

South Pacific Regional Environment Programme

Training Unit 11

DEALING WITH DEVELOPERS

USE OF THIS UNIT

Anyone connected with a development project, whether in government or in a rural area, will probably have to deal with the developers. Since people in the Pacific Islands have had little experience in such negotiations, this unit reviews some of the principles and problems involved in dealing with developers. It explains some of the ways that developers have taken advantage of people in the past, based on actual examples from the region. Since part of being a good negotiator is understanding the positions of each participant in the discussion of a development project, the roles and aims of some possible types of participants are discussed.

The material in this unit will be more interesting if it is illustrated with local examples, both of problems in the past with developers and of the procedures used to negotiate a project. If the group leader does not know such examples, then perhaps a local official involved with development projects could be invited to discuss these questions with the group.

EXERCISES

One of the best ways to learn how to deal with developers is to take part in simulated negotiations for a development project. Pick an example of an important development project in a local situation that everyone knows (such as building a cement factory, a sawmill or a fish cannery). Assign each member of the group to play one of the roles mentioned in the unit. Then carry out the negotiations for the project as a simulation game, with each person defending the interests of his or her role. Start with the developer approaching the land owners and the government for permission to carry out the project, and continue until the project is finally approved or disapproved.

If time permits, more than one simulation exercise can be carried out, with the participants exchanging roles for each exercise. Such role-playing games can be both fun and a good way to understand the dynamics of the actual process of negotiating a development project.

TEXT

DEALING WITH DEVELOPERS

A developer can be anyone: an individual, a private company, a co-operative, a government department, etc., that wants to develop some land, industry, or a natural resource. There is nothing wrong with development as such. Development can create employment and help the national economy to grow. However, too often developers see only the advantages of their project without thinking about the disadvantages.

A correct assessment of a development project requires more than a study of the economic costs of the project to the developer, and of the benefits it is expected to provide. It should also involve an evaluation of the possible damage the project may do to the environment and people, and of the alternative possible uses of the resources, including the alternative of doing nothing at all.

It is often people like you, who know the local environment and resources well, who will be the most sensitive to the good and bad effects of a development project on your environment. You must therefore learn how to deal with developers so that good projects can go ahead while serious environmental harm or social disruption from poorly-planned development projects can be avoided.

Co-operation

In developed countries, environmentalists have sometimes earned a bad reputation for their opposition to all development, and their use of confrontations and even violence to block projects. The Pacific Islands need wise development to meet the needs and aspirations of the people, so negotiations with developers will be more effective if carried out in a spirit of co-operation rather than confrontation.

It is in everyone's interest to develop with the greatest benefit and the least possible harm. However, the benefits and harm do not always come to the same people or places. It is often the role of the government to see that the welfare of the whole country is respected and that cost and benefits are shared so that no injustice is done. Assuming that a developer is negotiating in good faith, a full and frank consultation on all the issues will have the best chance of success in meeting these objectives.

Problems with developers

While co-operation and frank consultation are the ideal, there are unfortunately some developers who have no moral scruples. They will try everything to get approval for their projects, or to get around any constraints or controls placed upon them. The following are some examples of practices that have been used by developers in the Pacific.

Politicians and other leaders have received expensive gifts and trips to foreign countries paid for by the developer. Under such circumstances, it is hard for them to make an objective decision about the project.

Developers hoping to purchase resource rights have arrived in villages with suitcases full of money to distribute to everyone in the hope of obtaining the necessary signatures. A pile of money can be very impressive for those who have none. However the total amount may be much less than the real value of the resource (otherwise the developer would not give away money like that). Once people have accepted a gift of money, they feel obligated to accept the requests of the developer.

Promises have been made to replace the resource taken or damaged, such as by replanting the forest, but this has often proven impractical in practice.

The loss of a renewable resource capable of producing indefinitely may be compensated by a one-time payment which is quickly used up (often on beer and whisky), leaving the local people poorer than they were before.

Similarly, a project like a mine may create jobs for a few years and then shut down, leaving the environment destroyed and making it even harder for local people to earn a living.

A development agreement may specify that profits from the project will be shared with the land-owners or the government. However, the developer can then arrange things so that the local project never makes a profit. The profit goes to another company (also owned by the developer) in some other country where the money does not have to be shared.

A developer may distribute beautiful brochures full of pictures showing how wonderful the development will be, but saying nothing about the damage it will cause. The developer may even try to hide the real nature of the project from the local people or even from the government. The harder it seems to be to get information on a project, the more suspicious you should be. Most people will not hide information unless they are afraid of your reaction.

Even detailed technical or scientific reports may be arranged to cover up the real damage from a project by quoting figures that may be correct but do not show the actual effects, or by making comparisons with other parts of the world where the pollution is even worse.

The above examples show the importance of not being taken in by appearances, and of being well informed about the kind of development and its possible effects.

Negotiating a development project

Negotiation is the process where the different parties concerned by a project exchange views and discuss their respective positions in the hope that they can come to an agreement. Each person or group involved in or affected by a development project has different interests that must somehow be fit together if the project is to succeed. To be a good negotiator, it helps to be able to understand the position of each party. The following are examples of the different possible interested parties and what they want to get out of the negotiations on the project:

The **developer** is putting money and experience into the project at some risk, and he wants to recover his investment plus a profit that would make it all worthwhile.

The **development bank** may be helping to finance the project, and wants security for its investment with the assurance that the capital and interest will be paid back on time.

An **international aid agency** may have supported the studies leading up to the project, or may be making a grant towards the cost of the project. It wants to receive some credit for the project's success.

The **head of the government** wants the national economy to grow, creating jobs, providing tax income, and making the voters happy so that he and his party will be re-elected.

The **minister responsible for development** wants a successful project so that he will be seen to have done his job well and will also be re-elected.

The **minister responsible for the environment** does not want the project to have bad environmental effects which might hurt his own chances for re-election.

The **government environmental assessment officer** is worried about the effects of the project, but does not have enough information to make an adequate recommendation.

The **local government official** is afraid that the benefits of the project will all go to the national government while he gets all the problems created by the project.

The **village chief** is afraid the project will bring social changes and cause the traditional system to break down.

The **local land-owners** want the money promised by the developers, but are afraid of losing their land and of the changes the project will bring.

The **society for nature protection** is against the project because it may threaten natural areas.

The **newspaper journalist** knows that controversy sells papers, and is ready to exaggerate anything he hears.

The **village environmental specialist** sees certain aspects of the project that will damage important village resources if the project is not modified.

The **Regional Environment Programme** is ready to send a **consultant** to assist with technical advice on environmental impacts.

Not all these parties may exist in any particular case, and there could well be others not mentioned here. The descriptions are stereotyped and oversimplified, but they illustrate the kinds of differences that are involved. Obviously not all these interested parties will take part in the formal negotiations, but they may well put pressure on or try to influence the parties directly involved.

