

6.4 Transportation

6.4.1 Road Network Development Plan

The following are the most important issues in terms of the road network development strategy:

- The past excessive population growth of Koror State has to be moderated in order to achieve balanced development of the whole Republic of Palau;
- It is necessary to develop trunk road network in the Babeldaob Island in order to take advantage of the construction of the Compact Road;
- All states in Babeldaob Island have to be interconnected in order to integrate the local economic activities and communities after the completion of the new capital in Melekeok State;
- The roles and functions of Koror State have to be strengthened in order to secure its function as a center of the commercial activities in Palau.

Based on the strategies above, the following road network development plan is proposed.

(1) Establishment of trunk road network in Babeldaob Island

The focal point is to establish a trunk road network in order to interconnect the different states in Babeldaob Island and Koror State. In this context, the following road development is proposed (see Figure 6.4.1)

Completion of missing link of the compact road

- The Compact Road lacks a connecting link to the northern part of Palau International Airport. The north link to Palau International Airport will be a significant part of a ring road in Babeldaob Island. There is a need to fill this missing link in order that the Compact Road will become fully functional.
- Total length is 3.5 km and asphalt concrete pavement with 24 feet carriageway with the same standard as the Compact Road.

Improvement of connecting road

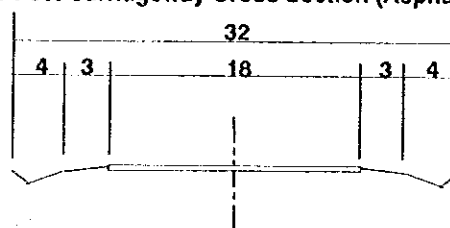
- Road development to establish a connection between the state capitals/docks and the Compact Road is essential after the completion of the Compact Road. Providing another missing link of the Compact Road in the Ngarchelong State is included in this subject.
- 18 feet carriageway and asphalt concrete pavement is recommendable to minimize both the total construction and maintenance costs, since traffic is expected to be small (50.2km).

(2) New roads to access the compact road

The state capitals should be connected to the Compact Road by the development of a connecting road. However, those villages located a distance from the state capitals will not benefit from the construction of the Compact Road. Taking both the locations of the remote villages and the current road network into consideration, new road development is desirable, with a view to form a community road network.

- Gravel road with 18 feet carriageway is recommended to minimize the construction and maintenance costs, since traffic is expected to be small (7.4km).

Figure 6.4.1 18 Feet Carriageway Cross Section (Asphalt & Gravel)



Source: JICA Study Team

(3) Major road improvement in Babeldaob Island

The total length of the major road improvement in Koror State and Babeldaob Island including the Compact Road is summarized in Table 6.4.1.

Table 6.4.1 Total Length of Major Roads to be Improved in Koror and Babeldaob

(Unit: Km)

States	Road Improvement Category					Sub Total
	Reef Road (2 lane 20 feet asphalt)	Compact Road (24 feet asphalt)	Filling of Missing Link (24 feet asphalt)	Connecting Road (18 feet asphalt)	Access Road to Compact Road (18 feet gravel)	
Koror	5.0	-	-	-	-	5.0
Babeldaob Is.	-	85.0	-	-	-	85.0
Aimeliik	-	-	-	11.6	5.4	17.0
Airai	-	-	3.5	-	-	3.5
Melekeok	-	-	-	3.6	-	3.6
Ngaraard	-	-	-	2.7	-	2.7
Ngarchelong	-	-	-	4.6	-	4.6
Ngardmau	-	-	-	3.0	-	3.0
Ngatpang	-	-	-	5.5	-	5.5
Ngchesar	-	-	-	6.9	2.0	8.9
Ngeremlengui	-	-	-	6.6	-	6.6
Ngijwal	-	-	-	5.7	-	5.7
Total	5.0	85.0	3.5	50.2	7.4	151.1

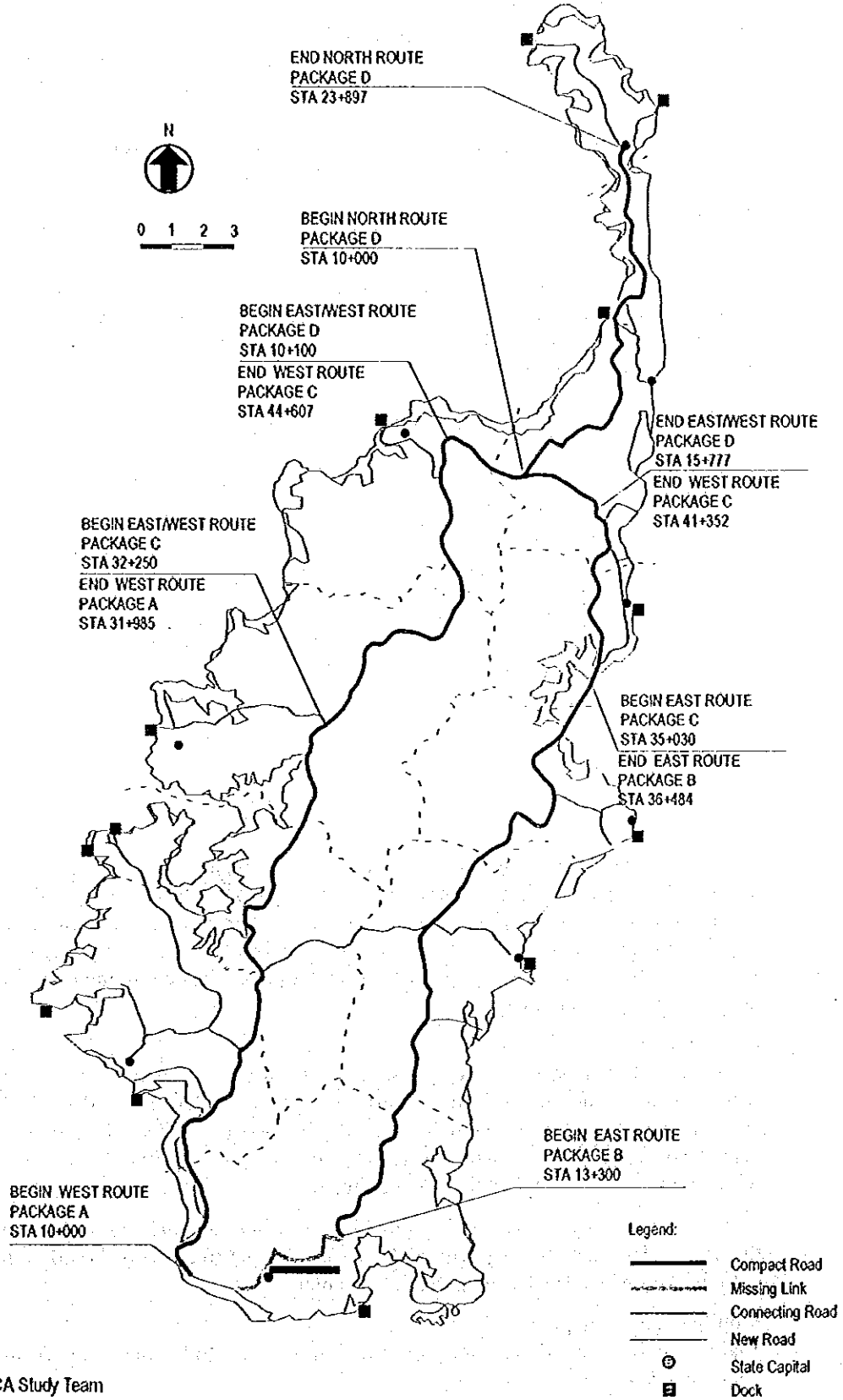
Source: JICA Study Team

(4) National road rehabilitation in Koror State

National road passing through from east to west in the Center of Koror Island is a trunk road to support economic activities and daily lives of the residents. As it is an essential transport path of the most populated and commercialized area in Palau, the road should be rehabilitated from the following viewpoints:

- The pavement surface is partly damaged due to heavy traffic;
- Three and two lanes appear alternately;
- There is no space for residents and tourists to safely walk around.

Figure 6.4.2 Road Development Plan for Babeldaob Island



Source: JICA Study Team

The project components are as follows:

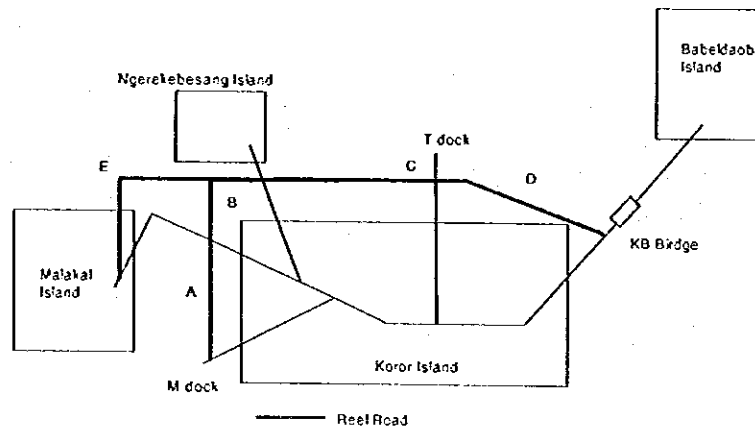
- Rehabilitation of the national road from Palau Mariculture Demonstration Center in Malakal Island to the KB bridge (10.7km);
- Rehabilitation of the Sakura Bridge to enable heavy vehicles to pass through;
- Provision of sidewalks in the central area, from the Medalaii Hamlet to the Ngerkemal Hamlet (3.5km); and
- Lane re-arrangement from the Medalaii Hamlet to the road connecting to the T Dock in line with a traffic management technique.

