

FEDERATED STATES OF MICRONESIA

**UNITED NATIONS CONFERENCE ON ENVIRONMENT
AND DEVELOPMENT**

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Prepared by:

Federated States of Micronesia
Presidential Task Force on Environmental Management and Sustainable Development
Pohnpei, FSM

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PREFACE

The Federated States of Micronesia (FSM) is pleased and honored to be a part of the United Nations Conference on Environment and Development (UNCED). The UNCED is a momentous and timely gathering. It is bringing together world leaders and an array of technical experts as the nations of the world face the challenges of sustainable development. The FSM, like many island nations, are particularly challenged in the endeavor to achieve sustainable development. The following document integrates the issues of economic development and environmental and resource issues faced by the people of FSM. The FSM recognizes this integration through the establishment of the Presidential Task Force on Environmental Management and Sustainable Development (EMSD). In preparing this report, the FSM has used the term sustainable development to mean the attainment of a level of natural resource utilization and environmental quality at a level sufficient to maintain the desired degree of economic development and quality of life appropriate for the cultures of the FSM.

The EMSD Task Force with Nancy S. Convard, South Pacific Regional Environmental Program (SPREP), SPREP Consultant, prepared the UNCED National Report following the guidelines provided by SPREP. SPREP graciously provided Ms. Convard to assist FSM in this endeavor. Information for the report was compiled from interviews with task force members, representatives of numerous national and state agencies, and review of various reports. The report represents a tremendous effort on the part of all who participated in its preparation.

As an island nation we are especially conscious of the fragility of our environment and the limitations of our resources. We are also keenly aware of our need for economic development. The report presents a summary of the issues of environment and sustainable development now facing the FSM. Numerous opportunities and constraints are present as we face this challenge. We are confident that while the issues of environment and development are dynamic, and new priorities may arise, that the UNCED and Regional Environmental Technical Assistance (RETA) and UNCED projects will assist the FSM in addressing these issues.

The preparation process for this report has raised several issues, challenges, and opportunities for the FSM EMSD Task Force as it faces the challenge of developing a national environmental management strategy. We would like to thank all the task force members for their valuable contributions in preparing this document. The task force members are identified in Appendix A of this report. Ms. Convard was responsible for incorporating the data, thoughts, and concerns of all individuals contributing to the report. We and the EMSD Task Force recognize the excellent efforts of Ms. Convard. The Federated States of Micronesia gratefully acknowledges and sincerely expresses its gratitude to SPREP for its kind assistance.

Finally, we and all those involved in the preparation of this report wish the UNCED much success as it undertakes this momentous occasion.

Respectfully,

Honorable Bailey Olter
President, Federated States Micronesia

Date

Dr. Eliuel K. Pretrick, M.O., M.P.H.
Chairman, Presidential Task Force on Environmental
Management and Sustainable Development

Date

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I. EXECUTIVE SUMMARY

This report was prepared for the United Nations Conference on Environment and Development (UNCED). The report reviews the state of the environment and development in the Federated States of Micronesia (FSM) and the constraints and opportunities for sustainable development. In preparing this report, the FSM has used the term sustainable development to mean attainment of a level of natural resource utilization and environmental quality at a level sufficient to maintain the desired degree of economic development and quality of life appropriate for the cultures of the FSM.

An established Environmental Management and Sustainable Development (EMSD) National Task Force and an international consultant to the South Pacific Regional Environmental Program (SPREP), Ms. Nancy S. Convard, prepared this report for the FSM. The report follows the guidelines provided by SPREP. Information for the report was compiled from interviews with task force members, representatives of numerous national and state agencies, and review of various reports. The report has been reviewed and endorsed by the EMSD Task Force.

The FSM is a young independent nation created from the former U.N. Trust Territory of the Pacific Islands. It is the largest and most diverse part of the greater Micronesian region. It lies between approximately 135 and 166 degrees east longitude and between the equator and about 13 degrees north latitude. The four states of Kosrae, Pohnpei, Chuuk, and Yap comprise the FSM. The four states have considerable autonomy under the federation type of political system. Each state manages its own natural resources and economic development. The national policies recognize the policies of individual states and their established priorities.

In both the traditional subsistence economy and the cash economy, the environment and its natural resources are essential to the physical and cultural sustenance of the peoples of the FSM.

FSM has a marine area of over 1 million square miles within its 200 mile exclusive economic zone (EEZ). As a result, the FSM is endowed with abundant and varied marine resources. It has, however, only 271 square miles of land area. Thus, it has limited land-based resources, such as agriculture and potable water storage and limited storage of freshwater. The resource and environmental issues affecting sustainable development are those that are common to all nations and, particularly, island nations.

Pelagic resources offer great potential for exploitation. Tuna catches have been increasing and marine resource officials believe that catch of skip jack tuna can be greatly increased without depletion of the resource. The national and state governments are strongly pursuing this area of economic development. Reefs and lagoons are overexploited in some areas, even where the exploitation of reef fish is limited to subsistence use. The reefs do provide opportunities for mariculture development. Present mariculture activities are sponsored by the state and national governments. Most projects are small and focus on resource replenishment not cash sale. Small-scale commercial activities are under consideration.

The pristine reefs, tropical setting, lush interiors of the islands, and historical and cultural resources provide great potential for tourism development. There has been a significant increase of visitors to the FSM and tourism is a leading contributor to the economy. Still, the total numbers remain small. All governments recognize the potential for development in this sector. Government resources for

developing this sector are limited. The private sector is encouraged to develop this sector.

Land resources presently provide for important subsistence agriculture activities and copra production is the only large commercial activity. There is room for expansion in this sector. The high islands have more fertile soils than the atolls, though the steep slopes of the high islands provide some constraints to exploitation. Small-scale livestock projects have potential as important import substitution activities.

The small economy, lack of infrastructure development, lack of trained labor, and lack of a developed private sector constrain development of these resources. The natural constraints of limited resources, great geographical distances within the FSM and to other areas, and the associated transportation difficulties and costs also constrain development.

Natural resource and environmental issues include issues of basic public health and environmental quality and resource degradation. The basic environmental health issues include: safe drinking water supply, solid and hazardous waste disposal, and domestic and commercial waste water disposal. Environmental quality and resource degradation issues include those associated with coastal degradation and resource depletion, particularly in the reef and nearshore area. Air pollution, while not yet a major issue, is also of concern.

The root causes of these issues lie in several areas. The lack of communication and coordination among government agencies and between the government sector and the private sector is one critical area. The lack of trained human resources, lack of education and awareness about environment and resource issues, especially cumulative and long-term effects, are also fundamental root causes. There is a greater emphasis on capital economic development projects than on human resource development issues. Finally, land tenure systems hinder development and resist control of land use for planning or environmental management purposes.

Sustainable economic development and its associated environmental and social goals may be achieved by establishing a comprehensive environmental management policy that clearly spells out the institutional framework and administrative responsibilities. While they need not be identical, national and state policies must be coordinated. Traditional systems should be incorporated as appropriate to maximize support and effectiveness of implementation. Management policies regarding land resources development must also be greatly improved. The policies need to address competing allocation of land among competing uses and ecological considerations. Most importantly, issues of land tenure and, therefore, land acquisition must be resolved.

The development of human resources is key to sustainable development. Development projects that include a training component are necessary for short term gains in this area. Improvements in the formal education system and development of sector specific training opportunities can assist in the short- and long-term development of human resources.

The need for technical assistance has been identified in several areas. Special technical expertise is needed for marketing of mariculture and agriculture areas, and development of commercial crops and farming practices appropriate for the FSM. Also, technical assistance to improve and expand environmental protection and resource management capabilities (to be placed at the national level and shared by the states) and to improve environmental management institutional/legislative development is

needed.

Financial assistance is also needed to support this technical assistance. Financial assistance is also needed for further infrastructure development and associated operations and maintenance training requirements.

On a regional level, cooperation and exchange of information and technical assistance could promote individual country development as well as regional development. Resource assessments are needed on a regional level for migrant species.

Stresses brought on by population growth and the threat of resource depletions require that the integrated economic development be appropriate and well planned with a regard for environmental and resource limitations. It is only in this way, that the economy will truly be sustained and the environmental and cultural heritage of the peoples of the FSM will be retained for future generations.

II. DEVELOPMENT TRENDS AND ENVIRONMENTAL IMPACTS

The Federated States of Micronesia (FSM) is a young independent nation created from the former U.N. Trust Territory of the Pacific Islands. It is the largest and most diverse part of the greater Micronesian region. It lies between approximately 135 and 166 degrees east longitude and between the equator and about 13 degrees north latitude. Figure 1 shows the general location of the Federated States of Micronesia in the Pacific. The four states of Kosrae, Pohnpei, Chuuk, and Yap comprise the FSM. The four states have considerable autonomy under the federation type of political system. Figure 2 shows the FSM in greater detail. The marine area within its 200 mile exclusive economic zone (EEZ) totals over 1 million square miles. As a result, the FSM is endowed with abundant and varied marine resources. It has, however, only 271 square miles of land area. Thus, it has limited land-based resources and limited storage of freshwater. The resource and environmental issues affecting sustainable development are those that are common to all nations, particularly island nations. The states benefit from the federation in many ways and their unity provides greater means to face the challenges of development.

The individual states of the FSM are unique and vary in specific resource potentials, yet, they share many common resource and development issues. All, like other Pacific Island entities, face legitimate pressures and demands for the exploitation of their natural resources.

The FSM is now an independent nation. It has a special relationship with the United States in accordance with the Compact of Free Association (Compact). The Compact is the treaty between the United States and the FSM that was implemented in 1986. This treaty terminated the relationship by which the United States administered the FSM as part of the Trust Territory of the Pacific Islands. The United Nations formally terminated the trusteeship in December 1990. The status of the FSM is significant. Although the FSM is a sovereign nation, its economic stability presently relies heavily on the financial assistance available through the Compact.

The natural environment with its diversity of habitats and species has always had a profound influence on the Micronesian people and their cultures. Until the advent of a cash economy, the Micronesians relied entirely on the environment and its natural resources for their daily sustenance. Today, that is still true on several outer islands. The cash economy was introduced to Micronesia at the turn of the century and its influence was strengthened with the Japanese and American administrations.

The demands of a cash economy and a rapidly growing population are beginning to place great pressures on the natural environment. Urban centers are the most affected to date. Rural areas and outer islands, once difficult to reach, are also facing increasing pressures. New technologies that have increased the ability to rapidly harvest food resources have depleted key resource populations and habitats in some areas and threaten other areas.

In both the traditional subsistence economy and the cash economy, the environment and its natural resources are essential to the physical and cultural sustenance of the peoples of the FSM. Thus, the linkage between environmental management and economic development must be at the forefront of all aspects of development planning. In the past, this linkage has not been recognized. The potential benefits of the islands' resources will not be realized if the resources are not developed and managed on a sustained basis. Sustained development allows for both resource replenishment

1 General Location of the FSM

2 Federated States of Micronesia Map

and economic development level maintenance. In preparing this report, the FSM has used the term sustainable development to mean the attainment of a level of natural resource utilization and environmental quality sufficient to maintain the desired degree of economic development and quality of life appropriate for the cultures of Micronesians with minimal assistance from external sources.

Traditional systems often provide for resource management and conservation through land ownership systems, resource use rights, traditional leadership systems, and many other cultural practices. In terms of resource management and conservation, these methods have been weakened. Indeed, in some areas they have been almost entirely eroded. In Yap, the traditional systems are stronger and remain an important influence on resource management. The resource management agencies desire to revive appropriate weakened traditional systems and incorporate the traditional appreciation and management of the environment and natural resources into the present day community structure.

Each state manages its own internal resources and economic development and national policies recognize the policies of individual states and their established priorities. Coordination and communication among the states regarding these issues, however, allow the individual states and the FSM as a whole to secure maximum benefits from their federation. A national strategy for environmental management and sustainable development will provide the potential for the economies of scale needed for technical implementation and financial efficiency.

