

# **KOSRAE/PACIFIC ISLANDS SUSTAINABLE DEVELOPMENT STUDY REPORT**

July, 1993

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The views expressed herein are those of the author(s) and do not necessarily reflect the views of the participating agencies.

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## *Acknowledgements*

This exercise began with a vision of *Thomas Laughlin*, Chief of International Liaison at NOAA headquarters in Washington DC and Chairman of the Pacific Island Network (PIN), subsequent to the Pacific Islands Conference in Honolulu in May of 1992. He believed that it could be worthwhile to attempt to develop a theoretical *and* practical model for sustainable development on Pacific Island states.

*Kit Dahl* from PIN and the *University of Hawaii's Sea Grant Extension Program* provided excellent briefings at the start of the work, in addition to arranging for interviews with numerous experts in Hawaii and other logistical support, with assistance from *Sharon Ziegler*, PIN Coordinator. On Kosrae itself, *Gerson Jackson* and his staff at the *Office of Planning and Budget*, particularly *Likiak Wesley*, Chief of the Planning and Statistics Bureau, provided similar, vital guidance and support to this neophyte of the region.

In total, some eighty persons were interviewed in the course of this project, many of them more than once. A list of their names and affiliations, as well as a list of references used, is provided in *Appendix 1*.

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### *List of Abbreviations Used*

ADB	Asian Development Bank
BOD	Biological Oxygen Demand
CRM	Coastal Resource Management
DC&D	Dept. of Conservation & Development (Gov't of Kosrae)
DRC	Development Review Commission (under KIRMP)
EIA/EIS	Environmental Impact Assessment/Statement
E-W Ctr.	East-West Center
FAA	US Federal Aviation Administration
FSM	Federated States of Micronesia
GDP	Gross Domestic Product
GODC	Global Ocean Development Corporation
KCAP	Kosrae Community Action Program
KIRMP	Kosrae Island Resource Management Program
KSG	Kosrae State Government
NGO	Non-governmental organization
NJ	State of New Jersey (US)
NOAA	US National Oceanic and Atmospheric Administration
PIDP	Pacific Islands Development Program
PIN	Pacific Island Network
SCS	Soil Conservation Service (USDA)
SPREP	South Pacific Regional Environment Programme
TAC	KIRMP Technical Advisory Committee
UH	University of Hawaii
UN	United Nations
US	United States of America
USDA	US Dept. of Agriculture
WA	State of Washington (US)
WCED	World Commission on Environment and Development

# INTRODUCTION

## *Terms of Reference*

The purpose of this exercise and report is to provide technical assistance directly to the Government of the State of Kosrae in the Federated States of Micronesia (FSM), and indirectly to other Pacific island states, by stimulating discussion of sustainable development. Initially, it was hoped that a practical, flexible model for sustainable development on Pacific islands in general could be developed, but when the resources available limited the field work to one island, it was decided instead to develop a "menu of sustainable development options" for Kosrae, with generically applicable options and lessons as a secondary, more implicit goal.

The island of *Kosrae* was selected for the case study because of its 1992 legislation establishing a Development Review Commission whose functions will include preparing land use plans and creating a development review permit process that incorporates rules and regulations necessary to implement the *Kosrae Island Resource Management Program (KIRMP)*. It was thought that this project could provide this pathbreaking program with some assistance in getting to its next level of implementation.

This document is the deliverable product that will provide these items, in written form, including:

- (i) mission documentation;
- (ii) a discussion of what sustainable development means in theory, of its general implications on small Pacific islands, and its implications for Kosrae in particular;
- (iii) the menu of specific options for sustainable development on Kosrae, and
- (iv) an explanation of the items on the menu, when possible including exploitable species or sites, potential markets, transportation issues, job implications, training needs, tax revenue projections, infrastructure needs, etc., as well as potential environmental and social impacts.

## *Methods*

The contractor's experience combines conceptual work on the theory of sustainable development and practical efforts to promote its implementation in coastal situations in several industrial and developing countries. He had, however, never been to a Pacific Island prior to the PIN conference in Honolulu in May of 1992. Consequently, after reviewing the *Kosrae Island Resource Management Program (KIRMP)* documents, the contractor stopped en route to Kosrae in Honolulu for four days of consultations with about twenty Pacific experts of various types, at the University of Hawaii (Sea Grant, the Law and Business Schools), the U.S. government (the East-West Center, the Economic Development Administration, the Forest Service), NGOs, and other agencies (see *Appendix 1* for a list of contacts).

The contractor then spent twelve (12) days on Kosrae. With invaluable assistance from the Office of Planning and Budget, he met privately with about forty individuals (government officials, private businessmen, bankers, various other expert technical assistance providers, etc.), held three group meetings (with the KIRMP Development Review Commission, its Technical Advisory Committee, and the Governor's Cabinet), toured the island and explored some of its current development projects and attractions, and collected documentation of past, present, and future development plans and reviews.

An *ad hoc* one-page "*Development Impact Assessment Checklist*" was prepared for these group meetings. This checklist allowed preliminary, subjective numerical ratings of anticipated impacts on infrastructure needs, the environment, the social system, and the economy. This was intended for demonstration purposes, and to stimulate discussion, which it did quite well. Other, more detailed checklist methodologies have already been provided to the Government of Kosrae. The Technical Advisory Group used the checklist to do a preliminary evaluation of two projects they are considering (a Marine Park and the Lelu Ruins site); the results, as well as a blank form, can be found in *Appendix 2*. The members of the Development Review Commission indicated that they would greatly benefit from additional training in such assessment methodologies.

Four days were then spent on Pohnpei island, the capital of FSM, where an additional ten people were consulted, from the national government, private sector, NGOs, etc., and further documentation collected. During a two day stop-over in Honolulu on the return, many of the experts met earlier were re-visited to debrief and discuss the findings of the islands trip. Several additional specialists were consulted once back on the US mainland.

# SUSTAINABLE DEVELOPMENT: FROM THEORY TO PRACTICE

## *What is Sustainable Development? Some General Principles*

There is considerable confusion in current discussions of "sustainable development," the over-arching goal for the "new world order" according to documents such as *Our Common Future* (WCED, 1987) and *Agenda 21* (a product of the "Earth Summit" last June in Brazil). Typically, there is a lot of hand-wringing over the need for a good, operational definition so that the World Commission on Environment and Development's theoretical, idealistic definition can be implemented:

*Sustainable development is that which meets the needs of the present without compromising the ability of future generations to meet their own needs... a process of change in which exploitation of resources, the direction of investments, the reorientation of technology development, and institutional change are all in harmony and enhance both current and future potential to meet human needs and aspirations.<sup>1</sup>*

At its most basic, sustainable development simply means development that lasts longer than many past or current attempts. Perhaps one source of difficulty is the fact that there has never been a universally accepted, theoretically as well as operationally rigorous, definition of "development." It is frequently assumed (by economists and planners, anyway) to simply be "economic" development that we are concerned about, as the ability to earn a living through the fruits of one's labor is often such a critical factor at the personal level of being able to meet one's own needs and aspirations. Putting the word "sustainable" in front may actually help, however, because it forces one to ask "what is it that we want to sustain?"

From a systems theory perspective, it seems that there are three sub-systems of the living system we call Earth that need to be sustained. They are very much inter-twined, so attempting to develop one without paying attention to the development and sustainability of both of the other two is bound to lead to problems. These three sub-systems are the Ecological, the Economic, and the Social Systems (Colby, 1990, 1991; Colby & Schulkin, 1992).

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<sup>1</sup> WCED (World Commission on Environment and Development), 1987. *Our Common Future*. Oxford University Press, Oxford & New York.



Sustaining the Ecological sub-system means sustaining the "environmental services" provided by the ecosystem, such as water cycling and purification, soil production, nutrient cycling, pollination systems, pest population regulation, ultra-violet light blocking, energy production, etc., that support the food, drink, shelter, fiber, medicine, and transportation production systems upon which all peoples and economies depend, "developed" or not. Some rather idealistic principles (in other words, general goals, not always applicable) related to ecological sustainability are provided below.<sup>2</sup>

1. Natural resource management should attempt to simulate natural ecological processes.
2. Contributions should be made to the restoration, perpetuation, and maintenance of the biological diversity (habitat, species, and genetic diversities) of the ecosystem.
3. Harvesting rates of renewable resources should not exceed regeneration rates.
4. Non-renewable resources should not be used for extended periods at a rate greater than the creation of renewable substitutes.
5. Native species should be preferred over the management of non-native, exotic species.
6. The most value should be sought from a resource before it leaves the region, rather than exporting raw materials to be processed elsewhere.
7. Technological progress should increase biophysical as well as economic efficiency in producing a product, rather than simply resulting in increasing the quantity of resources used.
8. The highest possible standards of energy efficiency should be used.
9. Waste emissions should not exceed the assimilative capacity of the ecosystem.

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2 Modified slightly from Ecotrust, a Portland, Oregon-based non-governmental organization dedicated to the promotion of conservation and sustainable development in the coastal temperate rainforest biomes of the world.

Discussions of the Economic sub-system often center on sustaining economic growth, particularly in places with relatively low per-capita incomes. Unfortunately, these discussions have tended to ignore or misunderstand the relationship between economic growth and its ecological and social impacts. Furthermore, such discussions have tended to suffer from a lack of clarity about what is, or should be, growing. It is crucial to distinguish between the things that can continue growing and those that cannot grow indefinitely on a biophysically finite planet.

Most of the world wants increased incomes, increased ability to provide the basic physical necessities of life (food, shelter, health care), as well as some of the physical and psychological niceties (transportation, education, recreation, etc.). The important question is can this be done without further expanding the expropriation of limited biophysical resources from the ecosystem (e.g., energy, minerals, biomass, water, elimination of diverse biological systems and their genetic resources) and excretion of harmful biophysical wastes (degraded energy, solid waste, air and water pollution from chemicals and other industrial and agricultural wastes, etc.)?

