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PAPUA NEW GUINEA

COUNTRY REPORT

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PAPUA NEW GUINEA
COUNTRY REPORT

Policy and Implementation.

Policy

The Government of Papua New Guinea passed an environment and conservation policy statement in September 1975, following the adoption of an explicit reference to environmental matters in the Five National Goals and Directive Principles of the Constitution.

The Fourth Goal is:

"We declare our fourth goal to be for Papua New Guinea's natural resources and environment to be conserved and used for the collective benefit of us all, and be replenished for the benefit of future generations".

"We accordingly call for:-

- (1) Wise use to be made of our natural resources and the environment in and on the land or seabed, in the sea, under the land, and in the air, in the interests of our development and in trust for future generations and,
- (2) the conservation and replenishment, for the benefit of ourselves and posterity, of the environment and its sacred, scenic and historical qualities; and
- (3) all necessary steps to be taken to give adequate protection to all our valued birds, animals, fish, insects, plants and trees".

Following this declaration of government concern in the environmental protection area, the "Environmental Policy - Statement of Principles" was passed by the national Executive Council and endorsed by the Parliament, (copy enclosed).

In addition to the Fourth National Goal, there is provision in the First and Fifth National Goals for preservation of the cultural environment through the preservation of Papua New Guinean forms of organization, and for the need for public participation in decision making.

Government policy on development is summarised in the National Development Strategy which outlines a five year plan to deal with the Eight National Aims which are further summarised in the Strategic Objectives under the National Public Expenditure plan which lists nine objectives under which future increased government expenditure arising from increased economic activity would be channelled. One of these objectives is environmental management. Unfortunately to date, none of these strategic objectives have been further detailed in order that activities under them may be prioritized.

Within each governmental sectoral area, there has been consideration of appropriate policy for mineral development, and forestry development and other areas.

The major task for government in the short term in the planning area, is to further define the elements of policy within the nine strategic objectives to further elaborate how each department or agency of government may be guided to provide the most appropriate projects according to these guidelines. In respect to social planning, there exists no document detailing the

Fifth National Goal and Directive Principle concepts.

Legislation

Following on from the national environmental policy document, the National Parliament of Papua New Guinea, passed three pieces of legislation in July 1978.

(A) The Environmental Planning Act which seeks to provide the framework under which an environmental planning process may be invoked where there is some concern for the need for planning on a sustained resource management basis. The purpose of the act is to encourage voluntary environmental planning within institutions engaged in development and there are several incentives within the act to encourage this kind of planning. Where the Minister is satisfied that this kind of planning has not taken place he may issue a requisition under the Act to require the production of a planning document according to guidelines established in regulation and for a procedure of public involvement in the decision making process.

(B) The Environmental Contaminants Act, covers the many areas of environmental pollution which in other countries are often covered under separate pieces of legislation. The legislation provides for a licencing process for water, air and land pollution. Noise pollution is prohibited and littering, setting fires in certain areas, and other materials, including pesticides, are covered under the act including radioactive materials. There are general prohibitions with in the act on pollution with heavy fines for violations. To date, only certain sections of the Act have been applied owing to a dearth of staff to implement the administrative machinery.

(C) The Conservation Areas Act provides for the protection of certain areas and the encouragement of land use planning within those areas to promote sustained resource management to the maximum degree possible. It is intended to provide the type of protection that is provided by national parks in other countries but is hampered in PNG by the traditional land holding patterns. The Act also provides for the establishment of a Conservation Council to provide advice to the government on future direction in environmental and conservation policy. In addition to these three Acts, the following have been in effect.

(D) The National Parks Act to provide for the establishment of National Parks reserve areas.

(E) The Fauna Protection and Control Act provides for the control of hunting and sale of animal products and allows for the establishment of reserve areas. The Act also provides for the protection of certain species such as several species of birds, butterflies and mammals. There is also legislation protecting aspects of the marine environment. In addition to the above legislation there remain in effect traditional rules at the village level which seek to protect environmental values. Little is yet known of these rules but research is about to be undertaken in this area.

Other than regulations, particularly under the Environmental Contaminants Act, it is unlikely that further legislation will be required except possibly in respect to flora conservation.