This FSM national report reflects the commonalities among the individual states regarding the issues of environmental management and sustainable development. It further reflects the states' common goal to achieve economic independence while maintaining the islands' natural environment and cultural heritage. Beyond describing in detail the setting for sustainable development, the report raises the issues to be addressed by the National Task Force on Environmental Management as it develops a national strategy for planning sustainable development in the FSM.

The following sections describe the natural resource endowment, patterns of economic growth, and demographic trends of the FSM. These trends are difficult to quantify due to the lack of and inconsistency of data.

A. Natural Resources Endowment

As a result of its extensive marine area, the FSM is endowed with abundant marine resources. These include pristine reefs, fisheries (pelagic, reef, and lagoon), and unspoiled coastal areas. These marine resources provide opportunities for sustainable economic development through commercial fisheries, mariculture development, and low-impact ocean-related and nature-based tourism. Low-impact tourism is defined by UNDP criteria and refers to tourism that has minimal environmental, social, and cultural impacts.

The land resources of the FSM, while limited compared to the continental setting, do provide considerable potential for agriculture and forestry. This is particularly true for the main island of each state. The outer islands face much more limited resources. The primary economic base will remain marine-based, but can be supplemented by land-based resources, particularly for import substitution purposes.

The contribution of land resources, the agriculture and forestry sectors, to national productivity is not fully recognized. While there is a lack of reliable information on the agriculture and other land-based sectors, these sectors are major contributors to national productivity (1990 ADB Report). Copra or other uses of coconut production is the most commonly exploited land resource. Taro, breadfruit, bananas, mangos, and papaya are also common on all islands. Pohnpei commercially farms pepper and Kosrae commercially farms some citrus varieties. Yap also commercially farms betel nut. Subsistence production and limited and semi-commercial production is found on all islands. Agro-forestry and forestry opportunities are found on all islands.

State Geographical Information

Chuuk State's land resources are very dispersed even by Micronesian standards. It differs from the other states of the FSM, in that there is no single land mass where the bulk of the population is located. Chuuk Lagoon is the population, economic, and political center of the state. There are 19 mountainous islands and over 70 flat coral islets. The lagoon area is approximately 822 square miles and a total land area of approximately 39 square miles.

The widely scattered outer islands of Chuuk are divided into 4 groups: the Hall islands to the North, Namonuito to the northwest, the Western Islands, and the Mortlocks, southeast of Chuuk Lagoon. Most of the outer islands are coral atolls, with a total land area of approximately 11 square miles.

The steep slopes of the high islands and the generally poor soil constrain extensive agriculture development. Flatter coastal lands of the volcanic islands do contain silty sand, as well as, peat and organic material.

Reefs and lagoon areas of Chuuk are heavily utilized and are in need of careful management practices. Remote submerged banks and reefs are, as yet, little used by Chuukese and provide opportunities for development.

Kosrae is the second largest island in the FSM with a total land area of 42.3 square miles. *Kosrae*

State consists of a single volcanic and isolated, high island, that is triangular in shape. It has five major population centers. It receives heavy rainfall that has produced eroded river valleys and deep water harbors and bays. Much of the island consists of a rugged interior, with fertile agriculture lands on the periphery. Mangroves surround most of the island, with some flat sandy loam areas.

The *State of Pohnpei* consists of the main island of Pohnpei and eight smaller outer islands. Pohnpei island is a high volcanic island, roughly pentagonal in shape with a land area of approximately 129 square miles. It has a rugged interior with steep ridges and narrow valleys. Sixty-one percent of the lands is classified as steep land. It has an extremely wet climate, receiving over 190 inches of rain in coastal areas and up to 400 inches of rain in the mountains. A series of inner-fringing reefs, deep lagoon waters, and an outer reef encircle Pohnpei island. There are many islets immediately off-shore. The coastal area predominantly consists of mangroves.

The outer islands of Pohnpei are low coral atolls. Their total land area is just 4.3 square miles. Several outer islands are inhabited. The outer islands are: Kapingamarangi, Nukuoro, Sapwuahfik, Pakin, Ant, Pingelap, Mwokiloa, and Oroluk. The lagoon area of Pohnpei Island encompasses 279.19 square miles.

Yap is the westernmost state of the FSM. It is composed of 16 island groups, or single islands, scattered over an ocean area of some 800 by 300 miles. The land and people are commonly viewed as comprising two provinces: the Wa'ab island groups, or Yap Proper, and the numerous islands of Remathau, or neighboring islands.

Yap Proper consists of a group of metamorphic and old volcanic islands of moderate slopes and lobed shorelines surrounded by fringing reef. There are four large islands and several small islands. Causeways connect the main islands. Mangrove areas are extensive in Yap Proper. The land area of Yap Proper totals approximately 40 square miles that account for 81 percent of Yap State's total land area.

There are over 108 islands in the Remathau Group in 10 atolls and 4 single islands. These islands comprise just 7.3 square miles of land area. Wa'ab's tropical climate and considerable rainfall, foster an abundant vegetation cover. Many of the vegetation types have been modified by man. The sandy coral lands of the neighboring islands generally pose many more constraints to the growth of vegetation. Coconut species predominate on these islands.

Table 1 provides a summary of the states' geographic characteristics.

Land Ownership

The land ownership systems in the four states of the FSM are complex. Ownership of land is restricted to citizens, however, noncitizens may lease land. Allowable lease periods vary from state to state. The national constitution does not allow indefinite leases. The traditional land ownership system is strong in the islands. Land is the most valued possession of the Micronesian people. As the traditional source of food, building materials, and living space, one was considered very poor without land. Social and political status was, and still very much is, dependent on the individual's

Table 1
Summary of State Geographical Characteristics

State	No. of Islands	Land Area (mi. ²)	Lagoon Area (mi. ²)	Annual Rainfall (inches)	Population (1990 est.)
Chuuk	89	39	822	140	49,163
Kosrae	1	42	na	170	7,369
Pohnpei	9	133	279	200	33,263
Yap	120 ³	48	405	130	10,782
Total	219	262 ¹	684	185 ²	100,577

- Notes: 1 Total land area varies from total given in text due to rounding and the exclusion of some smaller islands.
2 Average rainfall: rainfall for each state is based on the most recent available data.
3 The number of islands for Yap includes many of small islets.

and family rights in land. In all states, land below the high tide line is legally the state's property, but traditional rights to these areas in Chuuk and Yap are legally recognized.

In *Chuuk*, traditional ownership of land is passed matrilineally. The land may also be passed by the father, or by extended family, or received as a gift. In the past, these types of land transfer were much more common than transfers by purchase. Presently, the reverse is true. Lands received from the father are treated as separate from land held collectively by the matrilineal clan, and is often important in shaping the economic future of the father's children. Submerged reefs are considered to be property of private owners just as properties on land. Changes in land tenure have resulted from the German, Japanese, and American influences. The U.S. administration's policy accepted land transfers of previous administrations. All lands acquired by these administrations were transferred to the Trust Territory government and ultimately to the state or municipal governments. In Weno (Moen) almost all the land is privately owned. The Chuuk State government claims ownership of, or leases, approximately 240 acres of the 4,600 acres of land on the island. This land is concentrated near the airport, the government complex in Nantaku, and the commercial port. Most of this land is in active use and unavailable for development. Chuuk does not have a statutory limit on lease terms.

In *Kosrae*, private land is not as fractionalized as in other parts of the FSM. Landholdings are generally small. Private landowners are resistant to outside control or use of their lands, although agreements can be negotiated.

In *Pohnpei*, former colonial administrations interfered with traditional land ownership patterns by redistributing land titles to various people. The land commission has since settled many of the resulting land disputes, however, ownership of much land is still contested. Pohnpei limits land leases to 25 years.

Pohnpei State owns approximately 47,402 acres of land. This number is deceiving, however, because it does not account for land legally homesteaded or otherwise in use. The number does, however, indicate the extent to which traditional land tenure systems were affected by colonial administrations.

In *Yap*, the most traditional of the four states, individuals and families own land. Ownership can be complicated as different persons and families can own parts of an area that one might logically conclude belonged to one owner. For instance, a beach front may have an owner from the reef side, the beach itself, and the land inland of the beach. Yap State holds little public land.

Customary ownership systems resist government control of land use through environmental and zoning regulations. Private investment schemes, particularly foreign, are also handicapped by vague ownership or difficulties of securing clear leases. The inability to acquire necessary easements hinders the national and state governments' efforts to develop infrastructure. This problem is most notable in Chuuk and Kosrae and less of a problem in Pohnpei and Yap. It is thus important to encourage strong local participation and public education in all schemes for economic development and environment and resource management.

Fishery Resources

Fishery resources, including both reef fish and pelagic species, such as tuna, are leading natural resources for the FSM. Recent annual fish catch within the EEZ is estimated at over 150,000 tons per year. Incomplete data are available on reef fish catch, but most of the estimated 1,000 to 5,000 tons caught per year are used for subsistence. The pelagic fishery activities are vital for major commercial operations and subsistence fishing, while reef fish resources are critical to artisanal activities. The pelagic fisheries sector shows the greatest potential as a major component of the country's economic base. The FSM government and each of the state governments have appropriately placed a very high priority on the development of this sector.

Fish catches in the FSM by locally owned vessels and foreign vessels are steadily increasing. In Yap, the fish catch recorded in 1986 was 233.9 metric tons of reef fish and 13.2 metric tons of pelagic fish. The Yap Fishing Authority (YFA) 1990 fiscal year annual report indicates fish catch is increasing. From this report, pelagic fish catch for 1990 is estimated at about 114 tons. As this number reports only fish caught by YFA and some local fishermen, this is probably low. In 1989, Pohnpei reported a total of 176.8 metric tons of reef fish caught and 33.5 metric tons of pelagic fish. In 1990, Chuuk Lagoon fish catch was recorded at 381 metric tons of reef fish and 202 metric tons of pelagic fish. For Kosrae, 1989 fish catch was recorded as 31.9 metric tons of reef fish caught and 96 tons of pelagic fish. Table 2 summarizes fish catch data.

Major pelagic resources are skipjack tuna, yellowfin tuna, and bigeye tuna which are the targets of foreign licensed fishing. Lesser amounts of mahi mahi, billfish, sharks, and other pelagic species are by-catch. Tuna fishing in the FSM does not kill marine mammals.

Their fishery resources also have tremendous importance to the healthy sustenance and cultural heritage of Micronesians. Traditional foods, such as fish, are more nutritious than many increasingly popular imported foods. An increasing number and severity of health problems are due to a growing preference and dependence on imported foods.

Table 2
Summary of Recent Local Fish Catch Data

State	Reef (metric tons)	Pelagic (metric tons)	Data Year
Chuuk	381.0	202.0	1990
Kosrae	31.9	96.0	1989
Pohnpei	176.8	33.5	1990
Yap	233.9	13.2	1986

Source: FSM National Government, Marine Resources Division

Note: This data does not include catch by foreign fishing fleets.

Severe depletion of reef fish is detrimental to the complete health of the coral reef environment. A damaged coral reef environment limits its value for other uses, such as recreation and tourism. The coral reef environment is important to the way of life for the Micronesians, yet, reef areas near large urban populations have been seriously depleted. This is evidenced by fish catch, subjective observation, and changes to the species diversification of the reefs. As such, development of fisheries projects for this area should be limited to helping the subsistence fisherman. This has been, and is expected to continue to be, the policy of the individual state and municipal governments. Reef stocks should still be monitored to avoid overfishing to non-recoverable levels. Destructive fishing methods such as dynamiting and the use of bleach are illegal.

There is little quantitative information, other than reported fish catches, on pelagic fish stocks and rates of change in catch per unit effort by foreign boats for these stocks. Recent studies seem to indicate that catches can be increased substantially for purse seine caught skipjack tuna to 150,000 tons per year without depleting the resource. This is an area that must be further studied for other species, e.g., yellowfin and big-eye tuna, so that the resource can be properly sustained and managed. Fish stocks need to be maintained to achieve sustainable development of both the subsistence economy and the cash economy.