(5) Reef road

Background

The reef road had been proposed to pass through the coral reef in the northern part of Koror Island (see Figure 6.4.3). The idea was boosted in the National Master Development Plan issued in 1994 in order to relieve traffic congestion of the trunk road in the center of Koror State.

Figure 6.4.3 Original Plan of Reef Road



Source: JICA Study Team

The plan to relocate the current capital to Melekeok State is in progress and large-scale tourism development plans for the states of Kayangel, Ngarchelong and Peleliu are proposed in this study. These plans aim at the decentralization of the currently heavily populated capital, Koror, due to the sudden urbanization commonly observed in other Pacific countries. The future population growth in Koror State is going to be moderate if the proposed plan is in place.

Review of the original plan

The original plan was to build a causeway. The structure was going to be earth-filled with several open culverts for small boats crossing the Reef Road. However, construction of the causeway will prove detrimental to the inland portion of the sea between the Reef Road and Koror Island after the completion of the Reef Road. This will, without doubt, cause fatal environmental impact.

In the meantime, Marine Center Development is proposed in the tourism development in the Study. The southern segment of the M dock of the Reef Road should be integrated with the Marine Center Development as one plan.

Modification of the plan

Taking these conditions into consideration, the following modifications are recommended:

- Pier structure is preferable between the Ngerkebesang Causeway and the KB

Bridge (Segment B, C and D) in place of a causeway except the southern segment of the M dock;

- Reduced carriageway and one side sidewalk is recommendable to minimize the construction cost (see Figure 6.3.4);
- Some simple commercial entertainment facilities and tourism spots should be added to the original plan in order to fill inadequate tourism facilities;
- Pedestrian path is to be provided to connect the Reef Road and the inland after completion of the Reef Road.
- Segment A (Phase I) from the M dock should be implemented by reclamation integrated with the Marine Center Area Development.
- Segments B (Phase II), C (Phase III) and D (Phase IV) should be constructed after a comprehensive planning study on transportation in conjunction with the policy on national development direction, environment and urban environment.
- Segment E of the original plan of Malakal Islands should be suspended and the causeway between Koror and Malakal Islands should be widened instead.

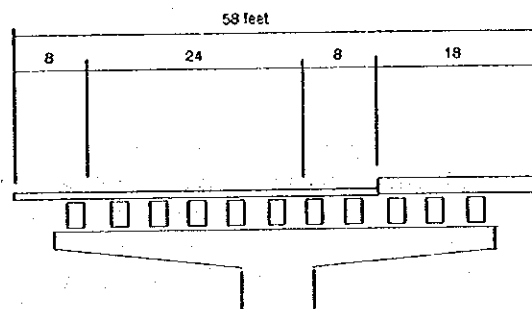
Management

The original plan alone needs a large amount of investment cost, \$16 million (without segment E), and with the proposed plan, which is targeted to prevent the environmental deterioration of sea corals, the cost increases to around \$ 54 million considering this large amount of initial investment cost and the future budgetary constraints, a toll system should be introduced. The toll system will not be able to cover the full initial investment cost but cover around one third of that and full maintenance cost.

Construction timing

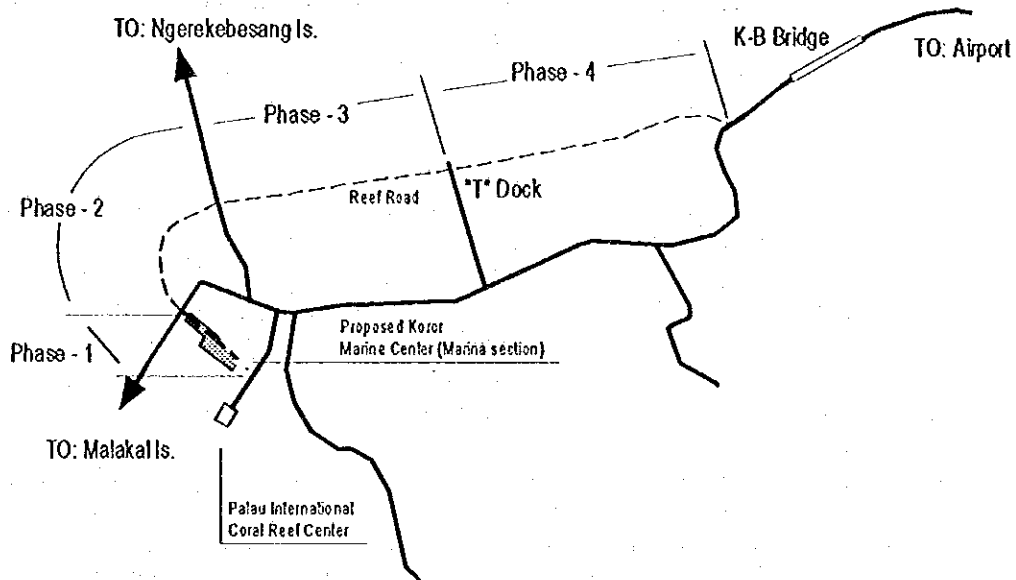
Considering the projected low population growth in Koror State, it can be acknowledged that the Reef Road should not be implemented early.

Figure 6.4.4 Proposed Reef Road Cross Section



Source: JICA Study Team

Figure 6.4.5 Modified Plan of Reef road



Source: JICA Study Team

(6) Maintenance of major roads

Maintenance of major roads is one of the key issues for the road network not only in Koror State and Babeldaob Island but also in remote islands. There are two management processes for major road maintenance, the in-house and the contract-out management. However the in-house management is unlikely to meet requirements for cost efficiency since the Bureau of Public Works and the states have not enough staff for in-house work. Hence it is recommended to use the contract-out system for the major road maintenance.

(7) Bus transport

Necessity of bus transport has always been one of the key issues on transport planning. Generally speaking, bus business is not lucrative even in the big cities in the world. In addition, a four-lane street is a minimum condition for bus transport in cities or towns since provision of bus priority lane is a basic condition to operate city bus in the congested areas and a four-lane carriageway is the minimum condition in Koror State where both directions is crowded. All these conditions lead to the conclusion that it is better to keep from introducing bus transport.

6.4.2 Airport Development Plan

(1) Future passenger demand

The future passenger demand is estimated based on tourism development and economic growth. The result is shown in Table 6.4.2.

Table 6.4.2 Future Traffic Demand by Air
(Unit: Persons)

Year	Visitors
1999	60,000
2009	90,000
2020	138,000

Source: JICA Study Team

(2) **Problems and issues**

Problems and issues on Palau International Airport are summarized as follows:

- B727, of which production was suspended in 1984, is currently used for air services, but the Palau International Airport cannot accommodate them because it has a short runway;
- A runway of around 3,000 meters is necessary in order to accommodate B767 airplanes. ;
- Terminal building is defective and there are some problems on passenger safety;
- Runway is deteriorated and some cracks can be observed;
- There is no modern navigation system and visual landing system is currently applied;
- Most telecommunication and other facilities currently used are old or outdated; and
- There is limited number of experienced and well-trained personnel.

(3) **Development plan**

Direct flight from Narita Airport

One of the most focal issues is the implementation of the direct regular flight service from Narita New Tokyo Airport to Palau. Table 6.4.3 shows the result of rough calculation on the possibility of direct flight service from Narita New Tokyo International Airport.

Table 6.4.3 Direct Flight Service from Narita (Potential)

Year	Visitors (persons)	From Japan (persons)	From Narita (persons)	Daily arrival From Narita	L.F (0.65)	Weekly Service
1999	60000	24000	16752	56	3	2-3 flights
2009	90000	36000	25128	84	4	4 flights
2020	138000	55200	38530	128	6	6 flights

Source: JICA Study Team

Note: Assumption 1: 40% of the total visitors comes from Japan
Assumption 2: 69.8% of Japanese visitors come from Narita
Based on B767 with 230 seats
Induced passengers by direct flight are not estimated

This calculation indicates that a direct service from Narita New Tokyo International Airport is possible though the project requires several conditions.

Improvement of Palau International Airport

The improvement of Palau International Airport requires two things: first is to ensure the safety of passengers and the second is to meet future traffic demand and development perspective. The components of the relevant project are listed below:

Improvement of terminal building: This component is to ensure that passengers are protected from any eventuality of the terminal building collapsing. The Japanese Government recently committed grant aide for improvement of the terminal building to the ROP.

Overlay of the runway: This is also to secure the safe landing and take off of airplanes.

Extension of runway: Wide-body aircraft will be needed to meet future passenger demand based on the planned tourism development and estimated economic growth. Taking these requirements into account, the following improvement is proposed.

- Extension of the existing runway about 800m to the east by the year 2009;
- Provision of a modern navigation system using GPS;
- Improvement of necessary associated facilities; and
- Periodic training of staff to cope with modern operation system.