Papua New Guinea is a member of the following conventions in respect of environmental and conservation matters:-

- (1) International Convention for the Prevention of Pollution of the Sea by Oil, 1954 and the amendments thereto.
- (2) International Convention on Civil Liability for Oil Pollution damage, 1969.
- (3) International Convention on the Establishment of an International Fund for Compensation for Oil, 1971.
- (4) Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972.
- (5) Convention on International Trade in Endangered Species of Wild Flora and Fauna.
- (6) Convention on Conservation of Nature in the South Pacific, 1976.

Other conventions that could be applied to the South Pacific area in the future should deal with the transport and use of toxic substances including nuclear materials and the adoption of standards minimum for discharges into regional seas. Perhaps the South Pacific area could be the first to standardize practices in relation to forest exploitation and in relation to utilization of marine products within economic zones.

Planning.

With respect to planning, even though the guidelines of the Environmental Planning Act only came into effect in May 1980, the act and the activities leading up to its passage and subsequent to its passage have had considerable effects on the development planning process.

At present, funding for new activities within the government sphere is largely through the National Public Expenditure Process which permits the funding of projects after an evaluation by the National Planning Office and other concerned agencies. In this respect, the Office of Environment is a member of the evaluation committee which is responsible for undertaking a preliminary examination of the project to be considered, and considering whether an environmental plan will be required. If there are serious enough problems associated with the project, it may not be approved for funding at all. Since virtually all potentially damaging projects will pass through the NPEP process, this can be an effective method for screening projects with environmentally damaging side effects or projects proposed without a careful consideration of energy usage and sustained resource management principles. To date, this screening has been imperfect because of a National Planning Office view that the concerns of this evaluation committee are "optional" to their own recommendations on these matters and the views of the committee can and have been overridden. It is expected that this may change once it is clear that the Environmental Planning Act will be invoked where the views of the Office of Environment are not taken into account.

It is envisaged that requisitions under the Environmental Planning Act will be issued only where there has not been voluntary planning by project proponents.

Broad range land use planning has not been undertaken to date in Papua New Guinea, although some provinces have shown more interest in this concept than the national government. Manus and Enga

provinces have shown interest in more detailed future oriented land use planning. At the national level, the Office of Environment is establishing a resource inventory section which will be responsible for undertaking planning in connection with any large scale natural resource development projects or where a conservation or other kind of protected area is being considered. There is a section within the Department of Lands that was established for this purpose but it has never received great support.

As a rule, since the Environmental Planning Act was passed in 1978, all major resource development projects have required an environmental assessment. The quality of these reports have varied with the time available within the Office of Environment to scrutinize each one and the limited staff availability to scrutinize all aspects of the plans. To date, the response from other government departments in undertaking this kind of planning has been very encouraging. The next stage is the application of the process to the policy planning process itself so that government planning will be more responsive to the National Goals and Directive principles and so that appropriate projects will be proposed in future. The major effort over the next few years will be to improve the planning capabilities of provincial governments, which have shown to date, in several provinces, a desire to be more involved in planning within their boundaries, but to date have lacked the expertise and methodologies for incorporation of these factors in planning.

Administration.

All departments of government are expected to heed the environmental policy and the Five National Goals and Directive Principles

of the Constitution. The Office of Environment is intended to act as the watchdog agency to ensure that the government's policy is carried out through the Environmental Planning Act. Since the Act was passed in 1978, and even though not having been brought into force, it has had considerable effects on the shape of many kinds of development. However it has not yet affected in many cases the style of development, and it has not as yet promoted the kind of development that the five National Goals indicate is appropriate for Papua New Guinea. It is this fundamental reorientation of development policies to fit the environmental planning framework which is the next major task for the environmental legislation.

In undertaking environmental planning there remains a dearth of expertise in natural sciences, although this is rapidly improving, but particularly in the social sciences where there has not as yet evolved a viewpoint on the shape of development that fits best into the concepts of sustained resource management. The University of Papua New Guinea has recently created a core course in environmental science and hopefully the graduates from this background will have a fuller understanding of the many facets and effects of contemporary kinds of development planning. The Office of Environment, which now includes the divisions of Wildlife and National Parks, is now undergoing a reorganization to better suit the activities of the Office to revolve largely around the priorities of the Environmental Planning Act and the encouragement of grass roots provincial-based natural resource planning.