Shellfish/Mariculture

Natural populations of giant clam, *Tridacnidae*, small clam species, and other shellfish are declining. Parts of the Federated States of Micronesia have been almost completely depleted of giant clam populations. The rates of decline are related to the proximity of human settlements.

Trochus harvesting is an important contributor to the economy in all states. Yap harvested 40.2 tons of clean shell in 1990, at a value of \$142,540 to the harvesters in a 10 day season, while Pohnpei harvested 67 tons in an 8 hour season in 1991, Kosrae harvested 10.3 tons in 1988, and Chuuk lagoon produced 121.3 tons in 1986. The trochus is harvested primarily for its shell, though some buyers also purchase the meat. Marketing of the meat may be considered to increase the economic benefit from trochus. It is understood that the meat sale has to be properly coordinated, as the purchase of clean shell alone makes it difficult to control out of season harvesting. This resource is subject to rapid depletion if not properly managed. All states undertake an annual evaluation of trochus populations to determine sustainable harvests.

The pristine reefs, shallow passes, lagoons, and mangroves in the FSM provide an excellent opportunity for mariculture development. Mariculture opportunities that are being developed for both the local and export market include: giant clam (*Tridacnidae*), rabbit fish, sea sponge, black-lipped pearl oyster, and trochus. The extensive mangroves provide an excellent opportunity to develop the mariculture of mangrove crab. This is particularly applicable to Kosrae and Pohnpei. Other options for mariculture such as mullet, sea shrimp, and grouper may have potential, but their feasibility for development in the FSM has yet to be studied. To date, only FSM and state agencies have experimented with giant clam, seaweed, trochus, and mangrove crab. Government and commercial firms are farming sea sponge. It is important to note that mariculture should not be used as a replacement for conservation practices.

Giant clams are a historically important traditional seafood in the Asia-Pacific area. The popularity of giant clams has led to their biological and economic extinction in many areas. Severe depletion has occurred in heavily populated areas of the Philippines, Japan, and Indonesia. Some parts of Micronesia have also become severely depleted. A market for the juvenile clams has also developed from U.S. and European zoos, aquariums, and private owners who want seeds for their aquariums. The cultivation of giant clams on the FSM's coral reefs provides an opportunity to replenish marine resources as well as to develop a local industry to meet a potentially lucrative export market. Giant clams are the highest priority mariculture species in government development plans.

Giant clam cultivation with the preliminary aim of replenishment of reef stocks is being undertaken by the Marine Resources Divisions in all states with support from the National Aquaculture Center. A pilot commercial project has also been undertaken by YFA.

Copra

Copra remains an important cash crop for the FSM. Copra production is a traditional source of income. However, income from this sector has declined as the result of falling world prices and low production. The low production results from several factors, including: low prices, aging palms, and, in

the outer islands, a lack of storage facilities, improper drying, and lack of adequate transportation facilities. The low world prices are particularly influential as this creates a disincentive to increase production. At present, the four states support copra prices. Copra production fluctuates widely with the world prices and the amount of government subsidies. Production in 1974 reached 5,438 tons, but was halved the following year. In 1983 production reached 3,824 tons but fell to only 750 tons by 1987. Most recent available data show that production recovered to 2,000 tons in 1988. Many copra plantations are inadequately maintained because of the lack of incentives in this sector. Many of the coconut trees need to be replaced by younger trees.

Development of other products from the coconut plantations is a viable option that has been undertaken in Pohnpei, Chuuk, and Yap. A private company manufactures soap, oils, lotions, and shampoo in Pohnpei. In Chuuk and Yap, government projects have begun for similar product manufacture.

Coconut crab is also found on all the islands. These are only used in the subsistence sector at present and would not sustain more than subsistence use.

Agriculture

Agriculture is an important activity in the FSM, as it is of major importance to subsistence consumption, employment, and wage earnings. It also provides export earnings. Agriculture activities consist of two general categories, subsistence food production and semi-commercial cropping. There are only a few purely commercial agriculture operations. Cash cropping is usually carried out on small plots of less than one hectare.

The data for the various states is inconsistent in terms of both type and quantity. A summary of the available agricultural resource information is provided below.

Breadfruit, taro, banana, and papaya are found on almost all the islands and should be exploited. Other crops for food, condiments, and ornaments are grown between these tree crops. The garden crops include: cucumber, sweet potatoes, eggplant, head cabbage, chinese cabbage, watermelon gourds, cassava, green onions, and pineapple. Some bell peppers, tomatoes, and sugar cane are also grown. Citrus has proven to have considerable potential in Kosrae. Pohnpei pepper is an important contribution to the local economy and is becoming increasingly well known in the export market. These resources are an important contribution to the subsistence economy. They are also important as cash crops and as a means of increasing import substitution, though this potential is not fully realized. The considerable growth potential in this sector is not realized.

Kosrae has some of the most fertile soil conditions in the FSM. This, in conjunction with a relative lack of pests and diseases, has resulted in a growing citrus industry. Kosrae produces tangerines, oranges, and limes and exports these products to the Marshall Islands and Pohnpei. Kosrae also exports bananas to Guam and taro to Guam and the Marshall Islands. Table 3 shows the number of trees by type in Kosrae as of 1989.

In 1988, Pohnpei had approximately 51 acres of pepper under cultivation and produced 36,500 pounds of green pepper (11,300 pounds of black pepper). Some estimates for pepper cultivation reach 70

acres. The number of acres under production is steadily increasing. Presently, there are five pepper processors operating in Pohnpei, compared to just one in 1988. The pepper is a high value export crop. Pohnpei also exports bananas to Guam. Acreage for other crops is not available. In 1983, unpublished U.S. Forest Service data showed Pohnpei with 2,102 acres of non-forest lands, 79 acres as cropland, and 62 acres as urban with agriculture. A large proportion of these lands, 1,476 acres, are described as grasslands.

Table 3
Kosrae Crop Trees

Tree	Immature	Harvested	Abandoned	Total
Lime	3,922	3,414	122	7,458
Orange	5,259	3,648	188	9,095
Tangerine	3,459	2,900	102	6,461
Banana	147,181	160,455	10,424	318,060
Coconut	53,542	122,546	3,822	179,910
Breadfruit	35,037	42,466	2,411	79,914
Total	248,400	335,429	17,069	600,898

Source: 1990 Kosrae State Statistical Yearbook (1989 data).

Yap exports bananas and betel nut to Guam and Palau. Betel nut is also an important internal cash crop. Local agriculture, however, is still largely confined to subsistence agriculture in traditional agriculture systems. These systems include tree farms (agro-forestry), taro patches, and some mixed gardens.

A survey of Yap Proper, based on 1976 aerial photos, showed that 46 percent of the land was in some type of agricultural use. The major type of agriculture was agro-forests, covering approximately 27 percent of the land. The additional 19 percent consisted of a mosaic of secondary forests, garden sites, and weedy vegetation. Vegetable and root crops cover about 1,116 acres and fruits cover about 5,660 acres, according to a survey in 1986. Total root crop production was estimated at 4,000 short tons. Production of the main fruit products, coconut and betel nut, is estimated at 7,000 short tons annually. Other fruit production is estimated at 247 tons and vegetables, at 190 short tons. Table 4 shows the acreage of different crops for Yap Proper. The total acreage of these crops represents about 29 percent of the land area. This agriculture data was gathered from the Draft Second Five Year Plan.

Forestry

All states except Chuuk have large forested areas. Pohnpei is the most densely forested with approximately 49,000 acres of forest lands, which comprises 56 percent of the state's land area. Kosrae has 17,500 acres of forest lands, 63 percent of the total land area, which is found mostly in the central mountains. Yap forest lands occupy about 33 percent of the state's land area. Yap's forest lands are used extensively for agro-forestry. Chuuk has just 10 percent of its land in forest

Table 4
Acreeage of Different Crops: Yap Proper

Crop	Acres
Taro	100
Sweet Potato	50
Cassava	25
Yam	10
Betel nut	3,050
Coconut	2,500
Breadfruit	40
Citrus	30
Mango	10
Banana	05
Other Fruits	25
Total	6,779

Source: Draft Yap State Second Development Plan.

lands. Mangrove areas are included in forest "lands" calculations. Table 5 summarizes the forestry characteristics of each state.

The forests' current main values are in their support of subsistence agro-forestry activities and their support of environmental protection roles. The forests of the central islands protect watershed and prevent erosion. The mangrove areas filter run-off sediments and act as nurseries for many marine species. Presently, there is limited use of timber resources for subsistence homesteading, furniture, and handicrafts. There is one rough timber sawmill operating in Pohnpei for the local market. In the past there were more sawmills in operation, which served both the local and export markets. State forestry officials discourage commercial timber operations and have banned timber exports due to concerns of erosion, resource depletion, and other environmental degradation.

Special Natural Areas

The pristine reef and forest areas combined with the historical and cultural resources of islands provide the FSM with the foundation for upscale marine and nature-based tourism. Nature tourism is a rapidly expanding business and FSM is in an excellent position to capitalize on this

Table 5
Forest Area by Land Class and Forest Type, 1983 (Acres)

	Chuuk	Kosrae	Pohnpei	Yap	FSM
Forest Lands	2,436	17,576	48,754	9,616	76,711
Timberland	656	9,157	41,408	9,034	60,255
Other Forest					
Steep	-	8,248	6,720	-	14,968
Scrub	108	171	626	582	1,487
Secondary					
Vegetation	624	3,005	4,565	1,370	9,564
Agro-forestry	7,567	6,474	29,389	6,287	52,717
Forest Type					
Upland	1,673	12,545	31,006	6,316	51,540
Mangroves	756	3,860	13,652	2,894	21,162
Palm	5	-	3,417	-	3,+22
Plantations	2	-	15	-	17
Swamp	-	959	529	383	1,871
Dwarf	-	170	2	-	172
Atoll	-	-	15	-	15

Source: ADB Economic report, which drew from the Draft Second Development Plan and this drew from: *Timber Resources of Kosrae Pohnpei, Truk and Yap, FSM*, USDA Forest Service, Resource Bulletin, PSW-24. *Vegetation Survey of Moen, Dublon, Fefan, and Eten*, State of Truk, FSM, USDA Forestry Resource Bulletin PSW 20. Not all Chuuk islands are covered in the inventory.

expansion because of the uniqueness and quality of the ecosystems. Nature tourism is generally considered to be low-impact. In comparison to other tourism developments it tends to have the least impact on natural, social, and cultural resources.

Tol Island in the Chuuk Lagoon has been found to be the home of two unique species, the Truk Greater White-eye (Rukia ruki) or Nimuesounupwin, a native bird, and the Truk poison tree (Semecarpus krameri Laut. ex. Kaneh). These species occur only in Chuuk and, together, only on Mt. Winipot on Tol Island. The local municipality is interested in establishing a protected area, perhaps a reserve, to preserve this area as an outstanding example of remnant native forest and as an important watershed. It was originally proposed through a National Natural Heritage Areas bill, but it has been decided to pursue this at the municipal level at this time.

No marine preserves areas have been established to date, except trochus sanctuaries. A private joint-venture established a marine park in Pohnpei. Two other marine parks in the same area have also been proposed. A watershed preserve has also been established on Pohnpei.

Cultural/Historical Resources

Each state has vast and varied cultural and historical resources. These resources include pre-historic, pre-European historic, and European/Asian historic sites. These resources are found on land, inter-tidal areas, and submarine sites. Archaeological and traditional sites of indigenous people and those resulting from World War II are all recognized by the FSM as important resources to the FSM.

Pohnpei has the famous Nan Madol site, an abandoned city over 1,500 years old, built of columnar basalt that was transported over water to the reef on which some 95 artificial islets were built. It also has numerous other historical sites from the European/Asian administered periods. Yap has its own traditional currency of stone money and a strong traditional culture in place. Yap also has wrecks and land-based historical resources from the WWII era. Chuuk is famous for its "Ghost Fleet" of sunken Japanese ships and airplanes from WWII, as well as historical sites on land. Kosrae also has several interesting sites dating from the Japanese period, a Nan Madol type ancient city, pre-dating that of Pohnpei, and historical shipwrecks from the whaling period.