In terms of the extension of the runway, there are two alternatives, extension of the current runway and the construction of a new runway beside the current runway, using the current runway as a taxiway. Exact cost analysis for those projects are not the subject of the study but the construction cost of the extension of the current runway is considerably low.

Improvement of Peleliu Airport

A large-scale tourism development is planned in Peleliu State by the Study Team in order to disperse the excessive concentration of residents and tourists to Koror State. Key framework of the tourism development is to increase the number of visitors and residents. The key framework is tabulated in Table 6.4.4.

Table 6.4.4 Key Framework by Development in Peleliu

Year	1999	2010	2020
Visitors (Persons)	-	22,000	45,000
Rooms	28	300	600
Employment (persons)	-	450	900
Population (persons)	531*	2,046	3,027

Source: JICA Study Team

Note: * In 2000

Based on the framework, it is required that transportation service between the states of Koror and Peleliu, using a small aircraft with a capacity of around 20 passengers, be operated on a regular basis. Part of the current runway, as long as around 800 meters, should be paved to cope with commercial flight services and to collect rainwater to supplement drinking water for residents and tourists, who are expected to drastically increase owing to the tourism development in the future.

6.4.3 Seaport Development Plan

(1) Improvement of Malakal Port

Background

General handling cargo volume is unlikely to drastically increase, including construction materials even in the future, since the residential population growth in Koror is anticipated to be relatively moderate in accordance with the economic development strategy in the study. In terms of construction materials, major construction sites are likely to shift to Babeldaob, so that some docks located in t Babeldaob State will be available for that purpose.

On the other hand, container transport is expected to increase in the future, since it is the single most possible means of sea transport in the world, even if the total cargo volume does not increase. In this context, it is necessary to secure a space for container handling in the future.

Development direction

There are two alternatives to solve the problems and to satisfy the future perspective. First is to improve the current Malakal Port and the second is to construct a new port.

Improvement of Malakal Port is recommended in concern with the construction and maintenance cost.

Major work components as follows:

- Securing a new space for container handling by landfill (around 2500 m²); and
- Installing 40 tons crane

(2) Improvement of existing Peleliu Port (Elochel Port)

Expansion of the Elochel Community Dock

The future development of Peleliu as a southern regional tourist base was proposed in the Study. Lots of goods such as construction materials and equipment, fuel oil for power plant and supplies will be required for the development. This will cause congestion at the existing dock. Therefore, expansion of the Elochel Dock is required before starting the tourism development.

Boat ramp

A roll on/off facility (to be part of dock expansion) is needed for unloading/loading heavy equipment as well as for pulling boats out of the water for repair.

Future channel dredging

The existing channel, although recently dredged by Japanese grant, is still relatively shallow (only 1.5m deep at low tide) and narrow. Accordingly, future dredging to deepen and widen the channel will be necessary.

Repair and installation of sea markers

The following are the major contents:

- Repairing current damaged sea markers; and
- Installing new sea markers.

The west-coast coral reef (135km) and the east coast coral reef (70km) are the subjects to repair and install the sea markers. There are about 100 pieces of sea markers.

6.5 Public Utilities

6.5.1 Development Policy

A development policy of public utilities is as follows:

- Maintenance of existing utility facilities has a high priority,
- Public utility development shall contribute to the improvement of the living environment, protection of the natural environment, and rural development,
- The public sector shall undertake minimum development of utilities,
- Each state shall be responsible for public utility development, and
- The private sector shall provide utilities for industrial development at remote areas.

6.5.2 Development Plan

(1) Water Supply

Unit water requirement in future

Table 6.5.1 shows the future water requirement per head per day by state.

The Koror-Airai area is considered as one water supply area. Water demand per head per day was estimated based on the U.S. standard of 450lt (120gallons). Considering the living style of the Palauans and the industrial activity in Palau, this figure might be

deemed too large. However, shortage of water supply sometimes occurs because of leaks in water pipes and wasteful use by households. The volume of 450 l/head/day could be reduced gradually to 250 l/head/day as facilities are fixed and/or replaced and water is used effectively.

Water demand per head per day in the states of Melekeok and Peleliu will increase because of New Capital Construction and New Resort Development respectively. Volume of water per head per day of 150 l in Hatohobei and Sonsorol remain the same even in the future. Volume of water per head per day in other 10 states will increase from 150 l to 200 l because of the future developments, which are expected to contribute to improvement of living condition and change of living style.

Table 6.5.1 Unit Water Requirement (Liters/head/day)

State/Area		Original	2000	2005	2010	2015	2020
Koror	One Supply Area	450	350	300	250	250	250
Airai		450	350	300	250	250	250
Melekeok, Peleliu		150	150	200	250	250	250
Hatohobei, Sonsorol		150	150	150	150	150	150
Other 10 states		150	150	200	200	200	200

Source: JICA Study Team

Hotel industry is the largest water consumer among the industries in Palau. Therefore, water demand for a hotel is calculated separately.

Lots of visitors, with different purposes such as conference, study, business, diving and sightseeing, come and stay at various types of hotel in Koror-Airai area. Therefore, water demand of 400 l per room per day on average is adopted. Since Melekeok will become the new capital, it will need hotels mainly for hosting conferences. Ngarchelong State will be one of the tourist spots in Palau. Therefore, hotels in those two states will also need an average water supply of 400 l/room/day. Village tourism development will be implemented in Ngatpang, and will require an average of 200 l/room/day of water. There exist in Peleliu at present small hotels and/or inns, which require the same amount of water. New resort area with several classes of hotel will be developed in the future and water demand will increase to an average of 400 l/room/day. Exclusive hideaway type resort will be developed in Kayangel and will need 600 l/room/day.

Table 6.5.2 shows the unit water requirement of hotels in the future.

Table 6.5.2 Unit Water Requirement (lt/hotel room/day)

State/Area	Development Type	2000	2005	2010	2015	2020
Koror-Airai	Commercial/Business	400	400	400	400	400
Melekeok	New Capital	0	0	400	400	400
Ngarchelong	New Tourism Spot	0	400	400	400	400
Ngatpang	Village Tourism	0	0	200	200	200
Peleliu	New Resort Area	200	200	400	400	400
Kayangel	New Resort Area	0	0	600	600	600

Source: JICA Study Team

Water demand in future

Table 8.5.3 shows future water demand by states up to year 2020.

Future water demand by state is calculated based on future population projections and number of hotel rooms.

Water demand in Koror-Airai area is estimated to gradually decrease because of decrease of population and unit water requirement in the future. Nevertheless, Koror-Airai area still is the biggest water consumer in Palau even in the future.

Water demand in Melekeok, Ngarchelong and Peleliu State will rapidly increase because of future developments. A new water supply system should be developed in Peleliu before the operation of hotels.

Water demand in Kayangel will also increase, however, private resort developers will have to provide the water supply system in the development area and also distribute water to the residents in the area.

Table 6.5.3 Future Demand of Water (m³/day)

Area/State	Capacity*	2000	2005	2010	2015	2020	Remark
Koror-Airai	15,140	6,056	5,536	4,288	4,177	4,250	Commercial/Business Center
Aimelik	490	55	71	72	83	85	
Melekeok	490	27	253	449	461	462	New Capital
Ngaraad	490	61	72	73	87	89	
Ngarchelong	490	29	61	89	124	152	New Tourism Spot
Ngardmau	490	22	29	29	33	34	
Ngatpang	490	32	44	49	54	57	Village Tourism
Ngchesar	490	28	34	35	41	43	
Ngeremlengui	490	36	46	47	54	56	
Ngwal	490	21	26	26	31	32	
Peleliu		85	107	529	701	845	New Resort Area
Angaur		25	31	32	37	38	
Kayangel		16	21	38	49	58	New Resort Area
Hatohobei		6	6	6	7	7	
Sonsorol		11	12	12	13	14	

Source: JICA Study Team

Note: * Existing production capacity of water

Recommendation

Investigation of the present water supply facilities ((location, size, condition, construction year) and the current service level (production and distribution volume, number of people supplied with water, consumption volume, etc) in Palau should be conducted. The collected data are to be used to prepare a future maintenance and expansion plan of water supply facility. Present water charge should also be reviewed in this study in order to recover the operation and maintenance cost at least.

A production and distribution facility of water supply in Koror-Airai has enough capacity. However, these facilities are old and damaged. Therefore, water distributed through these facilities is leaking constantly. Water pipes need to be repaired urgently. In addition,

there are still some houses that do not receive water supply service.

Peleliu State is expected to be one of the tourist bases in Palau. About 850m³/day of water will be necessary in 2020. A new water supply system with a new water source should be developed to produce enough volume and good quality of water to both tourists and residents. Another development that would also have to be considered, in terms of water supply, is an airport in Peleliu.

Many people will move to Melekeok State, as it will be the new capital of the Republic of Palau. This will increase water demand in the area to about 460m³/day by 2020. Its changed status as the new capital will also require the construction of a new water supply system or improvement of an existing system.

Kayangel will also be expected to be one of the new tourism spots in Palau. The island will require about 60m³/day of water by 2020. At the moment, the Kayangel State is has no water supply system. The public sector should guide the private sector to provide utilities, including water supply for inhabitants.

