike D. Young and Sarah A. Ryan, CSIRO Division of Wildlife and Ecology, Canberra, Australia

Including *A Blueprint for Sustainable Use of PNG's Forests* as an Appendix

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Using Environmental Indicators to Promote Environmentally, Ecologically, and Socially-Sustainable Resource Use:

A Policy-Orientated Methodology

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Foreword

This manual is a product of the Environmental and Natural Resources Policy and Training (EPAT) Project funded by the United States Agency for International Development (USAID). It is part of the effort by USAID to provide environmental policy information to policymakers and practitioners in developing countries. The objective is to encourage the adoption of economic policies for promoting sustainable use of natural resources and enhancing environmental quality. This manual provides information on a proven technique that can be applied in practice. It defines a methodology to rapidly identify indicators to describe the sustainable use of natural resources. The approach is relevant to many countries where data resources are limited and subsistence and market economies co-exist.

This manual is written for development professionals and policymakers in developing countries who are responsible for establishing and implementing policies on the sustainable use of natural resources, and for civil servants, project officers, and researchers directly involved in the implementation of development activities. The identification and use of indicators is a major issue in the work of these professionals. This manual can help change the way they identify and use indicators. The method employs "bottom-up" techniques and elicits consensus among participants to ensure that the effort will continue and be effective.

Several organizations have supported this work. The contribution of USAID toward writing, printing, and distribution of this document is estimated to be $22,500. The document is being distributed to more than 2,000 policymakers and professionals in developing countries. We will assess its effectiveness by soliciting the views of recipients. For that purpose, an evaluation sheet will be enclosed with each copy of the document distributed.

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This report and the work that it documents is only possible because of lateral thinking by a large number of people and financial support from the United States Agency for International Development (USAID) through the Midwest Universities Consortium for International Activities (MUCIA) and United Nations Educational, Scientific, and Cultural Organization - Man and Biosphere (UNESCO-MAB). In particular, we would like to acknowledge Graham Harrington for conceiving and developing an initiative to promote Economically, Ecologically, and Socially-Sustainable Tropical Rainforest Use (EESSTRU) throughout Southeast Asia.

A key characteristic of this concept is recognition that separate sectors and government departments formulate resource policy independently. This method of sustainable resource use concentrates on a more integrated approach that creates synergy among sectors and departments using the same environmental and resource base.

We also would like to thank Vincent Warakai and Chawi Konabe for the effort they put into early drafts of the *Blueprint*, Roy Green and Andrew Tagamasau for excellent chairmanship, Trevor Redhead for acting as an excellent facilitator, and Maria Taylor for turning the thoughts of many into a single style.

Finally, we would like to acknowledge the 13 Papua New Guinea (PNG) representatives who attended the workshop. They represented the Department of Forestry, the Forest Research Institute, the Department of Environment and Conservation, the Department of Agriculture and Livestock, the Department of Finance and Planning, the University of Technology, the University of Papua New Guinea, the National Council of Women, Shisei Enterprises, and the National Commission for UNESCO. The names of each of these people are listed on page 35 of the Appendix. Achieving consensus among such a diverse group was a challenge. The fact that they accomplished it so successfully and so quickly is a credit to the "PNG Way."

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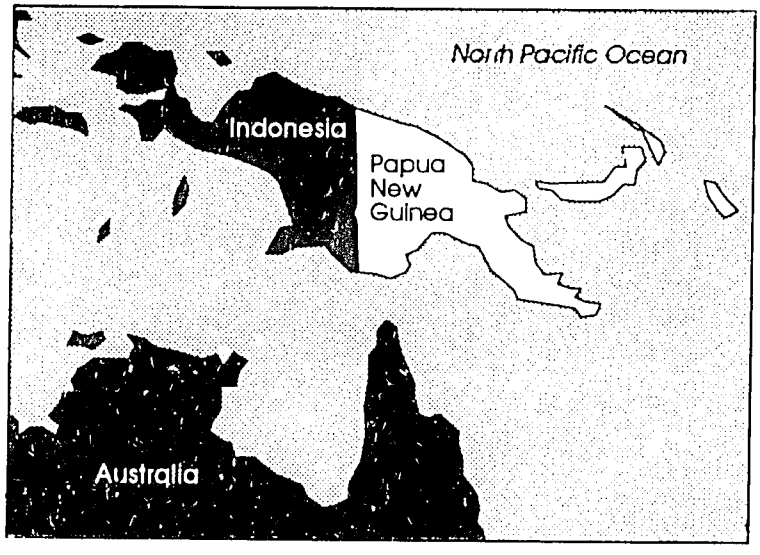
Acronyms

AIDAB	Australian International Development Assistance Bureau
CSIRO	Commonwealth Scientific and Industrial Research Organization
EESSRU	Environmentally, Economically, and Socially Sustainable Resource Use
EESSTRU	Environmentally, Economically, and Socially Sustainable Tropical Rainforest Use
PNG	Papua New Guinea
UNESCO-MAB	United Nations Educational, Scientific, and Cultural Organization - Man and the Biosphere Program

Introduction

This manual demonstrates how to rapidly identify indicators of progress toward the sustainable use of natural resources. The methodology has a strong policy orientation. Although focused on natural resource issues, the methods can be equally useful in addressing health, economic, education or many other policy areas.



A group of Papua New Guineans and Australian scientists worked together to identify indicators of progress towards sustainable development for tropical forest use in Papua New Guinea (PNG). They considered economic and social issues as important as environmental ones and code-named the exercise Environmentally, Economically, and Socially Sustainable Tropical Rainforest Use (EESSTRU). A more general acronym would be EESSRU - Environmentally, Economically, and Socially Sustainable Resource Use.

The activity arose from a UNESCO-Man and Biosphere (MAB) interest in helping developing countries identify indicators of sustainable development, especially in areas and economies dominated by rainforest. The result greatly exceeded our expectations. It also resulted in the production of a "blueprint" that has already had a significant effect on policy. We have written this manual to show that the approach can be useful in countries with limited resource data and where subsistence and market economies co-exist. We call the approach the "Blueprint Indicator Methodology." In this paper, "we" refers to the authors of this document. In most cases, however, we also sought advice from the other Australian team members and PNG participants.

There are three critical elements of our methodology:

1. It is bottom-up.

2. It includes broad cross-sectoral interests.

3. And it uses a highly interactive and carefully-managed workshop process to elicit consensus across interest groups.

In contrast to the approach where a consultant writes a draft report, the Blueprint Indicator Methodology emphasizes local knowledge. It draws upon the collective experiences and ideas of a wide group of people. By the end of the process, the group owned the report and wanted to take the work further. Their blueprint forms the case study for this report (Appendix). Before reading any further, take a moment to browse through the appendix for an overview of the blueprint idea.

Besides providing a good sense of ownership of the workshop document, we also believe this approach is fast and cost-effective. Workshop participants wrote the *Blueprint*'s text from start to finish in a five-week period. The complete exercise cost US $59,000 including all accommodations, printing, and travel. The exercise was an important learning experience for PNG and Australian participants and would not have occurred by simply hiring a consultant.

Indicators

Why Focus on Indicators?

Indicators are simply facts that show progress (or lack of it) toward a set of pre-determined goals. With present interest in policies that promote sustainable resource use, identifying indicators performs several important roles.

- Selecting indicators to show progress focuses attention on the meaning of sustainable resource use and the possible goals for each resource and the communities that use them.

- Defining indicators forces development of concrete, quantitative definitions of sustainability. If the group can achieve consensus, the process produces a "blueprint" for sustainable development indicators. Where barriers to progress might exist, indicators highlight the need for research and data. Indicators can also point to policy and program opportunities.

Sustainability Goals

Indicators Relate to Goals

Participants must agree to goals before they can set valid indicators. For Papua New Guinea, the group defined sustainability to mean that "PNG must achieve economic growth and social development without degrading the potential of its conditionally renewable natural resources." The group agreed that environmental, economic, and social changes offered opportunities for improvement but felt these changes had to be consistent with the "PNG way" (see Appendix p. 8). Participants saw sustainable use as the subset of economically and socially feasible practices that do not and will not compromise a broad set of national, regional, and community objectives.

It was significant that the group loosely defined the concept of sustainable development. They tried to find consensus for desired changes. It was not necessary for them to want changes for the same reason, only that the changes fit their notion of sustainable development.

Nature of Indicators

Physical Indicators

Quantitative Indicators

- *Rising gross domestic product per capita*
- *Increasing life expectancy*
- *Improving water quality*

There are two broad types of indicators: quantitative indicators and policy indicators. In PNG, participants chose quantitative indicators that included rising gross domestic product per capita, increasing life expectancy, and improving water quality. Some are economic while others are physical indicators. It is possible to criticize reliance upon physical indicators because of the time lag between cause and effect. For environmental aspects, this span can exceed 15 years (Young 1992).

In a developing country, the information needed to derive physical indicators of environmental quality can be expensive or even impossible to collect. For example, without an original inventory, it is virtually impossible to assess changes in timber stocks. Usually, a developing country only has detailed data available for physical monitoring in key sites. Elsewhere, the distribution of available resources suggests that administrators believe costs of environmental data collection outweigh benefits.

Policy Indicators

Policy indicators of progress should complement physical indicators.

An alternative approach is to search for policy indicators of progress that complement carefully-selected physical indicators. Policy indicators have the advantage in that they are easy to identify and encourage progress. One of their disadvantages is that the cause-effect linkage is usually nothing more than a hypothesized relationship.

For example, we hypothesized that involving women in development decisions would help maintain environmental quality because women have a more intimate association with forest resources. From this hypothesis, PNG workshop participants chose the inclusion of women in social mapping teams as an indicator of progress (see Appendix p. 22).

Similarly, participants hypothesized that the clear definition of rights for people and communities to use and protect resources was a necessary precondition for long-term development strategies. From this assumption, increasing land title registration became another critical indicator of progress (see Appendix p. 22).

Language used to express policy indicators must be context specific.

We stress that the language participants used to express policy indicators is context specific. For example, it may be politically wiser to state the nature of an indicator in a broad way. This can encourage progress and help administrators feel more comfortable with the idea. Thus, participants decided to identify "the existence of regular inter-departmental meetings at a provincial level" as an indicator without saying whether "regular" means biweekly, monthly, or annually. The important point is that an increase in the number of meetings would make policy implementation more effective. But in another country, "the presence of programs to ensure that decisions from inter-departmental programs are implemented" may be a more appropriate indicator.

Indicators must fit the policy context of specific countries.

In short, each indicator must fit the policy context of the specific country. It would be wrong, for example, to lift the indicators listed in the Appendix for Papua New Guinea and try to apply them verbatim elsewhere. Groups need to develop their own indicators based on existing situations in their countries.