This combination of biophysical input consumption and waste excretion (output) to serve human activities has been called the "throughput" of the economy (Daly, 1990). It is impossible to completely divorce economic production from throughput because every organism and machine takes some matter and energy in, processes it, and releases some waste. Maintenance alone, without development, requires resources (as all too many nations have discovered when they cannot afford the operations and maintenance costs of past development projects, let alone investing in new ones). However, it is probably possible to greatly increase the throughput efficiency of our economic system, by such measures as recycling materials, increasing energy efficiency and tapping renewables, emulating how biological systems function by turning the wastes of one production process into the raw materials of another, etc. This means working to provide more jobs and higher incomes while using less material and energy in the process.

While "development" almost invariably means "change," there are certain aspects of Social life that people resist changing. Some of these are site-specific "*Quality of life/ cultural*" factors such as religion, music, art, life-style, the role of the extended family and community in an individual's life, the kinds of work that are considered important or dignified, land use practices, etc.

Other social system factors are more universal concerns that have to do with the social contract that underlies a community and allows it to function. One of the most important of these issues is *Equity*. It is fashionable today to say that poverty is the greatest cause of environmental degradation. It is usually relatively wealthy people who say this; many poorer people (or countries) blame the disproportionately high consumption of wealthy people and countries for

global ecological problems such as atmospheric change and resource depletion. This is not merely a moral issue; it is a very economically practical one. While it is now widely accepted that absolute equality of income is both impossible and ineffective as a means for promoting development, it is also true that too great a disparity in access to basic resources or in the distribution of the economic rewards is unsustainable. Extreme disparities in access to resources often leads to increasing marginalization of people (as well as of all the other species and ecosystem services that provide life-support to them), as people find it increasingly difficult to meet their needs. Extreme inequity in the distribution of income may lead people to quit working if they derive too little benefit from it (i.e., cannot buy the products of their labor), which in turn may leave their employers with no product to sell. A high concentration of wealth has also been linked to most recorded depressions (Batra, 1987). Some would argue that poverty and affluence not only are causes, they can become effects of environmental degradation. (For instance when someone liquidates natural capital such as a forest, they may have both enriched themselves and impoverished other people who live in the forest and depended on its products and services for survival). *Thus, both poverty and wealth can be both causes and effects of environmental degradation. What is needed is a better balance of access to resources and rewards for labor, not necessarily equal, but certainly more equitable than the current situation.*

A second factor critical to the social development contract is *Participation*. As Russell Ackoff has said, "plan or be planned for" (Ackoff, 1981). Like equity, participation is a very practical issue. If the people of a community are involved in planning their future, they will not only make sure it is more compatible with their quality-of-life and equity concerns, they will also lend their much more detailed knowledge of local conditions to the design process, improving it. These factors will increase their sense of "ownership" of the resulting project, which will make them much more committed to achieving success. There are few things so pragmatic as the commitment of the people who are supposed to benefit from a project, who in the end must have the initiative to carry it out themselves. Thus, equity and participation can be thought of as different ways of expressing the same social need: the sharing of the responsibilities for and the proceeds of development.

*Thus, the three main categories of indicators to look at when trying to determine the sustainability of some development activity are:*

- *its ecological,*
- *its economic, and*
- *its social/equity implications.*

# SUSTAINABLE DEVELOPMENT ON PACIFIC ISLANDS

## *The Context*<sup>3</sup>

Pacific Islands vary considerably in their biophysical, economic, and socio-political characteristics, including their resource endowments and the size and expectations of the human populations that depend on them. Some are relatively large, rugged, mainly high volcanic islands that are fairly rich in natural resources, with fertile land and diverse marine and terrestrial resources. Even some of these high islands are not large, however (e.g., Kosrae), making their populations all the more susceptible to ecological degradation if development is not done carefully. Others are even smaller, low atolls with poor soil and little variety in terrestrial vegetation. Some states are island groups that consist of a mixture of these land types (e.g., Pohnpei).

The economies of many Pacific islands are extremely fragile, highly vulnerable to factors beyond their control, such as trends in the global economy, cyclones and shifts in oceanic currents, etc. Substantial trade deficits are common, and are sustained through large financial inflows from abroad, in the form of official subsidies, remittances from overseas residents (an important cultural element), and in a few cases more recently, the proceeds of investment abroad. Agriculture is a primary activity on many of the larger islands, and a main source of export earnings. Some islands are largely dependent on a single commodity (e.g., copra). Fishing is often the other main activity, but not always. Some islands instead earn revenues from their fisheries resources by leasing fishing rights within their exclusive economic zones to foreign nations with deep-water fishing fleets. Tourism has emerged on a few islands as a major source of income.

Often, the bulk of an island population's activities are subsistence related, sometimes supplemented by one member of an extended family unit who works for the government or has a cash economy job. One risk is that the attractions of a money economy (imported foods and other material goods), coupled with the resource demands of rapidly growing populations, may diminish the ability of the subsistence economy to provide basic foods and other needs traditionally provided by the local environment.

There is also quite an array of political systems and ethnic mixes on different islands: independent states, territories, self-governing but financially dependent protectorates, etc. Immigration between islands complicates development options considerably.

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3 Much of this discussion is adapted from *The Pacific Way* (SPREP, 1992), and from Economic Reports to the World Bank (1991) and the Asian Development Bank (1990).

## *Obstacles to Sustaining Development in the Pacific I: Economic Realities*

There are several, seemingly inescapable realities that impose significant economic obstacles or disadvantages on the small islands of the region, e.g.:

- Remoteness from export markets makes them less competitive.
- Prospects for many traditional commodity exports are declining.
- Domestic markets are small and fragmented.
- Their array of natural resources tends to be less diverse.
- Opportunities for increased trade among the Pacific island states remain limited because of similarities in production structures, resources, and high inter-insular transport costs.
- There has been a relatively small amount of entrepreneurial capacity development.
- High rates of population growth will continue to consume a large portion of whatever economic gains can be made, and further strain the already limited capacities of governments to provide basic services and maintain adequate nutritional standards.

The isolation of the islands means that transport, communication, and servicing costs are very high, and service levels low, making it very difficult to compete in the global marketplace, especially when coupled with the poor economies of scale due to the relatively small land area and population size.

The combination of small domestic markets, a narrow economic base, high transport costs, and a shallow labor market implies that the island countries will not be able to support a broad base of economic activities.

The outlook for many of the region's primary commodities is very weak (such as copra, sugar, and cocoa, whose prices have stagnated or declined dramatically the past decade).

It was suggested that the common, traditional island cultural trait of close extended families ("family values"?) may in fact be an inhibitor of entrepreneurial (private sector) development. Many argue that changing this trait may not be desirable from a social point of view, however.

In addition, on many islands, excessive growth of the administration budget (the government wage and salary bill) has tended to crowd out other current outlays, such as operations and maintenance.

## *Obstacles II: Ecological Realities*

There are also several common environmental obstacles to sustainability on Pacific islands. Amongst the most common local problems are:<sup>4</sup>

- Reef destruction (primarily for material for road construction)
- Erosion and Sedimentation (from land clearing)
- Terrestrial habitat destruction (mangroves, freshwater swamps, uplands)
- Water pollution (inconsistent maintenance of sewage systems, animal and solid waste)
- Over-exploitation of renewable resources (e.g., reef fishery and forests)
- Coastal erosion, mainly on atolls

The South Pacific Regional Environment Programme, in its recent Pacific Island Developing Countries' report to the United Nations Conference on Environment & Development (SPREP, 1992), identified a longer list of issues and constraints, sometimes involving global forces, that threaten prospects for sustainable development on Pacific islands (in no particular order):

- Climate change and sea level rise
- Population growth
- Environmental health (especially sanitary water supplies)
- Decision-making processes re: environment and development
- Energy
- Management of land resources
- Deterioration of traditional systems
- Loss of biodiversity
- Management of freshwater resources
- Management of wastes, toxic, and hazardous substances
- Low economic potential, high unemployment and poverty
- Weak education and low public awareness
- Increasing dependence on the global economy
- Degradation of coastal and living marine resources; sustaining their development

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<sup>4</sup> Sea Grant (University of Hawaii), 1992. *Malama Kai: Care for the Sea*, I: 1, Honolulu.

## *Development Strategies*

There are several alternative development strategies from the traditional large-scale, primary commodity export approach. The World Bank (1991) suggests private sector specialization in key sub-sectors as the cornerstone for growth and development. Because of resource constraints, it is important that development strategies be geared to growth in the few areas where there is a clear comparative advantage [e.g., Maldives: tourism & fisheries; Fiji: manufacturing, exports; Solomon Islands: forestry, fisheries, & agriculture]. Marine resources are usually the major natural resource of Pacific islands, and often offer potential for growth, provided that transportation can be secured. A hybrid strategy would be to combine import reduction where possible (especially food) with an export strategy that emphasizes high value/ low volume markets in primary products, rather than low value/high volume (e.g., fresh tuna and shellfish for sashimi and steaks, rather than canned fish). One thing to keep in mind, however, is that if several islands try to do the same thing(s), most of them are likely to fail, due to a lack of comparative advantages.

One approach, currently out of favor amongst conventional economists, would be inward focussing import substitution/self-sufficiency. There are not many successful examples of this as a pure strategy (few or no exports). However, neoclassical economists' faith in the principle of comparative advantage, on which much of their objection rests, may be exaggerated, particularly for small, poor nations with few resources, fewer natural competitive advantages, and no economies of scale.<sup>5</sup> Some of the nations considered to be among the most successful exporters have made it very difficult for imports to take hold of their internal markets (e.g., Japan). While it is highly unlikely that Pacific islands have the potential to achieve total self-sufficiency, it is apparent to many that their growing dependence on imported goods, especially food, has become a serious economic threat.