Project

Projects related to water supply are as follows:

- Study on Improvement of Water Supply System in Palau;
- Repair and relocation of water supply facilities and expansion of supply area in Koror-Airai;
- Construction of Additional Water Storage Tanks in Koror-Airai;
- Purchase and Installation of Water Meters in Palau; and
- Development of a New Water Supply System in Peleliu.

(2) Wastewater

Future wastewater generation

Volume of wastewater daily discharged is estimated same as volume of water needed per day.

Table 6.5.4 shows volume of wastewater generated by states in the future.

Expansion project of an existing treatment plant in Malakal Island in Koror State is being implemented. Treatment capacity will be doubled (7,570m³/day) in the near future. This capacity will be enough considering the volume of wastewater generated in Koror State.

Airai State is one of the largest wastewater generators in Palau. However, volume of wastewater will gradually decrease in the future.

Volume of wastewater daily generated in the states of Melekeok, Ngarchelong, Peleliu and Kayangel will increase rapidly because of developments such as construction in the new capital and tourism development.

In other 10 states, volume of wastewater will be almost the same or gradually increase in future.

Table 6.5.4 Future Wastewater Generation (m³/day)

Area/State	Generator	2000	2005	2010	2015	2020	Remark
Koror	Household	5,157	4,740	3,546	3,422	3,489	*1
	Hotel Rm.	344	344	340	332	320	
	Total	5,501	5,084	3,886	3,754	3,809	
Airai	Household	555	452	403	423	441	*3
Aimeliik	Household	55	71	72	83	85	*3
Melekeok	Household	27	253	437	449	450	*2
	Hotel Rm.	0	0	12	12	12	
Ngaraad	Household	61	72	73	87	89	*3
Ngarchelong	Household	29	49	65	88	104	*3
	Hotel Rm.	0	12	24	36	48	
Ngardmau	Household	22	29	29	33	34	*3
Ngatpang	Household	32	44	45	49	51	*3
	Hotel Rm.	0	0	4	5	6	
Ngchesar	Household	28	34	35	41	43	*3
Ngeremlengui	Household	36	46	47	54	56	*3
Ngwal	Household	21	26	26	31	32	*3
Peleliu	Household	80	97	409	521	605	*4
	Hotel Rm.	6	10	120	180	240	
Angaur	Household	25	31	32	37	38	*3
Kayangel	Household	16	21	26	31	34	*5
	Hotel Rm.	0	0	12	18	24	
Halohobei	Household	6	6	6	7	7	*3
Sonsorol	Household	11	12	12	13	14	*3

Source: JICA Study Team

Note: *1 Design-build on expansion of an existing treatment plant is now implemented. Future treatment capacity will be 7,570m³/day.

*2 Wastewater treatment systems should be included in the new capital development project

*3 Introduction of a new toilet system with a septic tank

*4 Introduction of a new toilet system with a septic tank, and provision of treatment system in development area by developer

*5 Tourism developers provide treatment system.

Recommendation

An investigation ((location, size, condition, construction year) of the existing wastewater collection, treatment facilities, sanitation facilities, and existing service level (service area, treatment volume, number of households connected to wastewater pipes, type of toilet, number of households by toilet type, etc) in Palau is very important. This study should be implemented as soon as possible to fully understand the existing and/or current conditions on wastewater and to prepare a management plan accordingly. Also, wastewater treatment charge should be studied and introduced to cover the operation and maintenance cost of facilities discussed in this study. The collected data must be arranged and filed properly for easy reference.

Only one wastewater system exists in Koror State. However, the system facilities (pipes, pumps, and treatment plant) are old and do not work adequately because of poor maintenance. Moreover, there are some households not connected to the existing system. Therefore, improvement of facilities and expansion of the service area should be implemented in Koror State immediately.

Airai State is not included in the wastewater treatment area of Koror. Almost all the houses use an old type of toilet. The cost of introducing a pipe system of wastewater collection in Airai and then connecting to the existing treatment system in Koror is very large not only for the initial investment but also for operation and maintenance. Therefore, the Government should implement installation of a new type of toilet with septic tank at each house.

There is no wastewater collection and treatment system in the Melekeok State. The transfer of the capital will cause a generation of about 460m³/day of wastewater in 2020.

The development of the new capital is now ongoing. This project should include the construction of a new wastewater treatment system.

Volume of wastewater will rapidly increase in Peleliu and Kayangel because of a resort development by the private sector. However, there is no wastewater treatment system in these states. Therefore, the public sector should strongly guide private developers on the provision of a wastewater treatment system in their sites when they construct hotels and other related facilities. The treatment system in Kayangel should be used not only for the resort area but also for residents with proper charge.

Other states have also no treatment system and use an old style of toilet. Sanitation improvement projects, similar to Airai's, should be conducted.

Project

Projects related to wastewater and sanitation, are as follows:

- Study on Improvement of Wastewater System and Sanitation in Palau
- Modification and Expansion of the Malakal Wastewater Treatment Plant
- Construction of a New Workshop, Store and Laboratory at Malakal WTP
- Sanitation Improvement Project (Sanitary Core Unit Extension) in Palau

(3) Waste Management

Waste generation unit

Waste generation unit is set based on the Integrated Solid Waste Management Plan conducted by Bureau of Public Works, the Republic of Palau, in June 1999.

Waste generation rates of the states of Koror and Airai are estimated to be 1.0 kg/person/day. This includes 40% of waste generated by several business activities (restaurants, markets, stores, factories, offices etc).

A new capital construction project is now undergoing at Melekeok State. Present waste generation unit in Melekeok is small (0.5 kg/person/day), the same as other states because of its population size and absence of industries. However, once Malakal becomes the new capital, waste generation rate will increase to 1.0 kg/person/day, the same as Koror's and Airai's, because of a rapid growth of population and industries.

Generation unit of municipal waste at other states at present is estimated to be 0.5 kg/person/day, and future generation rate will also be same.

Hotels are estimated to generate a volume of 2.6 kg/room/day of waste.

Table 6.5.5 Unit Waste Generation

State	2000	2005	2010	2015	2020
Municipal Waste					
Koror & Airai	1.0	1.0	1.0	1.0	1.0
Melekeok	0.5	1.0	1.0	1.0	1.0
Other states	0.5	0.5	0.5	0.5	0.5
Industrial Waste (Hotel)					
All states	2.6	2.6	2.6	2.6	2.6

Source: JICA Study Team

Waste volume

Table 6.4.6 shows the future volume of waste by state.

Koror State is the biggest waste generator, with a collection and discharge volume of 15 to 16 tons in the next 20 years.

Volume of waste daily generated and collected in Babeldaob Island will be almost double from 2.62 tons in 2000 to 5.29 tons in 2020.

Daily waste volume in Peleliu and Kayangel will increase rapidly in the future. Especially in Peleliu, generation volume is estimated to become 9 times, from 0.34 tons/day in 2000 to 3.07 tons/day in 2020.

Table 6.5.6 Future Waste Generation

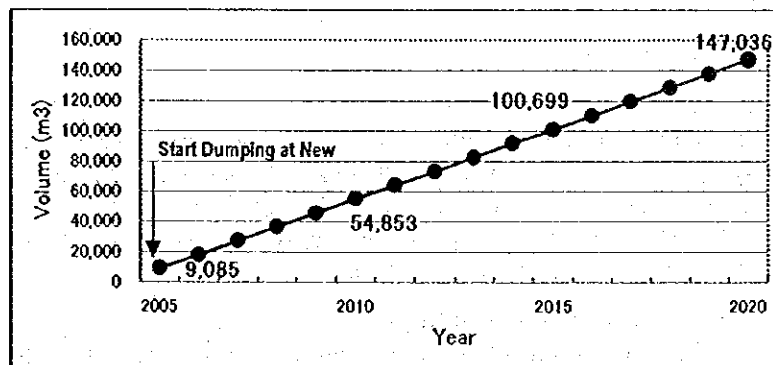
Generation Area		(Unit: ton/day)				
		2000	2005	2010	2015	2020
Koror		15.20	16.14	15.54	15.02	15.20
Babeldaob	Airai	1.59	1.51	1.61	1.69	1.76
	Aimeliik	0.18	0.18	0.18	0.21	0.21
	Ngatpang	0.11	0.11	0.16	0.19	0.20
	Ngchesar	0.09	0.09	0.09	0.10	0.13
	Melekeok	0.09	1.26	1.82	1.87	1.88
	Ngeremlengui	0.12	0.12	0.12	0.14	0.14
	Ngwal	0.07	0.06	0.07	0.08	0.08
	Ngardmau	0.07	0.07	0.07	0.08	0.09
	Ngaraad	0.20	0.18	0.18	0.22	0.22
	Ngarchelong	0.10	0.20	0.32	0.45	0.57
	sub-total	2.62	3.77	4.62	5.03	5.29
Peleliu		0.34	0.45	1.80	2.47	3.07
Angaur		0.08	0.08	0.08	0.09	0.10
Kayangel		0.05	0.05	0.12	0.16	0.19
Hatohobei		0.02	0.02	0.02	0.02	0.02
Sonsorol		0.04	0.04	0.04	0.04	0.05

Source: JICA Study Team

Amount of waste volume in Koror-Babeldaob

An estimated total waste volume of 9,085 m³ from Koror-Babeldaob will be disposed to a new final waste disposal site in 2005. Accumulated volume of waste discharged to the new dumpsite from 2005 to 2020 will reach about 147,000 m³.