Desirable Characteristics of Indicators

There is much practical literature on indicators. When selecting indicators, consider their purposes carefully.

These include:

- education of decisionmakers, resource users, and the public,
- clarification of political concerns and priorities,
- monitoring success of policies and programs in achieving goals,
- complementing existing policies and programs, and
- flagging the likelihood of future problems (CEPA 1993).

Characteristics

Verbruggen and Kuik (1991) warn that many indicators mix value judgements with a desire for objectivity. Oakley (1993) and Anderson (1991) provide useful lists of desirable characteristics of indicators. A combination of their suggestions gives us this list of descriptors.

Measurable
Indicators must be observable in a quantitative sense.

Widely Accepted
Indicators need to be understood and accepted, even if the users do not understand their technical basis.

Based on a Time Series
It is the direction of change in an indicator, the trend through time, that will show whether government policy or resource use is moving in the preferred direction.

Account for Regional Variation
It is important to accommodate concerns of local groups to maintain their commitment.

Reported Simply
A wide range of people need to understand the indicators, and participants should present them clearly.

Relevant to People's Lives
Indicators should relate to things that people value or with which they can identify.

Based on Existing Data When Possible
Indicators derived from existing data can be used immediately because a temporal baseline is already available. Those based on new data will not be useful until a time series has been collected with the consequence that they may not influence policy for several years.

Balanced between Positive and Negative Impacts
Participants are more likely to view a balanced set of indicators that reveal trade offs between production and conservation, for example, as politically neutral and therefore more acceptable.

Comparable
Participants can assess the rate of progress when they can compare change between regions, programs, and countries.

Quickly Observable
Indicators observable soon after data collection are more useful than those having long time lags between data collection and conversion to an indicator.

Flexible
Indicators are not subject to change. However, public attitudes may change, and new scientific knowledge may alter the importance of indicators.

From Indicators to a Blueprint

Quantitative physical indicators showing the condition of resource stocks and flows in developing countries often are available only for key locations and involve unacceptable lags.

A strategic, pro-active approach encourages policy development and review.

For that reason, PNG participants chose to focus mostly, but not exclusively, on policy indicators of progress. They judged that for their country (and probably many others like theirs), the widespread collection of environment and resource statistics would be very expensive and not cost-effective. This was a practical decision but it also allowed development of a policy blueprint without seeming to make specific recommendations. For each policy area, an indicator took the shape of a policy proposal for serious consideration.

Note that the approach brought them to the policy frontier where progress is made. It encourages a strategic, proactive approach to policy development and review. They (and we) consider that, with very limited

resources, this is the most appropriate point to monitor progress. The alternative reactive approach, noting whether decisions made several years ago have had or have not had the intended effect, is much less appealing.

Indicators must show real, not just "paper" changes.

Collectively, the set of indicators chosen for each proposal reflected the group's short list of characteristics for a set of policies likely to promote sustainable forest use throughout PNG. For example, they observed that one indicator of progress would be, "The existence of provincial wood harvesting and silviculture management plans in every province." At the time of writing, plans existed only for some provinces. The group carefully chose the word "every" after considerable debate (see Appendix p. 17).

The collective result of searching for many such indicators is a checklist of indicators of progress. This is a blueprint for assessing whether or not the nature of policy and program changes shows progress toward sustainable forest use. We stress that the indicators must show real, not just "paper" changes.

There are many different pathways to sustainable resource use.

Another characteristic of the Blueprint Indicator Methodology is its non-prescriptive style. The order in which to pursue indicators is left open. This makes the document much more acceptable to politicians and administrators. There are many different pathways to the elusive goal of sustainable resource use. No single policy pathway is superior to another. Thus, a periodic review of the list of indicators is a necessary part of the process.

The Process

Overview

The *Blueprint Indicator Methodology* consists of the management of a process that brings together people from different backgrounds with differing skills to define a common set of indicators of sustainable resource use. The process involves:

- development of a draft set of indicators,
- a workshop to reach agreement on the indicators, and
- publication and distribution of the agreed set.

To be efficient, the process needs a secretariat. Our secretariat consisted of the two PNG participants who had drafted the working documents, a professional writer to help incorporate changes into the working document, and the workshop manager. The secretariat's role is threefold.

1. In the early stage, it must show impartial leadership and begin the process.

2. It must have a very clear vision of the process and understanding of the concept of sustainable development and convey this vision to the participants.

3. It must always work to build consensus and be willing and able to turn ideas into written words without appearing to take over the process.

Pre-workshop

Gaining Commitment

The most critical element at the beginning of the process is to gain commitment from the country and the key people involved. In our case, the process began with a visit by a small group of Australian experts (3 ecologists, 1 economist, and 1 forester). They visited PNG to draft modular programs for submission to funding agencies.

One module grew out of a perception that senior administrators need to understand the responsibilities and challenges associated with the concept of sustainable development. Although all administrators had heard of the concept, they wanted and needed to know what it really meant and how to achieve it. They also wanted to know what other administrators in other departments thought it should mean for PNG.

In response to the above observations, the Australian team visiting PNG concluded that there was a need for a process that brought key actors together in a constructive environment. The visiting group collaborated with people from the PNG Forest Research Institute to write a proposal to facilitate this process, ultimately funded by UNESCO-MAB. The report in the Appendix was the final outcome.

The group sought to define indicators of sustainability for their tropical forests. The proposal was to use a workshop to help senior and mid-

level administrators identify opportunities to promote sustainable development. The administrators would then be able to show these opportunities to others.

The group then proceeded with two parallel streams of activity. They prepared a draft document so that the workshop would have a written basis for negotiation and further development. They also began planning the workshop itself.

The consulting team that implemented the proposal consisted of representatives from the Australian Commonwealth Scientific and Industrial Research Organization (CSIRO) whose job was to develop and facilitate a bottom-up process. A key requirement was that the entire process focus on linkages that should and could exist between different branches of the complex administrative hierarchies that affect forest use.

Preparation of a Draft Document

Two Papua New Guineans came to Australia two weeks before the workshop and prepared the draft document. We provided a suggested outline, background information on indicators, and editorial assistance. We advised the Papua New Guineans to keep the style of the draft deliberately tight forcing the workshop participants to debate key issues.

Workshop participants did not receive the draft in advance to prevent them from being ordered to adopt an official position that precluded the interchange of ideas. However, we did invite participants to respond to a list of issues. The participants received the completed draft document when they arrived at the workshop. This draft had each line numbered to allow for easy reference to specific words during the workshop.

The structure of the draft report included a simple progression of ideas:

- what we have (nature of forests in PNG, existing framework for resource use),
- where we want to go (sustainable development),
- where we are going (PNG development objectives),
- what we could do (development constraints and opportunities),
- how we could get there (institutional and policy options), and
- accepting the challenge.

In the "How We Could Get There" section, the group developed the indicators by policy issue or area. At the start, the format for each area was rigid, consisting of

- one factual paragraph on the policy area or issue,
- one paragraph on the nature of the problems associated with the issue,
- one paragraph on the flavor of policy approaches likely to promote EESSTRU, and
- a box listing 5 to 10 indicators of progress.

In retrospect, we found this very brief format a useful way to focus the discussion on indicators. Box 1 shows an example of one such set of indicators.

Box 1. Example of the Way That Policy-area Indicators Evolved from the Draft to the Final Document

Italics show new text that workshop participants added to the draft text.

Indicators

Indicators of progress towards greater community involvement include:

1. The greater devolution of power and responsibility to local communities *in a manner consistent with national and provincial policies;*
2. The employment of local negotiators, extension personnel and administrators *to facilitate joint planning and regulation;*
3. The development of mechanisms that enable land-use control *to be applied at the village level*; and
4. *Increased involvement of all sectors of the community, and particularly youth and women, in locally-based industries and resource use.*

Importantly, each set of indicators included at least one and preferably two policies now in use and regarded as successful. This is important because all participants and all subsequent readers must feel challenged but not threatened by the document. To be successful, a bottom-up process depends upon the willingness of people to contribute.

Planning the Workshop

Key elements in planning the workshop were selection of participants, location, facilities, and planning the structure of the three-day workshop.

Structure

The workshop structure required careful planning to ensure that the PNG contribution was effective. The finished document needed to reflect their views and knowledge, not Australian perceptions of PNG needs. It was important to reflect the partnership involved in the workshop and the recognition given it by both governments. Therefore, a senior CSIRO representative and a senior government official from PNG jointly chaired the workshop.

A facilitator was also an essential element to achieving concrete results from the workshop. We selected an Australian with a scientific background and established facilitation skills. However, the facilitator had no vested interest in a particular outcome and little prior experience in PNG. To maintain interest and productivity, the program included a mixture of activities as well as an excursion.

Location and Facilities

A suitable location is an important factor in designing a successful workshop. The location had to be attractive to senior people from PNG. It should also be sufficiently far away to avoid workplace demand and yet free of tempting distractions. We chose a resort complex which was near Cairns and next to the Great Barrier Reef. It was 20 kilometers from the nearest town so that the group would have to stay together. A group booking during the off season made economical hotel rates possible.

Workshop participants would have to use concentrated effort to produce an agreed-upon written document within the four days. Working rooms and bedrooms had to be comfortable with word-processing and photocopying facilities available.

Participants

Participants were selected by the local UNESCO office which had good knowledge of appropriate institutions, potential participants, and good contacts for locating others. Selection criteria were precise. It was important to have both wide representation and appropriate people

participating. To be valid, the finished document needed to represent a cross-section of interests. And for it to gain long-term commitment, influential people needed to develop it.

The participants also clearly had to have good knowledge of the sector they represented. High level government department officials were encouraged to attend as they could influence policy changes flowing from the workshop. However, it was important to keep the number of participants (including the Australian advisers) under 20 to allow effective interaction within a single group.

Workshop

The workshop was held during three and a half days in March 1992. Participants received folders containing the draft document and information sheets on the six issues listed below.

The program

Box 2 (page 13) shows a summary of the program.

Participant Roles

Identify each participant's role:

- *Why is that person there?*
- *What can s/he provide?*

It needed to be clear why each person was there and what they could provide. The categories were: co-chairs (2 people), PNG participants (10), facilitator (1), resource people (Australian experts - 2 ecologists, 1 economist, 1 women-in-development expert), and the secretariat (4). An observer from Australian International Development Assistance Bureau (AIDAB), Australia's national aid agency, should also attend several days of the workshop.

Allocation to Sub-groups

Only the PNG representatives, not involved in the prior drafting, participated in the group sessions. The two people who wrote the first draft together wisely felt the process would be more constructive if they were not there to defend "their" text. They did, however, participate in the plenary sessions that discussed all sub-group recommendations and helped draft the final document.