Assessment

The most outstanding environmental problems facing Papua New Guinea at the present time are forest depletion, both from subsistence activities and commercial logging; soil conservation and soil fertility problems in the Highlands and consequent forest depletion, and degradatory activities associated with other large scale mining and agricultural projects. In these latter areas the social environment is of particular importance and there is a very real need to develop in a pattern appropriate to Papua New Guinea's social context. This is particularly difficult in dealing with large scale agricultural activities, where models of development are imported directly from other countries whose development style is inappropriate to Papua New Guinea. It is considered that many of these problems may be largely rectified with the imposition of the Environmental Planning Act and voluntary submissions under the legislation.

However, problems associated with subsistence activities are much more difficult. With this in view the Office of Environment is working to build up its capacity in dissemination of environmental information particularly geared to village people and the population program of the government, which is also located within the Office of Environment, to deal with the effects of an exploding population in Papua New Guinea which has its inevitable effects on rural resources.

Particularly in the forestry field there will be continuing pressure on Papua New Guinea in the years ahead to exploit the forestry resource as other South East Asian areas are rapidly depleted. Similarly, with power costs increasing rapidly,

Papua New Guinea's hydro-electric potential will become increasingly attractive for overseas investors.

Urban areas are impacted by the usual problems associated with too rapid uncontrolled growth, including problems of sewage, improperly controlled effluents from factories, and effluents from automobiles and improper housing conditions.

In rural areas, problems are associated with subsistence activities in relation to excessive soil and forest exploitation and in connection with uses of pesticides for rural cash crops, and water pollution from decentralized agricultural activities.

Research and Monitoring

Some research and monitoring is taking place in connection with one large scale mining project and will also be undertaken in the course of another major mining development. In other cases the capacity for monitoring and research is very limited due to the lack of experienced personnel and the high cost of such expertise unless undertaken as part of a major mineral development. The Bureau of Water Resources of the Department of Minerals and Energy has the equipment and manpower to undertake much of this work, but to date this has only been applied for measurement of water quantity rather than water quality. It is hoped that after the reorganization of the Office of Environment the Resource Inventory section will be in a much better position to undertake these kinds of activity.

Management

Soil - The Office of Environment, as part of a new program this year will be instituting needed educational efforts in the area

of soil conservation. In several areas of the country the situation in respect to soils has become critical particularly in Simbu and East New Britain Provinces and other localized areas where soil erosion has become an increasing problem because of intensified subsistence activities. The Department of Primary Industry has a soil and land use assessment section but to date this has only been used for determining capabilities for land use in areas where major agricultural projects have been proposed. It is expected that the soil conservation program will be applied in the areas of most evident strain, where there will be research and improvement on traditional methods of soil (and nutrient) management.

Water (catchments and groundwater) - The Office of Environment has been attempting a closer link with the Bureau of Water Resources of the Department of Minerals and Energy to encourage more comprehensive water resource and water basin management. The work of this organization to date has been largely to assess future hydro-electric potential on Papua New Guinea's rivers. The concepts of more integrated water basin management are understood; however, with the exception of the Laloki River outside of Port Moresby, the need for river basin management has not become critically evident as yet. Legislation exists to regulate water resources but to date the penalties have been insignificant enough for licensees to ignore, and thus we now have a power crisis in Port Moresby caused by the inability of the government to apply the Act. Because of the generally high rainfall in Papua New Guinea with the exception of the Port Moresby area, the conflicts in the use of water resources are not as apparent here as they would be in much drier areas. However, because of the mountainous terrain

combined with this high rainfall, Papua New Guinea now possesses the second highest hydro-electric potential in the world (after Nepal), and certainly in the future this would lead to considerable resource allocation problems when there is a wish to develop this resource. Water pollution, except in connection with some urban areas and localized industrial sites has not been too serious a problem to be rectified, once staff is available in the environmental protection section of the Office of Environment and Conservation.

In the Highlands areas, there exists problems from domestic waste and from coffee pulping which is often done in close proximity to streams. The coffee pulping problem is easily correctable with enough staff. Oil palm mill effluent is also a significant problem.

During the negotiation of the Ok Tedi agreement there was considerable concern for the effects of tailings disposal, however the total tailings to be disposed down river will be considerably smaller than originally envisaged.