Figure 6.5.1 Accumulated Volume of Discharged Waste



Source: JICA Study Team

Recommendation

It is very important to make a "Solid Waste Management Program and Plan" in Palau, especially in Koror-Babeldaob. Therefore, a study should be urgently implemented for making the Plan and Program, which should include a feasibility study on a new final waste disposal site, a transfer station and the closure of the existing dumpsite. Furthermore, waste collection and treatment charge should also be studied and introduced to cover the cost for operation and maintenance.

The existing dumpsite in Koror is observed to be more than unacceptable for its unhygienic condition and it is almost overloaded. Hence, the Government of Palau and Koror State plan to close down this site and develop a new one in the Aimeliik State.

Operation of this new disposal site should be started as soon as possible.

Large amount of waste will be generated in the Peleliu Island because of the tourism development. A new facility for disposal should be constructed and operated properly at a proper place to keep the island clean.

Project

Projects related to waste are as follows:

- Study on the Solid Waste Management in Palau;
- Development of a New Final Disposal Site for Koror and Babeldaob;
- Development of a Transfer Station in Koror State;
- Purchase of Collection and Haulage Vehicles;
- Purchase of Vehicles for the New Disposal Site;
- Closure of the Existing Dumpsite at Koror; and
- Development of a New Final Disposal Site in Peleliu.

(4) Enhancement of organization on public utilities

The Bureau of Public Utilities (BPU) of the Ministry of Resource and Development is responsible for water supply, wastewater treatment and operation of the final dumpsite at present. However, it seems not to offer enough services to people because of several reasons such as shortage of budget and human resource. Therefore, there is a need to improve the operation and management of the Bureau of Public Utilities. The following are recommended:

Introduction of appropriate user charge system

At present, people pay only for water charge, which is computed by multiplying the volume of water consumed by a flat rate. To secure budget for operation and maintenance of utility facilities, not only adoption of water charge system of a rate of volume but also introduction of user charge system on wastewater treatment and waste management (collection and dumping) should be considered and be implemented immediately. Those charges should be collected and managed totally by a new department established in BPU.

Establishment of waste management department

There is not an independent department or division on solid waste management in BPU. BPU only operates a final dumpsite in Koror and does not totally manage solid waste generated in Palau at present. A waste management department should be newly established in BPU to manage solid waste totally with the cooperation of Koror State, which is the biggest waste generator in Palau.

Cooperation with EQPB on monitoring

At present, EQPB is responsible for the monitoring of quality of drinking water, treated wastewater and leachate from dumpsite. BPU should cooperate with EQPB on these monitoring tasks.

Training of employees and workers

CIP has engineers assigned to BPU. BPU should cooperate with CIP on the planning and design of public utilities. It is very difficult to find skilled workers with knowledge of operation and maintenance of facilities on public utilities in Palau. Therefore, workers should be trained not only on-the-job but also through attendance of training at PCC or other training schools with relevant work programs.

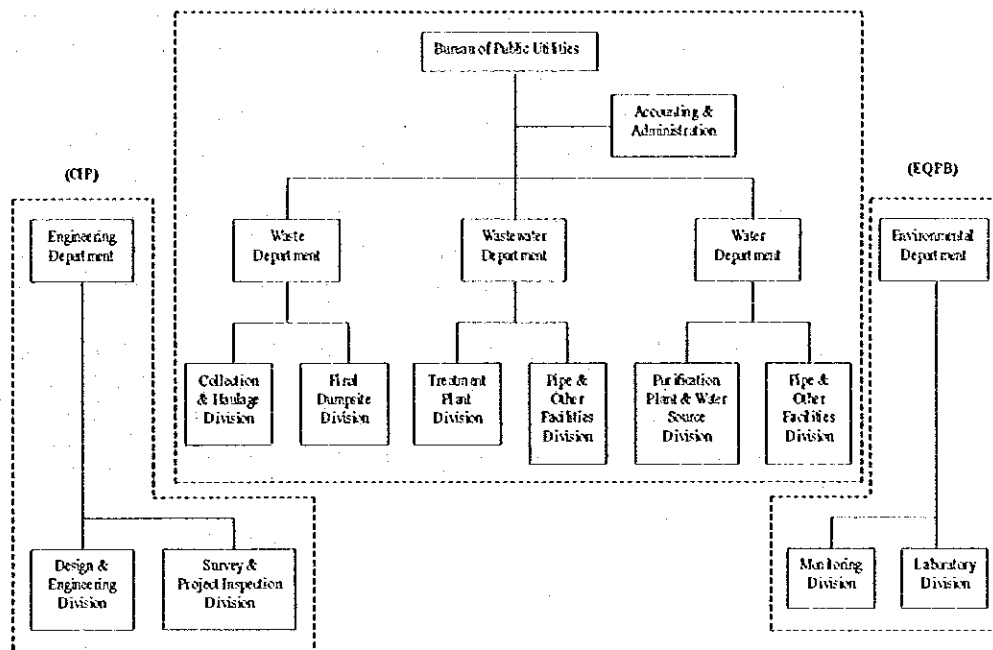
Development of conservation awareness

There is a need to develop in people an awareness of the need to save water and to minimize waste generation, in order that resources could be conserved and effectively used and that operation and maintenance cost of facilities be reduced. This awareness

campaign could be carried out in places such as schools, homes, work places, communities, etc.

Figure 6.5.2 shows the proposed new organization of the Bureau of Public Utilities. With this kind of organizational set up, the idea of the Bureau being run like a private company such as PPUC (an electric generation and distribution company), in the near future should be studied.

Figure 6.5.2 Recommended Organization on Public Utilities



Source: JICA Study Team

6.6 Telecommunications

6.6.1 Strategy in Palau National Master Development Plan

The Palau Master Plan envisions a high quality telecommunications network throughout Palau in a cost effective manner that provides an adequate return to the Government, and that is competitively priced and oriented towards full customer service.

The mission statement of PNCC is broadly crafted in line with the above strategy, although it does not focus on a commercial return to the Government or on competitive pricing goals. To achieving its objective, PNCC laid out the following targets:

- Provide 7000 telephone lines by the year 2000 (35 lines per 100 persons);
- Provide quality customer service by meeting set standards of operational efficiency, reliability and cost effectiveness;
- Upgrade skills of employees through short and long term training opportunities; and
- Commit to an aggressive and prudent fiscal program, recognizing that optimum return on capital investment is essential to achieve development and operational objectives.

The many planned programs and projects are to be implemented using the REA \$39 million loan. PNCC anticipates reducing the amount of loan funds actually required

through application of the most cost-effective technologies and through internal construction and funding of significant portions of the rural telecommunications infrastructure.

6.6.2 Recommendation

(1) Revision of tariff system on domestic call charge

- Continuous capital investment efforts are required to PNCC in order to keep up with the rapid changes in technology renovation. A particular request by the business sector to PNCC is that advanced communication means be provided, otherwise it will be difficult for business firms to survive in the severely competitive society prevailing right now.
- Introduction of new type of services, i.e., cellular mobile telephone system, and consequently, increasing of income is required for PNCC. Investment and operation of the new cellular system should be subjected to thorough F/S.
- By applying appropriate tariff level of domestic call charges, conceivable over holding of telecommunications facilities by innocent customers should be avoided. Accordingly, the financial situation suffered by PNCC should be improved.
- International telephone call charge of \$1.50/minute is considered an appropriate level. However, it is still necessary to search the most suitable level of call rates by comparing figures between the added income as a result of revisions on the tariff system and the lost income because of reduced number of international calls. To review the tariff for on-line service charge for Internet connections will be necessary as well.

(2) Operation and maintenance training

- Fostering of PNCC operation and maintenance staffs is an important work for PNCC as a common carrier of the communication system of Palau.
- Geographical condition of Palau is characterized by scattered small islands in a wide sea area and by sparse population.
- PNCC has an obligation to maintain the telecommunications facilities in good condition and, if trouble occurs, the repair works should be completed within a promised period to customers, from 24~48 hours.
- On the other hand, PNCC has to use its work force in a most effective way. It is good PNCC has applied a repair personnel dispatch system (some repair personnel are usually stationed at PNCC Headquarters) for effective maintenance.
- Re-training of staff and of new recruits are constantly required by PNCC. However, the required number of trainees is rather small. For the high degree technical training, such as digital switching, digital transmission, it is more effective and cheaper for PNCC to send trainees abroad rather than to have its own training school in Palau.
- When the trained personnel return from abroad, however, the PNCC organization should assign them to the same position they were trained for.
- The outside plant maintenance training is also important. Materials for training are not so expensive compared with switching and transmission equipment. For the local training, practical training must be provided at first and the theoretical basics should not be the priority of the curriculum.

(3) Provision of PCO

- Application of the domestic call charge system is recommended. When the new charge system is applied, more PCO (Public Call Office, pay phone) will be needed at public gathering places.
- Some states such as Aimeliik, Melekeok, and Ngechesar do not have any PCO. It is recommended that each state should have a PCO once the domestic call charge system is applied.