Box 2. Daily Schedule

Day 1

a.m. Participants arrive

p.m. Distribute draft document and read
Welcome dinner and address

Day 2

a.m. Outline of procedure
Goals of workshop
Participants' view of major issues
"Concepts of Sustainability"
Goals of sub-group sessions
Sub-group sessions
Sub-groups report back

p.m. **"Policy Opportunities and Sustainability Indicators - 1"**
Goals of sub-group sessions
Sub-group sessions
Sub-groups report back

Day 3

a.m. **"Policy Opportunities and Sustainability Indicators - 2"**
Goals of sub-group sessions
Sub-group sessions
Sub-groups report back, establish workshop position

p.m. Excursion

Day 4

a.m. Distribution and review of revised draft
"Global Opportunities and Constraints"
Goals of sub-group sessions
Sub-group sessions
Sub-groups report back

p.m. Workshop conclusions
Challenges for the future
Celebratory dinner

The aim of the sub-group sessions was to elicit contributions from each person and assure debate on all points of view. Each sub-group included members with a mix of interests and experience. The Australian experts were available to answer specific questions but only to contribute when asked.

Guidelines for Group Sessions

Sub-groups received these guidelines to assist their deliberations.

At the beginning of each new sub-group session, the sub-group appoints a coordinator and a writer. The role of the coordinator is to: ensure that all participants have an opportunity to express their views; to keep the sub-group focused on the objectives of the session; and to report the sub-group's conclusions to the main group. The writer's role is to capture the main points on flip charts and bring them back to the main group.

Group Names
Each sub-group selected a local PNG name of a product (e.g. plant, animal) from the forest to use as identifier for their group.

Additional Information

Participants received additional information to help them work at peak efficiency and to make sure that the workshop ran smoothly.

Biodata on Australian Participants
Workshop members received this information so that they could easily contact the appropriate consultants and draw on them as resources.

Workshop Participant List
This list enabled members to continue dialog after the workshop.

Accommodation Information
Clear details about meals and accommodations prevented distraction from the main purpose of the workshop.

Drafting the Blueprint

The drafting process followed a specific schedule. Each time participants split into sub-groups, they were to address the same issues and report to the plenary session in about one hour. Day 1 sessions concentrated on team building and protocol. The morning of Day 2 focused on explaining the process and defining the meaning of ecologically, economically, and socially-sustainable resource use (see Appendix sections 3, 4, and 5).

Participants felt uncomfortable with the speed of progress forced upon them. However, we overcame this by stressing that we would return to these ideas later in the program. Toward the end of each plenary group session, the facilitator summarized agreements.

Fast turnaround of draft text is critical.

The secretariat explained how they would write up the group's conclusions and then rewrote the drafts during sub-group sessions, over lunch, and in the evenings. A critical part of the process is the fast turnaround of draft text and the willingness of the secretariat to work long hours.

The afternoon of Day 2 and the morning of Day 3 concentrated on two or three indicators at a time. During the excursion in the afternoon of Day 3, the secretariat redrafted all but the last sections of the report. At the start of Day 4, participants received revised copies. After discussion of the last sections, we began a drafting session with the full group. Group drafting is difficult, and it is useful if one member of the secretariat takes leadership in this process but does not dominate it.

Participants took a revised final document home from the workshop.

PNG participants took home the revised final document produced at the workshop. However, after discussion with their organizations, they could request additional changes. Several participants promised to supply supporting factual information after returning home.

Post-workshop

Editing

Final editing of the document occurred in Australia, after we received final comments and information from the PNG participants. However, editors only made factual and grammatical changes so that the document would faithfully reflect the decisions of the workshop. In retrospect, we should have asked the PNG Minister for Forests to write a foreword to give the report more impact.

Printing

We had the document professionally designed and printed in Australia. Our intent was that an attractive, identifiable, easy-to-read booklet is more likely to be circulated, used, and referred to than a plain one. We used appropriate graphics from PNG material and printed the final booklet on good quality recycled paper.

In the end, we decided to omit CSIRO's and UNESCO's names from the report. Although non-PNG people criticized us for doing this, we believe that this greatly helped participants feel ownership for the report's list of indicators.

Distribution

The PNG Department of Forest distributed 1,000 copies of the document. We printed additional copies for our own use in Australia and have been distributing them upon request.

Highlights of the PNG "Blueprint"

The resulting blueprint was an innovative document. As far as we know, it is first time that policy rather than physical indicators have dominated in an exercise to clarify indicators of sustainable resource use. A key feature was the degree to which participants returned to the government's eight aims for development and the 5th of the Five Directive Principles in the PNG Constitution. As shown in Box 3 (page 17, also see Appendix page 14), these emphasize Papua New Guinean Ways of achieving decisions. In particular, they show a strong concern for cultural as well as economic and environmental considerations.

Several other key features emerged from the indicators. There is a willingness to examine institutional arrangements such as the transfer of power and policy consistency. There is also a willingness to involve women, industry, and local communities in policy formulation (page 18, also see Appendix page 17-20). In addition, a strong focus of resource rights, resource pricing, and even macro-economic policy emerged (see Appendix page 21-27).

Evaluation

A formal evaluation of the PNG exercise occurred at two points: once at the end of the workshop and again about a year and a half after *Blueprint* distribution. Informally, we believe the process was positively received and highly effective. It produced an agreed and tangible outcome in the *Blueprint*. And, we believe it achieved intangible benefits in relationships furthered and better understandings developed among PNG participants.

Box 3. Extract from the *Blueprint*

The PNG Way

The principle of Papua New Guinean Ways is entrenched in the Constitution of PNG as the 5th of the Five Directive Principles. It reads:

Papua New Guinean Ways

> PNG should achieve development primarily through the use of PNG forms of social, political and economic organization.

This means that PNG should closely follow its customs and beliefs and organizational forms in the quest for development. PNG Ways calls for:

> A fundamental reorientation towards PNG forms of participation, consultation, and consensus and a continuous renewal of responsiveness of these institutions to the needs and attitudes of the people.
>
> ...appreciation of traditional ways of life and culture, including language, in all their richness and variety.
>
> ...traditional villages and communities to remain as viable units of PNG society and for active steps to be taken to improve their cultural, social, economic, and ethical quality.

To ensure that these are enforceable, the Constitution of PNG requires the legal system to recognize established customs and customary law.

In practical terms, PNG Ways, which emphasize local consultation before the final decisions are taken, should be used when dealing with issues and disputes. Resolution of land ownership disputes and compensation issues, for example, should take into account traditional ownership and usages and attempt to follow closely customary dispute settlement procedures. It is critical, however, that the important PNG Ways Principle does not become an excuse for inaction.

Box 4. Extract from the *Blueprint*

9.3 Allocation of development and use rights

One of the most difficult issues in development is to find an efficient and equitable means to create access rights for non-traditional users. Options range from reliance upon Ministerial discretion with intensive negotiation over conditions to market-based tenders where community requirements are prespecified.

A related issue is the setting of royalties, license fees, and rents. Often these arrangements do not keep pace with inflation. Tender processes can make royalty payments less critical as the down-payment tends to offset any deficiencies in the royalty system. Such processes should be designed to prevent the emergence of collusive practices.

Indicators
Indicators of resource allocation procedures that are likely to promote sustainable forms of resource use include:

1. The allocation of new resource rights via overt processes that encourage long-term investment;
2. Mechanisms that make resource rights fully transferable;
3. Restrictions to ensure that allocation processes give full regard to the interests of local communities; and
4. The existence of management prescriptions and resource development bonds to ensure compliance.

Post-workshop Evaluation

The evaluation by questionnaire at the conclusion of the workshop also showed high level support for the approach we'd taken (see Box 5). Positive comments returned on the questionnaire included:

- more than the average opportunity to express own views
- well done
- smaller working groups provided a high standard of discussion and debate
- well-conducted workshop
- fine job.

Participants felt the largest single shortcoming was the short length of the workshop (3.5 days). Several participants also wanted more time to read the initial draft, to explore issues in detail, and to polish the final version. They identified some issues as important but not adequately addressed. These included industry, implementation priorities, indicator refinement, research on sustainable land use management, environment, and population. Although individual participants felt highly committed to furthering EESSTRU when they returned home, they felt that others might not have the same conviction (see Box 5).

Box 5. Responses to Questionnaire at Conclusion of Workshop

Average Score (1-low; 5-high)

Was the program structure appropriate to the goals of the workshop?	4.5
Was it productive to break into smaller groups for the working sessions?	4.7
Did you have sufficient opportunities to express your views?	4.0
Are you satisfied with the outcomes of the workshop?	3.8
How committed do you feel about furthering EESSTRU when you go home?	4.4
How committed do you think the other PNG participants are to furthering EESSTRU when they go home?	3.3
Were you satisfied with the venue, food, and accommodation?	4.8
Were you satisfied with the arrangements made by CSIRO?	4.8

A Year and a Half Later

Among many other indicators of success, it is significant that an August 1994 workshop convened to review and formally present the *Blueprint* to the government.

A year and a half after the original workshop, participants said they gained immensely from the process. They also suggested that wider distribution of the report and the selection of people well positioned to "sell" the final product is important. It has been difficult for the administrative hierarchy to feel "ownership" for the *Blueprint*.

To achieve this goal, the August 1994 workshop included a majority of people not involved in the preparation of the original *Blueprint*. They:

- updated the document to include new information, note progress, and set new challenges,
- decided to write a new complementary version of the *Blueprint* for use by school teachers and communicators as a non-technical resource paper (the current version is written for policymakers but is also used in universities), and
- decided to liaise with the recently-formed National Sustainable Resources Committee and inform them of progress already made in Sustainable Forest Management.

Another illustration of the impact of the *Blueprint* has been its affect on the Papua New Guinea Forest Research Institute. Its Director reports that the *Blueprint* led to a total restructuring of its program. Today more than 50% of its effort is targeted directly towards issues that coincide with challenges set by the *Blueprint*.

Guidelines for Applying the Blueprint Indicator Methodology

Rather than an executive summary, we believe it is more useful to summarize the principles applied in developing the *Blueprint Indicator Methodology*. This will make it easier to adapt to circumstances in other countries. We stress that, if you pay attention to the role of indicators in influencing decisionmaking, the methodology can apply to many policy areas, many sectors, and many countries. We urge people to test its application.

How to Test the Blueprint Methodology

When testing our methodology in your country, there are several aspects to consider.