Identification and preservation of historically and culturally important sites are important when considering future development in the FSM. Tourism is a leading sector in all state economic development plans. These sites add to the public interest and tourist value. Tourism development, however, must be carefully planned at, or near, these sites to ensure the preservation of the very treasures that attract the tourists. These sites are also important for maintaining the cultural heritage of the people of Micronesia. Cultural and historical roots of a society are important to the maintenance of a social foundation that is unique and fitting for its people.

Sustainable development is an integral aspect of the cultural heritage of the FSM. Traditional fishing and resource management practices often recognize ecological patterns and adjust the utilization of resources accordingly. These practices can be combined with modern resource management practices to lay a foundation for sustainable development.

Mineral Resources

No significant mineral resources have been identified in FSM. The mineral resources of potential interest at this time are potential gold and phosphate deposits in Yap. Phosphate deposits are on Fais Island. There is currently a U.S. firm conducting exploratory operations in the state to determine the extent of the gold deposits and the feasibility of commercial mining. The level of interest in the government sector in pursuing this type of development project has yet to be established, pending results of preliminary surveys. Early results indicate little economic potential for the gold deposits. Basalt and sand and gravel deposits for construction material are found on the high islands.

Deep ocean resources of manganese-cobalt crusts have been identified. The extent of these resources has not been fully studied. However, they are not believed to be as extensive as those in other areas. This is a long-term potential and is not considered in current developing plans.

B. Patterns of Economic Growth

The FSM under the U.S. administered United Nations Trusteeship received the great majority of funding for all government activities from U.S. grants. The Trust Territory (TT) Administration was responsible for enhancing the living standards in the FSM. The TT Administration introduced the United States style of government and made some improvements in health care, public utilities, education, and transportation, however, the TT administration did little to promote locally-based economic development. This, in conjunction with a declining copra industry and low revenues, has left the FSM people dependent on government jobs and subsidies.

Compact Assistance

Presently, the FSM relies on U.S. aid obtained through Compact funds. The Compact funds are structured into specific grant categories. The grants accrue to the national government, and are redistributed under a set national-state government procedure. External aid to the FSM totaled approximately \$136.7 million. Domestic revenues generated from the local economy amounted to \$31.2 million in 1989. This external aid, therefore, amounts to approximately 73 percent of the total revenues of FSM. Most of this aid is from the United States.

The purpose of the grant assistance is to provide funds for current operations, infrastructure development and maintenance in the capital account, contributions to the operation and maintenance of the communications systems, surveillance of the maritime zone, health and medical programs, and scholarships to fund post-secondary education. Program assistance provides the FSM with a continuation of a variety of federal services and programs, as well as, technical assistance.

The term of the Compact is 15 years and is renegotiable at that time. In the Compact's first five year period, U.S. grants available to the FSM under the Compact totaled \$365.8 million. Funding reductions began in 1991 at the start of the second five year funding period. Funding and aid through continuing programs in the second five year period of the Compact are being reduced by approximately

\$68 million to \$297.9 million. Funding will again be reduced in the third and final five year period to \$242.9 million, a reduction of \$55 million.

Compact funds from the general fund block grant are distributed to the states under a formula that provides for a base amount for each state and the national government with additional funds based on population. The percentage allocation of the block grant in the first five year plan was as follows:

	<u>National</u>	<u>Chuuk</u>	<u>Kosrae</u>	<u>Pohnpei</u>	<u>Yap</u>
General Fund Grant	12.50	37.4	10.27	24.31	15.52

Economic Imbalances

The reliance on U.S. aid and other foreign funding has created disparities between the monetary and subsistence sectors. Certain aspects of developed country lifestyle have emerged. This lifestyle has not been matched by local productive capacity. This has resulted in consumptive patterns reliant on imports and disparities between urban and rural income and living standards.

The ratio of the value of imports to exports is high, the national average is about 14:1. There is a heavy dependence on the import of consumer goods, raw materials, and capital goods. Food, beverages, and tobacco dominate imports. In 1988, imports exceeded exports by \$84.6 million, with non-oil imports of \$63 million. In 1984, non-oil imports were estimated at \$38 million. Export of goods has been relatively static, increasing from approximately 4.5 million in 1984 to \$5.4 million in 1988. The export of goods consists primarily of agricultural products. Tourism is a significant sector, with current expenditures by tourists estimated at \$3 million per year.

A balance of payments problem is avoided due to the Compact assistance. Without Compact assistance, FSM would have faced a balance of payments deficit of approximately \$82 million in 1988.

Labor Trends

The supply and demand for labor has been adversely affected by population growth, government transfers, and the reliance on the public sector as the main economic catalyst. Population growth has been demonstrated in a growing labor force. This growth, along with increased employment in the social welfare-oriented public sector, has resulted in a low-level, service-oriented labor population. In the state centers this has drawn labor away from traditional productive occupations, such as fishing and agriculture. It is beginning to draw labor from these sectors in the rural areas. It has also contributed to the lack of and development of applicable entrepreneurial and vocational/technical skills needed for service and production activities.

Expatriate labor is still required to supplement the limited resources of trained local personnel in technical and professional services areas. Local labor that goes abroad for training in technical areas does not always return. Others, including unskilled labor, migrate to Guam or Hawaii in search of better paying jobs.

Accurate employment data is difficult to obtain due to the difficulties in establishing the size of

the subsistence sector, definitions of unemployment and underemployment, and the individual's perception of employment status. For example, an individual may be considered underemployed because the individual worked part-time with the government, but may also be employed in a family business or may be involved in subsistence activities. Thus, employment data should only be used to obtain a general picture of the employment situation and not for definitive data. The total employed population of the FSM population is estimated at 15,455 persons in the cash economy. The working population, those aged between 15 and 65, is estimated at 50,000. It is difficult to calculate an accurate unemployment rate. This is due to the difficulties of determining the number of individuals

in education, looking after family, formally seeking cash income, and the number of those desiring to remain in the subsistence sector.

The FSM and state governments employ approximately 42 percent of the working population, excluding the subsistence sector. Chuuk State is the largest employer (41 percent of the total). Table 6 shows employment for the national government and each of the states.

Table 6
Employment by Public and Private Sectors

1989 Employment by Sector					
State	Public		Private		Total
	Number	Percent	Number	Percent	
Chuuk	2,828	52	2,568	48	5,396
Kosrae	768	66	397	34	1,165
Pohnpei	2,192 ¹	36	3,915 ²	64	6,107
Yap	1,030	50	1,036	50	2,066
FSM Total	6,818	46	7,916	54	14,734

Source: State Statistical Yearbooks and Draft Second National Development Plan.

Notes: 1 Includes national government employees.
2 Pohnpei private employees, determined by social security enrollment, include full-time and part-time employees including foreign labor.

Public sector workers are employed by the national, state, and local municipal governments' agencies/authorities and statutory authorities. Occupations are in the areas of community, social and personal services, construction, transport, communications, and public utilities.

A number of small businesses also provide employment. Private sector employment is in areas such as wholesale and retail (including trade, hotels, and restaurants), small manufacturing operations, finance, business services, construction, and insurance. Self-employed and subsistence workers are employed in the agriculture (primarily copra) and fishing sectors, handicrafts, wholesale/retail, and construction.

Though data are inconsistently available, it is apparent that unemployment has been on the increase. Underemployment, where workers are employed at less than full time jobs (usually less than 35 hours per week) is also increasing. Underemployment and unemployment is concentrated in the younger age groups in all states, though in Yap this concentration is not as severe. Underemployment and unemployment are expected to increase further if economic structural inefficiencies are not corrected and new investment is not attracted to FSM. The young population aggravates this problem.

A manpower survey conducted in 1990 provides an estimate of the sectoral distribution of the working age population. Table 7 gives the preliminary results of the survey. It is interesting to note that the inclusion of the subsistence sector lowers the estimate of government employment to 25 percent from 44 percent determined from state statistical data.

Table 7
Percentage Distribution of Employment by Sector in 1989 (by survey)

Sector	Chuuk	Kosrae	Pohnpei	Yap	FSM
Agriculture	20	13	25	13	20
Fisheries	10	5	6	3	7
Industry	8	10	9	10	9
Government	21	32	24	32	25
Other Services	11	18	11	13	12
Unemployed	29	22	25	28	27

Source: Draft Second National Development Plan.

Sectoral Analysis

The dominance of the public sector has resulted in the level of government expenditures determining the level of economic activity. The lack of large development expenditures has left the private sector dependent on routine government operational expenditures. There is little data on capital formation or production levels for the productive sectors. Collection and quality of statistical data is improving; however, there are still major data gaps. This lack of consistent data makes it difficult to discern accurate trends. The following summaries provide qualitative descriptions of the level of activity in the various sectors and apparent trends. When available, quantitative descriptions are provided.

Fisheries/Mariculture

Both the national and state governments have taken on the responsibility of investing in this sector by participating in joint ventures and undertaking feasibility studies to assess future possibilities for tuna processing, transshipment, and canning. Joint venture operations include: fishing operations, transshipment and cold storage facilities, fish base and longline fishing operations, and purse seiner fishing operations. The longline and purse seiner operations are considered to be in a start-up phase with some operational difficulties. The government expects the operations to provide long-term economic benefits by creating hundreds of jobs and export revenue with related secondary benefits.

A transshipment facility is currently in operation in Yap. A similar facility is to be constructed in Chuuk and similar ones are proposed for Pohnpei and Kosrae. The facility in Yap is operated by the YFA and services local and foreign boats. The YFA has entered into a joint venture with the National Fishery Corporation and is in the bid phase for a new larger facility in Yap. The new facility will service only foreign boats in the short-term and may also service local fleets in the long-term.

Tuna cannery operations have been proposed in all states. Kosrae has recently contracted a firm to conduct an environmental impact assessment for a proposed cannery at Okat. Unless this assessment indicates that unreasonable environmental damages will occur that cannot be mitigated, this project will proceed. The proposed cannery is being undertaken by a joint venture corporation, 90 percent of which is owned by the state government. It will have the capacity to process 40,000 tons per year. Pohnpei Economic Development Authority is constructing a fish processing plant at Teketik Harbor, which will have its own wastewater and water treatment. The Chuuk facility is planned for Dublon Island, which is adjacent to numerous popular wreck diving locations. Issues associated with these potentially conflicting uses of marine resources should be addressed in the planning process. Issues of concern include, degradation of water quality, attraction of sharks by discharge of the waste stream, and odor problems.

Mariculture development has also been undertaken by the national and state governments in the form of pilot projects. The national government established a mariculture research facility in Kosrae in 1990.

Copra

This industry has been in decline for the several years, primarily as the result of falling world copra prices. The industry will continue to provide an economic base for the FSM, but unless world markets improve, it is not expected to be a major force in economic growth. Presently, the purchase price is subsidized and the state governments provide seedlings for coconut replanting. Alternative products should continue to be encouraged.

Agriculture and Forestry

There is limited commercial activity in the agriculture (other than Copra) and forestry sectors. Most government programs focus on improving the capabilities of the subsistence farmers. Several small projects are underway in Kosrae, Pohnpei, and Yap.

In Pohnpei, the state government supports the continued development of the pepper industry, particularly for the export market. In Kosrae, the citrus industry has been successful, however, sales have been limited to Micronesia due to export restrictions to the United States resulting from various pest control regulations. The state government is working to resolve the issue.