Usually there are strong pressures in favour of development projects, and it is not always easy to stop them or change them even if they are potentially very damaging to the environment. Some Pacific Island countries have legislation or procedures for the evaluation or environmental assessment of development projects, and this can help to achieve a better result for all concerned. Otherwise you may need to use every possible channel of pressure (contacts with political leaders, articles in the press, actions by citizens' organizations, etc.) to get a proper consideration of environmental factors in the general interest.

South Pacific Regional Environment Programme

Training Unit I2

PRINCIPLES OF PROJECT ASSESSMENT AND MONITORING

USE OF THIS UNIT

Most developed countries have elaborate procedures for the environmental assessment of development projects. However the principles of environmental assessment are quite simple. The purpose of this unit is to give a brief introduction to the idea of assessing projects for their environmental impact. The principles will be useful both for those who may have to deal with large projects requiring a complete assessment, and for those who may be planning smaller projects, even at the village level, where environmental effects need to be considered.

The presentation and discussion should focus on the process of environmental assessment. It is not possible at this level to go into the many complicated procedures and methods that have been developed for environmental impact assessment. What is important is to understand what an assessment is and how it can help to make development projects more successful.

Details on the impacts associated with some common kinds of projects in the region are given in the subsequent units of this section.

EXERCISES

If your country has environmental assessment procedures or an office responsible for environmental evaluations, it would be good to invite someone knowledgeable in local practices to speak to the group.

A field trip to a project that has been assessed, comparing the assessment with the actual result, would also be instructive.

TEXT

PRINCIPLES OF PROJECT ASSESSMENT AND MONITORING

All countries want to develop their economies, create employment and improve the lives of their people through development projects. They may also have resources of value on the world market that attract outside developers who hope to make money by exploiting the resources.

It is normal to do an economic assessment or evaluation of a project to see if it is worthwhile financially; the money earned or value generated by the project must be greater than its cost. It is just as important to make an environmental assessment of a project to see what damage it may do and what other resources may be lost. Overall, a project should do more good than harm.

Big projects like mines and factories usually require very complicated studies to determine their effects or impacts on the environment. These are sometimes called environmental assessments or environmental impact statements. Such studies may be done by the government, by an environmental consulting firm, or by the developer, but they are generally reviewed and approved by the government. Smaller projects do not usually need such a detailed study unless they involve dangerous chemicals or occur in very fragile natural environments. But even small projects will be better designed and have a greater chance of success if they are planned with environmental effects in mind.

It is therefore important to understand the principles used in environmental assessments. If you have to deal some day with a big development project, you may need to know what to require of the developer and be able to understand an environmental report. If you are involved with smaller local projects, you should be able to apply the principles of environmental assessment in a simple way to the evaluation of such projects.

Environmental impact assessment

The procedure called environmental impact assessment is a way to put down information about the environmental effects of a development project so that decision-makers can make informed decisions about the project in the best interest of the whole country. The assessment itself is not a decision-making process, although it may lead to recommendations. It tries to explain what changes the project will make in the environment, what those changes may mean to the people in the area, and how the overall impacts may contribute to or detract from the goal of development. An assessment can contribute to the good design of a project, and help those who must approve the project to weigh environmental, economic and social factors in their decision as to whether the project should go ahead.

The following outline gives the steps involved in the environmental impact assessment of any action. An action is any project or activity, like building a road to a new area, approving the import of a pesticide, constructing a fish cannery, or selling timber rights to a logging company, for which an environmental evaluation may be useful in coming to a good decision. You can use this outline as a guide to preparing your own assessment reports of projects.

1. **Describe the proposed action (or development).** The description should include what is to be done, by whom, when, where and why. Give the steps involved in the construction and operation of the project, the processes and materials to be used, the resources required and areas affected, etc. This description should be as complete as possible, as it will help to identify possible effects.

There should also be a description of alternatives to the proposed action, including the alternative of taking no action at all (which may have its own positive or negative consequences).

2. **Predict the nature and size of the environmental effects.** For each environmental effect, give the kinds of changes, the rate at which the change will occur, and whether or not the change is reversible.

There are many different methods for predicting environmental effects, including check lists of the different possible effects, matrices (combinations of rows and columns) that list possible effects in one direction and resources that could be affected in the other, flow diagrams that show the processes or relationships between resources that could be affected, and maps with overlays that illustrate sensitive areas or areas with conflicts between uses. For simple assessments, check lists can help as a reminder of effects to look for, and maps with overlays can improve the siting of projects and identify vulnerable areas needing protection.

This section should also include a description of the present or initial state of the environment, and predictions of the probable future state of the environment without the action, and with the action. The predicted future states can be given at different times, such as at the end of the construction of the project, after several years of operation, and perhaps after the project has ended if it has a fixed duration.

3. **Identify the relevant human concerns,** which are all those areas of life and society where an environmental (or other) effect may have an influence on people. The range of possible human concerns is very great, including economic, social, psychological, health, safety, aesthetic, customary or historical, cultural, political, legal, scientific, conservation, etc.

4. **List the impact indicators.** The environmental impacts must be measurable in some way, perhaps as the amount of a certain pollutant, or the area of forest cleared, or the change in the water flow of a stream. This section should describe what can be measured, and what size or level of effect should be considered important. This is where environmental standards or emission standards come into the assessment, since these standards involve something that can be measured.

The next step is to determine what importance should be given to the different indicators, or in other words which impacts are the most significant? This is a subjective judgement that is usually based on national goals or policy, or on the views of important decision-makers.

Finally, estimate the level of each indicator for each alternative action and at different points in time (related to the future states described above).

5. **Estimate the total environmental impact** bringing together the environmental effects, human concerns and impact indicators in a summary evaluation. This may require some kind of broad analysis of the costs and benefits of the action, in which social and environmental effects are normalized or converted to some common units of comparison. The different costs and benefits will also probably need to be weighted in terms of their relative importance. Since this again involves subjective choices, the methods and weightings used should be described so that the influence of the subjective choices is clearly understood.
6. **Recommendations** may or may not be included in the assessment, depending on the preference of the decision-makers who will use the report. Recommendations could include: acceptance of the project, proposals for remedial action to improve the project or reduce its environmental impact, acceptance of one or more alternatives to the project, or rejection of the project.
7. **Inspection procedures and monitoring** should also be included. Inspections may be necessary to ensure that restrictions are respected and remedial actions are implemented, and that the project is not modified in ways that were not anticipated in the assessment. Continued monitoring of certain impact indicators may also be required to ensure that the project respects established limits. Inspection and monitoring also provide the basis for a review of the assessment procedure itself to see if it successfully predicted the effects of the project or action.

The above outline may make the environmental assessment of a project seem elaborate, but it is as much a way of thinking about projects as a procedure to be followed. For small projects or where resources are limited, it is possible to focus only on those few environmental effects that are known to be the most important, and to consider the kinds more than the amounts of the impact indicators.