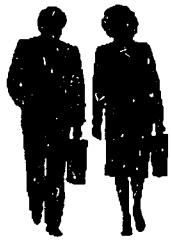
Organization

We recommend choosing:

- a maximum of 20 people per group to encourage interaction,
- a remote but pleasant location to attract senior people and keep them together,
- a secretariat with strong facilitation and drafting skills,
- a site with good support and photocopying facilities,
- a program that emphasizes interaction and progresses rapidly to focus on significant issues and realistic policy options.

Role of National Experts

We recommend that you:



- make every effort to attract very senior, competent people,
- limit participants to two per organization,
- select participants to represent a cross-section of resource interests and sectors, and
- choose participants who represent administration, research, and non-government organizations.

Role of Consultants

We recommend that consultants' contributions only support the exercise and help facilitate the process. This applies at all stages - during pre-workshop drafting, during the workshop, and in the final editing. The consultants' role is similar to that of a football coach. Consultants make sure the game's equipment is there and that people understand the rules of the game and follow the timetable. Coaches teach and encourage but rarely play the game.

Achieving National Ownership

We recommend:

- using a co-chair framework whereby two chairs, one national and one international, are chosen to run the workshop with the assistance of a facilitator. This will be a transition to national control, guided by a facilitator once co-chairs understand the process,

- choosing the national co-chair from the resource agency most closely associated with the resource or resources covered by the blueprint and organizing the agenda so that this person is responsible for at least the last half of the workshop.

- preparing the pre-workshop draft report quickly and just before the workshop. Participants then perceive that they must do most of the development at the workshop and are not endorsing a near final product, and

- having nationals lead sub-groups. Consultants should only be advisers.

Negotiating the Final Set of Indicators

Bringing such a process to conclusion is difficult. We recommend:

- keeping the report's style short and concise so that effort focuses on concepts rather than words, and

- having a single member of the Secretariat take a key leadership role in suggesting alternative words and sentences whenever problems emerge.

Achieving Political Acceptance

We recommend:

- the final report contain a foreword by a Minister or other similar person(s) and

- wide dissemination of the final report.

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Appendix

A Blueprint for Sustainable Use of Papua New Guinea's Forests:

Definition and Indicators of Progress

Economically
Ecologically &
Socially
Sustainable
Tropical
Rainforest
Use

A BLUEPRINT FOR SUSTAINABLE USE OF PNG'S FORESTS:

Definition and Indicators of Progress

April 1992

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Preface

A Blueprint for the Sustainable Use of PNG's Forest Resources was prepared at a workshop attended by senior people from a cross-section of departmental and non-government organisations. The document focuses on the definition of indicators for sustainable progress and emphasizes the need for development that promotes economically, ecologically, and socially sustainable rainforest use (EESSTRU).

Sustainability is here defined as positive development and the absence of degradation of the cultural, economic and physical environment.

With an emphasis on the need for sustainable development, this blueprint is designed to complement PNG's National Forest and Conservation Action Plan, its National Forest Policy and other initiatives being taken at the provincial, national and international level. The blueprint stresses the need to integrate wood harvesting and processing activities with other needs and values, both of the human users of forests and of the underlying ecosystem.

EESSTRU is best seen as an *on-going process* within the context of PNG's need for economic and social development. EESSTRU spans disciplines and sectoral interests. It aims to ensure, in a non-threatening manner, that sustainability objectives are not overlooked during the formulation and implementation of policies that affect forests and the people who use and depend upon them.

The blueprint has deliberately been kept brief. It provides a set of indicators which can be used to assess whether development is in line with sustainability. Those attending the workshop recognize that the indicators are not fully comprehensive. Others are encouraged to add to them on the basis of practical experience and greater expertise.

All issues discussed at the workshop and covered in the report are considered to be important. But the consensus was that, in the Papua New Guinea context, the greatest need and urgency was in the areas of land use planning at local, provincial and national levels. An important aspect of planning and decision-making is the involvement of the community, with particular emphasis on women. For this to happen, education and awareness programs are essential. Also essential is better co-ordination of the various departments and agencies in developing policies, recognizing the complex and multi-faceted nature of forest use issues.

A Blueprint for PNG's Forests, the workshop that prepared it and the CSIRO Division of Wildlife and Ecology consultancy that supported its development were funded by Unesco. Unesco's key role in bringing this important issue to the attention of PNG people is gratefully acknowledged.

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A BLUEPRINT FOR SUSTAINABLE USE OF PNG's FOREST RESOURCES: DEFINITION AND INDICATORS OF PROGRESS

1. Introduction

Papua New Guinea (PNG) is a developing nation which is rich in natural resources: renewable and non-renewable. PNG will continue to depend on its natural resources as it develops its economy. That means sustainably-managed development of forests will be essential if the immediate and long-term material demands of PNG's people are to be met.

PNG's forests have always provided the basic means of subsistence for the people. Not surprisingly, the people have a very high regard for their forests, which have traditionally provided food, timber for their buildings and medicine along with many other uses.

Often, the non-monetary values of forests are significantly greater than their commercial value. It is likely that the value of products extracted for subsistence purposes is greater than revenue from the sale of timber.

Within PNG, forests also play a critical role in the maintenance of social structures. Forests are respected for their traditional deep cultural and spiritual values.

From a national economic perspective, the harvesting of forest resources, especially for log and sawn timber products, has already contributed significantly toward the economy together with the mineral and agricultural sectors. The value of forest products exported annually is estimated to be almost 100 million kina. Forest products rank third after minerals and agricultural produce in foreign exchange earnings.

Equally important for the national interest is recognition that relatively undisturbed native forests provide the ecological functions that support the resource base.

There is great uncertainty at the national and global level about ways to measure the value of ecosystem functions. But it is known that forest ecosystems provide watershed protection, support the biodiversity of plants and animals and the continuance of healthy populations, prevent soil erosion, support subsistence agriculture and maintain the essential integrity of the landscape.

The negative impact of ecosystem degradation on the economy can adversely affect human welfare in PNG.

Economic considerations suggest that forests can be expected to play an increasing role in the country's development - to create industries and improve the welfare of Papua New Guinea. Experience indicates, however, that unless forests are managed with great care, the development process can put enormous pressure on both the natural and social environment. The pressure is already evident in some of PNG's forests where excessive logging has contributed to the degradation of both the ecosystem and the social environment (see Box 1).

Box 1

Some Consequences of Poor Forest Management

Experience in PNG and elsewhere indicates that when sustainable development is not the guiding principle for forest development some or all of the following consequences are likely to occur:

- *The owners of the forest resource may be inappropriately displaced and/or experience increased poverty together with a breakdown of existing social structures.*
- *Some plants and animals may become locally extinct and, where species are only found in a minor ecological niche, totally extinct.*
- *Soil erosion and reloted loss of prime agricultural land will result from deforestation, with attendant food shortages, siltation of rivers and widespread flooding.*
- *The potential yield of economic products that can be harvested from the forest area is reduced.*
- *Sections of the rural population will suffer from a shortage of wood for fuel and other uses.*

In building a modern economy on the country's resource base, it is vital to preserve the essential ecological processes and functions that sustain that resource base. It is equally important to ensure that there is minimal social and cultural dislocation of people. In other words, and in the spirit of EESSTRU, development to improve the national economic growth must be ecologically, economically and socially sustainable.

The important challenge for all agencies concerned with the management, utilization, and conservation of forests is to find a balance between economic development objectives and protection of the natural and social environment.

WHAT WE HAVE

2. *Background*

Papua New Guinea has a land area of 467,500 square kilometres and a population of almost four million people. Situated north of Australia and east of Indonesia, PNG shares many similarities with both these countries in regard to its forest ecosystems.

2.1 Nature of forests in PNG

Forests cover almost 77 per cent of the PNG land mass. They range from mangrove forests at sea level to alpine forests at very high altitude.

Although they account for only 1.5 per cent of the world's tropical rainforests, PNG's forests are outstandingly rich in diversity by global standards. Few species of either plant or animal are considered endangered. The inventory, however, is incomplete.

The conservation and commercial value of this rich gene pool is considerable. The forests offer many natural resources of commercial, subsistence, cultural and scientific importance.

2.2 Timber production

PNG's forests consist of more than 2,000 species of trees of which 400 species are known to be economically useful.

Current forestry legislations allow for the harvesting of timber and other forest produce through the granting of permits, licences, authorities and approvals to private dealings. The maximum annual allowable cut under all concessions at present stands at 4.6 million cubic metres. Actual total annual harvest has been much less. In 1991, the harvest up to September was 1.2 million cubic metres.

The export of timber in unprocessed form (logs) is by far the largest activity of the timber industry. There are currently some 40 log export operations. To correct the apparent imbalance between the high level of log exporting and low domestic processing, the National Forest Policy provides measures to encourage and require onshore processing.

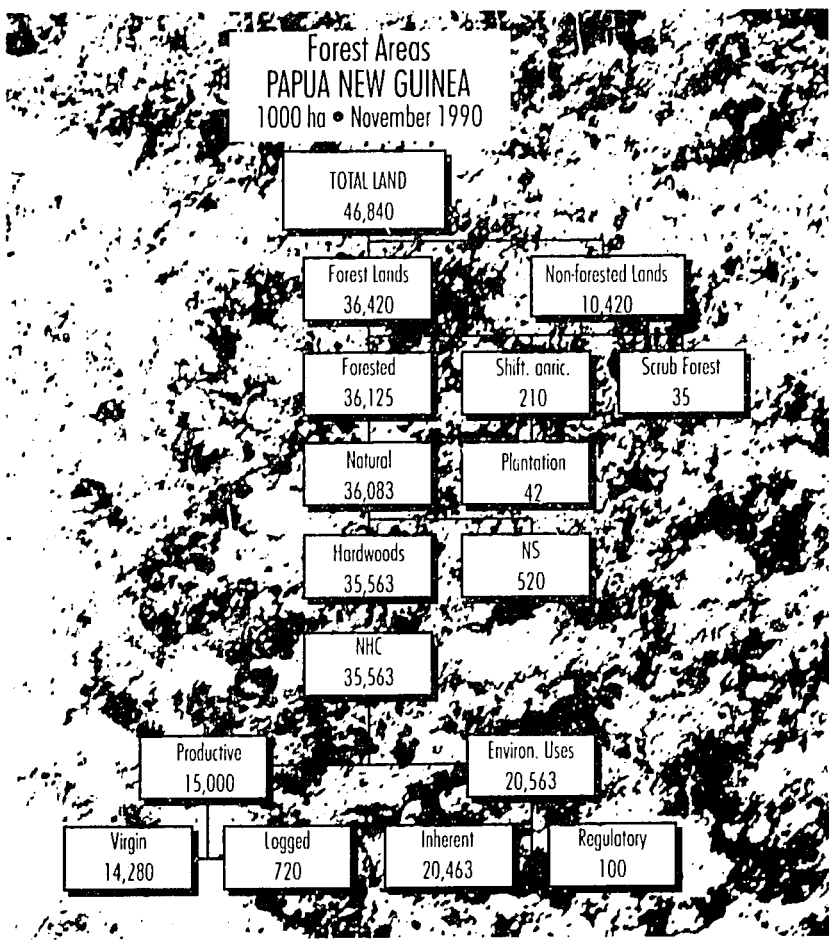
At present, the timber processing industry in PNG includes about 50 large scale sawmills, a plywood mill, a woodchip mill and 27 furniture-making factories and joineries. In addition there are more than 400 small, mobile sawmills scattered across the country.