Another strategy would be to establish a trust fund [i.e., with FSM Compact Funds], invest the capital overseas, and force the government (island) to live off the interest.

According to the World Bank (1991), much greater attention also has to go into operations and maintenance of physical infrastructure from past donor-financed investment projects (even at the expense of new projects), and also to human resource development. Increased emphasis on program and project planning processes and preparation capacity in key line ministries is needed (even though this can increase administrative costs).

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<sup>5</sup> See Chapter 11 in: Daly, Herman, and John Cobb, 1989. *For the Common Good: Redirecting the Economy Toward Community, the Environment, and a Sustainable Future*. Beacon Press, Boston MA.

# SUSTAINABLE DEVELOPMENT ON KOSRAE

## *Environmental Context*

Kosrae lies at five degrees North and 163 degrees East, at the eastern limit of the FSM. The 42-square mile island has volcanic peaks reaching about 2300 feet in elevation, and is mostly covered by dense tropical forests. Much of its shoreline is fringed with dense, old mangrove forests, which serve as rich nursery areas for reef fish and crabs, as well as sea and shore birds. Beaches range from rocky to fine sand. Three natural harbors offer safe anchorages on all sides of the island. A close fringing reef surrounds the rest of the island, with only a very shallow flat between the reef and most of the shore. Figure 1 is a map of the island's general topography.

Of the regional environmental problems identified in *Malama Kai* (Sea Grant, 1992), the following have been especially noted in Kosrae:

- Reef destruction (primarily for material for road construction)
- Terrestrial habitat destruction (mangroves, freshwater swamps, uplands)
- Water pollution (lack of even primary sewage treatment and/or inconsistent maintenance of sewage systems, animal and solid waste)
- Over-exploitation of renewable resources (e.g., reef fishery and forests)<sup>6</sup>

## *Socio-political Context*

During the first half of the nineteenth century, Kosrae's population of perhaps 7,000 was reduced to 200, mainly due to contact with western diseases from explorers, traders, and whaling ships that stopped there. New England congregationalist missionaries arrived mid-century and converted the entire population, creating a church-focussed lifestyle which remains dominant today. Spain ruled the island lightly in the late part of the century, until the Spanish-American War, after which the Germans took over until World War I, followed by Japanese control until the end of WWII, and then American administration under the aegis of the UN Pacific Trust Territory, until 1986 when the Compact Agreement of Free Association was signed.

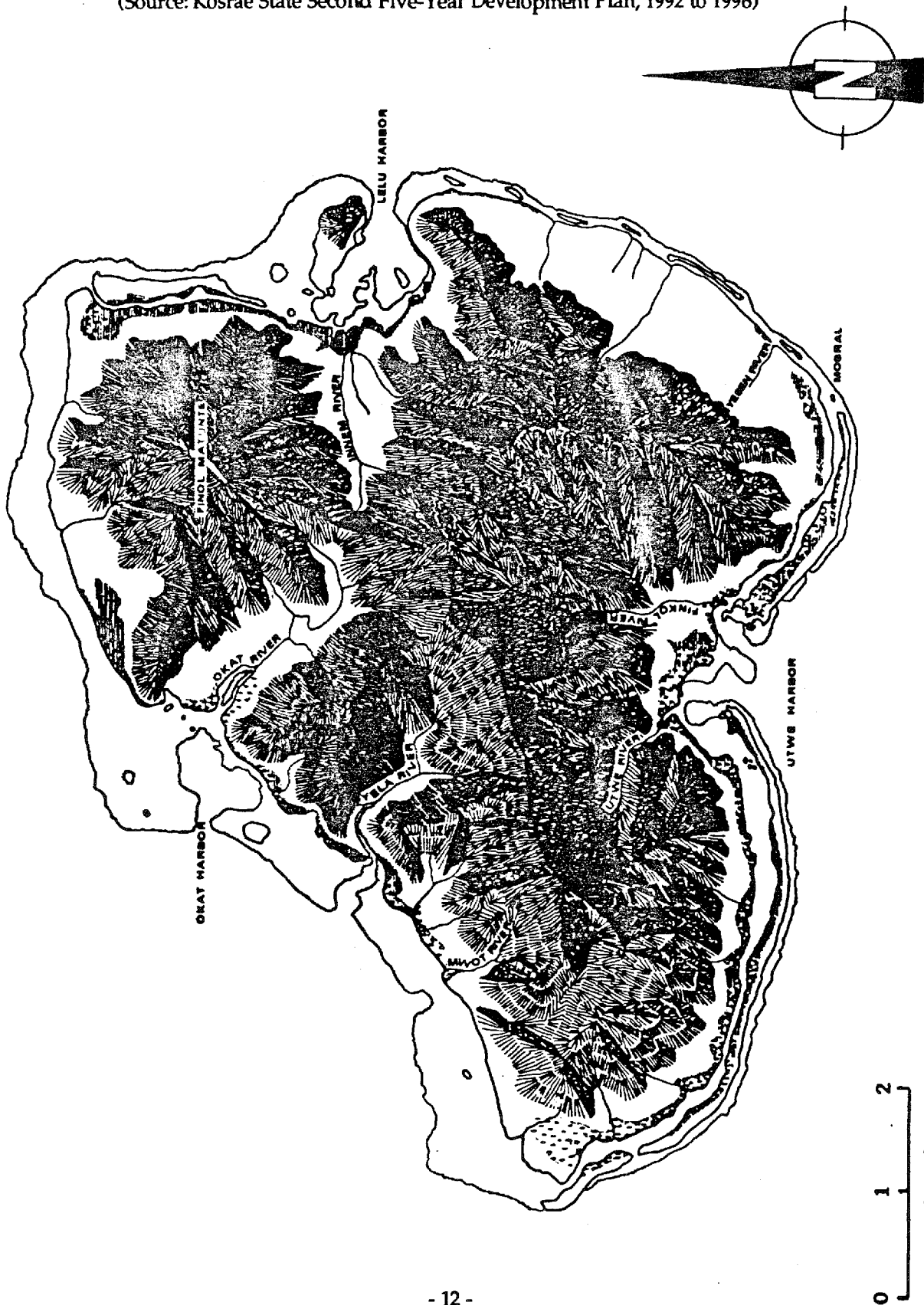
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<sup>6</sup> Des Rochers (1992) has reported that catch-per-unit-effort of reef fish appears to be declining. She attributes this to increased fishing pressure resulting from a combination of increasing population and increased effectiveness of gillnet fishing (compared with traditional nets) over the past twenty years.



Figure 1. Map of Kosrae, General Topography

(Source: Kosrae State Second Five-Year Development Plan, 1992 to 1996)



In this century, with the help of western medicine, Kosrae's population has increased fairly steadily to about 8,000 today (see Tables 1, 2 and 3). Most of the subsistence farming activity is carried out by men, while women do most of the subsistence fishing. Women also weave numerous ornamental and functional items from local materials. The society is very homogeneous, with few foreigners and no ethnic divisions. Weddings and funerals are major social events, complete with legendary feasts. Sundays are strictly reserved for rest and worship, with no work or outdoor recreation allowed. Saturdays are largely devoted to preparation for Sunday. The island is divided administratively into four municipalities, with major settlements at Lelu, Tofol, Malem, Utwa, and Tafunsak, plus the smaller, isolated village of Walung. Figure 2 is a map of Kosrae's municipalities, villages, and other points of interest.

Table 1. Population in Kosrae and the FSM, 1935-1990 <sup>7</sup>

Year	Kosrae	Chuuk	Pohnpei	Yap	FSM total	Year
1935	1,222					
1946	1,558					
1950	1,865					
1955	2,235					
1958	2,367	20,124	11,253	5,540	39,284	1958
1963	3,060		14,647		47,072	1963
1970	3,266		15,270			1970
1973	3,989	31,269	18,889	7,613		1973
1977	4,731					
1980	5,491	37,488	22,081	8,100	73,160	1980
1985			28,671*			1985
1986	6,607*					1986
1987				10,139*		1987
1989						1989
1990	7,367	49,269	33,263	10,890	100,789	1990

<sup>7</sup> Sources: 1958-2000 data (projections) from *Asian Development Bank Economic Report, Federated States of Micronesia, Dec. 1990, pp. 11-13*. Original sources: Population Census reports for Pohnpei (1985), Kosrae (1986), and Yap (1987). Population Preliminary Tables for Chuuk (1989). Data for 1973 from *Census Bulletin of Statistics, Volume III, Table 1, Trust Territory of the Pacific Islands, 1980*. 1935-55 data from *Kosrae State Statistical Bulletin, 1991*, Kosrae Bureau of Planning and Statistics, April, 1992, Table 10.01.

Notes: Census population projections (assumptions - moderate decline in fertility, constant mortality) used for all states except Chuuk, for which detailed projections were not yet available. Chuuk projections may be high, as Pohnpei rates were substituted for Chuuk. Projections refer to September of year indicated, not mid-year; assume no migration. Yap March 1987 census figures updated to September 1990.

Table 2. Population Growth Rates (%), 1970-2000

Period	Kosrae	Chuuk	Pohnpei	Yap	FSM total	Period
1973-90	3.7	2.7	3.4	2.1	2.9	1973-90
1990-95	3.0	2.9	2.9	2.2	2.8	1990-95
1995-2000	3.0	2.8	2.8	2.3	2.8	1995-2000

Table 3. Population Projections, 1990-2000

Year	Kosrae	Chuuk	Pohnpei	Yap	FSM total	Year
1990	7,367	49,269	33,263	10,890	100,789	1990
1993 est	8,050	53,681	36,242	11,625	109,495*	1993 est.
1995 est	8,425	56,840	38,386	12,022	115,637	1995 est
2000 est.	9,618	65,246	44,006	13,493	132,373	2000 est.