Broiler chicken raising and processing projects are also underway in Pohnpei. These projects first focused on output, but now consider environmental concerns such as disposal of waste and fly control. Production in this sector has expanded considerably. On Pohnpei, 35,000 poultry birds hatched in 1987. This is approximately three times the 1985 level. Egg production tripled during this time. A broiler production program implemented in Pohnpei by the State Agriculture Office has been successful. There are approximately 16 farmers participating in the program. (ADB Economic Report)

The development of the livestock industry does have environmental ramifications if not appropriately chosen. The introduction of goats, for example, has been questioned. The goats are rarely penned and often run free. The danger of feral goats and resultant vegetation destruction is high. Pigs are traditionally important livestock. Commercial raising of improved breeds is increasing. The Pohnpei Agriculture and Trade School is the largest commercial pig raiser, producing up to 200 pigs per year.

The Forestry Divisions in Pohnpei and Yap encourage agro-forestry techniques and would like to introduce cash crops into the traditional farming systems. Public education is included in the programs. A major goal is the improvement of the local food supplies to reduce import substitutions.

Poorly managed agricultural and forestry projects may lead to environmental degradation, primarily resulting from erosion and sedimentation of streams. The steep slopes in Pohnpei will require particularly careful crop selection and planting methods.

Development of the agriculture and forestry sectors does provide considerable economic potential for the FSM. Import substitution is of primary importance; however, export opportunities exist.

Tourism

The FSM has abundant cultural and natural resources to attract tourism. Tourism is presently a major foreign income earning industry for the FSM. As such, further development of this sector is expected in all states. Each state has made tourism one of the top target sectors for development. Properly planned, low-impact tourism has the potential to improve the economic base with minimum negative impacts. This type of tourism development should be encouraged. The governments encourage development in this area; however, they are primarily relying on private investment. The government is aware that contribution to the local economy may be limited, with tourism development dominated by foreign investment. Concern for the impact of tourism on the local culture and society has also been expressed.

Visitors to the FSM have been steadily increasing over the last several years. The methods of counting visitors do not distinguish between tourists and other types of visitors. Consequently, it is difficult to discern accurately the amount of visitor increase attributed to tourism. Table 8 shows recent visitor data for the states and the FSM.

Accommodation and infrastructure constraints hinder development in this sector. FSM hotels and restaurants are small and cater mostly to locals and interstate travellers. The Village Hotel in

Table 8
Visitors to the States and FSM

Year	Chuuk	Kosrae	Pohnpei	Yap	FSM
1984	3,306	552	4,323	1,282	9,463
1985	4,684	577	5,119	1,475	11,855
1986	4,286	969	5,335	1,740	12,330
1987	4,914	1,308	5,273	1,930	13,425
1988	3,714	1,327	6,475	3,160	14,676
1989	6,923	1,763	7,518	3,901	20,105

Source: ADB Economic Report

- Notes: 1 Visitors include tourists, business people, and government officials.
2 Visitors are counted separately in each state, thus visitors are frequently counted more than once.

Pohnpei, the Continental Hotel in Chuuk, and the Manta Ray Bay Hotel in Yap are notable exceptions.

Sustained tourism development requires careful planning and avoidance of conflicting resource

use. Development in other sectors that have negative impacts on the natural and cultural resources should, in addition to those impacts and its own economic benefit, be carefully considered for impacts on tourism and for its economic benefits.

Commerce and Industry

Family-owned businesses dominate the commercial and industrial sector. There are also a few public companies, cooperatives, insurance companies, and credit unions. These firms include a wide range of retail and service endeavors.

There is little development in the industrial and manufacturing sectors, except for the garment factory in Yap and coconut processing plants in Chuuk and Pohnpei. The Yap garment factory employs approximately 400 expatriate (Sri Lankan) workers and about 100 Yapese workers. There are also two trochus button factories in Pohnpei. Table 9 shows the distribution of commercial entities in the states.

Table 9
Distribution of Commercial Entities by State

	Chuuk	Kosrae	Pohnpei	Yap	FSM
Corporations	160	4	150	24	338
Cooperatives	159	4	6	2	171
Credit Unions	27	1	5	4	37
Commercial Banks	3	2	3	2	10
Insurance Corporations	1	0	3	1	5

Source: ADB Economic Report (from Second Draft National Development Plan).

C. Demographic Trends

During the first half of this century the population levels in the FSM were relatively stable. A census in 1920 enumerated the population at approximately 30,500. The population has steadily and dramatically increased since the end of World War II to approximately 100,577. This represents an average annual increase of about 3 percent. The increases are attributed to improved health care, higher fertility rate, lower infant mortality, a lack of war, and other factors. At the present rate of population increase the population will reach 150,000 by the end of the Compact period, 2001. The demographic data used in this report is estimated from state census data during different years and projections based on

those data.

Population projections used Table 10 are based on an FSM national average annual growth rate of 3 percent, which is still believed to be an accurate estimate. Chuuk State's estimated population growth rate is 3.5 percent. Kosrae, Pohnpei, and Yap, growth rates are now estimated at 3.5, 2.9, and 2.2 percent, respectively.

The population of the FSM is extremely young. Approximately 45 percent of the population is less than 15 years of age. The percentage of the population under 15 is lower in Yap, 37 percent, and slightly higher in Chuuk, 48 percent. In most developing countries the population under the age of 15 years is around 40 percent. In developed countries it is between 20 and 30 percent. With an over 65 population of approximately 4 percent, this leaves a working population of just 51 percent.

There is only very limited information on migration within the FSM and to other countries. There is known to be a moderate amount of out migration to Guam and Hawaii. The opportunity of open immigration to the United States that came with FSM's status under the Compact has been taken by many young people. The out migration is for several reasons, including, search for jobs,

Table 10
Population Projections for the States and FSM

Year	Chuuk	Kosrae	Pohnpei	Yap	FSM ⁵
1985	43,032	6,427	28,671 ³	9,745	87,875
1986	44,194	6,607 ²	29,531	9,940	90,272
1987	45,387	6,792	30,417	10,139 ⁴	92,735
1988	46,612	6,982	31,330	10,345 ⁴	95,269
1989	47,871 ¹	7,178	32,269	10,563	97,881
1990	49,163	7,369 ²	33,263 ³	10,782 ⁴	100,577
1991	50,549	7,513	34,228	11,019	103,309
1992	51,854	7,785	35,220	11,256 ⁴	106,115
1993	53,254	8,003	36,242	11,510	109,009
1994	54,692	8,227	37,293	11,763 ⁴	111,975
1995	56,169	8,425 ²	38,386 ³	12,034	115,014

- Notes: 1 1989 Chuuk Census Results, Office of Planning and Statistics (OPS), FSM (not yet officially released).
2 Kosrae State 1986 Census Report, OPS, FSM: pg. 51.
3 Pohnpei State Census Report, OPS, FSM pg. 71.
4 Report on the Yap State Census of Population, Volume II; pg. 52.
5 All States' figures combined.

education, and the western lifestyle. Internal migration between states is not considered significant. Migration within states is evident in Yap and Chuuk. Outer island residents move into the state centers for jobs, health care, and education and often do not return to their home islands.

The described demographic trends have a significant impact on the environmental and social situations, as well as, economic development. The large number of children under 15 places a great burden on the working age population and on the already stressed educational system. Overcrowding in some urban areas, due to a rapidly growing population, results in classic public health problems, such as diseases associated with poor water quality and sanitation and respiratory diseases.

In both urban and rural areas safe water supplies and adequate sanitation facilities are not available to much of the population. Communicable diseases associated with poor water and sanitation are among the leading causes of childhood morbidity and mortality. The leading causes of childhood morbidity include: skin disease, infectious and parasitic disease, gastrointestinal diseases, diseases of the

respiratory system. Some nutritional diseases are also becoming evident. This could be attributed to low income or to change in diet from the traditional local foods to imported convenience foods. Diseases of the respiratory system are also related to population conditions as they are often associated with overcrowding. Nutritional diseases also can be associated with poor economic status which can be associated with large under and unemployed populations. This is also strongly associated with growing preference for imported foods over healthier local foods.

Finally, the local economy cannot support the available labor population. The young population will continue to add to the already serious employment problems.

D. Natural Resource and Environmental Issues

Major environmental issues include issues of basic public health, environmental quality, and resource degradation. The basic environmental health issues include: safe drinking water supply, solid waste disposal, and domestic and commercial waste water disposal. Environmental quality and resource degradation issues include those associated with coastal degradation and resource depletion, particularly in the reef and the nearshore area. Air pollution, while not yet a major issue, is also of concern.

Fortunately, serious degradation of environmental quality and depletion of resources has not yet occurred to a great extent. Presently, irreversible damages are localized. The island population is particularly dependent on sustainable uses of the natural resources. The production capacity of the environment is therefore of vital interest to development planning.

There is qualitative evidence of a significant depletion of reef fish stocks and shellfish in certain areas. The degradation of reef quality and fish numbers has been caused by a number of actions:

- use of explosives/chlorine for fishing
- loss of reef area from filling and dredging
- degradation of water quality and reef habitats from pollution sources (runoff and associated sedimentation, sewage discharge, and dredging related siltation)
- greater fishing pressures from increasing populations and new technologies
- erosion of traditional land use and conservation practices associated with coastal fishing.
- killing of coral by crown of thorns starfish

Coastal degradation resulting from development pressures and inappropriate coastal developments (projects which do not consider environmental factors) is increasingly evident. The limited land area, lack of sufficient control over private land use through environmental regulations, and inadequate planning mechanisms have encouraged inappropriate developments and have allowed urban pressures to go unmitigated. Lack of adequate sanitation facilities and other waste discharge controls also contribute to the degradation of water quality. The lack of a coastal zone management plan and consistent consideration of environmental impacts in development planning will exacerbate the impacts from future projects. Coastal degradation affects living and non-living resources. Loss of land through erosion, sedimentation of coral reefs, degradation of coastal water quality, and the loss of biodiversity are all closely related. These negative effects of development impact the health of the society through potential exposure to contaminated water and a decrease in the available quantity of local foods. Long-term

economic development can be hampered by the depletion of renewable natural resources.

Land-based environmental and resources issues are also significant. Forest degradation through poor agricultural practices (e.g., slash and burn methods) and commercial development has occurred in all states. Accelerated erosion from agricultural and construction activities has threatened fresh water (streams and rivers) quality. As the number of commercial farms increases this may be expected to increase. Both issues are included in concerns of watershed management protection. Improper use of pesticides has also threatened to contaminate water and soils. Air pollution, resulting from some development projects (e.g., emissions from asphalt plants for road paving), has also occurred.

Rapid population growth is a critical issue. Though, it contributes to other environmental and resource issues, its importance requires that it also be identified as a distinct issue. The government has recognized the significance of rapid population growth and considers it an important issue.

The transition to a cash economy, increasing population, and lowered environmental quality (including indiscriminate solid waste disposal, inadequate water supply, and deficient sanitation facilities), have had direct, adverse impacts on the health status of the population, particularly of mothers and children. Infant mortality ranges between 20 and 40 per 1000 for the different states. This is in contrast to developed-country rates of 8 to 12 per 1000. The leading cause of infant mortality is prematurity, which is associated with maternal health and the level of pre-natal care. Diarrheal and parasitic diseases are also among the leading causes of infant mortality. These causes may be related to environmental and nutritional conditions. Diseases of the respiratory system are also related to environmental conditions. Cholera outbreaks are a continuing concern in Chuuk. Water-related disease incidence may be expected to increase without accelerated water and sanitation improvements.

In the adult population increases in respiratory ailments, including tuberculosis have also been observed. The prevalence of diabetes, cardiovascular diseases, hypertension, and other chronic diseases is also increasing rapidly. This increase is seen primarily in the middle age group, those people first exposed to the transformation to a cash economy and its associated societal changes. These health problems result from the environmental conditions and the socioeconomic conditions that have led to an increase preference and reliance on imported foods. There is a lack of understanding, and in some cases a lack of resources, to select a nutritional diet from imported foods and available local foods.

Socio-cultural impacts of the growing population and the urban environment, that have been occurring rapidly in the recent past, are affecting traditional family systems and goals of the young population. The extended family is being stressed by the limited resources in a cash economy. The traditional roles of the young men and women do not apply easily to the more urban environment, resulting in new social problems, including: alcoholism, juvenile delinquency, and students dropping out of school.