2.3 Land ownership

About 97 per cent of the land in PNG remains under the control of traditional owners. This means that almost all rainforest areas are owned by local people.

Access to land and ownership of land are important for people's day to day subsistence. Land also plays a major role in wealth and status values. Under law, development of forest resources must be carried out with the approval and participation of the local people.

Experience has shown that landowner concerns about royalty payments, environmental degradation, and lack of opportunities for meaningful participation in development projects, can lead to disputes which in turn can slow down or even halt a project. Land owner companies are being formed to give local communities greater control over forest development.



Forest Area
PAPUA NEW GUINEA

Box 2

PNG ECONOMIC OVERVIEW

Papua New Guinea has an open economy with a large international trade sector. Important primary commodities include coffee, copra, cocoa and timber. Mineral exports of copper and gold are significant revenue earners.

The PNG development strategy has changed significantly since independence. The old strategy was equity rather than growth. This has now changed to one of aggressive growth.

Mineral and petroleum exports lead this transition. Since the shut-down of Bougainville, another big mining project, Porgera, has come into operation, and Lihir and Misima (all gold mining projects) will follow. Oil and gas projects are under construction and their export will contribute very significantly towards dynamic growth in the economy. To a large extent, however, these sectors act as enclaves within the national economy. For the majority of the PNG population, agriculture has been and will continue to be the dominant economic activity.

The open nature of the economy has meant that PNG is vulnerable to international price fluctuations and inflationary impulses. The major macro-economic strategy in defence has been the "hard Kina" strategy which has been in place since independence. In 1990, however, the closure of Bougainville mine forced the country to devalue its currency by 10%.

As a result of several structural problems, some cultural features, its mountainous landscape and many islands PNG is saddled with a high cost economy.

The country has maintained a centralised wage fixing system. While this has contributed to some distortion, PNG has succeeded in maintaining comparative price stability. The consumer price index (CPI) has risen on average by about 6% per annum.

2.4 Biodiversity

PNG's forests are internationally known for their outstanding biodiversity and relatively intact status.

The country's unusual geological history, with spectacular mountain landforms on the main island and volcanic features on smaller islands has produced a unique blend of Malay and Gondwanan plants and animals. These include more than 11,000 species of flora, with ferns alone accounting for 2,000 species. The lowland rainforests have more than 1,200 tree species.

Fauna diversity and endemism are high and internationally valued. Many species are only found within PNG. One example is the beautiful Raggiana Bird of Paradise, which has become the national symbol of PNG. PNG's bird fauna is one of the richest and most varied in the world. Of the 740 species of birds recorded to date, 10% are only found in PNG and 445 live in rainforests. None are considered in danger of extinction, but 24 species are now very rare and possibly coming under threat.

PNG also has almost 200 species of mammals. Donia's and Goodfellow's tree-kangaroos and the Woodlark Island cuscus are considered threatened. In addition, the range of some species is extremely restricted and therefore vulnerable. For example, the world's largest butterfly, the Queen Alexandra Birdwing, is only found within a 50 kilometre radius of Popondetta in Oro Province.

5. The Existing PNG Framework for Resource Use

The founding fathers of the PNG Constitution had the foresight to enshrine in it guiding principles aimed at "Integral Human Development". These principles, which recognise that the country's natural resources and environment are a valuable national heritage, will play a major role in guiding development today and in the future (see Box 3).

The fourth of the Directive Principles not only gives the people of Papua New Guinea a mandate as custodians of the natural environment now and for the future, it also stresses the importance of developing an environmentally sound framework for resource use in PNG. The challenge is to turn these principles into practice.

Box 3

The Five Directive Principles

1. Integral Human Development
Every person should be dynamically involved in the process of freeing himself or herself from every form of domination or oppression so that each man and woman will have the opportunity to develop as a whole person in relation with others.

2. Equality and Participation
All citizens should have an equal opportunity to participate in and benefit from the development of our country.

3. National Sovereignty and Self-Reliance
Papua New Guinea should be politically and economically independent and our economy should be basically self-reliant.

4. Natural Resources and Environment
Papua New Guinea's natural resources and environment should be conserved and used for the collective benefit of all and should be replenished for future generations.

5. Papua New Guinea Ways
Papua New Guinea should achieve development primarily through the use of Papua New Guinean forms of social, political and economic organizations.

WHERE WE WANT TO GO

4. Sustainable Development

4.1 In general

The concept of sustainable development has many definitions (see Box 4). It is generally agreed that the essence of sustainable development is: "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." (World Commission on Environment and Development 1987). This definition is expanded with two key concepts.

> "The concept of 'needs', in particular the essential needs of the world's poor, to which overriding priority should be given; and
>
> "the idea of limitations imposed by the state of technology and social organization in the environment's ability to meet present and future needs."

In other words, current economic and land-use practices must not be at the expense of the future. In practice, this means integrating economic goals with environmental goals and working towards consensus about the ecological and social constraints to economic activity.

Specific to the use of indigenous forest resources, most definitions of sustainable development recognize the need to:

- understand and maintain ecological processes and functions within the forests;
- maintain species and genetic biodiversity;
- maintain aesthetic and cultural values;
- ensure that resources are appropriately managed so as to provide both market and non-market benefits;
- maintain the productive potential of renewable resources; and
- contribute positively to global environmental quality and ecosystem functioning.

At the same time, however, all definitions recognize the need for further economic and social development so that the needs of people who live in and/or depend upon forests can be satisfied.

4.2 As applied to Papua New Guinea

The concept of sustainability is not a modern concept to PNG. Traditionally, many people in PNG lived in self-contained communities that were sustained over time. Some traditional systems, however, have not proven sustainable over the long term and current population pressures increase the risk that some traditional systems may collapse. The present-day dual economy which involves both market and subsistence activities also places differing pressures on resources.

The modern western concept(s) of sustainable development derives, in part, from the experiences of self-sustained societies, such as PNG's many communities. As noted above, a number of definitions of sustainable development exist.

In attempting to construct the most relevant definition of sustainable development for PNG it must be recognized that the nation has become part of the global society and economy. Our people's expectations have increased and their needs have changed. Many people now seek a transition from the subsistence to the market economy. Development therefore means that PNG must achieve economic growth and social development without degrading the potential of its conditionally renewable natural resources.

The challenge is to create opportunities for development consistent with Papua New Guinea Ways.

The broad policy objective of sustainable development is to optimise *all* benefits from forest use, tangible and non-tangible, while conserving the integrity of the forest ecosystem.

Box 4

Alternative definitions of sustainable development

"Sustainable development - development that is likely to achieve lasting satisfaction of human needs and improvement of the quality of life" (Allen 1980).

****

"There are many dimensions to sustainability. First, it requires the elimination of poverty and deprivation. Second, it requires the conservation and enhancement of the resources base which alone can ensure that the elimination of the poverty is permanent. Third it requires a broadening of the concept of development so that it covers not only economic growth but also social and cultural development. Fourth, and most important, it requires the unification of economics and ecology in decision-making at all levels." (Gro Harlem Brundtland 1986).

****

"The sustainability criterion requires that the conditions necessary for equal access to the resource base be met for each generation." (David Pearce 1987).

****

"We take development to be a vector of desirable social objectives, and elements might include:
- increases in real income per capita
- improvements in health and nutritional status
- educational achievement
- access to resources
- a 'fairer' distribution of income
- increases in basic freedoms.

... Sustainable development is then a situation in which the development vector increases monotonically over time.

"We summarise the necessary conditions [for sustainable development] as 'constancy of the natural capital stock'. More strictly, the requirement is for non-negative changes in the stock of natural resources such as soil and soil quality, ground surface waters and their quality, land biomass, water biomass, and the waste assimilation capacity of the receiving environment." (Pearce et al 1988).

Sustainable development in PNG will:

- recognise the critical role of land and forest resources to the PNG way of life and, in particular,
  - the importance of simultaneously considering social, environmental and market demands,
  - the diversity in cultural practices and traditional conservation practices which is largely still in place in PNG,
  - the government objective of achieving "Integral Human Development";
- maintain biodiversity values, ecological integrity of all natural ecosystems and the general quality of the environment;
- incorporate the idea that in order to achieve full economic and social potential, we must use resources efficiently without detracting from community values;
- equitably allocate rights of access and opportunities to develop resources;
- optimise the benefits of development to the community and equitably distribute these benefits;
- avoid changes that might be irreversible and acknowledge uncertainties about the impacts of economic activity on the environment; and
- build upon the capacity of PNG social and political structures to develop resources.

Significantly, the sustainable development concept calls for change but, as suggested in PNG's National Forest and Conservation Action Plan, the prospect of structural change can be turned into an opportunity to achieve Integrated Human Development. At the same time, it needs to be recognised that the exact nature of forests and climates will change with time.

5. PNG Development Objectives

5.1 General policy objectives

The philosophy underlying development of PNG is well established in the Constitution and in the White Paper on the National Development Strategy (PNG 1977) which contains the Eight Aims (see Box 5). These continue to guide the Government of Papua New Guinea.

Policies that may emanate from the EESSTRU process must be compatible with the above, especially with the fourth goal of the Directive Principles (see Box 3). To achieve this and related goals, those who manage and utilize forest resources and the underlying ecosystems need to agree on the forms of forest use that are likely to be sustainable over the long term.

5.2 Forest policy objectives

Forests are not only a source of timber but also serve many other functions. Policies that consider all forest values simultaneously are a necessary condition for sustainable development. In formulating policy, attention must be paid to the Five Directive Principles and Eight Aims embodied in the Constitution (see Boxes 3 and 5).

Consistent with the fourth goal of the Five Directive Principles and focusing on timber and wood harvesting, the National Forest Policy has two main objectives:

- Management and protection of the nation's forest resources as a renewable natural asset; and
- Utilization of the nation's forest resources to achieve economic growth, employment creation, greater PNG participation in industry and increased viable onshore processing.