When to make an environmental assessment

Too often today an environmental assessment is made as a kind of token gesture to environmental interests at a late stage in project development when the important decisions are already made.

If assessment is to make a real contribution to project conception, and if the worst environmental errors are to be avoided, then environmental considerations should be introduced at the earliest possible time, and integrated into the whole process of defining a project.

In the first place, environmental planning which describes the resources available and their limits and interactions should be the basis for defining what development projects are the most desirable. An environmental input into project conception should help to identify the areas to be developed, the processes to be used, the infrastructure required, etc. The environmental assessment itself should be integrated with the economic assessment, since environmental factors often have economic consequences that can affect the profitability of the project. Consultations between environmental specialists, engineers and technicians during the design stage can identify the most cost-effective solutions for respecting environmental constraints. In many cases this has led to savings on projects in comparison with the initial design. The results of monitoring during construction and operation can be fed back into better project operation. Finally there will probably need to be environmental restoration or rehabilitation of the site after the project has ended.

Some planners and economists of the old school still see the environment as interfering with their goal of rapid economic development. It is certain that environmental assessment is one more thing to be done, but if it is well integrated in the process of project development it need not lead to any delays. On the contrary it can contribute significantly to project success and often even provide cost savings. The region has already suffered from too many projects justified on narrow economic grounds which have been disappointing financially or closed prematurely because of unexpected environmental costs. Today, the wider use of environmental assessment of development projects is a matter of common sense.

QUESTIONS

Why is the environmental assessment of projects important?

What does an environmental assessment try to do?

What are the steps involved in making an assessment?

What are some of the human concerns considered in an assessment?

Does an assessment include some subjective judgements?

What role does government policy play in an assessment?

How is the total environmental impact of a project estimated?

When should a project be assessed for its environmental effects?

South Pacific Regional Environment Programme

Training Unit I3

MINING IMPACTS

USE OF THIS UNIT

This unit reviews some of the major environmental impacts of mining projects broadly defined to include all mineral extraction from oil wells to sand and gravel pits. Even islands without valuable minerals may have some problems with sources of construction materials, but obviously more time should be spent on the unit in areas where there are significant mining projects.

The text discusses the environmental problems in general terms, but the discussion leader should add specific examples whenever possible. If there is a local person knowledgeable on mining impacts, he or she could be invited to lead the discussion on this topic. Illustrated magazine articles or slides of mines would help the participants to visualize a mine and its effects.

AUDIO-VISUAL SUPPORTS

The slide programme Problems in the Pacific Islands Environment accompanying unit B1 includes a number of slides of mines and mining impacts that could be shown again in support of this unit, including numbers 19 (dredging), 62-64 (coastal oil pollution from drilling blow-out), 68 (quarry), 71 (gold dredging wastes), 72-74 (Nauru phosphate mine), 75-78 (Bougainville copper mine), and 79 (New Caledonia nickel refinery).

EXERCISES

The best exercise if the opportunity exists would be to visit a mine and discuss its effects with mine personnel and the surrounding inhabitants. A visit to a local quarry or dredging site can also be instructive. During or after the visit, the group should discuss all the environmental impacts they observed or suspected to be associated with the mining project.

TEXT

MINING IMPACTS

Mining can be any of the many ways of taking minerals out of the ground. It includes the removal of rock, gravel, sand and other construction materials, the mining of ancient or recent guano deposits for phosphates, the extraction of the ores of various metals like copper, nickel, gold, chrome, manganese, and bauxite for aluminium (to mention only those most important in the Pacific), and drilling wells for oil and gas.

The environmental impacts of mining vary with the type of mineral and the kind of mine. However mining is inherently a destructive activity involving the taking of a non-renewable resource. Some environmental damage is inevitable in any mine; the goal should be to minimize the extent of the impacts.

Mining impacts can be sub-divided for convenience into four categories: the effects of the mine itself, the disposal of mine wastes, the transport of the mineral, and the processing of the ore which often involves or produces dangerous materials. These activities may take place at the same site, in which case the impacts are combined, or they may be separated by considerable distances. The effects of each are discussed separately here.

Direct impact of the mine

Many mines are at the surface (sometimes called open cast mines). They may consist of a great hole in the ground (most copper mines), strip mining along the tops of ridges (nickel in New Caledonia), the digging out of ore in pits and sheets across a large surface (phosphates), or a pit or hillside excavation (rock and sand quarries). With such mines, the land surface over a considerable area is destroyed, and what is left behind may be unstable, producing landslides, erosion, siltation, and polluted water. Such land is generally useless after the mining ends, and may continue to cause environmental problems long after the mine has closed.

When the mine is beneath the surface and is composed of tunnels, the disturbance is usually localized at the mine entrance unless there are later cave-ins or some interference with ground-water supplies.

The drilling of oil wells may cause some local environmental effects from the machinery and drilling muds used, and there is a slight risk of blow-outs or accidental breakage leading to oil spillage, but once the well is in operation, there is generally little further effect.

Any kind of mine may cause some water pollution through water drained or pumped from the mine.

Disposal of mine wastes

In most mining operations, a great deal of waste rock and tailings must be moved to reach the ore. In addition to rock covering the ore or mixed in with the ore, there may be low grade ores that are not worth treating. The disposal of these wastes from the mine often causes more environmental damage than the mine itself. The problems come both from the enormous quantities of rock to be disposed of, and the fact that some mine wastes may be toxic to plants or cause water pollution as water drains through them.

The dumping of these wastes may affect more land surface than the mine. Waste dumps are subject to erosion, and are difficult to stabilize or revegetate. It is sometimes even necessary to build dams to hold the wastes back. Inadequately contained mine wastes have damaged or destroyed rivers and agricultural land and caused heavy flooding. In some mines the wastes are intentionally washed in to a river so that they will be carried away to the sea, with severe effects on the river, its valley, and the sea coast at the river mouth.

Transport of ores

Mines are usually located in remote areas, requiring the transport of the mineral in some form from the mine to a port where it can be shipped to its markets. The infrastructure for the transport of large quantities of heavy material may involve roads, railroads, pipelines and conveyor belts, the construction and operation of which may have considerable environmental impacts, particularly since the terrain crossed is often difficult. Major port facilities and storage areas are also generally required.

Ore treatment or refining

Since transportation cost in the region are very high, and are related to the bulk of the material, there is a strong incentive for at least some treatment of the ore to concentrate it if not refine it completely. This generally requires large industrial installations and the further production of wastes to be disposed of. Furthermore, ore treatment often requires dangerous chemicals like mercury or cyanide, or strong acids or alkalis, and the metals being treated may themselves be toxic. Some are even known to accumulate in food chains, threatening human food supplies. Even if the wastes are treated, there usually is some spillage, and there is always the risk of accidents such as the cyanide spill in Papua New Guinea.