Crops - At present there has been largely uncontrolled use of pesticides in Papua New Guinea, and there have been several accidents involving pesticide usage to date. This is intended to be one of the first priorities of the Environmental Contaminants Act, however, since personnel have not been approved by the Public Service Commission it will likely go unenforced until this approval is forthcoming. Crops are being planted in nuclear estates and on smallholder sections after the completion of logging. Significant areas of lowland forest are increasingly being taken over for rubber plantations and

oil palm plantations. This is especially notable in West New Britain where there has been large scale deforestation for logging and then replacement by oil palm settlement.

In the Highlands there have been increased planting of coffee which is a major cash earner in that part of the country. However, cocoa and coconut planting have eased off over the past few years and there is increasing concern over the lack of management skills for these crops in plantations that have been repossessed by traditional owners.

Animal Husbandary - From the social and economic perspective the introduction of cattle has been most unsuccessful to date in Papua New Guinea. Smallholder cattle ownership has largely been a failure because of the different priorities which village people have placed on cattle ownership which has often meant that cattle have often gone feral and the economic perspective has been of secondary importance as cattle replace pigs as a symbol of affluence. Recently policy emphasis has been on ranch management on existing grasslands throughout the country. Since in this part of the world there is an overabundance of cattle and export capacity for beef is most unlikely, the South and Central American experience is unlikely to be repeated here.

Sheep have been introduced in the Highlands and there is some concern over the ecological effects of their introduction to Papua New Guinea. Environment Officers have recently done a reconnaissance of this problem. It appears because of the smaller husbandry requirements for this animal it is likely to be more successful in the village setting than cattle.

The possibility of overgrazing exists and more investigation of the social aspects of the introduction will have to be conducted. There may be an opportunity for fostering agro-forestry projects with the distribution of sheep where kunai grasslands have been rehabilitated for sheep grazing. The major ecological stresspoint for the sheep in the future may be where old garden land is turned over to the sheep and thereby not allowed to lie fallow and then once again used in the future for vegetable production, thus increasing the total lands deforested for new garden sites. This will have to be more closely investigated.

Of more concern is the possible introduction of goats. Up until this year it has been the policy of the Department of Primary Industry not to encourage goats within the country, however there has been a change of policy in the past year without adequate reason. Aside from ecological damage that is associated with goats they have not in the past been popular in village areas in Papua New Guinea because of their ability to climb fences and eat from gardens. The Office of Environment, should this NPEP proposal be approved, have notified that this change of policy will be subject to the Environmental Planning Act and this will likely provide the first opportunity to issue a requisition under the legislation.

Pigs, have long been of fundamental importance in PNG and in localized areas where they are plentiful, have caused damage.

Some buffalo have been used in Papua New Guinea but because of the lack of animal husbandry experience in Papua New Guinea, have never become a popular draft animal. A similar situation exists with horses.

Only the introduction of chickens can be considered an unmitigated success in Papua New Guinea in the animal management area.

Forests - Represent the most critical environmental situation for Papua New Guinea in the near term future as in other South East Asian countries. The methods of tropical forest exploitation evolved to date are not consistent with long term resource management and it will likely always be difficult to achieve this until there is more of a united effort by tropical countries to standardize the methods of operations of these logging firms and until the economics of the industry are geared to an environmentally sound manner of production. The forest area represents the most serious environmental threat to Papua New Guinea in the short term. Significant areas of timber rights have been purchased by the government and, because of the royalty provisions on timber production are a very attractive development proposition for provincial government.

Despite the fact that compared to other kinds of development, there are less revenues associated with this kind of forestry, provincial governments are greatly encouraged by the tax structure to become involved in them.

Papua New Guinea, in comparison to other countries maintains some of the least disturbed tropical forests in the world. At the higher altitudes in central New Guinea there has been considerable deforestation from subsistence activities. Some reforestation has taken place in conjunction with the plywood sawmilling industry in the Bulolo area of Morobe Province. More consideration is now being given to reforestation for

fuelwood cropping, particularly in the Highlands where there has been scarcity of trees in some areas. Unregulated fuelwood cropping has also taken place in connection with fuel for tea factories in the Highlands.