5.3 Environment and conservation policy objectives

In developing Papua New Guinea the government recognises and has responsibility to maintain and, where possible, improve the quality of our environment whilst increasing national prosperity.

Development, however, requires change and often entails substantial modification of the environment and natural resources. Recognising this, all evaluations of and decisions about development proposals are measured against the five Directive Principles expressed in the National Constitution (see Box 3). In implementing policy the Department of Environment and Conservation's objectives seek to

- make wise use of natural resources in the interests of development whilst recognising that they are held in trust for future generations;
- conserve and replenish, for the benefit and prosperity of PNG, the environment and its sacred, scenic and historical qualities; and
- take all necessary steps to give adequate protection to all valued birds, animals, fish, insects, plants and trees.

As a basis for environmental policy the Department seeks to ensure that PNG's natural and physical resources are managed to sustain environmental quality and human well being. This requires the simultaneous attention to social, economic and ecological considerations.

WHERE WE ARE GOING

Box 5
The Eight Aims

1. *A rapid increase in the share of the economy under the control of Papua New Guineans and in the share of personal and property incomes generated by the nation's development.*

2. *More equal distribution of economic benefits, including rapid progress towards equalization of incomes among people and in their access to basic services.*

3. *Decentralization of economic activities, planning and Government decision-making, with an emphasis on agricultural development, village industry, improved internal trade, and the channelling of public spending to local and area bodies.*

4. *The promotion of small-scale artisan, service and business activity, relying wherever possible on typical Papua New Guinean forms of production.*

5. *The development of a more self-reliant economy that is less dependent on imported goods and services and is better able to meet the needs of its people through domestic production.*

6. *The development of the capacity to meet Government spending needs from domestically generated revenues.*

7. *The rapid increase in the equal and active participation of women in all forms of economic and social activity.*

8. *Ensuring Government control and participation in those sectors of the economy where control is necessary to achieve the desired pattern of sociol and economic development.*

5.4 Social policy objectives

PNG's social policies are based on objectives that include enhanced quality of life, maintenance of traditional PNG culture and a more uniform distribution of wealth to eliminate poverty. All policies emphasise the need, according to the PNG Way (Box 6), to avoid types of change that are unacceptable to local communities.

5.5 General Indicators

General Indicators

At this general level, with outcomes differentiated according to gender, indicators of progress include:

Quality of Life

Economic:

1. *Rising GDP per capita;*
2. *A closing of the gap between rich and poor people as indicated by a 'Gini' co-efficient of income;*
3. *The presence and periodic revision of a range of development and improvement plans;*
4. *Increased access to resources, such as training, equipment and credit.*

Social:

4. *Increasing life expectancy;*
5. *Declining infant and maternal mortality;*
6. *Increased number of schools and hospitals per 1000 head of population;*
7. *Decreasing level of malnutrition;*

Environmental Quality:

8. *The presence of periodically reviewed land-use and resource development strategies;*
9. *Declining population pressure on forests;*
10. *Improved or stable water quality and soil condition;*
11. *Status of apex indicator species.*

WHAT WE COULD DO

6. Forest Development Opportunities

There are many opportunities to develop further the forests of Papua New Guinea. Not all are based upon improved harvesting and reforestation practices, or on improved downstream processing. However, in some cases, modification or replacement of forest cover to increase the quality and value of products may be appropriate.

Non-wood options include:

- the development of some appropriate forest areas to support sustainable agriculture and fisheries;
- the development of markets for non-wood products like bark, rattan, industrial and traditional medicines, mushrooms, orchids and butterflies;
- the development of national and international tourism as a means to increase local revenue;
- international conservation agreements could be developed into a significant source of revenue for local people;
- the development of non-forest uses such as water storage and hydro-power generation, dams for urban areas and airports; and
- the use of the genetic diversity of PNG forests to attract royalties.

With appropriate policy changes, there is opportunity for greatly increased efficiency together with considerably more value-adding at the local level within the wood-harvesting and processing sectors. Such changes would include sawmilling and furniture production. Additionally, some regions have the potential for development of a plantation sector that focuses on high quality timber. Logging also creates opportunities to modify forest cover in ways that improve future options.

Box 6
The PNG Way

The principle of Papua New Guinean Ways is entrenched in the Constitution of PNG as the 5th of the Five Directive Principles (see Box 3). It reads

Papua New Guinean Ways
"PNG should achieve development primarily through the use of PNG forms of social, political and economic organisation."

This means that PNG should closely follow its customs and beliefs and organisational forms in the quest for development. PNG Ways calls for:

"A fundamental reorientation towards PNG forms of participation, consultation and consensus and a continuous renewal of responsiveness of these institutions to the needs and attitudes of the people.

"... appreciation of traditional ways of life and culture, including language, in all their richness and variety.

"... traditional villages and communities to remain as viable units of PNG society and for active steps to be taken to improve their cultural, social, economic and ethical quality."

To ensure that these are enforceable the Constitution of PNG requires the legal system to recognise established customs and customary law.

In practical terms, PNG Ways, which emphasize local consultation before the final decisions are taken, should be used when dealing with issues and disputes. Resolution of land ownership disputes and compensation issues, for example, should take into account traditional ownership and usages and attempt to follow closely customary dispute settlement procedures. It is critical, however, that the important PNG Ways Principle does not become an excuse for inaction.

7. Recognize Constraints to Achieving Sustainable Development of PNG's Tropical Rainforests

There are two ways to look at constraints to sustainable development. The first way is from the perspective of the bottom-up political process or PNG Way, characterized by extensive community involvement in decision-making and the immediate distribution of income throughout the clan.

The other perspective takes a top-down view and recognizes the role of government in facilitating structural change and the promotion of development.

Recognizing these two routes for decision-making, the following are some constraints to sustainable development.

- A basic problem facing EESSTRU is the often conflicting institutional objectives of relevant departments, non-governmental organisations and community groups. Some emphasize economic objectives while others focus on conservation or social objectives. The result of conflicting directions is that the country's resources are often either over or under-utilized.
- There is also a lack of political will to develop along the PNG Way.
- The population growth rate

of between 2.2 and 2.4 per cent per annum is placing pressure on forest resources. For GDP per capita to remain the same from year to year the volume of economic activity has to increase commensurately.

- A sizeable percentage of the PNG population is concerned mainly with day-to-day survival and with overcoming poverty rather than with preserving resources for future generations.
- There is also a lack of awareness, knowledge and understanding amor g local owners of the real costs of unsustainable development coupled with unrealistic expectations regarding returns.
- There are inconsistencies between locally recognised land ownership customs and the way that government is formalizing these arrangements. For example, in some matriarchal societies women are the traditional owners but much of the forest use and development is undertaken by men.
- At other levels, there are inconsistencies between legislative arrangements, national forest policies, and environmental management plans.
- There is a lack of data about and understanding of forest resources and ecosystems.
- Also a problem is the lack of trained personnel and resources to carry out the essential tasks of project design, data generation, evaluation and monitoring of projects.
- The large number of languages and differing customs make participation in policy decisions difficult. This great diversity also makes the development and implementation of policies that apply to all regions, very difficult.
- A further constraint is inappropriate advice from experts who have not appreciated aspects of PNG social and political realities, especially those that relate to resource use and ownership.
- Also affecting development is the vulnerability of the PNG economy to fluctuations in the international economy, as well as PNG's need to keep terms of trade within acceptable limits and service its debts.

A rapid transition to more sustainable forms of development could be aided by institutional and policy rearrangements.

8. Institutional Options for Improved Forest Use

In searching for the appropriate institutional option or institutional mix to achieve effective implementation of policy towards sustainable development, we are confronted with several cultural and political realities.

First, as noted above, PNG is culturally diverse (illustrated by the large number of languages spoken in the country - 700 plus). This means that cultural practices vary greatly as do responses to change related to development. Examples of these differences can be seen in the complex area of land-ownership and compensation claims.

Second, government operates through a hierarchy of national, provincial, local and/or community governments. While this hierarchy enhances participation by Papua New Guineans in the political process, it can also be a very inefficient policy implementation structure, particularly at the lower levels of government where fund shortages are common and personnel often lack the necessary skills. The challenge is to find methods of operation that reduce existing inefficiencies.

A related area of concern is the devolution of decision-making powers to the provincial and local level. This is a critical question for resource development. For example, how much power and what powers should be given to community governments?

Third, whilst governments tend to be organised by sectors like agriculture, forestry and education, many resource development issues are cross-sectoral in nature. For example, a community may be prepared to allow commercial logging only if the development provides urgently needed roads and schools. This again raises the important issues of the devolution of power to decision-makers at the regional and local level.

HOW WE COULD GET THERE

8.1 Responsibility

The National Forest Policy and subsequent administrative decisions create precedents for a different way to administer forest resource. In particular, decision-making responsibilities and powers will be shared in new ways that give a more appropriate balance between top-down and bottom-up processes.

Landowner needs (basic needs) and local development requirements are often most efficiently recognized by local people. But cross-sectoral issues such as the area of land that must remain in conservation areas require at least a regional or provincial perspective. Similarly, monitoring of land-use activity and enforcement of regulations cannot be done completely at the local level. Some decisions will always need to be taken at national and provincial levels.

Solutions emphasize devolution of some responsibility to provincial governments and greater involvement of non-government organizations and local people. Further progress is dependent on initiatives that will enable local communities, backed by market forces and government regulations, to make and enforce their own decisions.

Indicators

Some indicators of progress towards more effective allocation of responsibility for decision-making include:

1. *Preparation and release of provincial forest policies that emphasize sustainable forest use and are consistent with national policies;*

2. *The existence of national, provincial and local land-use plans that*

   - *are based on local consultative processes,*
   - *address all forms of forest use,*
   - *set targets for the percentage of land to be devoted to each land-use category, and*
   - *recognise the complexity of ecological systems that cross political boundaries;*

3. *The existence of provincial wood harvesting and silvicultural management plans in every province;*

4. *Increasing involvement of local people in the development of logging and re-afforestation plans; and*

5. *Increasing resources for the monitoring and enforcement of forest regulations coupled with high staff morale.*

8.2 Inter-departmental co-ordination

Sustainable development cannot be achieved through the efforts of a single department or organization. It requires an integrated effort by all relevant departments, non-governmental organizations, industry and the community at large. Amongst other things this requires recognition of the fact that forests are not made up of trees alone but of many other species of plants and animals. This biological diversity lends itself to user and usage diversity.

Mechanisms that force independent departments to develop unified policies are part of this recognition. Arrangements that require departments to share information can also reduce conflict. Regular forums, staff exchanges, and memoranda of understanding all have a role to play.