### *Economic Context*

Less than fifteen percent of Kosrae's total population works in the formal, cash economy, with about twenty percent of the adult population (800 people) being in the employ of the government. Thus, the economy is based on system of administration, funded from outside sources, with the salaries of its employees as its mainstay. Expenditures by these employees support a small private sector, mostly in the service industry. Virtually separate from this money-based economy, there is a substantial subsistence agriculture (usually agro-forestry and a few pigs and chickens), fisheries, and handicrafts sector serving domestic needs, mostly within the family.

Perhaps two economic trends most dramatically illustrate the need for economic development in Kosrae's future. First, most of Kosrae's income (almost \$12 million of \$14.3 million in total revenues in 1989) is from development and recurring financing provided by the United States under the FSM Compact Agreement. This assistance is supposed to decline to zero over the remaining 8 years of the agreement. Local revenue generation for the state government provides only 7% of its budget, and even that is mostly derived from the Compact revenues as they are recycled through taxes on government job incomes and local spending. Thus, government revenues, which in 1989 accounted for about \$1,900 per capita out of a total per capita GDP of \$1,989 (FSM, 1992b, Table 17), could easily decline to less than a quarter of current levels by 2002.<sup>8</sup>

<sup>8</sup> According to the 1991 Kosrae State Statistical Bulletin (Tables 8.01-8.08), the Kosrae State government's budget (expenditures) in 1989 totalled \$ 11.8 million. GDP was approximately \$14.3 million (\$1989 times c. 7200 people). Government revenues

Second, the present population of about 8,000 in Kosrae is increasing at at least 3 per cent per annum, which portends large increases in the size of the labor force in the future, in education and basic health care costs, in sewage generation, food and energy demand, etc.

Thus, it would appear likely that Kosrae is presently living well beyond its sustainable means.

### *Obstacles*

All of the economic obstacles described in the general discussion of Pacific islands apply to Kosrae, but perhaps the most difficult obstacle or dilemma is the shortage of air transport for exports.

Air service to the island has increased in the past couple years, to three flights per week in each direction, with one of the two Boeing 727 planes providing this service having extra cargo space (in exchange for reduced passenger space). It was frequently claimed that there is not enough air cargo space for current export products, let alone an expansion. There were anecdotes of bananas bound for Guam being dumped on the runway in Pohnpei or Chuuk in favor of higher priority items such as fresh fish bound for Japan. Farmers are hesitant to expand their export crop production because they fear they will not be able to get their produce to a market. Meanwhile, airlines are hesitant to increase service without solid advance cargo bookings.

Regional alternatives to Continental Air Micronesia may be possible, but have not filled the gaps yet. Reasons offered include lack of fuel storage capacity, lack of reliability or dependence on a single plane.

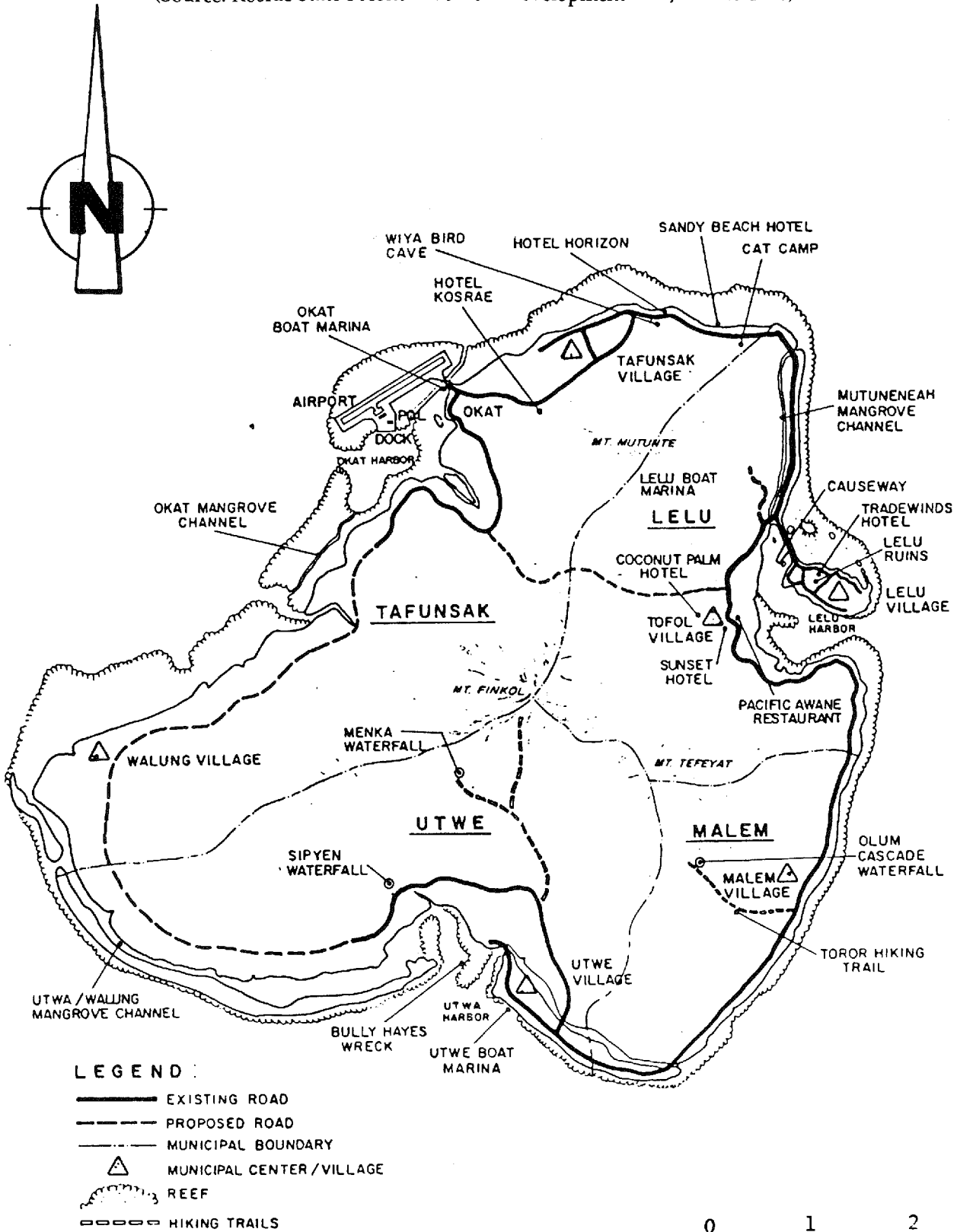
Some sort of temporary subsidy may be inevitably required to attract additional air service which would be necessary for the expansion of any perishable or high value/low volume products.

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totalled \$14.3 million. Investment income accounted for \$1.3 million of this. \$985,261 was generated locally, including \$135,606 from locally collected taxes, \$432,485 from federal (FSM) tax revenue sharing, and \$374,000 for government services rendered. Thus, some 7% of the government revenues came from the local economy, fueled largely by incomes derived from foreign assistance. At that net rate, it could require a GDP of 14 times \$14.3 million, totalling \$200 million, to generate the level of government revenues Kosrae had in 1989 from taxes and services alone.

**Figure 2. Map of Kosrae, Municipalities, Villages, Points of Interest**

(Source: Kosrae State Second Five-Year Development Plan, 1992 to 1996)



0 1 2  
Scale in Miles

## *Kosrae's Current Strategy*

According to the Government of Kosrae's *Second Five-Year Development Plan (1992-1996)*, besides basic infrastructure improvements (\$3 million for roads; a total of about \$5 million for electricity, water, and sewer) the strategy for development in Kosrae involves the following five projects/programs (quoted from page 51 of the above document):

1. *Increase State export earnings and private sector employment and income through the development and full operation of the Okat Fish Processing Complex (tuna cannery and cold storage).*
2. *Support the continued growth of export-based agriculture production, and import substituting food production.*
3. *Continue the development of the long-line fishing program for the export of sashimi-grade tuna to regional markets.*
4. *Restructure government to decrease public sector employment and increase productivity.*
5. *Increase efforts across all Government Operations and Projects to identify profit centers, and try and privatize as many activities as possible.*

In fact, the budgets proposed in the Five-Year Plan indicate that Kosrae expects to invest a relatively small amount (about \$100,000 annually for the next five years) in improvements for agriculture (bananas, limes and tangerines, and perhaps chickens), while only about \$50,000 per year is planned for tourism development (mainly in various forms of information products).

Kosrae is pursuing a public sector development strategy that is focussed primarily on canning tuna it hopes to buy from foreign seiners, to the almost complete exclusion of other marine resources as well as agriculture and other terrestrial activities.<sup>9</sup> This is by far Kosrae's most ambitious economic development project ever. It involves a total investment of about thirty million US dollars to build a tuna cannery, a large cold storage facility, and support infrastructure (power generation, fresh water supply, etc.) near the Okat harbor and airport. The projected annual capital investment averages \$1.8 million for the next few years.<sup>10</sup>

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<sup>9</sup> *Kosrae State Second Five-Year Development Plan, 1992 to 1996.*

<sup>10</sup> Anticipated cannery processing capacity of 120 metric tonnes per day; cold storage capacity: 3000 tons, at a cost of \$5 million. See *Appendix 3* for further discussion of the Cannery complex.