Special impacts in coastal areas

Where mines occur in coastal areas, or mine wastes are released there, additional environmental impacts can be expected on sensitive coastal resources. Corals and other forms of life on the bottom generally require clear water for growth, and are easily smothered by any input of tailings or other sediment. Dredging and other forms of coastal mining thus both destroy the immediate site and affect a much larger area through the sediment stirred up in the water. Removing sand and gravel from the beach or lagoon bottom can also cause beach disappearance and serious coastal erosion. Copper and other toxic materials from mines may kill most marine life in the vicinity of treatment and shipping facilities.

Long-term problems

Mines as development projects can create employment and provide a significant source of national income and foreign exchange. However, as a development based on a non-renewable resource, mines are only viable for a limited period and are then abandoned, requiring the writing off of all the capital investment involved. All across the Pacific there are mining ghost towns and rusting equipment that are the only remaining signs of brief periods of prosperity. When the mine closes, there is generally no one left to be legally or financially responsible for the long-term effects. Those costs are left to the government and people. Often all that remains of the mine are the environmental problems and large areas of ruined land on islands that can ill afford to waste limited land resources.

The solution to such long-term problems is to build environmental controls and provision for rehabilitation into the project from the beginning.

South Pacific Regional Environment Programme

Training Unit I4

FORESTRY IMPACTS

USE OF THIS UNIT

Since most forest development projects involve the destruction of the forest, this topic should be introduced with a review of Unit C4, Forests and their ecological importance. This review should highlight the benefits that are lost temporarily or permanently when the forest is exploited. These losses are also discussed at the beginning of this unit.

Some of the direct impacts of logging are then reviewed in the unit, followed by a discussion of reforestation projects. The issues of forest cutting or clearing, and of re-establishing forest, should then be discussed with reference to local problems and needs.

If information is available on the amount of forest cover locally and its change over time, this also could be discussed with the group.

AUDIO-VISUAL SUPPORTS

The SPC film "Story of an Island" includes sequences on logging and reforestation in Western Samoa that can be used to illustrate forestry impacts. The SPREP slide programme on forests can also be used in support of this unit.

EXERCISES

A visit to a forest logging project should be arranged if possible.

TEXT

FORESTRY IMPACTS

The value of island forests as a renewable resource has already been discussed in the unit on forests and their ecological importance. To keep this value, the forest must keep its structure and ecological functioning largely intact. Forests are a dynamic system with some powers of regeneration, but only within certain limits.

The significance of forestry impacts on the environment is therefore determined largely by whether the forest is managed or developed within its limits as a renewable resource, or whether it is simply "mined" for the value of its standing timber without regard for the future. Forestry development projects generally involve the cutting of trees for their wood. If trees are only selectively cut and removed, then the forest may be able to recover, but if the trees are clear cut or the land is converted to other uses, then the values of the forest are lost.

Impacts of forest loss

Damage or destruction of the forest brings many kinds of environmental changes:

- There is generally an important loss of habitat for native plants and animals. Many plants depend on the forest trees to provide the right environment for their growth; they will disappear when the trees are cut. Sometimes even the trees themselves are local species of considerable rarity and conservation interest. Many native birds, animals and insects are forced to retreat to ever smaller areas of undisturbed forest where they can still find food and shelter, but their numbers will diminish as their habitat shrinks. Some rare plants and animals may eventually be driven to extinction.
- The trees shelter the land, release moisture into the atmosphere, and otherwise moderate and improve the climate. Cutting the trees can bring local changes in climate, such as reduced rainfall and greater extremes of high and low temperatures.
- The loss of the forest reduces the capacity of the land to catch and hold water. This increases both the danger of flooding downstream and the effects of drought, when streams and springs may dry up completely. In many parts of the world, the destruction of the forest has increased the number and the size of natural disasters affecting the nearby human populations.

- Since much of the fertility in tropical forests is in the vegetation rather than in the soil, cutting the forest will lead to a serious loss of soil fertility after only a brief improvement. The exposed soil is also subject to erosion which can result in the rapid loss of the top-soil, leaving the land permanently degraded.
- The commercial harvesting of trees, usually for export, means the loss of many important forest resources for local use, such as fruits, nuts and other food from forest plants, medicinal plants, wood for construction and carving, fuel wood, vines, fibres and other useful materials. These secondary resources may be very important to local people, but their loss is seldom calculated among project costs.

The extent of these and other losses obviously depends on the kind of forest exploitation and whether it is reversible. Light selective logging may leave many forest values nearly intact, but it can lead to a change in forest composition unless efforts are made to ensure the regrowth of the species that are cut. Heavy selective logging which leaves only "trash" trees will produce a less rich and productive forest, but one that still provides some soil protection and water management once the immediate damage from logging is overgrown.

Clear cutting may be followed by reforestation, but the trees planted are often fast-growing exotic species intended to be cut again in a few decades. Such a plantation forest is much less valuable as wildlife habitat, as a source of local materials, or for maintaining soil fertility, and it will not hold water as efficiently as the native forest. Clear cutting with no attempt at restoration generally leads to a weed-covered wasteland which may slowly regenerate into a poor secondary forest of little value.

Frequently, once the forest is cut, farmers move in and plant subsistence gardens until the soil is exhausted. This usually prevents even the regrowth of a secondary forest, and the land may remain as grassland or scrub which is occasionally cleared again for relatively unproductive gardens. The forest values of such land are permanently lost and its contribution to island productivity becomes marginal.

Impacts of logging and clearing

Projects for cutting and removing forest trees or the clearing of forest land can have direct impacts on the environment and other resources. Since this work usually requires heavy machinery like bulldozers, there is a risk of direct damage to the soil, particularly where it is wet as it often is in the tropics. Heavy tracked machines can cause severe soil compaction, with the soil becoming so hard that plants cannot easily take root. One study of logging in the Solomon Islands showed that 15% of the logged area was seriously compacted and worthless for future forest production. Vehicle tracks are also very susceptible to erosion and gullying.

The disturbance of the land caused by logging and clearing, combined with the movement of vehicles and people in and out of the area, results in the invasion of the disturbed areas by weeds and introduced species. These aggressive fast-growing plants out-compete and smother native plants, prevent or slow forest regeneration, make reforestation difficult and expensive, and may spread into the surrounding forest upsetting the natural balance of species.

Forestry projects require the construction of access roads into the areas being exploited. These roads make it possible for people to enter areas previously protected by their inaccessibility, and can lead to uncontrolled development, the establishment of squatters, and the planting of crops in areas where such use is inappropriate and can only lead to degradation of the land. Such unplanned settlement may be socially and politically difficult or impossible to control. It may even block the implementation of development projects, and create difficult problems of legal rights and land titles.