It must be recognised that, in many cases, it is appropriate to allocate constrained powers to individual national departments, as well as provincial or local governments so that decisions are taken and real development begins.

At the same time, EESSTRU has the potential to establish a forum and encourage dialogue on forest-use policies and assist with establishment of an "information clearing house". Such information might include research on forests, on users of forest products, on land-ownership issues, on potential investors in forest development and on downstream processing of forest products.

Indicators

Indicators of interdepartmental and administrative arrangements favourable to sustainable development include:

1. *Delegation of administrative responsibility to a Board with appropriate representation from all interested parties and sectors;*
2. *Regular inter-departmental meetings at the provincial and national level;*
3. *The establishment of an information clearing house;*
4. *The development of broad-based industry/land user Ministerial advisory groups;*
5. *The establishment of interdepartmental advisers for local and community governments, landowners and development companies; and*
6. *Coherence between legislation and published policies.*

8.3 Community involvement

The development of many PNG policies has been dominated by western market-based concepts. In contrast, the PNG Way emphasizes community involvement, participation and management which adequately addresses the concerns of both women and men to ensure that local preferences and aspirations are not ignored. This bottom-up approach facilitates greater community acceptance, as well as faster implementation of programs and policies. Greater community involvement in decision-making also enables local knowledge to be used to make up for the lack of objectively derived information.

The issue here is greater community responsibility for resource management. Most of the solutions involve mechanisms that ensure public participation through the consultation process.

At another level, emphasis on the bottom-up PNG Way provides new challenges for government. For example, while portable sawmills operated by village entrepreneurs are likely to increase value adding at the village level, the prospect of unregulated expansion of their use could result in forest degradation and the loss of important conservation values. The land-use control mechanisms and silvicultural practices necessary to overcome these problems still have to be developed.

Indicators

Indicators of progress towards greater community involvement include:

1. *The greater devolution of power and responsibility to local communities in a manner consistent with national and provincial policies;*

2. *The employment of local negotiators, extension personnel and administrators to facilitate joint planning and regulation;*

3. *The development of mechanisms that enable land-use control to be applied at the village level; and*

4. *Increased involvement of all sectors of the community, and particularly youth and women, in locally-based industries and resource use.*

8.4 Women and forest use

Some parts of PNG operate under a matriarchal system whilst other parts operate under a patriarchal system. Women in Papua New Guinea are responsible for 60-90 per cent of food production and processing and therefore play a critical role in the day-to-day decision-making on the use of forests.

Despite recognition of the seventh of the Eight Aims (see Box 5), the important role of women is often overlooked in policy development. The result is that important community considerations are also overlooked. Also often overlooked is the fact that women have a vast store of traditional knowledge about the uses and types of organic forest products.

Solutions to these problems require the development of formal consultation procedures that ensure that women's knowledge of traditional forest use, forestry products and conservation practises are taken into account. In addition, there is an important role for women within administration, monitoring and extension. Non-government organisations can be particularly effective in facilitating progress in this area.

Indicators

Indicators of progress towards the greater inclusion of women in decision-making and resource management include:

1. *Active training for and involvement of women in all aspects of forestry and forest management demonstrated, for example, by an increasing proportion of women forestry graduates and their retention within the forest profession;*

2. *Increased numbers of women working in forestry together with achievement of Government targets for participation of women in all technical and senior administrative positians;*

3. *Active promotion of women through the development of appropriate role models;*

4. *Establishment of formal mechanisms for consultation with women in all aspects of forestry;*

5. *Movement towards proportional representation of women in negotiating teams supported by mechanisms that require participation in negotiations about forest management and explaitation; and*

6. *Payment of royalties in a manner that requires cheques to be endorsed by all male and female parties to any logging permit.*

9. Policy Options

In addition to the institutional considerations discussed above in section 8, it may be necessary to modify policies that influence resource use and investment to encourage the structural adjustment necessary for sustainable development.

The following sections suggest, issue by issue, the general nature of policies and programs that promote sustainable development. Indicators of progress towards that goal are included in each case. It should be noted that in many cases elements of appropriate policies are already in place.

9.1 Recognizing land ownership and mobilizing resource

Constitutionally, almost all PNG land is under the control of traditional landowners. From a community perspective, therefore, land ownership is not a problem. However, many of the customary land ownership arrangements, whilst recognised, have not been formally documented by the government, which does create problems. The issue is made more complex by the fact that there is no uniform land-tenure system in the country or within provinces.

A separate problem revolves around the issue of providing opportunities for others to use and invest in land.

Forestry developments are possible under two systems of land tenure:

(i) where the government acquires a piece of land through a legal title (state land); and

(ii) where the government has acquired the *right* to harvest the timber from the customary landowners in their customary land through a formal agreement, without having a legal title to the land.

Both of the above systems, because of the lengthy process related to the acquisition of land and the *right* of harvest, can restrict the progress of economic development.

Solutions require arrangements that formalize traditional land ownership and contractually enable other people to use and develop these lands. Contractual arrangements need to be sufficiently secure to encourage investment while being tied to maintenance of resource productivity and environmental quality.

Indicators

Indicators of land tenure arrangements that promote sustainable forms of investment and resource use include:

1. *A formal government commitment to recognize and respect the rights of customary owners;*
2. *Increased social mapping to identify community obligations far resource maintenance and rights to use resources;*
3. *Programs thot train women and men for social mapping and genealogical studies.*
4. *Legislation thot enables national and provincial governments and local communities to lease resource-development and resource-use rights to third parties;*
5. *Legal mechonisms that make secure resource rights conditional upon compliance with obligations and hence make compliance a matter of self-interest;*
6. *A growing land title register and also a growing register of leases and licences;*
7. *Existence of community awareness programs that inform people of the implications of leasing development and use rights to third parties; and*
8. *A declining number of disputes over rights to receive royalties.*

9.2 Integrated land-use planning

There is very little integrated land-use planning at the national level in PNG and none at the provincial level. Plans that simultaneously consider all land-use opportunities are rare and progress is hindered by a lack of data. As a result, significant land-use opportunities are being missed and there is a risk that too much land may end up being allocated to uses that are inconsistent with sustainability objectives.

Land-use planning processes enable governments to direct desired outcomes and protect people and the nation from undesired outcomes. For example, topographic, cultural and biodiversity information can be used to identify which areas are most appropriate for conservation and which areas are most prone to soil erosion and other similar problems. Similarly, the process can be used to determine which areas are most suited for agriculture, tourist development, wood harvesting followed by reforestation, wood processing, tree plantations or urban and industrial development.

Land-use planning is also a useful vehicle for co-ordinating the roles of different departments and governments. Land-use planning forces consideration of all political trade-offs simultaneously and helps to maximise opportunities for sustainable development.

Any final plan is likely to be more acceptable and implementable if all resource owners and all levels of the political hierarchy have had an opportunity to participate in the planning process.

Indicators

Indicators of land-use planning practices likely to promote sustainable resource use and investment include:

1. *Addition of social, economic and ecological information to the PNG Resource Information System [PNGRIS];*

3. *Development of a national strategic plan that sets provincial targets for the total area of land to be allocated to wood harvesting, agriculture, conservation, community forestry etc;*

4. *Existence of provincial and local land-use plans;*

5. *Establishment of an interdepartmental land-use planning group;*

6. *A convergence between national strategic goals and current land-use practice;*

7. *The presence of land-capability classification systems;*

8. *Definition of a permanent national forest estate;*

9. *Mechanisms that promote lacal participation in the planning process;*

10. *Regulations that preclude extractive forms of land use in specified areas; and*

11. *Existence of an appeal system that enables people to oppose development that is inconsistent with local plans.*

9.3 Allocation of development and use rights

One of the most difficult issues in development is to find an efficient and equitable means to create access rights for non-traditional users. Options range from reliance upon Ministerial discretion with intensive negotiation over conditions to market-based tenders where community requirements are prespecified.

A related issue is the setting of royalties, licence fees and rents. Often these arrangements do not keep pace with inflation. Tender processes can make royalty payments less critical as the down-payment tends to offset any deficiencies in the royalty system. Such processes should be designed to prevent the emergence of collusive practices.

Indicators

Indicators of resource allocation procedures that are likely to promote sustainable forms of resource use include

1. *The allocation of new resource rights via overt processes that encourage long-term investment;*
2. *Mechanisms that make resource rights fully transferable;*
3. *Restrictions to ensure that allocation processes give full regard to the interests of local communities; and*
4. *The existence of management prescriptions and resource development bonds to ensure compliance;*

9.4 Resource pricing

Using natural resources without accounting for environmental costs can shift prices in a way that causes environmental degradation. In theory, conservation objectives require that market prices include all the costs of resource use including those associated with environmental degradation and the provision of services.

Whilst some countries are beginning to move towards such a policy framework, changes in this policy direction require careful consideration. From a national viewpoint, faster rates of economic growth may be achieved via the strategic exploitation of the environment and subsequent reclamation when the country is wealthier. If PNG is to forego economic growth in order to satisfy global environmental objectives that are inconsistent with those of its own people then the question arises as to who should compensate the nation for doing this.

Eliminating poverty at the individual level presents a similar challenge. Long-term considerations about environmental quality can be over-ridden by the immediate need for increased income and opportunity. At the same time, subsidies and taxation concessions that are only available to large companies can make it impossible for local communities to develop their own resources. The situation is further complicated by the lack of a local revenue base and the common practice of attaching obligations to build roads and supply infrastructure to logging permits. Some forest charges discourage the adoption of sustainable harvesting and silvicultural practices. Others, however, enhance prospects of achieving these objectives.

Solutions to these problems include: pricing mechanisms that begin to charge people for using the environment; mechanisms that strengthen the links between the economy and the environment; and avenues for payment of compensation to people who give up development opportunities in order to maintain global ecosystems.

Mechanisms that provide compensation are further explored in a later section. They include trade reform, development grants, concessional loans, and global emission rights.

Indicators

Within PNG indicators of progress towards pricing arrangements that promote EESSTRU include:

1. *Pricing arrangements that make sustainable forms of resource use optimal, increase the degree to which consumers and resource users contribute to the costs of environmental degradation, and reveal the costs of resource use to the general public;*
2. *Direct payments to communities that work to maintain conservation values;*
3. *Levies and charges on forest-based commerce to finance enforcement, monitoring and training;*
4. *The phased removal of direct and indirect subsidies and taxes that distort prices; and*
5. *The increased use of market mechanisms to select logging companies.*

9.5 Resource management

Existing resource management policies focus on the need to control industrial forest use. As the extent of small-scale or community forestry increases, new guidelines and land-use regulations will become necessary.