The secondary part of Kosrae's strategy involves investment in four larger long-lining vessels for the regional fresh tuna (sashimi) market. The Asian Development Bank is supporting a similar long-lining project with the other three FSM states (ADB, 1992), aimed at private sector development. (Even this ADB project is rather capital intensive, costing some \$6.5 million for six or seven boats, to create 130-170 jobs (including indirects), which it expects to contribute about \$2.1 million to GDP and \$120,000 to government revenues annually.)

## **A MENU OF SUSTAINABLE DEVELOPMENT OPTIONS FOR KOSRAE**

This section provides a list ("menu") of development options for Kosrae, differentiated by this contractor's assessment of their apparent degree of sustainability (based on the information that was available to him on a relatively short mission). The menu is arranged in four tiers:

- 1) Options that are likely to be sustainable.
- 2) Options that may be sustainable, but should have some additional research done to determine if this is true, before proceeding.
- 3) Projects whose sustainability appears to be questionable.
- 4) Projects that are probably unsustainable.

It is followed by some discussion of the options that appear more viable.

### ***TIER ONE:***

#### ***LIKELY SUSTAINABLE OPTIONS***

##### **Agriculture**

Bananas  
Flowers

##### **Tourism/Services**

Marine Park: mangrove tours, snorkeling / diving  
Lelu ruins  
Improved [small] hotel(s) and restaurants

Water sports: diving, windsurfing, etc.

**Tourism/Goods**

Local, gourmet foods for tourism/restaurants:

Mangrove crabs

Smoked fish from fish processing

***TIER TWO:***

***POSSIBLY SUSTAINABLE OPTIONS; MORE RESEARCH NEEDED***

**Marine Resources**

Tuna fishing: horizontal vs. vertical long-lining

Pot fishing (e.g., crab, lobster, shrimp, grouper, snapper)

Fish processing (smoking, salting)

**Agriculture**

Citrus - maybe limes/lime extract, tangerines

Poultry (chickens) for local consumption

Vegetables

**Aquaculture**

Giant clams for export (to other FSM islands) and for Kosraen restaurants

Trochus

**Tourism/Goods**

Handicrafts

***TIER THREE:***

***PROJECTS OF QUESTIONABLE SUSTAINABILITY***

**Marine Resources**

Tuna Cannery (problems include economic viability and social impacts;  
see Appendix 3)



## **Tourism**

Retirement havens (would be import intensive, expensive and economically risky; potentially undesired social impacts)

## **Manufacturing/Assembly** (main obstacle: high transportation costs)

Furniture

Clothing

## ***TIER FOUR:***

### ***PROBABLY UNSUSTAINABLE PROJECTS***

#### **Marine Resources**

Aquarium fish prospecting on reef (will fish out small reef quickly)

Sport fishing (not enough tourist traffic)

#### **Aquaculture**

Mangrove Crab culture (too many poorly understood life stages)

Sponges (lagoon too shallow)

Eels (competition from Asia too keen; transport)

Milkfish (same)

#### **Agriculture**

Oranges (low quality, price competition from US)

Mangos, Papaya (improper weather)

Commercial Swine (market too small; competition with new Pohnpei operation)

**Timber for export** (island too small; watershed protection too critical)

#### **Tourism**

Golf course (not enough surplus suitable space)

## **TIER ONE DISCUSSION**

### **Agriculture**

Agricultural exports totalled about \$50,000 in 1989. This is a very small amount compared to any of the proposed fisheries projects. The most promising crops appear to be cut flowers (a new item) and bananas.

#### **Bananas**

Bananas currently account for two thirds or more of agricultural export revenue (\$35,000 in 1989). It is expected that sales of this crop in Guam and other Pacific islands can continue to grow, provided that air transport can be secured (the major obstacle to expansion at the moment). New plantings totalling 32 acres (16 farmers) have been put in recently.

#### **Flowers**

A private company from Hawaii is planning a major investment (\$600,000, no public money involved) in Kosrae to grow exotic, high quality/low volume flowers for export. The main purpose of the investment is to grow one particular species in a carefully controlled, blight-free environment, for the long-term (at least 15 years). They have searched worldwide for the best environment, and claim that Kosrae is it (no other FSM island has the right soil). This would involve using the existing greenhouse plus a 2-6 acre garden. They also expect to contract with Kosraens to grow a higher volume of less exotic flowers on their own properties. The proprietor claims to have arrangements to meet his air transport needs. Total job creation would be about a dozen, plus supplemental income for several Kosraen contractors. Revenue generation was not quoted for proprietary reasons, but it would appear to be greater than any other agriculture project on Kosrae in order to generate a return on a \$600,000 investment.

Included in this business plan is a small (12 room) high quality hotel designed to cater to business travelers (not tourists). This would probably create another dozen jobs. A self-contained sewage treatment facility is planned, which would generate dry fertilizer for the flower farm.

### **Tourism-Services**

Like agriculture, tourism is presently, and likely to remain, a small part of Kosrae's economy compared to marine resources. Kosrae is unlikely to become a destination resort, as it has no totally unique attractions, is difficult to get to, and does not have much room for large installations such as a golf course. It does have some attractions (reefs, ruins, mangroves), but none of them has a significant comparative advantage over other FSM islands. Nevertheless, visitation is gradually growing (from 712 visitors in 1984 to 1,925 in 1989), and it

should be possible to keep island hoppers and other visitors on the island for a few extra days, by giving them more things to do. The Tourism Master Plan is replete with suggestions for this, but so far funding has been unavailable for anything more than information development. The following options seem to hold the most promise:

#### **Marine Park**

A simple marine park facility has been proposed for the area between Utwa and Walung. The Technical Advisory Committee estimated that the capital cost of the facility would be about \$100,000, including some improvements to the existing road. The main activities to be conducted there would be mangrove-canoe tours and snorkeling/diving trips run by the private sector. There should be a park entrance fee for tourists (foreigners), and perhaps also a significant diving fee. The TAC estimated that annual revenue generation might reach \$75,000 on total sales of \$400,000. Perhaps 10-20 full-time job equivalents would be created.

#### **Lelu Ruins**

These archaeological ruins, in the middle of Lelu village, are similar in style and more accessible, though smaller than the Nan Madol Ruins off Pohnpei. They could become a significant tourist attraction. The US Commerce Department's Economic Development Administration is interested in funding development of the attraction -- site clean-up, paths, signs, tour guide training, etc. -- which might require a total investment of \$250,000. There is one major difficulty, however, in that site ownership is currently divided among some 19 private landowners. The State Government has initiated discussions with the owners to see if the land can be purchased. Direct government revenues would be rather low unless tourist traffic increased significantly, but as many as 20 jobs might be created, including indirect positions deriving from lengthened stays at hotels and restaurants, and this also means increased tax collections.

#### **Improved [small] hotel(s) and restaurants**

There appears to be room for at least a couple new small, higher quality hotels and restaurants, which the private sector is moving to fill. The flower company's concept of a hotel catering to business travelers (phones and faxes, a conference room, etc.) is an interesting one, and probably needed.

#### **Water sports: diving, wind-surfing, etc.**

A dive company with Japanese backing has expanded its operations from Pohnpei to Kosrae this past year, with an investment of approximately \$500,000 so far. They would like to add other water sports such as ski jets, para-sailing, sport fishing, and windsurfing (the latter two seem more compatible with Kosrae's culture). There has been some conflict over their desire to build their own hotel to serve their clients. They believe they can at least double tourist traffic to Kosrae, and therefore that the hotel capacity of the island needs to be at

least doubled. Also problematic has been their practice of billing clients for their trip in Japan, with little revenue actually accruing in Kosrae.

### Tourism-Goods

#### **Local, gourmet foods for tourism/restaurants**

Marketing research conducted by the National Aquaculture Lab indicates that there is an un-met demand on Pohnpei (and to a smaller degree on Kosrae) amongst tourists for greater variety in local seafood at restaurants. Mangrove crabs and giant clams are obvious choices (the latter will be discussed in greater detail under Tier Two).

### *TIER TWO DISCUSSION (FURTHER RESEARCH NEEDED)*

#### Vertical long-lining and pot fishing

Nils Dragoy, a fishing and fish processing expert who visited Kosrae concurrently with this mission, believed that smaller boats than the currently planned long-liners, which would cost considerably less (as little as \$150,000 per boat), might be a more economically (and socially) viable approach. He was asked by the Government of Kosrae to develop a funding proposal based on using relatively inexpensive 42-foot vessels for a combination of vertical long-lining in conjunction with fish aggregating devices (for the fresh tuna market) and pot fishing for lobster, shrimp, grouper, snapper, etc., on the deep shelf around the island and some nearby seamounts. If air cargo capacity is expanded, these fish could (1) be flown out to fresh markets (Japan, Guam, Hawaii, Los Angeles), (2) be processed (e.g., smoked) on Kosrae before export, or (3) marketed to the growing tourism industry in FSM, supplying restaurants in Pohnpei and Chuuk (as well as Kosrae itself). According to staff at the Micronesian Maritime Authority, the smaller boat, vertical long-lining approach has met with some success in Palau and/or Western Samoa.<sup>11</sup>

The extent of the harvestable resources is unknown at this point, though tuna industry data and some preliminary surveys in the early 1980s suggested a possible sustainable yield of 1000 tonnes of tuna and 100 tonnes of other species per year within Kosrae's 12 mile territorial waters (ADB, 1991, 1992b). This is not

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<sup>11</sup> Craig Heberer, Micronesian Maritime Authority, personal communication. Mr. Heberer was awaiting a paper documenting Palau's experience with vertical long-lining at the time of our meeting.

without controversy. Other surveys have reportedly found far fewer fish.<sup>12</sup> (Considerable criticism of previous test fishing efforts was reported during this mission, however). Some experts believe a more rigorous test-fishing program is needed, others believe it would be fruitless. It is beyond the scope of this study to resolve this dispute. Without such an effort, it is risky to forecast the potential for sales, revenues, or job creation.