Forestry projects are attractive because the trees can be converted into a quick source of cash income. However, the destruction of the forest frequently means the loss of other development opportunities which might provide a better return in the long term. Logged areas lose any tourism potential they may have had. The damage to water supplies may hurt agricultural or urban development. Coastal fisheries development and aquaculture may be blocked by the increased sedimentation resulting from soil erosion and flooding. The cost to the country of the loss of these development possibilities needs to be balanced against the benefits of the immediate income.

Reforestation

Reforestation, or the replanting of trees to make forest areas, is a much more constructive type of development project. Tree planting projects can have several possible aims.

Forest plantations may be established to produce wood as a crop. The economists' desire for a rapid return on investment often leads to the planting of fast-growing exotic species like Caribbean pine or eucalyptus. Such trees may provide low grade lumber like fence posts, or be converted to wood chips to be exported for the manufacture of paper, but their suitability has not been demonstrated for all parts of the region. More valuable timber trees may also be planted. Since usually only one kind of tree is planted in an area, such plantation forests lack diversity and provide few of the values of native forests. These forests are also intended to be cut again when they reach maturity. It is too early to know whether such regular tree harvests can be continued in the Pacific without using up soil nutrients. *

Where a natural forest is cleared to make way for a plantation forest, the result is generally a degradation in forest values. However, such plantations can also be created on grasslands or other areas where the soil has already been degraded, and can thus reconvert wastelands to productive use. The reforestation of damaged areas can produce many environmental improvements as tree cover is re-established on the land.

There have been proposals for energy tree plantations of fast-growing species that can be harvested to provide firewood, or to supply fuel for wood-burning electric power plants. These would have some of the same advantages and disadvantages as other plantation forests.

Reforestation can also play a part in the establishment or maintenance of village forest reserves or wood lots. These areas of forest near a village are designed to provide a handy supply of fuel wood, building materials and other forest products to the village. The tree planting can be done by the villagers themselves using the species most useful to them.

Planting trees may also be done more for the benefits of environmental protection or restoration than for the production of wood. Reforestation may aim to restore watershed capacity, control erosion and flooding, improve wildlife habitat, regenerate depleted soils, cover mine wastes or protect against wind damage. Even in village and town areas trees can contribute environmental benefits, such as shading streets and gardens, reducing heat accumulation, and making built-up areas more attractive for residents and tourists. On small islands where land is scarce, there is no reason why the land along roads and in urban areas should not make a contribution to the production of wood and other tree products as well as improving the urban environment.

South Pacific Regional Environment Programme

Training Unit I5

AGRICULTURAL IMPACTS

USE OF THIS UNIT

Aspects of agriculture have already been treated in units C5 - Environmental Management in Agriculture, C3 - Soils, and D3 - Nutrient Cycles. This unit focuses on the environmental impact of agricultural development projects, which tend to be large in scale and emphasize commercial production and cash crops.

Since each country has its own types of agricultural development programmes, this unit should be supplemented with information on local agricultural development and its effects on the environment.

AUDIO-VISUAL SUPPORTS

The poster-sized SPREP Environmental Fact Sheet on pesticides accompanying this unit illustrates some of the problems associated with the pesticides that generally accompany modern agricultural development.

EXERCISES

If it is possible to arrange a visit to one or more large agricultural development projects, this unit can be covered largely through discussions during such visits.

TEXT

AGRICULTURAL IMPACTS

Agriculture should be considered the most important land use, since it is the basis for the productivity of most human societies. Everyone needs food, and food comes essentially from agriculture. Many other materials, from vegetable oils and fibres to renewable energy sources come from agriculture. It is therefore natural that many countries want to develop through agricultural projects.

Land use impacts

Unfortunately, agriculture requires land, and good agricultural land is very limited in the islands. There may also be questions of land tenure which limit the possible land areas available for agricultural development projects. One of the most difficult questions in planning agricultural development is thus choosing where to locate the project.

If the land to be developed is forested or otherwise still in its natural state, then its conversion to agriculture will result in the loss of its natural values and perhaps affect the water regime. The ability of the soil to support long-term agricultural development may also not be established. In some places, land not developed in pre-European times was not used for some good reason, since traditional farmers had a good understanding of the environment.

If the land is being used for subsistence agriculture, then its conversion to cash crops may result in local food shortages as food gardens are pushed onto marginal lands. Agricultural development projects may thus produce indirect social and health effects, such as child malnutrition or a shift to imported foods of poor nutritional quality.

Sometimes land for development is taken from that normally left for a long time in fallow to allow the soil fertility to recover. The result is generally the shortening of the time the soil is allowed to rest on the remaining land, which will lead to a steady decline in agricultural productivity unless other techniques are introduced to maintain soil fertility and humus content. Development projects may thus require changes in traditional agriculture as well.

Given the limited land available on islands, agricultural development should be accompanied by overall land use planning to achieve the best balance of uses. Whenever possible the best soils should be reserved for agriculture, and village or urban development should be directed to poorer areas.

Impacts on subsistence agriculture

It should be evident from the above that big agricultural projects can have a significant negative effect on subsistence food production. This can come from the competition for good land, from shifts in the agricultural

calendar imposed by the labour demands of the cash crops, from declining soil fertility as traditional fallow systems break down, or even from a change in diet motivated by the availability of cash incomes and more attractive if less nutritious imported foods.

If care is not taken, this can produce the irony of agricultural development reducing local food availability and increasing food imports. Therefore the balance between export crops and food self sufficiency should be respected whenever possible.

Impacts on soils

The soil is an essential agricultural resource and it should be used sustainably. The kinds of agricultural development proposed must be adapted to the requirements for soil conservation at the site to be developed. The risk of soil loss is often greater with large development projects, which attempt to achieve economies of scale through large cleared areas and the use of machines. While these technologies are highly successful in the more temperate conditions of the developed countries, they are not always as appropriate to tropical island conditions with fragile soils and frequent problems of erosion. In some cases, the use of poorly chosen machinery or techniques has badly damaged the soil.

The economic requirement for a continuing return on investments may not permit the periods of fallow which allowed island soils to regenerate. While a decline in fertility can be made up with chemical fertilizers, the rapid loss of humus in the tropics is more difficult to replace, and the soil structure and its ability to hold water may deteriorate. Techniques like composting and mulching which restore organic matter to the soil are seldom practiced on a large scale.

Agricultural development projects need to be adapted to these constraints. Crop rotations and the use of legume crops can help to maintain the soil. It may be necessary to use mixed plantings of more than one crop, to use cover plants to protect the soil from heavy rain, or to use windbreaks and other protective plantings around the crop. The new techniques of agro-forestry in which trees and food or crop plants are mixed are showing promise in tropical areas and may well be appropriate in the Pacific.

Impacts of chemical use

Small island ecosystems are particularly vulnerable to damage by chemicals, and modern agriculture tends to require increasing quantities of chemicals. Most dangerous chemicals imported in large quantities into the islands today are for agricultural use. These chemicals include fertiizers, insecticides, fungicides, herbicides and other pesticides.