Resource management policies involve a variety of administrative, regulatory and monitoring processes. The lack of guidelines, the lack of resources for monitoring and difficulties in enforcement have been major problems.

Problems also include the failure of resource users to honour contractual agreements and the use of methods that cause environmental degradation. Lack of information about post-logging effects on communities and forest ecosystems has proven a serious impediment to more effective management. Lack of mechanisms for effective land-use control at the community level are another problem.

A key solution lies with systems of rights to resources that provide industry with an economic incentive to improve the environment and manage for sustainability. Another solution lies with more effective guidelines for resource use and the requirement that resource users and developers prepare environmental, logging and similar plans. Increased monitoring and more effective regulations are other avenues for improved compliance. A number of departments are already pursuing these initiatives.

Indicators

Indicators of progress towards more effective resource management include:

1. *Clearer guidelines for resource use at all administrative levels;*
2. *Mandatory preparation of logging plans;*
3. *The existence of management plans for non-wood products;*
4. *Monitoring and enforcement arrangements that limit rates of harvest to sustained yield and force appropriate silvicultural treatment;*
5. *Increased collection and objective analysis of social, environmental and resource use data;*
6. *Expansion of programs to cover all uses;*
7. *Increased use of market-based and regulatory instruments to achieve sustainability objectives;*
8. *Development of more effective regulations and increased capacity to enforce regulations; and*
9. *Formal mechanisms to review and update guidelines to ensure new information is incorporated.*

9.6 Forest impacts of national economic policies

National policies, such as on taxation, exchange rates, and the real interest rate have a major impact on prospects for sustainable development. A high real interest rate encourages investors to ignore the long-term environmental consequences of their actions. Currency overvaluation reduces competitiveness and thereby reduces opportunities for forest industry development. Poorly developed credit markets also act as a disincentive to sustainable forms of forest industry investment.

In addition, the influence of these economic factors on small-scale or community forestry and non-timber uses warrants attention. Subsidies for industrial forestry, for example, tend to suppress opportunities for villagers to develop competitive community forestry systems.

Solutions may lie with lower real interest rates and taxation arrangements that are at least neutral to environmental considerations. Policies that encourage increased value-adding through downstream processing offer further opportunity.

Indicators

Economic policy patterns and trends consistent with EESSTRU objectives include:

1. *Economic conditions that encourage value-adding within PNG;*
2. *Economic conditions that encourage investors to give attention to the long-term consequences of their actions;*
3. *Preparation of trade and market statistics and national accounts in a way that reveals the value of all non-wood products, subsistence activity and resource depletion;*
4. *Economic incentives that do not give industrial forestry an unfair competitive advantage;*
5. *Improved credit markets;*
6. *Increased diversity in local forest-based industries; and*
7. *Increased participation by local communities in the production of goods for export.*

9.7 Conservation

While PNG fully recognizes the importance of environmental management and conservation, suitable policies, legislation and implementation are not fully developed. A National Environment and Conservation Plan based on both sustainable resource use and community protection, and which reflects the needs of both local landowners and the national interest, is still to be developed

There are three major conservation issues within PNG. The first is a lack of areas that are protected from exploitative uses. The second is a general lack of knowledge about forest biodiversity: it is not known whether and how many species are close to extinction and whether or not the situation is improving or getting worse. The third is a lack of knowledge about the impact of logging on forest ecosystems.

Solutions require administrative arrangements that will protect species, maintain biodiversity values and increase knowledge about PNG's flora and fauna. Once implemented, there may be considerable opportunity to use these arrangements to promote tourism and attract international grants and compensation payments.

Recognition of the value of wildlife and wildlife products both to local people and to the national economy is a critical aspect of forest conservation. Sensitive use of this resource including well-managed tourism may be a positive contribution to EESSTRU.

Indicators

Indicators of arrangements likely to enhance conservation objectives include:

1. *Publication of a national conservation strategy that includes criteria for the selection of different classes of conservation areas;*
2. *Land-use policies that require the protection of significant areas of forest;*
3. *Increased numbers of tourists to well-managed areas of high conservation value;*
4. *An increase in the area of land defined as a biosphere reserve, World Heritage Area, national park or other similar area;*
5. *An increase in the number of requests by PNG people to retain their land under conservation status;*
6. *Increased data on the distribution and density of PNG flora and fauna;*
7. *An increase in monitoring activity of impacts of logging on forest systems;*
8. *Information on wildlife use, including the extent of illegal exports; and*
9. *A charge on those who extract forest products for commercial purposes to finance implementation of a natianal monitoring program.*

9.8 Education and public awareness

At present there is a lack of knowledge within the general community about the importance of forests in achieving sustainable economic development, conserving diversity at the ecosystem, species and genetic level and, also, realizing social objectives. Often a lack of basic education and communication abilities hinders these processes.

Solutions involve programs that increase awareness of the consequences of inappropriate use of forest resources at all levels and that improve the general level of education throughout the community. Non government organizations (NGOs) play an important role in enhancing public awareness.

Indicators

Indicators of progress towards greater public awareness and improved education include:

1. *Existence of significant public awareness programs in all provinces;*
2. *Mandatory public consultation procedures;*
3. *Increased entry into secondary level education with an emphasis on technical and vocational training for forestry;*
4. *Increased environmental and resource management content in all courses;*
5. *Increased numbers of adequately trained supervisors and managers;*
6. *Effective liaison between NGOs and government agencies;*
7. *Increased interest and commitment to community forestry;*
8. *Development of postgraduate and extension courses in industrial forestry, community forestry and environmental science;*
9. *Emphasis on the necessary conditions for sustainable forest use and the environment in course structures; and*
10. *Inclusion of sustainable development concepts in primary and secondary curricula.*

9.9 Human resource development

The success of any development program largely depends upon its manpower capacity and expertise. Inappropriate management and utilization of forest resources and the forest environment is often due to either a shortage of personnel or inadequate training.

To overcome this constraint, agencies involved in the management and utilization of forest resources and the environment can develop appropriate training strategies, including the specialized training of nationals at reputable overseas institutions. Collaborative programmes with overseas institutions, which involve exchange of scientists and attachment training, tend to increase the degree of expertise available to PNG administrators.

Indicators

Indicators of progress in the development of human resources include:

1. *Increased human resources capacity and training;*
2. *Availability of information regarding forest management and utilization;*
3. *Reduction of forest and environmental hazards; and*
4. *Increased proportion of staff with post-graduate qualifications.*

9.10 Research

The achievement of many of the objectives of EESSTRU will require an increase in the research effort in PNG. At the moment government agencies have been forced to make decisions with very limited information. This has resulted in significant degradation of the environment and of the productive potential of some forests. A related problem is the lack of integrated social, economic and environmental research.

Policy areas related to forest use that require an adequate research base include: social disruption; land-use; optimum forest management systems; environmental protection; ecosystem processes; public awareness; new forest based industries; and entrenching the PNG Way into political systems. Another vital area is research that increases understanding about the silvicultural and growth responses of natural forests under alternative logging regimes.

The effectiveness of the total research effort can be improved with astute direction, increased funding from national and international sources and the strengthening of links between researchers and practitioners. Collaboration with international research organisations and universities can also improve the effectiveness of research.

Particularly important is socio-economic research into community perceptions, social structures, economic expectations and likely responses to policy proposals.

Organisations that are capable of undertaking such work include the Department of Conservation and Environment, the Forest Research Institute (Department of Forests), the PNG University of Technology, the University of PNG and most non-government organizations.

Indicators

Indicators of research effort that will assist the development of EESSTRU include:

1. *An increase in funding for ecological and socio-economic research on forest issues;*
2. *Technology transfer as a supplement to research;*
3. *An increase in the number of scientists with postgraduate qualifications employed in forest related activities;*
4. *Formal research co-ordination;*
5. *The development of management systems and policies that take greater account of local environmental and social conditions;*
6. *Increase in research publications by PNG nationals;*
7. *An improved database on forest ecological production and socio-economic information;*
8. *The development of formal mechanisms for the transfer of research results into applications for adoption by landowners, including a national clearing house;*
9. *Increased research personnel at the technical and scientific levels; and*
10. *Administrative arrangements that establish integrated research priorities and direct research effort into these priority areas.*

10. Global Opportunities

PNG is an increasingly active member of the international community and inevitably will be caught in the global issues related to environment and economic development.

PNG has an urgent need to develop its economy and eradicate poverty. Unaided, however, it does not have the capacity to achieve these goals without degrading or clearing more of its forests and logging substantial parts of them. The international community stands to be affected by PNG forest degradation, through such effects as global warming. It therefore has an obligation to compensate PNG landowners when they agree not to clear or log their forests.

Progress in these areas will be dependent upon global recognition of PNG's role in maintaining ecological processes and biodiversity values. Within PNG, ratification of the World Heritage Agreement could aid this process.

A related issue is the potential of PNG forests to provide improved medicines and other useful products for use in other countries. Royalties in return for rights to use these resources offer another way to increase prospects for national development.

Another issue is that of technology transfer, especially in those areas which would enhance the development of alternative forest practices and speed the transition to sustained yield management of timber.

An area of action for industrialized countries is the recognition of international common interest in the dismantling of punitive tariffs that suppress opportunities for PNG to process and add value to its timber. Tariffs on furniture but not unprocessed timber, for example, make it more difficult for Papua New Guinea to develop its own manufacturing base and force it to erect tariff barriers. In short, the development of PNG's forests and its economy will be well served by a multi-lateral reduction of barriers to trade across all countries. Thus, a successful conclusion to the Uruguay round of negotiations over the General Agreement on Tariffs and Trade (GATT) could make a major contribution towards prospects for EESSTRU in PNG.

Indicators

Indicators of progress towards arrangements that strengthen PNG's contribution to the conservation of the global commons include:

1. *A reduction in industrial country tariff barriers for manufactured products that contain forest resources;*
2. *International transfer payments that compensate PNG for the development opportunities that it foregoes in order to contribute to global conservation objectives;*
3. *PNG ratification of international conventions on climate change, sustainable development, forest maintenance and genetic patent rights; and*
4. *PNG ratification of the World Heritage Agreement.*

ACCEPTING THE CHALLENGE

11. Challenges for the future

The above blueprint offers a framework which, even if implemented gradually, will bring sustainable resource use and investment to the forefront of policy formulation throughout PNG. Attention to the indicators will focus that effort.

The challenge now is to convince the people who depend upon PNG forests and those who seek to profit from them that the interests of future generations are as important as the interests of those alive today. Through attention to economic efficiency, social equity and environmental integrity it is possible to achieve economic development without environmental degradation and to ensure that the economic progress sought by all Papua New Guineans will be sustainable.

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Appendix 1

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