The very large youth populations place increasing stress on the educational systems. Limited human resources, equipment, and supplies have constrained the education field. The educational environment is adversely affected by the lack of water and sanitation facilities. The poor physical environment is not conducive to optimum learning opportunities.

The costs of addressing the needs of the health and education sectors are growing rapidly while the funds available are decreasing. The population pressures on these sectors will continue to increase.

There is an evident need to improve education, health services, and general living environment if the country is going to be able to improve its economic condition.

These issues have affected economic development in two principal ways: (1) unreliability of basic water supplies and inadequate waste disposal facilities discourage the development of tourism and productive industries, (2) insufficient local production of food increases the reliance on imported goods. Fresh water supplies have been unreliable, though the FSM receives significant rainfall. The water supply systems are constrained by system deficiencies, unreasonably high per capita demand, due to waste at the service connections, and in some cases limited storage capacity.

The adverse impacts these environment and resource issues have had on the health and education sectors also affect the economic sector. Without a healthy, educated population (i.e., human resources) economic development cannot be sustained. There is no single sector as crucial to a country's development efforts as investments to improve the health status, level of education, and skills of its people.

The root causes of these issues are evidenced by the above described demographic and economic trends. Environmental quality will continue to be impacted by population growth. Resources will be impacted from increased populations and economic development due to over-exploitation of food resources, overuse of water supplies, and contamination of marine and fresh water.

Another significant root cause enveloping the environmental and resources issues is the lack of adequate communication and coordination. The lack of timely communication is seen among government agencies and between government agencies and the public (including private developers). Part of this lack of early communication results from the confusion over jurisdiction for environment and resource issues. Closely allied with this is the issue of public awareness and level of education regarding environmental management and the environmental, cultural, and social impacts of development projects. Cumulative impacts are often not understood. Long-term aspects of these issues must also be understood.

There is a general lack of awareness and education about environmental and resource issues. The level of understanding and education in these areas must be increased in order to achieve successful environmental management and sustainable development.

A more difficult issue to address, yet one that must be resolved to achieve sustainable economic development, is land tenure. Present land tenure systems make physical planning nearly impossible. The lack of resolution of this issue has provided the opportunity for development of a management plan for sustainable development by also slowing development.

Economic development can have a positive impact on the environment through the improvement of basic infrastructure. The governments' have emphasized this area and it is targeted for continued emphasis in the upcoming state and national development plans. Capital improvements must, however, be accompanied by a dedication to operations and maintenance. Water and sanitation improvements are obvious examples. Properly planned and managed economic development projects improve the standard of living through an increase in real cash income. Projects in the fisheries/mariculture and agriculture sectors that also replenish natural resources depleted by previous over-exploitation are other examples of positive impacts.

Climatic Change

The issue of climatic change is addressed separately to emphasize its importance and to note its external root causes. This issue, particularly the sea level rise component, potentially threatens the ocean resources, and indeed the very existence, of the atoll islands and heavily populated coastal areas of the FSM. While the root causes of climatic change lay outside of Micronesia, the FSM must consider it in its development planning. Internally, implementation of a complete environmental management strategy is the most appropriate response. Wise forestry management and relatively clean power sources will contribute to the global efforts at minimizing risks of climatic change. The FSM recognizes that it does contribute in small ways to this problem, e.g., by using aerosol sprays and air conditioners, and therefore can contribute in small ways to address the issue locally.

III. RESPONSES TO DEVELOPMENT/ENVIRONMENTAL ISSUES

The various levels of government, local educational institutions, and the private sector have responded to development and environmental issues. These responses attempt to address economic development, public health issues, social issues, environmental management, resource protection, and preservation of the country's cultural heritage. Responses to date have not been well coordinated between the state and national governments nor among agencies of the governments. Many positive responses currently under development have not reached a tangible stage. The national and state governments are demonstrating an increased awareness of the issues of sustainable development.

It is significant to note that, in its recent session, the National Legislature passed a resolution expressing its concern over issues of climatic change. It called upon the President to take necessary measures throughout the nation to address FSM's concerns on this issue and to work closely with the Alliance of Small Island States (AOSIS) to ensure that FSM interests are represented in the international arena. AOSIS is an organization established to address climatic change issues and to protect the interests of the affected nations in any forum associated with climatic change issues. The President also addressed this issue in his inauguration speech.

The government encourages private sector development of many sectors, including tourism, fisheries, mariculture, agriculture, and manufacturing.

A. Government Policies, Legislation, and other Developments

The FSM and state governments have recognized the fragility of the nation's island environment and the importance of its environment and natural resources to its people and culture. They also recognize the importance of its natural resources and environment quality to its continued economic development. Several policies address the natural resource and environmental issues. Many efforts of the national and state governments are just underway and many intangible advances toward the inclusion of environmental issues in development planning have been made.

To encourage economic development and as an attempt to improve efficiency of certain government utility operations, the FSM will undertake the privatization, or convert to state-owned enterprises, in several utility areas. These include: the water and sewer operations, power production, and telecommunications. The utility operations will first be heavily subsidized, but improved services and a gradual reduction of subsidies should result.

In 1988, the then President of the FSM, established a National Task Force to address the issue of population growth. The task force studied the overall issue in relation to health, education, and development. Its recommendations encompassed policy issues in all related sectors not simply those of population control. The report and the included recommended policy have not yet been endorsed by the government.

Environmental Legislation

The state and national governments have concurrent jurisdiction for environment and health issues. This has resulted in ambiguity over environmental management responsibilities. Under the constitution, the national government clearly has legal responsibility in the areas of radioactive and hazardous waste. The ambiguities have hindered development of both the national and state programs. The states seem to have greater jurisdiction over environmental issues; however, the national government clearly has a moral responsibility to maintain the environmental heritage and resources of the country. The states, being both physically and socially closer to their environmental issues, need to take a leading role. The technical and financial resources of the states require that some type of coordination and sharing of effort be established with the national government.

The national government enacted its Environmental Quality Protection Act in 1983. In addition, former TT regulations for earthmoving activities have been replaced by FSM regulations. FSM also established Environmental Impact Assessment regulations. Remaining TT regulations regarding the environment remain in effect until they are replaced or repealed by FSM regulations.

Former TT laws and regulations for the protection of endangered species and protection of marine resources were carried over to the FSM government. The status of these laws and regulations and implementation responsibilities remain unclear.

Pohnpei State is in the process of promulgating their Environmental Protection Act. The Environmental Health and Sanitation Office of the Department of Health implements Pohnpei State's environmental protection program. Yap has also enacted their own Environmental Protection Acts. Chuuk has also drafted an environmental protection act that has not yet been passed. These acts are similar to the former TT act and use TT regulations until they are repealed or replaced by state regulations promulgated according to the state acts. The FSM government formally delegated authority of implementation of its regulations to Chuuk State. These environmental protection responsibilities remain with the Environmental Health and Sanitation Office in the Department of Health Services. The Yap enabling act established an independent Board administered Environmental Protection Agency (EPA). Yap presently uses the national government system. Pohnpei State presently operates with the former TT regulations and Pohnpei State promulgated earthmoving regulations. The Chuuk Act would establish a separate environmental protection department as the state constitution mandates. Funding constraints have hindered the passage of the Chuuk Act.

Kosrae has developed, for introduction to the upcoming state legislature, a comprehensive "Island Resource Management Plan" that would establish an independent agency with responsibility for regulating development issues. The agency would have a decision-making Board, technical advisory committee and review process. It would replace many responsibilities of the State EPA Board and the Conservation Division. Presently, the Environmental Health and Sanitation Office works with the National Environmental Health Coordinator to implement environmental regulations in Kosrae.

Yap State is also developing a Coastal Zone Management Plan. The development committee includes several state agencies, community groups, and traditional leaders. It, like the Kosrae plan, would include a project review system. It would not, however, replace the current EPA. In Yap, the governor also established a Colonia Beautification Committee.

The Governor of Chuuk has recently established a task force on environmental impact assessment. The task force will establish guidelines for incorporating EIA into the development process.

Pohnpei enacted their "Watershed Reserve and Mangrove Protection Act" in 1987. The purpose of this Act is "to create and provide for the protection and maintenance of an effective watershed forest preserve and for the conservation and management of mangrove forests." The regulations necessary to implement this Act are still under promulgation. Pohnpei State has also just begun studies toward the establishment of state parks.

Environmental regulations at all levels have been constrained by the traditional land tenure system that resists government control of land use through environmental and zoning regulations. Public understanding of the environmental consequences of unplanned development and uncontrolled increases in population and infrastructure is limited. Consequently, public education must be an important, high profile activity of the responsible agencies.

The FSM is also involved with a number of regional and international organizations. They have signed and ratified the SPREP Convention, among other international conventions, concerning environmental protection. They are members of SPREP, South Pacific Commission (SPC), South Pacific Forum Fisheries Agencies, South Pacific Applied Geoscience Commission, and the AOSIS, an organization set up to address climatic change issues.

B. Institutional Development

Many national and state government departments are involved in environmental and resource issues. In the states and national governments there are separate departments responsible for resource management and development and environmental protection. In all states, except Kosrae, additional departments are involved in resource and other economic development. As described in the previous section, each state has proposed some changes to the institutional structures for resource management and environmental protection; however, none of these proposals has been enacted. Table 11 summarizes the FSM and the state departments' present responsibilities.

Presently, each state, except Yap, has placed regulatory responsibility for most environmental protection areas with the Environmental Health and Sanitation Office within the Department of Health Services. The areas these offices are responsible for regulating include: drinking water quality, earthmoving, pesticides, solid waste, marine water quality, and air pollution. As noted in the above section, Yap established an independent agency, the EPA, to administer the state environmental protection program.

The FSM National Government places responsibility for environmental protection with the Department of Health. There is only one position, Environmental Health Coordinator, assigned to the environmental area.

Table 11
FSM and State Resource and Environmental Protection Departments
(Sheet 1 of 2)

Government/Department	Resource Development Responsibility	Regulatory Responsibility
ESM		
Dept. of Resource and Development	yes	Registrar of Corporations
Marine Resources Division	yes, overall marine resource management.	no
Agriculture	yes, overall land resource management	quarantine
Commerce and Industry Tourism Office	Advisory	no
Dept. of Health: Environmental Health Coordinator	yes	Drinking water, solid waste, earthmoving, pesticides, water quality, etc.
Office of the Attorney General: Division of Marine Surveillance	no	overall enforcement
Micronesia Maritime Authority	yes, licensing and foreign agreement management	yes
Office of Administrative Service: Historic Preservation Office	yes	yes
Pohnpei		
Dept. of Conservation and Resource Surveillance	yes	yes
Marine Resources Division	yes	yes
Forestry Division	yes	yes
Agriculture	yes	no
Dept. of Health: Environmental Health and Sanitation	yes	drinking water, solid waste, earthmoving, air pollution, pesticides, water quality, etc.
Historic Preservation Office	yes, historical and cultural	yes
Chuuk		
Dept. of Marine Resources	yes	yes
Dept. of Agriculture	yes	no
Dept. of Health Services: Environmental Health and Sanitation Office	yes	drinking water, solid waste, earthmoving, air pollution, pesticides, water quality, etc.
Historic Preservation Office	yes, cultural and historical resources	no

Note: FSM Resource and Development Divisions responsibilities are advisory only for issues within state jurisdiction.

Table 11
FSM and State Resource and Environmental Protection Departments
(Sheet 2 of 2)

Government/Department	Management Responsibility	Regulatory Responsibility
<u>Kosrae</u>		
Dept. of Health Services: Environmental Health and Sanitation Office	yes	drinking water, solid waste, earthmoving, air pollution, pesticides, water quality, etc.
Dept. of Conservation and Development		
Marine Resources	yes	yes
Agriculture	yes	no
Forestry	yes	no
Historic Preservation Office	yes	no
<u>Yap</u>		
Environmental Protection Agency	yes	drinking water, solid waste, earthmoving, air pollution, pesticides, water quality, etc.
Dept. of Resources and Development		
Marine Resource Management Division	yes	yes
Agriculture and Forestry Division	yes	no
Historical Preservation Office	yes	no

Note: FSM Resource and Development Divisions responsibilities are advisory only for issues within state jurisdiction.