Fertilizers are added to the soil because they help plants to grow. The environmental problems with fertilizers come if they are washed out of the soil by the rain and go into the ground water, into lakes or streams, or into the lagoon where they contribute to pollution. The fertilizers in the water encourage algae and other plants to grow, and these may become so thick

that they start to rot and smell. They may also crowd out or shade out other valuable forms of life like corals. Nitrate fertilizers are also dangerous if they get into drinking water, because they may be turned into nitrites which can cause cancer.

Pesticides are by their very nature poisons for at least some kinds of life, often including people. The SPREP Environmental Fact Sheet on Pesticides explains some of their dangers and how to use them carefully. Pesticides can hurt the environment or poison people in many ways. They may be used without following the instructions very carefully, so that too much is used, or at the wrong time. They may be absorbed by the people who apply the pesticides, especially in the tropics where people do not know much about pesticides and do not like or even have protective clothing. They may be washed off the crop or field by the rain, or blown into villages or into the forest by the wind. They may be applied too close to harvest time and thus still be on the food when it is harvested and eaten. They may not be used the way they were intended (such as for poisoning fish), or be washed into water supplies when users wash their equipment carelessly. They may be eaten accidentally by children thinking they are something good, or by people who use pesticide containers for food or drink. They may be taken intentionally by people who want to commit suicide (if it is a poison with no known cure, even if they change their mind they still die a horrible death). They may spill or leak while they are being transported or while they are in storage.

Once they get into the environment where they are not wanted, they can be a great danger to people and to many useful forms of life. Pesticides should thus only be used when absolutely necessary, and with the greatest care. The increasing use of dangerous chemicals for agricultural development projects can thus have serious impacts on the island environment either directly through the project or indirectly through the risks associated with simply having such chemicals on the island.

Other impacts

Agricultural development can bring with it other risks for the island environment. The large quantities of seeds imported for some projects may contain a few weed seeds. Even one or two unwanted seeds can introduce a noxious weed that may become a serious problem when released in an island ecosystem with few competitors or enemies.

Seeds or planting stock that are not carefully inspected and subject to strict quarantine requirements may also introduce pests or diseases previously unknown on the island and which can ruin its agriculture.

Even some supposedly useful animals and plants introduced for agricultural purposes have turned into pests in the islands with serious effects on native species and even on agriculture itself. Guava, mynah birds, cane toads and mongooses are obvious examples.

It should be clear from all of the above that agricultural development projects require extremely careful planning if they are not to have unexpected and often serious effects on people and the environment.

South Pacific Regional Environment Programme

Training Unit I6

FISHERIES INDUSTRY IMPACTS

USE OF THIS UNIT

This unit reviews the possible impacts of commercial or industrial fisheries development in the Pacific Islands, with an emphasis on coastal fisheries. The basic principles of tropical coastal fisheries management have already been covered in unit C6 - Fisheries Management, and it may be appropriate to start with a review of some of the characteristics of the fisheries resource described there.

The discussion of the text should concentrate on the characteristics of commercial fisheries that can make resource management more difficult in tropical shallow-water fisheries. Some of the economic factors may require more explanation if the participants have little background in economic thinking. Use simple examples if necessary drawn from situations with which they are familiar.

Since commercial fishing projects vary greatly in their nature and size, the points raised in the unit may be more or less applicable to specific local examples. These differences and the reasons for them should form part of the discussion.

EXERCISES

While a commercial fishing operation is more difficult to visit than land-based development projects, there may be coastal port, processing or marketing facilities that could be the object of a field trip.

TEXT

FISHERIES INDUSTRY IMPACTS

While some subsistence fisheries have led to overfishing, most have achieved a balance with the productivity of the local fisheries resources. Subsistence fisheries generally exploited a wide range of edible fish and other animals found on the reef and in coastal waters at levels that were approximately sustainable. In the absence of ways of storing an excess catch, such fishing tried to meet a moderate but constant demand determined by the size of the local population. If the resource was less than the demand for it, limits were usually established either on fishing for, or on consumption of, the resource in question.

Several things have now changed the possibilities for developing fishery resources. Fish can be stored more easily through salting, icing, freezing or canning, so there is a way of using catches that are more than what is needed for local consumption. The development of urban centers and of various kinds of paid employment has created markets for fishermen who want to sell their fish to those who lack the time or the means to fish for themselves. Transportation links with other countries have even made possible the export of some fisheries products. All of these have helped to encourage the creation of commercial fisheries (fishing for money) in many parts of the Pacific Islands.

There are many reasons why commercial fisheries projects and the development of a fishing industry can have important impacts on the environment and coastal resources. The following are some of the most important reasons for and kinds of fisheries impacts.

Size

While subsistence fisheries are limited to the immediate needs of a low density local population, commercial fisheries tend to be larger in size, and to supply markets that may be more demanding, or even almost without any limit relative to the size of the resource. The conservation ethic of leaving behind what you do not need immediately does not apply in a commercial fishery. Thus one of the most important controls on traditional fisheries no longer works with commercial fishing; the fisherman tries to catch as much as he can regardless of the effect on the fish population.

Knowledge of the resource

Most tropical coastal fisheries are still poorly understood scientifically. There have not been enough surveys or research to know what yields are possible or how to manage the resources scientifically. Traditional fisheries experience is often the only guide available, but it is not always easily converted to modern fishing methods and changing environmental conditions.

Many commercial fisheries development projects have failed because the resource was not understood or misunderstood. A reef may be swarming with fish, but this does not mean that it can produce so many fish again quickly once those that are present are caught; the standing stock is not the same as the productivity.

Limited species of commercial interest

The coastal waters of the Pacific Islands have many kinds of fish living together, yet only a few of these will have a high market value or be easy to sell. Commercial fisheries prefer to concentrate on those species that sell easily or bring a good price. Heavy fishing for only these species can upset the balance of resources through changes in food chains and population controls. Less desirable species which may be caught by accident are often just wasted, and much of the available productivity of the environment is not utilized. The commercially-useable yield may thus be lower than the subsistence yield.

New technologies

New and more elaborate fishing technologies have been introduced to the region, including larger boats, motors, nets, hooks, lines, reels, spearguns, diving gear, etc. Such technologies make it possible to catch more fish, leaving fewer to reproduce and maintain the population. At the same time better boats have improved travel to all possible fishing grounds, spreading the fishing pressure to the whole population. There are now few places so remote that they can continue to serve as population reservoirs from which more heavily fished areas are restocked. The result of both these factors may be to lower the ability of the total fish population to reproduce and replace those fish that are caught. As the pressure increases, the productivity of the fishery will decline.