Timber rights purchases have been made in several areas of the country and the haste with which they are being used is a subject of some concern.

Mangroves - The mangrove resource in Papua New Guinea is in probably better condition than any other country in the world. The areas where the major mangrove resources are to be found are sparsely populated and in other areas forest resources are significant enough that there is little threat to the mangroves as a fuelwood alternative. There are some exceptions to this in the Port Moresby area. From time to time there has been some investigation of the commercial possibilities of the mangrove resource, but nothing at this point would suggest that they are greatly endangered. Certain studies of the mangrove resource have been undertaken in connection with the Purari River basin environmental studies and as an adjunct of the UNESCO MAB program.

Reefs and Lagoons - Except in some urban areas, Papua New Guinea's reefs and lagoon areas have remained relatively free from extensive damage from either over-exploitation for subsistence or commercial purposes. With the exception of Port Moresby, there is little collection of shells and reef products for the tourist trade nor is there substantial export of such material which requires a permit from the conservator of Fauna. From time to time there has been interest in a more intensive exploitation

of these resources by outside investors, however, none of these ventures have been approved as this is seen to be more appropriate as a village-based industry. As there is little large-scale manufacturing activity in Papua New Guinea with the exception of the Bougainville copper mine, there has been little effect on reefs from such activities. Tailing effluent from the Bougainville mine is known to have caused some problems in the Empress Augusta Bay area. Papua New Guinea is not on the shipping route for major oil tankers and so has been spared instances of major oil spills although there have been localized incidents with non-tanker traffic, particularly in the Milne Bay area which have caused oil damage to reefs.

Fisheries - There has been considerable concern in several coastal areas from overseas fishing boats depleting inshore resources and particularly in the Central Province there has been concern about the issuance of licences for these foreign fishing vessels. Two years ago Manus Province rejected a proposed tuna cannery, on several grounds but one of the most important was the potential effect of the bait fishery on the subsistence fishery of the island. Papua New Guinea is actively seeking to develop its economic zone fishery primarily through licencing of foreign vessels, but also through the development of the tuna cannery which now has been relocated to New Ireland. The relationship between the offshore and inshore fisheries must be more closely studied. There is little threat from pollution to the fishery, except perhaps from continuing nuclear dumping and testing and the cumulative impacts that might result from this activity.

Conservation, Parks and Reserves - There are three types of management area in Papua New Guinea: (A) National Parks comprise a very small percentage of Papua New Guinea's total land area and there are four National Parks in existence all of an extremely small size. Papua New Guinea's land tenure situation make it extremely difficult to establish parks within the country. A new marine National Park is now being proposed. (B) Wildlife Management Areas - have been a far more successful concept and in the Papua New Guinea landholding situation, and there are now over thirty such areas throughout the country where local wildlife management committees control hunting and species management under the authority of the Minister for Environment and Conservation. (C) Conservation Areas - are basically an extension of the Wildlife Management Area concept into habitat preservation and land use management. Unfortunately a lack of staff has prevented a full-scale implementation of this concept although there has been shown to be a great interest at the village level.

At the general level, Papua New Guinea's situation in the nature conservation area, despite the lack of reserve areas is an enviable one. A very low population per land area allows for the continued enviable status for flora and fauna throughout major areas of the country.

One exception to this, is the Alexandria birdwing butterfly, the world's largest butterfly, which because of its limited habitat in the Northern Province, is threatened with extinction because of the activities in relation to logging and oil palm plantations. Planning now being undertaken in connection with a projected major timber project will include provisions for

a major protected area, to be supplemented by planting the butterfly's food plant.

It may also be true, because of lack of baseline data, that more unspectacular species may have been effected in some areas, particularly in West New Britain where there has been significant clearing of tropical forest both for logging and oil palm plantations. The recent agreement for a major timbering operation on this coast did include a fauna survey the results of which played a considerable role in the subsequent land use plan and forest working plan.

It is notable that the demand for reserve areas usually comes as a result of development activity in areas of overuse for subsistence purposes.