If tests were to prove that there is a sizable, sustainable harvest, this approach has several attractions:

- First, it follows the *high value, low volume approach* mentioned in the general strategies for islands section above, and at the same time involves greater diversity (species) of products.
- Second, it might have a *social sustainability advantage* over conventional long-liners in that it would only require one-day trips, rather than week-long voyages. More on-shore jobs would be created per on-boat job. Kosraen men are not traditionally seamen, and by personal accounts, are not eager to join fishing fleets that require long trips.
- Last but not least, because it is less capital intensive, this would allow more substantial effort to be put into other options now being postponed for lack of funds, such as infrastructure, agriculture, and tourism. This means a *more diversified, perhaps less risky approach* to development, rather than putting all of Kosrae's investment funds into one project (the cannery).

### **Fish Processing**

The government of Japan provided Kosrae with two fish processing (smoking, drying) kilns a couple years ago. The smoking kiln does not work. It is missing some key parts, and others do not function properly. The technology is twenty-five years old. It is probably not worth repairing.<sup>13</sup>

The original idea behind the existing plant was that the products would be sold in the local market to Kosraens. This appears to be unrealistic, as most Kosraens prepare their own fish, and are unlikely to spend hard cash for it. It should be noted that Pohnpei has had great difficulty getting their new multi-million dollar fish processing plant operational (or at least profitable). If they succeed, it is unlikely that a small plant on Kosrae would be able to compete in

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<sup>12</sup> Raymond P. Clarke, NOAA, review comments on draft of this report.

<sup>13</sup> Recommendations by Nils Dragoy, fish processing consultant, to the government of Kosrae, February 1993.

the export market; if they fail, it seems questionable that a small Kosrae plant could succeed.

Mr. Dragoy estimates that it would cost \$250,000 to purchase and set-up a new fish processing operation. It may not be worth the expense. Given the supply and transportation problems, and the market/ competitive uncertainties at this point in time, it is suggested that further research be conducted before committing to a new fish processing plant on Kosrae.

## Agriculture

### **Citrus**

Kosrae is known throughout the islands for its citrus, though this may simply be because few, if any, other islands have attempted to grow it. Kosrae citrus is banned from US Customs islands due to the fruit fly, though it is hoped that limes may be exempted from this ban eventually. It is estimated that there are a total of 30-50 acres in citrus, including about a dozen acres (by six farmers) in new plantings. Limes are Kosrae's highest quality citrus product; exports totalled almost \$6,000 in 1989, mainly to Pohnpei and Chuuk. Lime extract has been discussed as a value-added product, but nothing is planned for the near future. Some tangerines are exported to Pohnpei and Chuuk (\$3,343 in 1989). Oranges are grown as well, but their quality is not sufficient for export. Kosrae often propose that they could at least export oranges to other islands, as islanders may be less demanding than US consumers, but most expatriate agricultural experts consulted were pessimistic due to the economies of scale issue. It was suggested that with the new plantings, Kosrae may actually be overproducing citrus within a few years, so it does not look like a major revenue generator, unless the Guam quarantine opens up, which merits some effort.

### **Poultry (chickens) for local consumption**

A chicken barn has already been constructed. Agricultural experts (ADB, 1992a) have declared that the market on the island is too small to support a commercial broiler operation. One of the reasons for this is the cost of importing feed. Attaching a small fish meal plant to any of the proposed fishing operations could alleviate some of this cost (and reduce fish waste, and therefore, biological oxygen demand in waters used for waste disposal). It seems inappropriate for all but the smallest of islands to continue to import frozen chicken, when they could grow their own and provide some jobs in the process. Careful management and cost accounting may yet prove that it is viable, but it requires an entrepreneur willing to take the risk.

### **Vegetables**

It would seem that there would be a market for fresh vegetables on many of the other islands. The main problems cited were too much rainfall on Kosrae, and transportation.

## Aquaculture

Unfortunately, there was a consensus amongst the experts consulted that there is only a small potential for commercial aquaculture using natural sites on Kosrae. The reason for this is that the fringing reef is too narrow, leaving an extremely shallow "lagoon" whose water temperature gets too high. Giant clams and sponges require deeper, cooler water; there are only a couple sites around Kosrae suitable for giant clam culture. Freshwater aquaculture, using ponds, might be possible, but it was frequently heard that islanders do not like the taste of freshwater fish (one suggestion was for tropical freshwater aquarium fish). It may also involve significant environmental costs (alteration of wetlands, water quality problems).

### **Giant clams for export (to other FSM islands mainly)**

The giant clam hatchery (National Aquaculture Center) may be capable of being self-sufficient, if the recent restaurant test-marketing proves successful and farmers on other islands who contract with the Lab to buy year-old clams can successfully grow them out. Current plans to double the size of the nursery may even be feasible. This would just mean that the Lab will not cost the national treasury much to maintain, however. Other than through local sales to Kosrae's restaurants (limited by the small market) it does not appear that the clam culture operation will bring significant economic benefits to Kosrae, because there are so few suitable sites around Kosrae for farms. The number of jobs at the lab is unlikely to increase.

### **Trochus**

There is a trochus reserve on the island, with limited harvest seasons. The main problem appears to be transportation.

## Tourism-Goods

### **Handicrafts**

The Kosrae Community Action Program (KCAP, a non-profit organization) has initiated a marketing study for export of Kosraen handicrafts, primarily weaving, but also wood carving (the former is done by women, the latter by a few men). They estimate that there are about 50-60 weavers available to do part-time work (16-25 hours per week), at a wage of about \$1 per hour. The aggregate wage potential would be about \$50,000 per year (circa \$1,000 per person). Unfortunately, this would generate very little government tax revenue<sup>14</sup>

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<sup>14</sup> There are three main kinds of taxes in the FSM: Import taxes on certain imported goods; a Business Gross Revenue tax of \$80 on annual grosses between \$2,000-10,000 and 3%

(because the first \$1,000 of wage income is tax exempt; alternatively, the threshold for the Business Gross Revenue tax is \$2,000). The main benefit is that this could provide as much as \$1,000 per year in income to 50 or 60 women, when few women currently participate directly in the cash economy. One concern is potential impact on shellfish populations, though it was claimed that only shells that were found dead were used.

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over \$10,000; and a Wage and Salary tax of 6% between \$1,000-11,000, and 10% over \$11,000.



## CONCLUSIONS

The following environmental problems have been noted in Kosrae:

- Reef destruction (primarily for material for road construction);
- Terrestrial habitat destruction (mangroves, freshwater swamps, uplands);
- Water pollution (lack of even primary sewage treatment and / or inconsistent maintenance of sewage systems, animal and solid waste);
- Over-exploitation of renewable resources (e.g., reef fishery and forests).

There are opportunities for sustainable private sector economic development in Kosrae, perhaps especially in smaller scale fisheries, but also in agriculture and tourism. While the number of jobs and state revenues generated would be small in comparison to projections for a tuna cannery, these projections are widely regarded to be very optimistic. Relative to the size of the island's work force, a significant number of jobs could be created from these smaller, more diverse opportunities. The shortage of air transportation is the major obstacle to expanding production of any perishable or high value/low volume products, however. Some sort of temporary subsidy may be inevitably required to attract additional air freight service.

It was suggested that with the new citrus plantings that have been made, unless the Guam quarantine can be removed (which merits some effort), Kosrae may actually be overproducing citrus within a few years.

Attaching a small fish meal plant to any of the proposed fishing operations could alleviate some of the cost of a poultry operation (and simultaneously reduce fish waste, and therefore, biological oxygen demand in waters used for waste disposal).

Even assuming that the transportation problem is solvable, these opportunities still seem quite unlikely to amount to a \$200 million dollar economy that might be needed to generate government tax revenues anywhere near the current level provided by foreign assistance (see footnote #8, page 14). Thus, it would appear likely that Kosrae is presently living well beyond its sustainable means.

The growing sense of urgency about an impending economic crisis in Kosrae is understandable; this is what makes the tuna cannery (or a golf course, or retirement haven) so enticing. But, unless a way is found to overcome the serious economic viability questions, and reduce the likely social and environmental impacts, proceeding with these projects would appear to unduly risk wasting precious investment capital, because their sustainability is questionable.

An alternative strategy would be to establish a trust fund from Compact funds, invest the capital overseas, and force the government (island) to live off the interest while nurturing the capacity for more modest, culturally and ecologically sustainable on-island development. A few other islands have reportedly pursued this strategy with some success. It would make an island less susceptible to competitive pressures for commodity markets.

It appears to this contractor that Kosrae is going to remain significantly dependent on foreign aid inflows for some time. In the long run, Kosrae also needs assistance aimed at reducing its population growth, and its growing dependency on imported food and fuels.<sup>15</sup>

The members of the KIRMP Development Review Commission indicated that they would greatly benefit from additional training in development impact assessment and land use planning methodologies.

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<sup>15</sup> The energy issue, an important one for sustainability, was not addressed in the report because it would not be an income generator. Efficiency gains, as well as substitution for fossil fuels with local renewable energy (such as solar and wind) would in the long term help Kosrae's economy by reducing the trade deficit and cash drain caused by imported fuels, however.