These new fishing techniques have eliminated one former factor in fisheries conservation, the inability of traditional techniques to catch more than a fraction of the total population. Where a primitive technology in itself made over-fishing difficult, modern techniques have made it much easier, increasing the need for voluntary restraint or other kinds of management controls.

Support facilities

Many fisheries industry development projects involve the construction of fisheries support facilities such as freezers, harbours, and canneries. These facilities can often have severe effects on the environment in the coastal zone. The construction itself may involve dredging and filling, and may interfere with sediment movement and other coastal processes, causing damaging erosion or filling in. Canneries and other processing plants produce large quantities of fish wastes and washing water that can cause serious local pollution. Refueling and other fishing boat operations may lead to spills of fuel and oil, producing chronic pollution in ports and harbours.

Support facilities may also tend to concentrate fishing activity in the area immediately around the facility. No fisherman is going to use more expensive fuel than he needs to. The result is rapid overfishing in the immediate vicinity of the facility, gradually spreading outward as fishermen are obliged to go farther and farther away to find a reasonable catch.

Economic pressures

The fishing industry requires important capital investments, both individually in boats, motors, nets and other gear, and collectively in ports, processing and marketing installations. Such investments are often financed with loans that must be paid off regularly, putting pressure on fishermen to keep fishing in order to maintain a regular income. It is thus no longer possible to adapt fishing pressure to the needs of the resource, which usually needs periods of protection to allow reproduction and replenishment.

The commercial requirements of a modern economy or industry for constant production and the efficient use of investments are thus not particularly compatible with the ecological requirements of a tropical "hunting and gathering" fishery in a natural unmanaged environment. A resource damaged by a cyclone or simply a bad year may need time to recover, but to stop fishing would mean economic bankruptcy. These economic pressures can make good management of coastal fisheries resources much more difficult, and accelerate the damage to resources through over-fishing. Aquaculture, where (just as in farming) there is more control over the level of production, fits better with commercial requirements.

It is already hard for island fisheries to compete with the more efficient overseas temperate water fisheries because of the greater distances and small scale of island fishing industries. The conflict between commercial pressures and tropical coastal resource requirements makes it even harder to achieve economic success.

Conflict with subsistence fishing

Just as cash crops have hurt subsistence agriculture, so can commercial fishing cause a decline in the local subsistence diet. Fishermen will devote their best effort to the commercial fishery, and important food fish will be sold rather than eaten. The family may only get what cannot be marketed.

Commercial and subsistence fishermen will often be trying to catch the same fish. Since the commercial fisherman is generally better equipped and more efficient, he may reduce fish numbers to the point that less efficient local subsistence fishing techniques are no longer able to give adequate catches.

The presence of the commercial fisherman also destroys the conservation interest of the subsistence fisherman in leaving for tomorrow what he does not need today. The traditional approach to managing the resource is subject to a forced change. If over-fishing results, both the commercial and subsistence fisheries will suffer.

Oceanic fisheries

Offshore or deep ocean fisheries, such as those for skipjack and other tunas, are subject to different management requirements which do not need to be discussed here. However they can have an important impact through the construction of supporting facilities in coastal areas (see above), and through the exploitation of coastal resources of bait fish.

If bait fish populations are not properly managed, there can be over-fishing which would affect coastal fisheries food chains and might have an impact on other fish species of economic importance.

There has also been a widespread problem of oceanic fishing boats from outside the region taking advantage of the impossibility of policing all remote islands and coastal areas to poach valuable fisheries resources in coastal waters such as giant clams, with serious effects on the resource. The more foreign fishing boats are attracted by a fisheries development project, the greater the risk of such unwanted side effects.

It should be clear from the above that the fishing industry can have two main types of impacts. One involves coastal pollution, construction and other effects common to many industries in the region. The other concerns the management of the fishery resources themselves, and is related both to the ecological limits of the natural ecosystems exploited and to the importance of coastal fisheries resources for local subsistence. Fisheries development projects must be planned with these possible impacts in mind.

South Pacific Regional Environment Programme

Training Unit 17

TOURISM IMPACTS

USE OF THIS UNIT

The tourism industry is a special case because it depends on the whole island environment as a resource. This unit looks both at the direct environmental impacts of tourism development projects, and at some ways that tourism development can help to improve the local environment.

As with the other units in this section, the points raised here should be illustrated whenever possible with local examples, perhaps with the help of a resource person from the local tourism office.

EXERCISES

If the participants are not familiar with tourism developments, and if there is a large resort in the area, then a visit to the resort would be instructive.

As a practical exercise, the participants could be asked to plan a tourism development for their own local area, with an explanation of how it should be designed and what its impacts would be.

TEXT

TOURISM IMPACTS

Tourism in the Pacific Islands context involves people who come from other countries for the pleasure of visiting the region. Since tourists spend money on travel, hotels, food, entertainment and recreation, they can be an important source of income and thus of economic development for islands with few other possible sources of revenue.

The tourists who come to the South Pacific have been attracted by their image of the island environment: sun and sea, white sandy beaches and waving palm trees, lush vegetation and friendly natives. The reality is never quite the same as the tourist image, but while it can be different, it should not disappoint them or tourism will ultimately fail. People do not come several thousand kilometres to see the same dirt, pollution, industry and degraded environments that they have at home.

Tourism thus depends on the quality of the environment for its success, and good tourist development requires the protection and even the improvement of the environment. The most important tourism resources are the natural beauty of the island, their distinctive or exotic character, their recreation possibilities, and the cultural interest of the people. The hotels, resorts, transportation networks, recreation facilities and other tourism infrastructure can complement but never completely replace the dependence on environmental resources.

The basic problem with tourism development is that tourism facilities and the tourists themselves have impacts on the environment. If care is not taken, the tourism development itself can gradually destroy the environmental resources on which it depends. This problem can be particularly serious on tropical islands where the environment is fragile and easily degraded, and where the small scale of the island means that even moderate tourism development can have a proportionately large impact.

Economic and social impacts

The economic and social impacts of tourism are a big subject that cannot be covered thoroughly here. They should be examined in detail for any large tourism development project.

Economically, tourism can create jobs for local people and bring money into the country. However many tourists like their comforts from home, and it is often necessary to import a large part of their requirements, so that much of the money may leave the country again to pay for these imports. If the resorts and hotels have been financed by overseas investors, they will also want to export their profits. The developers may want the government to improve the airport, roads and other infrastructure, and possibly to provide tax breaks and other financial advantages, which cost the country money. The remaining benefit to an island country from some kinds of tourism development may thus be small indeed. Other kinds of tourist facilities provided by villages or financed locally may be economically more interesting.

The social impacts of tourism may also be important. Most jobs for local people in the tourist industry are as servants, house maids, waiters, gardeners and other menial work that may give people a sense of inferiority. At the same time the tourists come from other societies with different values and lifestyles, and because they have come seeking pleasure, they may spend large amounts of money and behave in ways that even they would not accept at home. Local people seeing the tourist example may want to live and behave the same way. Tourists may also, out of ignorance or carelessness, fail to respect local customs and moral values. These and other social effects may be among the most important long-term impacts of tourism development.