(4) Securing insulation of drop wires

- Buried secondary cables are terminated at inside DP (Distribution Point) post. Drop wires are connected to the secondary cable pairs and laid to the subscriber premises.
- DP post should be located above rainfall water level. Concrete base for DP post was not constructed. Often, soil is unearthened by very heavy rainfall.
- Climate in Palau is featured with high humidity through the year. Terminals and wires are often moist. There are no perforations on side covers of DP post. On the other hand, cross connection cabinet has openings for ventilation.
- Sometimes indoor cables are laid instead of using outdoor cable/drop wires. In this case, the insulation of copper wires is insufficient and its cable sheath is not adequate for outdoor use. It causes low insulation and noise.
- Therefore, complete sealing of the cable end by resin compound becomes a very important maintenance practice even PE insulated wires.

6.6.3 Mid-term Improvement Plan Up To the Year 2009

(1) PNCC service improvement program

- Demand for Internet and E-mail connections will grow rapidly especially in the business sector, such as financial institutions and tourism agencies.
- Strengthening the international call connection capability is required to PNCC.
- Recent Internet service growth rate in Asian countries are quite high, i.e., 71.4% increase from 1997 to 1998 and 54.2% increase from 1998 to 1999. Internet users growth rate in Palau is set for the time being at 30%. Then, the number of users in the year 2001 will be 1,300 and in 2002 it will be 1,700.
- Traffic measuring of voice circuits and data circuits and the adjustment of the number of international circuits are necessary.
- Moreover, the construction of the proposed ROP new capital in Melekeok State will require additional facilities to provide service for governmental, business and residential growth that will result from the capital move.
- This program consists of three projects: Construction of 2nd Earth Station for Expansion of Capacity, Expansion of Subscriber Network, and Upgrading Facilities for Melekeok.
- Total cost of \$7.5 million is estimated to implement this program.

(2) Wireless system development program

- This system will provide reliable, secure, and private communications to the marine as well as the land-based user.
- Business people and others require dependable mobile communications with excellent coverage to conduct their businesses in the modern world.
- Safety at sea for Palau's marine-related business and recreation would be greatly enhanced by cellular coverage.

-
- This equipment can also be used to provide wireless local exchange service for residences and businesses that are not located near existing telephone facilities.
 - Introduction of cellular mobile system in metropolitan/business center area (Koror and Airai), will largely help business activities as well as smoothen communication services in the community.
 - In the low-density population areas, telephone services can be provided more economically than providing services through landline.
 - This program consists of three projects: Purchase and Installation of Equipment of Cellular Telephone, Purchase and Installation of Equipment of 2nd Cellular for Land/Marine, and Development of Wireless Local Loop Telephone System
 - Total cost of \$4.3 million is estimated to implement this program.

(3) Radio towers-marine safety

- Four towers for radio antennas will give an important boost to marine safety, especially to fishing boats and, from the tourism viewpoint, to diving boats. Distress calls can easily be picked up and rescue activities mobilized.
- Provision of international VHF radio system for maritime safety is also required. International VHF communication system will link the Maritime Safety Control Office with 3 new radio towers. Kayangel and Anguar areas will be connected to this system by utilizing PNCC's microwave radio system and towers in the two islands. The new location of Maritime Safety Control Office will be selected later. Towers will have omni-antennas and directional Yagi antennas with VHF repeaters, powers and shelters.
- The 3 new towers will also give additional coverage and increased reliability to the PSTN (Public Switched Telephone Network) and PSMN (Public Switched Mobile Network) radio systems.
- Residential and business wireless exchange service can be provided from these towers to locations that are beyond the reach of PNCC's landlines. The Compact road project, which has just started actual work in early March 2000 and is scheduled to complete within three years, is expected to spur construction in some areas, where PNCC has no facilities.
- PNCC is introducing a new mobile telephone system, the equipment having landed at Malakal harbor already. These radio towers can provide ubiquitous coverage to mobile land and marine cellular service in Palau by additionally utilizing them with the existing towers. However, international VHF radio system shall be distinguished strictly from convenient cellular mobile system.
- Locations of towers will be the east side and the west side of Babeldaob Island and the west side of Koror State. The locations shall be selected during in-depth feasibility study.
- The estimated cost for this project is in a preliminary base of \$5,000,000.

(4) Refurbishment of obsolete AM radio broadcasting station

- The government-owned AM radio broadcasting station, T8AA, frequency band 1,584kHz with nominal ERP (Effective Radiated Power) of 5kW, is obsolete and apt to have troubles. The station is located at the south cape of Malakal Island.
- Though it is still working, the output is limited to not more than 2kW, because of unstable impedance matching between antenna and transmitter.
- The 60-meter-high rusted lattice type antenna tower with stays, which was installed by the US Armed Forces for their HF communication use, has to be replaced by a new antenna tower. The material shall be treated with anti-salty air.
- Old-fashioned mixer controller desk has to be refurbished also.

- **Obsolete transmitter, manufactured by Harris, also has to be replaced by a new 5 kW power transmitter.**
- **This station is the sole AM broadcasting station in Palau and its signal reaches the entire islands of Palau.**
- **The estimated cost for the project is \$300,000.**

7. PROPOSED PROJECTS AND PROGRAMS

7.1 Projects and Programs for Mid-term Implementation

7.1.1 Proposed Projects and Programs

Table 7.1.1 shows the reasons for formulating projects and programs by sub-sector. Based on this, 58 projects and programs were formulated and proposed for implementation during the mid-term period from 2000/01 to 2008/09 by each sub-sector.

Table 7.1.1 Reasons for the Formulation of Projects and Programs by Sub-sector

Sub-sectors	Main Reasons for Selection
Agriculture/fishery	Not from a viewpoint of maintaining economic growth but from a viewpoint of securing basic self-sufficiency in food with an improvement of balance of payment
Tourism/urban development	To expect high and sustainable economic growth as an engine of the growth in the future
Land use/environmental management	To formulate basic rules and regulations with a view to enable environmental preservation for sustainable development in a long-term perspective
Social	To establish an effective and efficient social system
Infrastructure	
Airport	To support tourism development and to strengthen relations with foreign countries
Road	To make the most use of the Compact Road which can strengthen accessibility with Babeldaob Island
Port	To secure import commodities necessary for daily lives and economic activities
Water Supply/wastewater	To make the most use of current and planned facilities and to renovate old ones to meet basic living standards
Solid waste management	To provide facilities and the system to meet basic standards
Telecommunication	To support economic activities and people's daily lives

Source: JICA Study Team

For these identified projects and programs, the public investment costs of these projects and programs are estimated at about \$152 million for the implementation over the mid-term period from 2000/01 to 2008/09 at constant 2000 prices, as presented in Table 7.1.2.

Regarding the share of sub-sectors, transportation sub-sector shares a dominant percentage accounting for more than 60% of the total public investment.

On the other hand, the private investment cost of those projects and programs is estimated during the project period, which is estimated at \$119 million.

The proposed projects and programs are listed in Table 7.1.3.

Table 7.1.2 Investment Cost of Proposed Projects and Programs (in 2000 Price)
(Unit: \$ thousand)

Sub-sector	Public Investment Cost (Mid-term Period)		Private Investment Cost (Project period)
	Amount (\$ thousand)	Share (%)	
Agriculture	2,050	1.4	285
Fisheries	620	0.4	84
Tourism	2,900	1.9	102,460
Land Use	500	0.3	0
Environmental Management	3,046	2.0	0
Social	100	0.1	0
Urban Development	5,300	3.5	4,500
Road Transportation	42,800	28.2	0
Air Transportation	45,951	30.3	0
Sea Transportation	9,600	6.3	0
Water Supply	15,732	10.4	0
Wastewater	2,744	1.8	0
Waste Management	15,152	10.0	0
Telecommunication	5,300	3.5	11,800
Total	151,795	100.0	119,129

Source: JICA Study Team

Table 7.1.3 Proposed Projects and Programs for Mid-term Period (2000/01-08/09)

(Unit: \$ thousand)

Sub-sector	Project and Program		Public Investment Cost (Mid-term Period)	Private Investment Cost (Project period)	Implementing Body
Agriculture	Promotion of Food Production	Ar-01 Improvement of Plant Nursery	465	0	Division of Agriculture & Mineral Resources, Development
		Ar-02 Extension of Organic Farming Practice	0	200	
		Ar-03 Promotion of Proper Use of Agri-Fund for Input Materials	100	0	
		Ar-04 Introduction of Food Processing Techniques	100	0	
		Ar-05 Reinforcement of Agricultural Research, Education and Extension	430	0	
		Sub-total	1,095	200	
	Establishment of Market Facilities	Ar-06 Establishment of Hygienic Slaughterhouse	200	85	Division of Agriculture & Mineral Resources, Development
		Ar-07 Establishment of Farmers' Market at Central Area of Koror City	540	0	
		Sub-total	740	85	
	Eradication of Oriental Fruit Flies	Ar-08 Emergency Treatment of Fruit Fly Infestations and Strengthening Quarantine Control	215	0	
Sub-total		215	0		
	Total of Agriculture	2,050	285		
Fishery	Fi-01 Study on Fishing License System		20	0	Ministry of Resources & Development
	Fi-02 Small Fishing Boat Maintenance Training		600	0	Ministry of Resources & Development
	Fi-03 Marine Product Processing in Palau		0	84	Private
	Total of Fisheries		620	84	
Tourism	Infrastructure and Area Development for Tourism	To-01 Development of Tourism Facility Complex of Koror Marine Center	0	14,460	Private
		To-02 Improvement of Access Road for Ngaradmau Water Fall	300	0	State
		To-03 Ngarchelong Tourist Base Development Project	1,500	10,000	State
		To-04 Kayangel Island Resort Development Project	100	15,000	State
		To-05 Peleliu Tourism Promotion Zone Development Project	0	63,000	Private
		Sub-total	1,900	102,460	
	Other Tourism Development	To-06 Reinforcement of PVA	0	0	PVA
		To-07 Improvement of National Museum in Koror	1,000	0	PVA
	Sub-total	1,000	0		
	Total (Tourism)	2,900	102,460		

Source: JICA Study Team

Note: To-01 Development Tourism Facility Complex of Koror Marine Center, is a one of components of Ur-01 Marine Center Development.