## APPENDIX 1. LIST OF CONTACTS

	Name	Tel. #	Agency/Office
	<u>in KOSRAE:</u>		
1	Gerson Jackson	691-370-3170	Dir., Office of Budget & Planning, KSG
2	Likiak Wesley	3163	Planning & Statistics
3	Lyndon Abraham	370-3003	Lt. Governor
4	Bruce Howell	3165	Dir., Dept. of Public Works
5	Singkitchy George	3200	Dir., Dept. of Health Services
6	Katsuo William	3006	Admin., Div. of Environmental Health
7	& Nena Nena		
8	Dr. John Riley &	2069	Dir., National Aquaculture Center
9	Steve Lindsay		
10	Robert Wescom	671-472-7490	USDA - SCS/Forestry
11	Dr. Ruben Dayrit	691-329-2112	USDA-SCS, Pohnpei
12	Erik Waguk	3017	TAC, DC&D Agroforestry
13	Glasstine Cornelius	3017	DC&D Agroforestry
14	Madison Nena	2228	TAC, Tourism
15	Berlin Sigrah	3078	TAC, History & Culture
16	Simpson Abraham	3031	TAC, Marine Resources Div.
17	Ken Mackwelung	3006	TAC, Env. Health (Sanitation)
18	Weston Luckymis	3094	TAC, Public Works
19	Bill Tosie	2084, 3181	State Senator, Businessman
20	Molience Kephass	3007	DRC-KIRPM Program Director
21	Hostino Levi	3165	DRC, Public Works dept.
22	Fanry Albert		DRC, Education
23	Itosi Chesi		DRC (retired public works)
24	Jim O'Brien	3043	Attorney General
25	Palik Sigrah	3217	Kosrae Community Action Program
26	Jeannie Latenser	3217	KCAP - handicrafts
27	Richard Sigrah	3033, 2021	Senior Land Commissioner
28	Rensley Sigrah	3004	Dir. of State Finance & Treasury
29	Ruben Charley	3070	Loan Officer, FSM Development Bank
30	Nils Dragoy	206-542-6372	Pres., Occidental Trading (Fisheries)
31	Webster George	3116	Webster George Enterprises
32	Donald Jonah	3239	Sandy Beach Hotel, Dive Caroline
33	Thurston Siba		Governor
34	Jack Sigrah	3031	Marine Resources Div., DC&D
35	Lewis Brooks	3044	Director, DC&D
36	Stefanie Peavey	2069	National Aquaculture Lab
37	Grant Ismael	3100	Phoenix Marine Sports Club
38	Roger Emerson		fisherman, inc. aquaria
39	Hiroshi Ismael		Spec. Advisor to Governor Siba
		3010	FSM Revenue Office

Appendix 1. List of Contacts, cont.

	Name	Tel. #	Agency/Office
<b><u>in POHNPEI:</u></b>			
40	Timothy Semuda	320-8200	FSM National Statistician
41	Marcelino Actuoka	320-8200	FSM National Planner
42	Dick Croft	320-5374	Aquaculture specialist
43	Asterio Takesy	320-2646	Sec., Dept. of Resources & Development
44	Dan Perin	320-5723	Economic Advisor, EDA & Governor
45	Hon. Aurelia Brazeal	320-2187	US Ambassador to FSM
46	Bill Raynor	320-2652	Nature Conservancy Field Rep.
47	Dr. Ruben Dayrit	320-5893	USDA Soil Conservation Service
48	Capt. Peter Bristow	320-5417	Pohnpei Deep Sea Ent. (Sport fish)
49	Craig Heberer	320-5181	Micronesia Maritime Authority
<b><u>MAINLAND U.S.:</u></b>			
50	Megan Brooke	503-221-9945	ex Peace Corps, Kosrae
51	Nils Dragoy	206-542-6372	Fisheries, fish processing; fax--0532
52	Greg Volkhardt	206-866-0702	Tuna Cannery EIS
53	Ken Leisher	714-548-6199	Sport fishing tourist w-553-1948
54	Dina Towbin	793-237-9303	Pragma Corporation (ADB Ag. Study)
55	Dennis Tufts	206-665-4577	WA Dept. of Fisheries
56	Chip Giacoboni	609-751-2397	Aquarium fisherman (NJ)
57	Ed Miles	206-543-7004	Univ of Washington
<b><u>in HAWAII:</u></b>			
		<b>(808) +:</b>	
58	Katie S. Friday	541-2628	US Forest Service
59	Kit Dahl	956-2864	PIN/UH Sea Grant Extension
60	Sharon Ziegler	956-2960	PIN/UH Sea Grant
61	Stephen Pollard	944-7716	East-West Center PIDP
62	Frank McChesney	541-3391	US EDA
63	Michael Hamnett	956-7469	Social Science Research Inst. - Center for Dev. Studies
64	Larry Hamilton		East-West Ctr
65	Mark Ridgely		UH Geography Dept
66	Len Newell	541-2628	US Forest Service
67	Mark Skinner	956-6286	Pacific Business Center Program, UH
68	Angela Williams	956-6286	Pacific Business Center Program, UH
69	Jerry Norris	951-4026	Pacific Basin Development Council

Appendix 1. List of Contacts, cont.

	Name	Tel. #	Agency/Office
	<u>in Hawaii, cont.</u>		
70	Jim Rizer	944-7541	E-W Ctr., Pacific Island Energy Project
71	Casey Jarman	956-7489	UH Law School
72	Edward King	956-6543	UH Law School (ex-FSM Chief Justice)
73	Peter Rappa	956-2868	UH Sea Grant- CRM Extension
74	Bruce Miller		UH Sea Grant Director
75	Leanne Fernandes	944-7216	UH Dept of Geography
76	James Friday	956-2620	UH Dept. of Agronomy & Soils
77	David Owens	961-2863	Kosrae Tropicals (flowers)
78	Leng Chia		UH Horticulture Dept.
79	Dan Cheney	808-524-0594 206-822-8880	Parametrics

**APPENDIX 2. SAMPLE  
DEVELOPMENT IMPACT ASSESSMENT CHECKLISTS**

## Development Impact Assessment Checklist

INFRASTRUCTURE NEEDS	+	-	Notes
Roads			
Energy demand			
Water supply			
Transportation demand			
Housing demand			
Food demand			
Sewage treatment loads			
Waste disposal			
Education needs			
Hotel rooms			
Hospitals/health care			
Recreation			
ENVIRONMENT IMPACTS	+	-	Notes
Water Quality			
Water flows			
Soil erosion			
Fisheries			
Other Marine resources			
Agricultural lands			
Noise			
SOCIAL IMPACTS	+	-	Notes
Traffic			
Income levels			
Income distribution			
Land use conflicts			
Cultural values			
Consumer expectations			
ECONOMIC IMPACTS	+	-	1 pt/\$100k V.A. or govt rev, /10 jobs
Investment costs			
Sales/Traffic potential			
# Jobs created			
Job training needs			
Value Added to GDP			
Gov't revenues			
Import needs			
eROI (GDP/invest. cost)			

## Marine Park Development Impacts

INFRASTRUCTURE NEEDS	+	- 4.5	Notes
Roads			
Energy demand		1/2	
Water supply		1	
Transportation demand		1/2	
Housing demand			
Food demand		1/2	
Sewage treatment loads		1/2	
Waste disposal		1/2	
Education needs			
Hotel rooms		1/2	
Hospitals/health care			
Recreation		1/2	
ENVIRONMENT IMPACTS	+ 3	- 1	Notes
Water Quality			
Water flows			
Soil erosion			
Fisheries	1	1/2	must be careful of reef impacts;
Other Marine resources	1		sanctuary should enhance resources
Agricultural lands			
Noise		1/2	
Forest resources	1		protect mangroves, but force cutting elsewhere
SOCIAL IMPACTS	+2	- 3	Notes
Traffic		1	
Income levels	2		
Income distribution			
Land use conflicts		1	restrict mangrove cutting
Cultural values		1	
Consumer expectations			
ECONOMIC IMPACTS	+ 10.75	- 2	1 pt/\$100k V.A. or govt rev, /10 jobs
Development costs	\$100,000		
Sales/Traffic potential	4000 people/yr		2500 divers, 4000 mangrove tours
# Jobs created	2.0		10 + 10
Job training needs			
Addition to GDP	4.0		\$400,000 ?
Gov't revenues	.75		\$75,000, inc. diving fee of \$25 per
Import needs		2	Boats & dock, diving gear, fuel
ROI (GDP/invest. cost)	4.0		
	+ 15.75	- 10.5	= + 5.25



## Lelu Ruins Development Impacts

<b>INFRASTRUCTURE NEEDS</b>	<b>+</b>	<b>- 4.5</b>	<b>Notes</b>
Roads			
Energy demand		1/2	incremental
Water demand		1/2	incremental
Transportation demand		1/2	incremental
Housing demand			
Food demand		1/2	incremental
Sewage treatment loads		1/2	incremental
Waste disposal		1/2	incremental
Education needs			
Hotel rooms		1	increase current capacity 50%?
Hospitals/health care			
Recreation		1/2	increase current capacity 50%?
<b>ENVIRONMENT IMPACTS</b>	<b>+ 2</b>	<b>- 1</b>	<b>Notes</b>
Water quality	1		clean up canals
Water flows	1		clean up canals
Soil erosion			
Fisheries			
Other Marine resources			
Agricultural lands			
Noise		1	traffic in middle of village
Forest resources			
<b>SOCIAL IMPACTS</b>	<b>+ 2</b>	<b>- 5</b>	<b>Notes</b>
Traffic		1	traffic in middle of village
Income levels	1		
Income distribution			
Land use conflicts		2	
Cultural values	1	1	tourists, cultural/historical pride
Consumer expectations		1	
<b>ECONOMIC IMPACTS</b>	<b>+ 7.5?</b>	<b>- 1</b>	<b>1 pt/\$100k V.A. or govt rev, /10 jobs</b>
Investment costs	\$250,000		
Sales/Market potential	4000/year		increased tourist arrivals
# Jobs created	4		20 direct + 20 indirect
Job training needs			
Value added to gdp	2.4		\$240,000 (4000 tourist days x \$60 per)
Gov't revenues	0.1		\$ 7,200
Import needs		1	Energy fuel, food, luxury materials
eROI (GDP/invest. cost)	1.0		
	<b>+ 11.5</b>	<b>- 11.5</b>	<b>= + 0.0</b>

## APPENDIX 3. PROPOSED TUNA CANNERY COMPLEX

### *Additional Background*

A consulting firm based in Hawaii (Global Ocean Development Corp., Peter Wilson, President) developed the plans for this project, with the expectation of being contracted to manage the facility, in return for 10% of the operation's profits (with no capital investment). GODC and the Government of Kosrae recently engaged each other in litigation on this matter, and the contractual relationship may be terminated as a result. A California firm is now involved in planning the project.