Environmental impacts of tourism facilities

Tourism development usually starts with the construction of hotels, resorts and other places for tourists to stay. In addition there may be restaurants, night clubs, and recreation facilities such as golf courses, tennis courts, swimming pools, and marinas. These facilities require a lot of space, and land is usually scarce on an island. Land and resources used for tourism are not available for other uses; developers may even want to keep local people away from beaches, reefs and lagoon areas reserved for tourists only. Whenever possible, tourism developers prefer to build on the coast, where the hotel will front on a beach and perhaps a coral reef, yet the coast is the most fragile and vulnerable area on an island, with the greatest conflicts between uses.

The construction of these facilities can have the same kinds of impacts as any other construction projects, such as soil erosion, changes in water runoff, and damage to natural environments. If the resort is on the coast, the plans frequently call for changes in the coastline, such as the creation or improvement of a beach, the construction of an artificial island, or the dredging of a harbour or building of a dock for tour boats to use to pick up and leave off the tourists. These changes may upset normal coastal processes and be very difficult to maintain. Coastal hotel sites themselves are often vulnerable to storm damage, erosion and other problems because of their exposed location.

Tourist developments also require resources that may be scarce on an island. Water may be in short supply, yet tourist use of water is usually much greater per person than among the local population. Tourists require large quantities of high quality food; if it cannot be produced locally, it will have to be imported.

The sewage from large hotels can be a source of pollution if it is not treated and disposed of carefully. Most hotel projects include waste water treatment plants, but these can be difficult to maintain in the islands and need to be monitored regularly. Tourist facilities also produce large amounts of solid waste which can add to the existing solid waste disposal problems on many islands.

Infrastructure requirements

Any major tourist development requires a good airport where large jets can bring tourists from overseas countries. Visits by tour ships may require improved docking facilities. Roads may have to be built to resort sites, or improved for tour buses. Water and electricity supplies may have to be increased. All these kinds of infrastructure require investments which must be added on to the direct cost of a tourism project.

Building roads, airports and docks can have major environmental impacts which are beyond the scope of this unit. Their overall effects, however, may be positive as well as negative. Such facilities benefit local people as well as tourists, reducing the isolation of remote areas and increasing the convenience of travel within the country and overseas. Tourism development can thus support useful expenditures that could not be justified for the local people alone.

Damage from tourist use

Tourists are often unaware of how fragile some island environments are. They may trample vegetation and thus cause erosion, or disturb birds and wildlife. They may leave their rubbish behind, littering the environment. They are apt to break corals as they walk or swim over the reef. Even anchoring in a fragile reef area can result in significant damage to corals. Tourists love to collect corals, shells and other pretty objects as souvenirs, but too much collecting can damage a reef or other site. Fishing is sport for a tourist, but it may take away resources needed as food in nearby villages.

Where a few tourists may do little damage, thousands of them can be a disaster. Think of the difference between one tourist breaking off a piece of coral, and hundreds of tourists each taking a piece of coral; a reef could quickly be stripped of its corals and shells. Areas subject to heavy tourist pressure should be protected from damaging activities. Laws may be needed to protect wildlife and to control collecting.

The increasing demand for curios such as stuffed turtles, turtle shell jewelry, mounted butterflies, and traditional objects made with rare bird feathers or animal skins can threaten rare species with extinction. The manufacture and sale of such objects should be prohibited or strictly controlled. Coral, shells for handicrafts or collectors, and local trees used for carving can also be wiped out locally or reduced to low levels when too much is used to supply the tourist trade.

Planning tourism development

One major question to be answered in planning tourism development is what scale of tourism is appropriate for the local environment and culture. Every place has a carrying capacity that cannot be exceeded without bringing about serious changes or even the collapse of important resources or systems. While some small-scale tourism can be fit in almost anywhere, large scale tourism can cause major problems if it is not planned very carefully.

The number of tourists an area can absorb should be decided before tourism development goes too far, because there always will be pressures for bigger and bigger developments. Waikiki Beach in Hawaii is a good example of an extreme case of tourist development. The appropriate scale of tourism may be determined by the most limited resource, such as water or coastal land, or by the desire to prevent serious social or cultural impacts. How many people, for instance, can a community receive comfortably as visitors, or how would it feel to be outnumbered by the tourists on your own island?

Comprehensive planning for tourism

Unlike most development projects that only involve a specific site or area, tourism frequently depends to some extent on an entire country or island. It is therefore in the interest of the tourist industry to see that the overall planning of the country's development includes the requirements of tourism. As more governments begin environmental planning and make physical plans (including town plans, master plans and coastal zone plans), it is essential that these plans include the sites of particular scenic or recreational potential. The coastlines, vistas, swimming beaches, waterfalls, mountains and lagoons that tourists visit and photograph are capital assets just like hotels, but they are generally not owned by the tourism interests that benefit from them. Only careful comprehensive planning, and often the understanding and support of the traditional owners, can protect these resources from degradation and destruction.

Planning helps in making choices between conflicting uses, or in finding ways to make them compatible. It should aim to locate unsightly or polluting activities, like industrial areas, fuel storage depots, rubbish dumps, etc., where they will not destroy the beauty of a town or coastline or conflict with tourist sites. In many Pacific Island towns, there are already too many cases where urban pollution is making tourist beaches unsightly or unsafe. Planning early for tourism development can help to avoid damaging and expensive errors and also to prevent the gradual erosion of environmental values significant to tourism.

Improvements that help tourism, like better transportation, tree planting, restoration of historic sites, urban beautification and cleanliness, also improve the environment for the local population. Tourism development can help to stimulate general community improvement.

Conservation

One area where tourism interest coincides with the long-term interest of a country is in the conservation of nature and traditional culture. Tourists are particularly attracted by unusual vegetation, birds and wildlife, by coral reefs and lagoons, and by distinctive cultures, customs and life styles. Very little has been done to develop these resources for better tourism, and ways need to be found to make them available without putting them at risk or degrading them.

The development of protected areas such as national parks and reserves can be one way to protect a country's heritage and to make it available for local education and tourism. The investment in facilities such as trails, signs, picnic shelters and visitors' centres is usually repaid through tourists who come in larger numbers and stay longer because there are more things to see and do.

Conservation areas will also attract special categories of tourists with interests in botany, bird watching, wildlife, nature photography, skin diving, archaeology, etc. Such kinds of tourists are generally more interested in the country they visit and less apt to cause serious social impacts.

Overall, tourism tends to be a mixed blessing in its benefits and impacts on the island environment. If it is allowed to grow unplanned, it can have serious social and environmental impacts while providing little real economic benefit. If developed with care, it can bring many advantages to small island communities with few other resources.

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