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Table 7.1.3 Proposed Projects and Programs for Mid-term Period (2000/01-08/09)-Continued

Sub-sector	Project and Program		Public Investment Cost (Mid-term Period)	Private Investment Cost (Project period)	Implementing Body	
Land Use	Lu-01	Formulation of Zoning System	500	0	Office of the President	
	Total (Land Use)		500	0		
Environmental Management	En-01	Integrated Ngeremeduu Watershed Management	986	0	4 States	
	En-02	Ngardok Watershed Management Focus on Nature Reserve	750	0	State	
	En-03	Land and Marine Resources Inventory Re-establishment	290	0	Bureau of Natural Resources and Development	
	En-04	Improvement for Water Quality Monitoring Activities	760	0	Environmental Quality Projection Board	
	En-05	Capacity Building for Environmental Enforcement and Management	260	0	NGO Group participation	
Total (Environmental Management)		3,046	0			
Social	So-01	Consolidation Plan of Elementary Schools in Babeldaob Island	100	0	Ministry of Education	
	Total (Social)		100	0		
Urban Development	Ur-01	Marine Center Development	5,300	4,500	Koror State	
	Total (Urban Development)		5,300	4,500		
Transportation	Road Transportation	Tr-01	Construction of Compact Road in Babeldaob	(\$88 million by US)		
		Tr-02	Improvement of Connecting Road incl. Missing Link (L=53.7km, W=18 feet)	30,900	0	Bureau of Public Works, Ministry of Resources & Development
		Tr-03	New Roads to Access to the Compact Road (Gravel, L=7.4km, W=18 feet)	2,300	0	
		Tr-04	Construction of Reef Road (L=5km, 2 lanes 40 feet long) in Koror (Total cost \$54 million)	2,600	0	Koror State
		Tr-05	National Road Rehabilitation (L=5.7km, W=2.5m x 2) in Koror	7,000	0	Bureau of Public Works, Ministry of Resources and Development
	Sub-total of Road Transportation		42,800	0		
	Air Transportation	Tr-06	Construction of New Terminal Building at Palau International Airport			Japanese grant
		Tr-07	Overlay of Runway at Palau International Airport	2,520	0	Bureau of Commercial Development, Ministry of Commerce and
		Tr-08	Extension of Runway (L=800m) at Palau International Airport	43,000	0	Trade
		Tr-09	Improvement of Peleliu Airport	431	0	
	Sub-total of Air Transportation		45,951	0		
	Sea Transportation	Tr-10	Expansion of Malakal Port (including study on master plan)	5,000	0	Bureau of Natural Resources and
		Tr-11	Navigation Markers	1,000	0	Development
		Tr-12	Improvement of Existing Peleliu Port (Elochel)	3,600	0	
Sub-total of Sea Transportation		9,600	0			
Total (Transportation)		98,351	0			

Source: JICA Study Team

CHAPTER 7 PROPOSED PROJECTS AND PROGRAMS

Table 7.1.3 Proposed Projects and Programs for Mid-term Period (2000/01-08/09)-Continued

Sub-sector		Project and Program		Public Investment Cost (Mid-term Period)	Private Investment Cost (Project period)	Implementing Body	
Public Utility	Water Supply	Ut-01	Study on Improvement of Water Supply System in Palau	300	0	Bureau of Public Utilities, Ministry of Resources & Development	
		Ut-02	Repair of Water Supply Facilities and Expansion of Supply Area in Palau	5,000	0		
		Ut-03	Purchase and Installation of Water Meters	450	0		
		Ut-04	Design and Construction of Additional Water Storage Tanks in Koror	6,000	0		
		Ut-05	Construction of New Water Supply System in Peleliu	3,982	0		
			Sub-total of Water Supply		15,732	0	
	Wastewater	Ut-06	Study on Improvement of Wastewater r System in Palau	500	0	Bureau of Public Utilities, Ministry of Resources & Development	
		Ut-07	Modification and Expansion of the Malakal Wastewater Treatment Plant	(US Fund)	0		
		Ut-08	Construction of New Workshop, Store and Laboratory at Malakal Treatment Plant	300	0		
		Ut-09	Sanitation Improvement Project (Sanitary Core Unit Extension)	1,944	0		
			Sub-total of Wastewater		2,744	0	
	Waste Management	Ut-10	Study on Solid Waste Management in Palau	500	0	Bureau of Public Works,	
		Ut-11	Development of A New Final Disposal Site for Koror and Babeldaob	7,784	0	Ministry of Resources & Development	
		Ut-12	Development of Transfer Station in Koror	1,948	0	Koror State	
		Ut-13	Purchase of Collection and Haulage Vehicles	637	0	State	
		Ut-14	Purchase of Vehicles for the New Disposal Site	719	0	Bureau of Public Works, Ministry of Resources & Development	
Ut-15		Closure of Existing Dumpsite at Koror	1,841	0			
Ut-16		Development of New Final Disposal Site & Purchase of Vehicles in Peleliu	1,723	0			
		Sub-total of Waste Management		15,152	0		
		Total (Public Utility)		33,628	0		
Telecommunication	PNCC Program	Tt-01	PNCC Service Improvement Program	0	7,500	PNCC	
		Tt-02	Wireless System Development Program	0	4,300		
			Sub-total (PNCC)		0	11,800	
	Ministry of Commerce and Trade	Tt-03	Radio Towers - Maritime Safety	5,000	0	Bureau of Commerce & Trade, Ministry of	
		Tt-04	AM Broadcasting Station	300	0	Commerce & Trade	
		Sub-total (Ministry of Commerce and Trade)		5,300	0		
		Total (Telecommunication)		5,300	11,800		

Source: JICA Study Team

7.2 Priority Projects and Programs

7.2.1 Selection Criterion

Out of the 59 projects and programs, the priority projects and programs are selected in conjunction with the national development objectives.

Following three criteria are major concerns for the evaluation of the proposed projects and programs:

- Contribution to the sustainable economic development in consideration with the improvement of the nation's Balance of Payment (BOP) and the balance between states and urban rural area.
- Development with maintaining the natural and people's living environment.
- Improvement of social conditions in terms of community participation, social welfare and employment generation.

In addition to the above, various aspects to be improved by implementation of the projects are taken into account.

(1) Self-reliant economy

Three evaluation items are set as following:

- Economic development: The amount of each project's estimated contribution to the national economy should be evaluated in terms of both the direct and indirect effects on the GDP. Consequently, indispensable infrastructure for the crucial economic development can be evaluated a high priority.
- Improvement of Balance of Payment (BOP): Palauan economy has never reached an equitable level of BOP. Therefore, projects that can ease the imbalance of the country's BOP, in other words, a reduction of imports, should be considered primarily. However, if the benefit produced by the project is small comparing to its cost, the project should be regarded as being less significant.
- Urban/rural balance: Equality of the development between states and economic disparity between the urban and rural community is becoming a bigger issue in Palau. The projects that can contribute to the development of the rural areas should be considered important.

(2) Environmental conservation and improvement

Natural environment and Living environment are taken into account.

- Natural environment: Conservation of the natural environment is one of the most significant factors, as it is the most valuable economic resource in Palau. Projects that may put the environment at risk of deteriorating must be implemented with special treatments.
- Living environment: Sanitary conditions are main consideration. Projects that improve sanitary conditions directly or indirectly must be given importance.

(3) Social condition

Three evaluation items are selected: community participation to the development, the social welfare and the employment generation to the Palauans.

- Community participation: Women in the traditional society of Palau have been playing important roles to maintain Palauan tradition and customs. The Palauan women should realize active participation to the economic development to

encourage the development. Projects that give significant roles to the community, especially to women, are considered as high priority projects.

- **Social welfare:** Projects that improve the Palauans' health condition and educational environment are taken into account.
- **Employment generation:** Employment generation especially in the rural area and remote areas is considered to be important in the future economic and social development of Palau.

In addition to the evaluation items above, the size and location of beneficiaries are also taken into account for the evaluation.

The proposed projects and programs are evaluated based on each criterion using five ranks of the extent of impacts as follows:

- Very high impact;
- High impact;
- Medium impact;
- Not applicable; and
- Negative impact.

Figure 7.2.1 shows the results of the evaluation.