Endangered species - There are several protected species in Papua New Guinea although their protected status does not necessarily indicate their endangered status. For example, all species of Birds of Paradise are protected although there is no suggestion, except perhaps for one, that they are endangered. Again, there may simply be a lack of baseline data which would give a brighter picture than actually warranted. However, it is not likely that many terrestrial species would have been greatly affected by habitat destruction, although in some localized areas this would be true and also from over hunting. Fairly strict control on the use of firearms has also allowed for an even balance for species. Marine mammals represent the area best documented where there may be potential problems for the future. Both dugongs and marine turtles are under stress

in Papua New Guinea as in other parts of the world, although relatively in a far better state here. The Wildlife branch has an active program to inform and protect these creatures.

Papua New Guinea is the only country exempted from the ban on trading in crocodile skins because of the general abundance of the species in Papua New Guinea and a program to encourage more crocodile farming.

The healthy state of Papua New Guinea's species populations can be attributed to both the few people in relation to land area and the small mammalian populations that might otherwise be a target for subsistence hunting and other activities.

Local energy sources - As mentioned earlier Papua New Guinea has a huge hydro-electric power resource which remains largely untapped, but will likely become of interest at some time for industrial purposes which require cheap sources of power. The Department of Minerals and Energy over the past few years has been actively looking for domestic replacement of imported fossil fuels. As prices of fossil fuels increase here other options may be expected to become more attractive. Solar uses are also being extensively researched.

Minerals - Papua New Guinea appears to be richly endowed from a mineral standpoint compared to many of its Pacific neighbours. Large deposits of copper and gold exist in the country and both metals at different historical times have been the backbone of the Papua New Guinea economy. Mineral exploration is still continuing and it appears that the recent development of the

Ok Tedi area has spurred more interest in Papua New Guinea by other mining companies. Gas and oil exploration has been undertaken to a minor degree in the Western Province and Gulf of Papua area but nothing of commercial interest has become evident. More exploration will be commenced in the next few years.

In addition to copper and gold, significant quantities of nickel and chromate have been located, as well as abundant quantities of limestone for cement production.

Human resources - Except in some urban areas notably Port Moresby and Lae there is a significant shortage of labour throughout the country and there is a continuing concern that some of the new development projects will have difficulty in recruiting labour particularly if too many schemes come on stream too quickly. The drain on male labour is causing problems in village areas in some parts of the country where the women must do all the work including that which was formerly done by men. Because of the stresses this has caused, particularly in gardening, malnutrition is increasing.

In Port Moresby and Lae there are significant problems of unemployment which may be contributing to a major crime problem in both cities, and it is becoming a common assumption that because there are unemployed in both cities that it is symptomatic of the whole country.

The solution to these urban-rural imbalances is to once again promote development at the rural level with an increased proportion of development assistance to the village area, but as in so many other developing countries this has been extremely difficult to achieve.

Infrastructure - Papua New Guinea has a sea, highway and air transport system which is imperfectly balanced. A disproportionate amount of government revenues is spent on the air sector particularly to buy large jet aircraft where traffic does not warrant such purchases. At the same time a network of small airfields is kept in operation for smaller aircraft which remain the lifeline for many isolated locations throughout the country. The mountainous nature of the country ensures that this will be the case for sometime. This same alpine terrain, combined with extensive swamps make the maintenance of a road transportation sector extremely expensive. Although roads continue to be built, increased fuel costs and maintenance costs will require much more careful scrutiny of the priorities for road construction. Sea transportation and inter-island sea transport is not as well developed as it could be and there remains serious deficiencies in safety standards for this industry. Despite the fact that it is by far the most economic method of transport throughout the country it still receives relatively little development attention through government funding.

The development of electricity has run into serious difficulties lately because of poor planning. Excessive draining of the Sirinumu Dam which supplies Port Moresby, has left the city facing a major power crisis over the next few years until the reservoir can be filled up again. An emergency gas turbine is continually breaking down because of lack of maintenance staff and spare parts. In other parts of the country, diesel fired generators which are old and in need of replacement break down regularly and is a source of continuing discontent

in these centres. The electricity authority is now bankrupt and it is expected that an increase in tariffs by 50% will be required to pay for fuel for the Port Moresby generator and repairs of other generating equipment in other parts of the country.