As of this writing (March, 1993), the cold storage facility is completed and scheduled to begin operating some time in the second quarter of 1993, when additional power capacity comes on line.

An environmental impact assessment of the cannery project is currently being conducted, by a Seattle-based consulting firm.

Foreign purse seiners (tuna boats) are expected to bring their tuna cargo to port at Kosrae to supply the cannery. They would also get re-provisioned (food, fuel, etc.) there, supporting a number of additional onshore jobs and revenues.

### *Reasons the cannery project is attractive:*

- Predicted profits (State revenues) of \$5M/year, to replace declining US Compact funds and jobs they support.
- 600-1200 Jobs (depending on who one asks) for a growing population, especially in light of likely government employment cutbacks.
- Locally add value to the most abundant natural resource of the region, rather than export it raw with minimal economic benefits.
- Duty-free access (potential) to US markets give a 10% price advantage over Thailand.

These projections make the project very enticing indeed, especially when there appears to be no other feasible project that would have such sizable economic benefits. Only three simple assumptions need to be made to accept this project as an major boon to Kosrae, even if it requires forestalling other development projects for several years:

- accept the financial (profit) projections made by GODC;
- assume that any consequent social impacts will be minor; and
- assume that any ecological impacts will be minor and virtually costless.

On the other hand, one or more of these assumptions may prove false, resulting in lower profits or other problems. The following is a [non-exhaustive] list of potential concerns compiled from interviews during the mission.

*Reasons the attractiveness may have been over-estimated:*

**Economic Viability:**

- GODC may have underestimated the cost of tuna (by 10% ?)
- GODC probably underestimated the cost of labor (by 50% ?)  
*[Correcting these two items alone eliminates most of the projected profits, according to one fisheries economist who analyzed the plan.]*
- Market access (both input and output ends) may be significantly more difficult than anticipated:  
e.g., cost of delivering supplies for seiner re-provisioning,  
access to raw materials,  
how to get shelf space in US?
- Probably underestimated cost of associated infrastructure needed;  
esp. if depend on foreign workers (housing, sewage, water, power,  
FOOD (more imports?))
- Forgone balanced investment approach, on Kosraen scale; economic vulnerability to external forces.
- Management issues: lack of investment by management firm, lack of relevant experience on Kosrae, lack of industry network.

**Social Impacts on a very homogeneous, conservative society:**

- Will be dependent on imported labor?
- Or Migration and/or additional transportation needs for Kosraen workers (this would also be an additional economic cost)
- Ship crews on shore leave, seeking recreational outlets
- Changing gender roles in community; paid female labor

**Ecological Impacts:**

- Impacts of fresh water drawdown on reef / lagoon, etc?
- Waste water impacts; BOD, chemicals, etc: impacts to reef & fisheries
- Increased boat traffic; risk of oil spills, etc. in harbor - preparedness?
- Sewage treatment, if new village required for foreign workers
- Impacts of additional ancillary construction, e.g. housing.

Without being able to reach a firm conclusion (this consultant has no particular expertise on projects of this sort, and there is presently a shortage of information available, especially on impacts), it would at least appear to be a highly risky investment at this point in time, on purely economic grounds.<sup>16</sup>

Risky investments sometimes do pay off, but this consultant believes that *it would be prudent to obtain rigorous environmental and social impact assessments, plus additional in-depth, more systemic appraisals of the project's economic viability (under various external market condition scenarios), by several independent but well-established tuna industry experts, before any further investment, or even planning, proceeds.*<sup>17</sup> These inputs can only improve the project if it does go ahead, or prevent a disaster that Kosrae simply cannot afford. In either case, they will improve the decision-making process, as well as the government's ability to plan future development projects.

*Topics for further investigation*

As mentioned above, the array of concerns that are commonly expressed about the viability and sustainability of the cannery project can be grouped into three categories: economic, social, and ecological (environmental), discussed below.

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<sup>16</sup> In the course of the present study, several documents related to this project and other cannery projects were reviewed. Approximately 40 Kosraens plus some 40 technical experts were interviewed (in varying depths), including fisheries, fish processing, and other marine resource analysts, and development planners. Very few (less than 10 per cent) were willing to accept the above assumptions. NOT ONE person outside the Kosraen Government (and GODC) was found who believed GODC's financial scenario for the cannery.

<sup>17</sup> The succeeding section briefly describes some of the issues raised by interviewees that merit investigation.

### Economic Viability

Several analysts have questioned the basic assumptions underlying the profit projections made by GODC, with the result being that it appears to be questionable whether the cannery would ever generate the magnitude of profits predicted.

First, fisheries economist Phillipson states that the cost of the basic raw material, tuna carcasses, was under-estimated by ten percent, due to the difference between a short ton and a metric ton (2000 vs. 2200 pounds). This ten percent addition to the cost of raw tuna would consume almost 50 per cent of the projected profit.

Phillipson and many others also believe that labor costs were underestimated considerably (perhaps even by fifty percent). GODC projected wages for most of the workers at \$0.75 per hour, when the minimum wage on Kosrae is currently approximately \$1.25 per hour, and workers are likely to expect perhaps \$1.50/hour for the physically demanding cannery work. This fifty percent increase in labor costs would consume most of the remaining projected profits, leaving relatively little for State coffers.

Third, several experts also question the likelihood of even these revised projections due to the competitiveness of the world's canned tuna market. This market is controlled by three or four companies, with very narrow profit margins, and it is unclear whether GODC really can garner sufficient market access (e.g., US supermarket shelf space) to sell Kosrae's product, for a couple of reasons. First, some say prospective cannery manager GODC apparently has little proven track record, having never managed a cannery before. Second, several other islands in the Pacific are also considering installing tuna canneries, at a time when several existing canneries have closed down (Puerto Rico) due to fluctuating market conditions, such as changing consumer tastes, and intensified competition from aggressive Thai processors with extremely low labor costs (\$3-4 dollars per day). It is true that the Thai's wage advantage could be significantly balanced by Kosrae's duty-free access to the US market, but that assumes GODC can get the product on the shelves and sell it.

There has been some question as to whether the foreign fleet will want to bring its cargo to Kosrae and re-provision there. Who will enforce the proposed rule requiring fishing licensees to off-load at least a portion of their catch? Some say it would allow boats to be more efficient by (1) spending less time travelling back and forth between more distant ports and the fish, and (2) not having to stand idle for weeks waiting to off load. Some question whether Kosrae has the critical mass to re-provision all these ships, however. Supplies would have to be brought out to Kosrae and stored, which is an additional cost to factor into the

equation. This may be cheaper than the current system, but it will not be free, as seems to be assumed.

### **Potential Social Impacts**

One set of potential social effects centers around the very real possibility of having to export up to a thousand foreign workers if Kosraens will not do the work for the budgeted wages. This would also entail the additional economic costs of constructing a new village (housing), sewage treatment facilities, water, and other utilities; increased food imports, and so on. Kosrae is a very homogeneous, quiet, small, and conservative society; introducing so many foreigners is likely to be quite disruptive. Similarly, having ships frequently in port means that there will be a continuous flow of foreign fishermen on shore leave, looking for recreation, often of types that are frowned upon in Kosrae's religious culture.

Even without foreign workers, the pressures for social change will intensify greatly. First, transportation needs of the island (including increased demand for imported gasoline and vehicles) will increase significantly, an additional economic cost. Alternatively, laborers may desire to migrate closer to Okat, once again adding the cost of constructing a new village. It is also likely that many of the cannery's workers will be women, making them wage earners for the first time, which will cause a good deal of confusion between the genders, if not outright turmoil. This can be perfectly acceptable (some would even say desirable), but it might be prudent to ask Kosraens themselves if it could be problematic, and if so, how to ameliorate it.

### **Potential Ecological Impacts**

So-called "environmental" impacts often come back to cause economic problems. The environmental impact assessment currently in progress should provide answers to questions regarding impacts on water quantity and quality, and resultant effects on the reef and fisheries; on the effects of increased boat traffic and emergency preparedness; on sewage treatment needs, especially if a new village is needed; and on ancillary effects of additional construction, such as wetlands filling, dredging, etc.

### ***Conclusions***

This project will require the dedication of the majority of Kosrae's capital investment funds over the coming decade. In essence, virtually all investments other than the infrastructure directly supporting this project are being delayed in

### Appendix 3. Tuna Cannery, cont.

favor of the cannery. Virtually all of Kosrae's capital development fund is being put into one project. While this consultant can discern no other development projects for Kosrae that offer the temptation of such high economic benefits, the vast majority of experts consulted on the matter believe these benefits have in fact been greatly exaggerated. This consultant has also seen numerous quick fix projects such as this fail due to social incompatibility and/or ecological unsustainability. This project is too risky to continue without substantial analysis aimed at evaluating the potential risks, followed by more integrated planning and re-design work if necessary to reduce those risks remaining.

There are alternative strategies for obtaining a return on Kosrae's marine resources, that may be considerably less risky, with significantly fewer negative impacts (social as well as environmental), in addition to the fact that they would allow a more diverse investment portfolio, which also reduces overall risk. These are discussed in the body of the report.

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