The National Department of Resources and Development holds national government responsibilities in the promotion of economic development. Its staff is organized into divisions and manages the following sectors: Agriculture (includes forestry), Marine Resources (includes mariculture and coastal resources), Commerce and Industry, Labor, Energy, and Minerals. The National Department serves only an advisory role for resources within the states' jurisdiction (within 12 miles of islands). The National Fisheries Corporation is established to develop commercial large-scale fisheries and fish processing. It is governed by a board of directors representing all states and is administered by the Chief Executive Officer and President. It targets joint-venture operations in tuna longlining, tuna purse seining, and on-shore support and processing of tuna. The Micronesia Maritime Authority, under the direction of its Board, manages marine resources within the national EEZ and provides licenses to foreign fishing vessels.

In compliance with the new state constitution, the **Chuuk** Department of Commerce and Industry was newly formed in 1990 along with the Department of Marine Resources and the Department of Agriculture. Formerly these departments had been united as the Department of Resource and Development. The former Chuuk Maritime Authority, which was active in mariculture and fisheries development and resource management (It maintained a team of conservation officers.), was incorporated into the Department of Marine Resources.

In **Kosrae State**, economic development activities are supported by the Department of Conservation and Development. Its staff manage the following areas: agriculture, forestry, marine resources, energy, tourism, industry, and commerce.

Pohnpei State has within its executive branch of government a Department of Conservation and Natural Resources Surveillance, which promotes development through its divisions of Agriculture, Forestry, Marine Resources, Energy, and Economic Development. These divisions also have resource conservation responsibilities. Tourism development is the responsibility of the Pohnpei State Tourism Commission. The Pohnpei State Economic Development Authority concentrates on the implementation of fisheries development but also is responsible for other economic development sectors. It answers to a governing board and has been active in manufacturing (thong sandal factory), seaweed farming for export, aquarium supplies (fish and coral), and others. It has entered into joint-ventures in tuna purse seining, provides shoreside services for tuna transshipping, and is building a large fish processing facility.

Yap State's Department of Resources and Development has responsibilities for agriculture, forestry, tourism, industry, economic development in general, and management of marine and other resources. Fisheries development in Yap is the responsibility of the Yap Fishing Authority (YFA). The YFA is governed by a Board and promotes longlining through its own locally crewed boats and shoreside support of commercial fishing operations.

C. Specific Programs and Projects

Specific programs and projects are discussed in the other sections of this chapter. In addition, the FSM is now in the process of developing its second five year development plan. Volume two of this plan includes specific projects and programs. The document is now in draft form.

D. Training, Education, and Public Awareness

The Pohnpei Agriculture and Trade School, the Trade, Training, and Testing (T-3) program, the Community College of Micronesia, and the Micronesian and Maritime and Fisheries Academy (private) provide training opportunities for FSM youth. Xavier High School (private) in Chuuk also provides academic training, which prepares youth for a wide range of professions.

The state EPA offices conduct both formal and informal environmental education programs to varying degrees. These programs range from radio public awareness messages to distribution of environmental posters and sponsoring of environment-related contests. The public health offices of the national and state health services departments also produce educational materials, primarily in the water and sanitation sectors.

The local educational institutions are also involved in environmental education activities. The Community College of Micronesia works with the local Sea Grant Officer on a teacher training workshop on environmental education. The workshop is part of the in-service training program and will teach teachers ways to incorporate environmental education into regular course curriculums.

E. Private Sector Initiatives

Community-based groups are essential to the successful management of environment and sustainable development issues. There are a small number of non-governmental organizations in the FSM involved in issues of environment and development.

Micronesian Island Conservation is a local non-governmental organization based in Pohnpei. This conservation organization's efforts involve the production of educational materials, participation in local resource studies, and encouragement of community environmental awareness programs.

Yap Institute of Natural Science conducts many activities in the area of environmental education and research studies of local resource issues. Traditional management practices are also studied.

Truk Society for Historical Investigation and Preservation focuses their efforts on marine and land-based historical sites. They are also concerned with environmental issues. They have produced a video on the marine historical sites and the need for preservation, proper diving practices, and control of artifact removal.

The number of private business sector initiatives to enhance sustainable development has been disappointing.

The church is strong throughout Micronesia. Its role in environment and development is often informal and unofficial. The government recognizes the contribution of the church and its potential to assist in a number of areas, including respecting laws and regulations. Women's groups also provide significant behind-the-scenes support for many programs. Again, because this role is unofficial, and often

informal, examples of their initiatives are difficult to describe.

IV. PLANNING FOR SUSTAINABLE DEVELOPMENT

Continued economic development can yield environmental benefits through an improved infrastructure and a potentially higher standard of living. It is also recognized that there will be a loss of environmental resources with continued economic development. The FSM government policies focus on the minimization of negative impacts and the realization of positive impacts. The need for self-sustained economic growth has become critical as the economy, dependent on government transfers, is experiencing Compact funding reductions. Stresses of population growth and the threat of resource depletions require that integrated economic development be appropriate and well-planned with a regard for environmental and resource limitations. It is only in this way that the economy will truly be sustained and the environmental and cultural heritage of the peoples of the FSM will be retained.

A. Prioritizing Sustainability Issues

The critical environmental issues involve both basic public health concerns and resource management issues. It is difficult to prioritize among these traditional and more recent concerns. Social issues are also critical to the achievement of sustainable development. These issues include human resource development and health maintenance. Activities affecting water quality and coastal processes are also an important concern. Continued, or even increased, availability of local food resources is also a critical issue. These resources are essential both to the country's economic base and its health status.

Given the present public health situation, environmental issues of water supply and sanitation must be given a high priority. To address these public health issues there must be a sincere dedication of financial resources to the physical management of wastes and to the health and education sectors. Operations and maintenance cannot be neglected. The government, private sector, and general population at all levels must gain a higher level of awareness of these issues. This requires the conduct of both short- and long-term educational projects. Coordinated education efforts among government departments and agencies enhance the successful implementation of such programs. The development of the health and education status of the population requires policy adjustments addressing the relationship of these areas to economic development projects.

The poor status of physical infrastructure facilities, particularly water, sewage, and power systems, is also a key issue for sustainable development. The present water supply systems are strained to produce a 24-hour supply (or even lesser amounts) of water throughout the year. Sewage collection and treatment systems are not operating effectively. Power supply is a concern in all states, but especially in Pohnpei and Chuuk. The status of infrastructure may also be considered a constraint to development, but its critical importance to health and environmental quality requires that it also be considered as a high priority sustainability issue.

The issue of coastal degradation, including water quality, is also of high priority. This issue can be addressed without detracting from the priority given to the public health related issues. The limited land area and the critical importance of the coastal areas to the economic and social viability of the FSM require that this issue be addressed concurrently with the other priority issues. Coastal environmental quality is placed ahead of inland concerns simply because of the greater immediate threat to these areas

from development. This prioritization does not attempt to ignore the relationship between inland and coastal environmental concerns.

Land-based resources can be protected under many of the same institutional structures now established for the management of coastal areas. Development and management of land-based resources should not be neglected. Responsible utilization of land-based resources will broaden the economic base, provide local food resources, minimize downstream impacts to coastal areas, and preserve the complete environmental heritage of the islands.

Negative environmental and social impacts of development projects are minimized when these issues are considered in the planning process. Policies requiring implementation of established plans, coordination of planning efforts among relevant government agencies, and departments should be established.

B. Constraints to the Sustainable Use of Resources and the Environment

The land tenure systems, human resource capabilities, ambiguous government environment and resource management structure (lack of coordinated, comprehensive policy), private sector capabilities, physical infrastructure status, and natural (e.g., geographical) constraints are the major constraints to the sustainable use of resources and the environment. Population growth will also have a constraining effect in state centers.

The status of human resource capabilities has already been identified as critical social issue. The lack of a trained population to service and manage economic development limits self-sustaining economic development. This also stresses limited infrastructure and social structures through increased populations from the importation of labor. Vocational training schemes, health status, and limited availability of education and training opportunities dampen expectations of increased human resource capabilities.

Contributing to the shortage of trained labor is the loss of individuals that do not return from overseas training opportunities. Many find more attractive opportunities at the overseas training locations. This situation also occurs internally with outer islanders moving to the state centers for education and failing to return to their home islands.

The present government structure and lack of formal policies and procedures does provide for communication among agencies and departments. Inconsistent application of these policies and procedures hinders communication of development planning concerns. Enforcement of environmental regulations is also inconsistent. The inconsistent application of policies and procedures results from many reasons, including different department priorities. The lack of communication results in inappropriately planned projects and contradictory programs. Development schemes that have the potential to negatively impact the environment and natural resources should be discussed early on with the agencies established to manage these areas. Development planning requires multi-disciplinary input.

Communication between the government sector and the private sector is also insufficient. The private sector is limited in its capabilities by the nature of the economy. The present economy is

dominated by the public sector and highly dependent on foreign assistance. Private investment is primarily from foreign sources. Private industry is primarily service oriented. This is mainly due to the expenditures from government salaries and construction and infrastructure expenditures. There is also a deficiency in numbers of entrepreneurs and production-oriented businesses. Improved government dialogue with the private sector is needed to create an environment that encourages entrepreneurship.

The FSM's geographical location and population dispersion are also major constraints to economic development and provision of social services. The high costs of transporting imports and exports affect the FSM ability to compete in world markets. The difficulties and costs of transportation within the FSM are also obvious. to the outer islands has also been an expensive service of the government. The government subsidized air and sea transportation for the provision of goods and services to the outer islands is an expensive service of the government. Lack of, or minimal, transportation facilities at outer islands hamper outer island export product development.

The previous section identified poor physical infrastructure facilities as a sustainability issue and a constraint to sustainable development. Besides water, sewage, and power facilities, inadequate transportation facilities are also evident constraints to development. The movement of goods to and from the FSM and major suppliers and markets has been a hindrance to productive sector development.

World market prices have their greatest influence on the copra industry. World prices have not yet adversely affected any other sector. World prices that affect the transportation industry have the potential to impact numerous economic sectors. World prices have been good for tuna species; substantial fluctuations in the world prices for these species would have a serious impact on this developing industry.

Coastal degradation is minimized through coordination and planning among the relevant agencies. In this way, appropriate development project selection and siting are achieved. The coordination and communication of development plans are often seen as slowing down the development process. In fact, such early communication and coordination can accelerate the process and improve the project by identifying potential problems and opportunities. Lack of awareness by development agencies of these benefits continues to constrain sustainable development planning. Cumulative impacts are difficult to predict and plan for, especially if potential future projects are not identified early in the planning process.

Finally, sustainable development and the use of resources and the environment require an improved planning, project implementation, monitoring, and evaluation process. No coordinated planning process is apparent. Inadequate monitoring and evaluation leads to the continuation of inappropriate projects and the abandonment of successful projects. Without follow-up, transfer and development of capabilities are frustrated.

C. Opportunities for Sustainable Development

Considerable opportunities for sustainable development are available to the FSM. The majority of the described constraints can be addressed with both short-term and long-term initiatives. The transition from a public sector dominated economy to a productive self-sustaining economy depends on multi-disciplinary program planning and implementation. A self-sustaining economy will result from integrated urban and rural development that emphasizes human resources. Recognition and inclusion of the cultural heritage in development planning is essential. Traditional resource management and community effort can be used effectively to support government structures. The subsistence economy sector, employing both traditional practices and modern technology enhanced practices, can be blended with the cash economy. The economic development (including the provision of social services needs) of the outer islands, rural areas and urban areas must be individually and jointly addressed.