Major Development Trends

Human Settlements - The growth of Port Moresby and Lae in particular are causing severe strains on urban resources and the unplanned and uncoordinated growth of these areas are causing the expected problems in infrastructure requirements that have been evidenced in other urban areas throughout the developing world. The most serious from the environmental point of view include, pollution from domestic waste at points of sea outfall, increased air pollution from unregulated traffic, littering, energy and electricity problems as mentioned in the previous section, fuel wood shortages are becoming evident in Port Moresby. Lae has examples of the kinds of problems associated with urban growth. Cutting of firewood in the hills behind the city and gardening activity is causing flooding of one of the local rivers during the wet season endangering bridges and housing settlements, as flood waters sweep through the city. Because of the dryness in Port Moresby, similar problems have not occurred there, however strain on urban infrastructure has caused other kinds of problems.

Industrial Development - Papua New Guinea is an increasingly attractive site for development because of its hard monetary

policies and generally stable atmosphere for investment. This combined with a favourable natural resource endowment, make its future quite bright from the industrial development point of view. The major problem for investors is that lack of manpower and particularly unskilled manpower, makes the introduction of highly sophisticated types of development very difficult. At the same time the lack of manpower, makes it difficult for the introduction of intermediate technologies that are labour intensive. The introduction of strict environmental standards has not proved to be a great difficulty to date in industries that have operated in other developed countries. However those industries that have evolved in other tropical developing countries are much more resistant to higher standards, eg. oil palm and coconut processing.

Agriculture - Commercial agriculture on large plantations will likely slow drastically in the next few years through the lack of availability of land for expansion. There are almost no large acreages under government control for expansion of this sector, and perhaps less incentive to since there is so much underutilized production potential from existing plantations. This is especially true with copra and cocoa and major programs are now underway to rehabilitate rundown plantations. Increasingly future production in all cash crops will be coming from village based production, as is now the case for coffee where most is produced from village holdings. The major drawback to this method is the inadequate quality control provisions. Infrastructural costs of smallholder development make the likely applicability of these projects in the future probably very limited.

The use of land for commercial agricultural use must inevitably have effects on subsistence agriculture and there is some concern that when too much land goes into commercial crops that the less stress on food crops causes malnutrition since the money from cash crops does not necessarily go to nutritious foods. The use of cash crops also increases pesticide usage which has already caused several problems including poisonings in several areas of the country. Some areas of the country with heavy population densities are suffering severe difficulties through the depletion of soils and consequent malnutrition.

Forestry - The trend here is for increasing production from the forestry sector even though this may not be the most appropriate time for this activity to take place from the environmental point of view since present practices used in other tropical countries forest exploitation are not conducive to long term sustained productivity. Nonetheless, there is increasing pressure for forest development particularly from provincial governments who receive a disproportionate share of revenue from such development. The forest development area is in drastic need of rationalization to accord with future long term economic prospects for the industry.

Fisheries - There is increased interest by external fishing companies in PNG's resources. The country is assumed to have one of the largest stocks of tuna in the world and significant stocks of other fish. The country will be carefully negotiating future access to these resources.

Management Approaches

At present, because of the lack of manpower available and lack of a serious threat at this point except localized areas in

urban locations, coastal zone management has not as yet received high priority. However with increased interest in fishing opportunities and coral harvesting and reef resources inevitably administrative attention must be given to these areas, especially in areas of high population density.

An oil spill contingency plan is in effect and some equipment is available at all the major ports, however a much more sophisticated plan will be required in the future when there is increased shipping traffic through the region. Papua New Guinea has some interchange with Australia in relation to planning for major oil spills and for the transportation of equipment in the case of major spills, however these are areas which need considerable streamlining. Because of the communication situation for Papua New Guinea in relation to the rest of the South Pacific area, it is likely that Papua New Guinea would have to continue to rely on its own resources in this area with assistance from Australia.

The Office of Environment is responsible for carriage of the government's population information program. At present there is no population policy in Papua New Guinea and the awareness program is really to alert the nation to the problems associated with too large and too rapid population growth and its effects on both natural and human resources in being able to carry out planning priorities.

A Land use planning section exists within the Department of Lands but its activities have been very limited. There is a similar section in the Department of Primary Industry, but it is used only in relation to large scale agricultural developments.

The use of comprehensive natural resource and land use planning as a major tool in development planning is still a long way off however, some provinces notably Manus have shown interest in using this technique to determine future development priorities for the province.

Degraded areas, caused by commercial activity are few in Papua New Guinea, and the costs in relation to the needs for future oriented preventative planning strategies are such that it would be some time before these areas would be rehabilitated. There will undoubtedly be a need in some parts of the Highlands in the near future to undertake reforestation in several areas both for the creation of fuelwood but also to increase lost soil fertility.

Requirements for National Action

Scope for handling of new problems as they become more pressing is provided for in the National Public Expenditure Plan. For example, this year, the Office of Environment has submitted several new projects dealing with Soil Conservation; decentralization of environmental planning to provincial governments; implementation of conservation area planning and Port Moresby urban environmental improvement. Most of these projects would be considered under the environmental management category of the nine strategic objectives. The ability to take on new projects and actions remains severely hampered by the lack of managerial capacity both in the Office and the government as a whole to provide staffing requirements. Support systems and infrastructure (eg. housing in Port Moresby) have now reached a

critical stage, forcing the Office of Environment and other government departments to deal only with the most serious high priority problems.

Education

The Office of Environment has been actively developing an environmental curriculum for the Grades 7 to 12 levels and is responsible for co-ordinating the development of all new environmental education programmes for school children. Some public education programs are now in formulation and some have been done in conjunction with the population awareness program however there remains a critical shortage of personnel to undertake more intensive campaigns at the grass roots level. It is one of the purposes of the soil conservation project to undertake this kind of education. Good liason has been established with the Department of Education to implement much of the school curriculum materials.

Personnel

There is insufficient manpower available at the present time either local or expatriate. This is particularly true in the pollution control field where higher technical skills are required which have not been as yet been achieved by many Papua New Guineans and these are also the fields in which it has always been most difficult to hire expatriates. In the environmental planning field, staff is relatively adequate although the present pace of development leaves these human resources severly strained. It is expected that the situation will last for several years until more appropriately trained graduates are available from tertiary institutions. Particularly in the environmental contaminants field there will be a need for extensively trained personnel.

More extensive training programs are required for public information officers, pollution analysis and technicians and monitors in particular. Officers in the social environment and policy making field need more exposure to alternate types of development especially development styles that are less energy intensive and where there are more possibilities for recycling.

Facilities and Equipment

The amount of equipment for testing both in field and laboratory equipment is quite limited as yet and the human factor is also critical in this area. In other laboratories, quite sophisticated instrumentation is available, as found by a recent consultant to this office investigating the capacity of the government to carry out the environmental contaminants legislation but there continues a crisis in the number of highly trained personnel being required to undertake the work. Much of these equipment could likely be used by other countries for testing of samples for example the University of Technology, Lae laboratory, however transportation problems would likely make this difficult as routine means of sample analysis.

Outside expertise

The major areas of outside expertise that are required are usually in connection with specific industries and learning of potential environmental problems associated with them and those most practicable standards to be applied to the operations. Thus there has been need from time to time to bring in outside consultants to assist in the environmental planning of certain industrial facilities. More and more it is becoming the

responsibility of project proponents to hire their own consultants but the government should continue to hire its own on occasion. Assistance will also be required in the area of development of guidelines under the Environmental Planning Act in the development sectoral plans for the mining and forestry industries and for more specific kinds of industries where desirable in the future. The Office is also seeking to find assistance in the development of recycling legislation or regulation in order to encourage the use of recyclable packaging.

Information

In comparison to other countries, PNG has a great deal of extensive land use information available through the activities of the CSIRO during the Australian administration, covering much of the basic geographical material needed for environmental planning. Flora and fauna data remains much less well developed but is now being gathered in connection with future development projects. The cataloguing of these materials is also very unsatisfactory and as in other technical fields, people with backgrounds in library sciences are difficult to find. Therefore this information is not necessarily in a format easily utilizable for environmental management purposes.

Most of the information now being gathered is in connection with potential development projects, however although this is not the best framework within which to gather this information, it is the most easily fundable.

There may be need for a regional data bank particularly in the marine environment field.

At the moment the Office of Environment and the Institute for Applied Social and Economic Research is undertaking a seminar on "Traditional Conservation Practices in Papua New Guinea; Their implications for contemporary policy making". The results of this seminar may be of special interest to other South Pacific countries which are interested in pursuing a similar exercise.