To achieve sustainable development and its associated environmental and social issues, a comprehensive environmental management policy that clearly spells out the institutional framework and administrative responsibilities needs to be established. While they need not be identical, national and state policies must be coordinated. Traditional systems should be incorporated as appropriate to maximize support and effectiveness of implementation.

Management policies regarding land resources development must also be greatly improved. The policies need to address competing allocation of land among competing uses. Most importantly, issues of land tenure and therefore land acquisition must be resolved. Ownership, traditional or western title-based, needs to be clearly established and registered. Another opportunity is for increased government involvement as an intermediary, perhaps by leasing land and making it available to potential development.

Some policy adjustments must also be made. A shift to better support of the development of human resources provides a foundation to support economic development. The necessary policy adjustments are in two major areas: (1) direct support of human resource programs, e.g., health and education and (2) indirect programs, through the support of development projects that provide training opportunities.

Small-scale agriculture and fishery projects, like those described in previous sections, provide opportunities to address development of cash products and contribute to the immediate needs for import substitution of food products. Marine stocks replenishment and stock enhancement for trochus, clams, and fish also are important.

Larger-scale development must also be considered, but again, the inclusion of a training component should always be considered. These projects must be planned in an interdisciplinary manner so that potential negative environmental and social impacts can be avoided or mitigated.

Human resource capabilities can be addressed in a number of ways. Vocational and technical training should be emphasized, however, managerial skills must not be neglected. Short-term improvements may be achieved by requiring development to have a training component. This training must be monitored and evaluated. In the medium-term, longer, training programs and in-service

education opportunities should be encouraged. Improvement of the education system may be stimulated through teacher training, increased funding, efforts to raise community awareness of the importance of education, and the involvement of community groups in the educational process.

Programs to encourage the return of overseas trained persons can be developed. Incentives involving increased salaries and better career opportunities can help to encourage trained FSM citizens to return. This type of program would face budget constraints but its value should be carefully considered.

The importance of improvement of health conditions, particularly the mother and child, must be continuously stressed. Health service programs must also include expanded education and awareness programs to supplement direct curative health services.

Environmental education, particularly as it relates to public health and sustainable development, should be addressed in routine public awareness programs, special projects, and formal education. Opportunities for public education can be incorporated into open discussion of development projects. Discussion of the environmental advantages and disadvantages, and identification of available mitigation measures, creates an obviously applicable learning opportunity.

Increased communication among the government department agencies improves the planning effectiveness of a given project. Development arms of the government need to be made aware that communication and joint planning can improve a potentially viable project's success. They should also be aware that project implementation is not slowed by such communication and is often hastened since the environmental review process is occurring concurrently with other planning and design processes.

Finally, increased funding levels alone are not the key to sustainable development. Improved efficiency with available funds through proper planning, project implementation, and monitoring, is key. Human resource development, through improved environmental quality, addressing of nutritional and environmental health concerns, education, and training, provides the foundation for sustainable economic development.

Technical Assistance Needs

Technical assistance to quantitatively assess the marine resources, particularly fisheries, is needed. Present government policy assumes adequate resources to continue expansion of large-scale projects. Quantification of the resources would allow for more reliable estimates and ensure responsible harvesting. The sustainable yield of the critical resources should be established. For migratory species, such as tuna, region-wide resources assessments should be undertaken.

Marketing assistance in several sectors is needed. Marketing studies are especially needed for non-pelagic marine resources such as trochus, dried fish, sea sponge, etc. The marketing assistance is needed both for promotion and identification of market opportunities.

Similar marketing assistance for agricultural products is needed. Training and technical assistance for development of this sector is also needed. Technical assistance on farming practices and crops appropriate for the local environment would also be valuable.

Technical assistance, perhaps at national level, to be shared with states, on environmental protection areas, e.g., environmental engineer, environmental scientists, and perhaps a planner or policy development specialist, would also be valuable. This assistance at the national level would allow a higher level and greater range of assistance than the states could afford individually.

Legislative assistance to assist in institutional development is needed. The need will be more clearly defined by the results of the RETA international legal consultants' report.

Financial Assistance Needs

Funding assistance will be required for the technical assistance needs identified above. Some local support may be available, but it will be limited.

Additional funding for infrastructure is also needed. It is desired that assistance in this area include training of local labor in facilities operations and maintenance.

Regional Strategies

Regional strategies can assist the region and its individual countries in their environmental management capabilities and in enhancement of economic development opportunities.

Cooperation on resource assessment studies, particularly for migrant species, will allow the individual countries to evaluate the exploitation of its own resources. It will also allow for the study of potential cumulative regional impacts of resource exploitation by the region.

Cooperative regional marketing, trade agreement standards, and preferential opportunities for, and among, Pacific Island nations could give the nations greater negotiating strength when dealing with other nations. These types of agreements could also help to mitigate the common constraints affecting the nations. Greater economies of scale might be achieved.

Regional training opportunities in both formal and informal programs should continue to be encouraged. Exchange of expertise between islands can be especially valuable. Exchange of expertise that includes case study experience provides particularly applicable help to many levels of development planners.

The availability of island-appropriate technologies to mitigate negative environmental impacts must be continually communicated among the region's organizations and governments.

Sources of support for environmentally sensitive development need to be identified. The U.S. AID Profitable Environmental Protection project, for example, needs to be better publicized.

E. REPORT PROCEDURAL MATTERS

This UNCED report was produced in coordination with the existing Regional Environmental Technical Assistance Project, RETA, that is also sponsored by SPREP and funded by the ADB. The coordination benefitted the preparation of this report by using existing structures. It also benefits the RETA Environmental Management and Sustainable Development, EMSD, by providing background information and raising issues for consideration by the task force. It serves both as the first input to the RETA project, and its first output.

The FSM EMSD task force was established by Presidential Order Number 11 and includes: Secretary, Department of Human Resources (Chairman); National Planner (Vice Chairman); Secretary, Department of Finance; Secretary, Department of External Affairs; Attorney General; Secretary, Department of Resources and Development; and one representative from each of the four states, as appointed by the respective Governors. The Task Force members are identified in Attachment A.

The UNCED report was prepared by EMSD task force and the international consultant, Ms. Nancy Convard, provided by SPREP. The preparers followed the guidelines prepared by SPREP and through the information and comments received from task force members, the numerous local contacts, and review of various reports. A list of consulted agencies, groups, and individuals are identified in Attachment B. The draft report was reviewed and endorsed by the Task Force at its second meeting on May 23 and 24, 1991. The final report was endorsed by the Chairman's steering committee on July 15, 1991.

In compiling and completing this report, emphasis was placed on receiving input from both the state and national levels. At each level, meetings were held with a variety of departments and agencies. The severe time constraints made complete coverage of all agencies difficult to accomplish; however, it is felt that the level of input was sufficient to raise major issues and concerns of all sectors. Ms. Convard was responsible for incorporating the data, thoughts, and concerns of all individuals contributing to the report.

Ms. Convard travelled to each state for 2 to 7 days each, and returned to Pohnpei for 2 days of meetings with the National EMSD Task Force to discuss the draft report. In addition to the endorsement of the draft report the EMSD Task Force identified steps to be taken to finalize the report.

The consultant returned to Pohnpei from July 11 to July 17, 1991 for final consultations with the task force, local consultants, appropriate government officials, and preparations for government endorsement of the final report. The final report was forwarded to the President for his endorsement. Ms. Convard finalized document printing in Honolulu and returned the report to the Task Force Executive Director for transmittal to UNCED.

ATTACHMENT A
ENVIRONMENTAL MANAGEMENT AND SUSTAINABLE DEVELOPMENT TASK FORCE

Task Force Members

- | | |
|--|---|
| * Secretary, Department of Human Resources (Chairman): | Dr. Eliuel Pretrick |
| * National Planner (Vice-Chairman): | Mr. John Mangefel |
| * Attorney General: | Ms. Maureen Phelan (Assistant Attorney General) |
| * Secretary, Department of External Affairs: | Mr. Epel Ilon (Acting Secretary) |
| Secretary, Department of Finance: | Mr. Aloysius Tuuth |
| * Secretary, Resources and Development: | Mr. Marcelino Actouka |
| * Chuuk State Representative: | Mr. Marion Henry, Director of Commerce and Industry |
| * Kosrae State Representative: | Mr. Singkitchy George, Director of Health Services |
| * Pohnpei State Representative: | Mr. Elden Hellan, Chief Sanitarian |
| * Yap State Representative: | Mr. Joseph Xavier, Acting Executive Director, Yap Environmental Protection Agency |

Task Force Executive Director

- | | |
|------------------------------------|------------------|
| * Environmental Health Coordinator | Mr. Nachsa Siren |
|------------------------------------|------------------|

Local Consultants:

- | | |
|---|---------------------|
| * | Mr. Michael Gawel |
| * | Ms. Donna Scheuring |

ATTACHMENT B
CONSULTED AGENCIES AND INDIVIDUALS

1. EMSD Task Force

All those with an asterisk on previous page.

2. Other Representatives of Task Force Represented Departments

Office of Planning and Statistics:

Mr. Tim Semuda, Chief of Statistics

Department of Health:

Mr. Isamu Abraham, Assistant Secretary for Health

3. State Contacts

Chuuk

Environmental Health and Sanitation Office

Ms. Kathy Asor, Chief Sanitarian

Mr. Joe Konno, Environmental Specialist

Office of Planning and Statistics:

Mr. Mike Habbit, Acting Director

Mr. Henry Kellam, UNDP Advisor

Chuuk Visitor's Bureau:

Mr. Carmilo Akapito

Department of Health Services:

Mr. Sanphy Williams, Deputy Director

Department of Agriculture:

Mr. Arthur Ansin

Department of Public Works

Kosrae

Honorable Thurston Siba, Governor

Department of Planning and Statistics:

Mr. Gerson Jackson, Director

Mr. Likiak P. Wesley, Chief Planner

Department of Health Services:

Mr. Singkitchy George, Director

Mr. Katsuo William, Chief Sanitarian, Environmental Health and Sanitation Office

Department of Conservation and Development and Conservation:

Mr. Lewis Brooks, Director

Department of Public Works: Mr. Bruce Howell, P.E.

3. State Contacts (continued)

Pohnpei

Department of Natural Resource Conservation and Surveillance:

Mr. Andelino Lorens, Chief, Division of Agriculture

Mr. Herson Anson, Chief, Division of Forestry

Mr. Tashiro Ludwig, Chief, Division of Marine Resources

Department of Planning and Statistics:

Mr. Nick Solomon, Director

Mr. David Morgan, UNDP Advisor

Department of Public Works:

Mr. Largo Edwin

Environmental Health and Sanitation Office:

Mr. Elden Hellan Chief Sanitarian

Economic Development Authority:

Mr. Quirino Mendiola

Yap

Council of Tamol:

Mr. Velarmino Hathheyul, Chairman

Environmental Protection Agency:

Mr. Joseph Xavier

Department of Health Services:

Mr. John Gilmaetam, Director

Ms. Cristina Gadhey, Public Health Nurse Supervisor

Department of Resources and Development:

Mr. Sebastian Anafel, Director

Mr. John Iou, Chief, Marine Resources Management Division

Mr. Patrick Sokaw, Chief, Agriculture and Forestry Division

Office of Planning and Budget:

Mr. Leo Chiengyan, Chief Statistician (Acting Director)

Division of Youth Affairs:

Mr. Sam Falanranuw

Department of Public Utilities and Contracts:

Mr. Charles Chieng, Director

Mr. Gregory Hartkopf, P.E., Project Manager

Office of the Attorney General:

Cypriano Manmaw, Attorney General

Yap Fishing Authority:

Mr. Peter R. Rebeuluch, General Manager

4. Other Contacts

Mr. Kit Dahl, Sea Grant Extension Agent

Honorable Aurelia E. Brazeal, United States Ambassador

Many individuals and agencies provided valuable contributions to this report. Apologies are extended to those not included in this listing.

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