The figure also indicates that the implementation initiative of the projects and programs fall under three types:

- Public sector initiative needs for the implementation of the projects and programs proposed.
- Projects should be implemented by private sector initiative.
- Crucial point to implement the projects is partnership between public and private sectors.

There are some projects that continuously need public investment beyond the mid-term period, which are also shown in Figure 7.2.1.

Figure 7.2.1 Evaluation of the Projects

Sector	Project and Program		Evaluation Items for Selection of Priority Projects and Programs									Initiative for Implementation						
			Self reliance economy			Environment		Social condition				Public initiative	Private initiative	Public and Private Partnership	Needs for Public Investment beyond 2010			
			Economic development	Improvement of SOP	Urban/rural balance	Natural environment	Living environment	Community participation	Social welfare	Employment generation	Number of beneficiaries							
Agriculture	Promotion of food production	Ag-01	Improvement of Plant Nursery		○					△			◎	■				
		Ag-02	Extension of Organic Farming Practice				○								■			
		Ag-03	Promotion of Proper Use of Agri-Fund for Input Materials	△						△				△	■			
		Ag-04	Introduction of Food Processing Techniques	△									△			■		
		Ag-05	Reinforcement of Agricultural Research, Education and Extension			△					△				■			
	Establishment of Marketing	Ag-06	Establishment of Hygienic Slaughterhouse		○			○		○			△			■		
		Ag-07	Establishment of Farmers' Market at Central Area of Koror City							△			△		■			
	Fruit Fly	Ag-08	Emergency Treatment of Fruit Fly and Strengthening of Quarantine Control	○				○		△			△			■	⇒	
	Fisheries	Fi-01	Study on Fishing License System	△											■			
Fi-02		Small Fishing Boat Maintenance Training	△						△	○	△	△			■			
Fi-03		Marine Product Processing in Palau	○		○							○	○		■			
Tourism	Infrastructure and area development for tourism	To-01	Development of Tourism Facility Complex of Koror Marine Center	○								△	△		■		⇒	
		To-02	Improvement of Access Road for Ngaradmau Water Fall											△	■			
		To-03	Ngarchelong Tourist Base Development Project	○	△	◎							△			■		
		To-04	Kayangel Island Resort Development Project	○		◎					○	○	△			■		
		To-05	Peleliu Tourism Promotion Zone Development Project	◎	△	○		△	△	△	△	◎	○			■		
	Other tourism development	To-06	Reinforcement of PVA	△									△	△	■			
		To-07	Improvement of National Museum in Koror	△									△		■			
Land Use	Lu-01	Formulation of Zoning System				○							△	■				
Environmental Management	En-01	Integrated Ngarameduu Watershed Management				◎	○					△	△	■				
	En-02	Ngardock Watershed Management Focus on Nature Reserve				○								■		⇒		
	En-03	Land and Marine Resources Inventory Re-establishment				○								■				
	En-04	Improvement for Water Quality Monitoring Activities				○	○						△	■		⇒		
	En-05	Capacity Building for Environmental Enforcement and Management				○	○					△			■			
Social	So-01	Consolidation Plan of Elementary Schools in Babeldaob Island	△		○		○				◎		○	■				

LEGEND: ◎ : Very High Impact No Mark : Not Applicable ■ : Implementation Initiative
○ : High Impact X : Negative Impact
△ : Medium Impact

Source: JICA Study Team

Figure 7.2.1 Evaluation of the Projects (Continued)

Sector	Project and Program		Evaluation Items for Selection of Priority Projects and Programs									Initiative for Implementation							
			Self-reliance economy			Environment			Social condition			Public initiative	Private initiative	Public and Private Partnership	Needs for Public Investment beyond 2010				
			Economic development improvement of BOP	Urban/rural balance	Number of beneficiaries	Natural environment	Living environment	Community participation	Social welfare	Employment generation									
Urban Dev.	Ur-01	Marina Center Development	⊙			△			△		△	○							
Transportation	Road Transportation	Tr-01	Construction of Compact Road in Babeldaob (funded by US)	○		⊙	×				○	△	⊙	■					
		Tr-02	Improvement of Connecting Road incl. Missing Link (L=53.7km, W=18 feet)	○		⊙	×	△			○		○	■					
		Tr-03	New Roads to Access to the Compact Road (Gravel, L=7.4km, W=18 feet)			△						△		△	■				
		Tr-04	Construction of Real Road (L=5km, 2 lane with 40 feet) in Koror	△			×						△	△	■			⇒	
		Tr-05	National Road Rehabilitation (L=5.7km, W=2.5m x 2) in Koror	○	△				△					○		■		⇒	
	Air Transportation	Tr-06	Construction of New Terminal Building at Palau International Airport	⊙										△	■				
		Tr-07	Overlay of Runway at Palau International Airport	○	△									△	■				
		Tr-08	Extension of Runway (L=800m) at Palau International Airport	⊙	○									○	■			⇒	
		Tr-09	Improvement of Peleliu Airport	⊙	△									△	■			⇒	
	Sea Transportation	Tr-10	Expansion of Matakal Port (including study on master plan)	⊙									△	△			■		
		Tr-11	Navigation Markers	△										△	■				
		Tr-12	Improvement of Existing Peleliu Port (Eloche)	○		△								△	■				
Public Utility	Water Supply	Ut-01	Study on Improvement of Water Supply System in Palau			△			△				○	■					
		Ut-02	Repair of Water Supply Facilities and Expansion of Supply Area in Palau						△			△		○	■				
		Ut-03	Purchase and Installation of Water Meter	△											■				
		Ut-04	Design and Construction of Additional Water Storage Tank in Koror						○					△	■				
		Ut-05	Development of New Water Supply System in Peleliu	○								△		△	■				
	Wastewater	Ut-06	Study on Improvement of Wastewater System in Palau				△	△			△				■				
		Ut-07	Modification and Expansion of the Matakal Wastewater Treatment Plant				△	△			△			△	■				
		Ut-08	Construction of New Workshop, Store and Laboratory at Matakal Treatment					△						△	■				
		Ut-09	Sanitation Improvement Project (Sanitary Core Unit Extension)			○		○			○			△		■			
	Waste Management	Ut-10	Study on Solid Waste Management in Palau				○	⊙			○			○	■				
		Ut-11	Development of A New Final Dump for Koror and Babeldaob					⊙			○			○	■			⇒	
		Ut-12	Development of Transfer Station in Koror							○				○	■				
		Ut-13	Purchase of Collection and Haulage Vehicles							○				△	■				
		Ut-14	Purchase of Vehicles for a New Dump						△					△	■				
		Ut-15	Closure of Existing Dump at Koror				△	⊙						△	■				
		Ut-16	Development of New Final Dump at Peleliu						○			○		△	■				
Telecommunication	Th-01	PNCC Service Improvement Program	○								△	△	○		■				
	Th-02	Wireless System Development Program	○								△		○		■				
	Th-03	Radio Towers - Maritime Safety	○								○		△	■					
	Th-04	AM Broadcasting Station									○		○	■					

Source: JICA Study Team

7.2.2 Proposed Priority Projects and Programs

Twenty projects and programs are selected based on the selection criteria mentioned in the above section. The selected projects are listed in Table 7.2.1.

Table 7.2.1 Priority Projects and Programs

(Unit: \$ thousand)				
Sub-sector	No.	Projects and Programs	Code	Public Investment Cost (Mid-term Period)
Agriculture	1	Improvement of Plant Nursery	Ag-01	465
	2	Establishment of Hygienic Slaughterhouse	Ag-06	200
	3	Emergency Treatment of Fruit Fly Infestations and Strengthening of Quarantine Control	Ag-08	215
Fishery	4	Small Fishing Boat Maintenance Training	Fi-02	600
	5	Marine Product Processing in Palau	Fi-03	0
Tourism	6	Ngarchelong Tourism Base Development Project	To-03	1,500
	7	Kayangel Island Resort Development Project	To-04	100
	8	Peleliu Tourism Development Plan*1)	To-05, Tr-05, Tr-09, Ut-05 & Ut-12	9,736
Environmental Management	9	Integrated Watershed Management	En-01	986
Social	10	Consolidation Plan of Elementary Schools in Babeldaob Island	So-01	100
Urban Development	11	Marine Center Development	Ur-01	5,300
Road Transportation	12	Improvement of Connecting Road	Tr-02	30,900
	13	National Road Rehabilitation	Tr-05	7,000
Air Transportation	14	Extension of Runway at Palau International Airport	Tr-08	43,000
Sea Transportation	15	Expansion of Malakal Port	Tr-10	5,000
Wastewater	16	Sanitation Improvement Project (Sanitary Core Unit Extension)	Ut-09	1,944
Waste Management	17	Study on Solid Waste Management in Palau *2)	Ut-10	500
	18	Development of a New Final Disposal Site for Koror and Babeldaob	Ut-11	7,784
Telecommunication	19	PNCC Service Improvement Program	Tl-01	0
	20	Radio Tower-Marine Safety	Tl-04	5,000
Total				120,330

Source: JICA Study Team

Note: * Costs for the following related infrastructure development projects are included:
Tr-09 Improvement of Peleliu Airport
Tr-12 Improvement of Peleliu Port (Elochell)
Ut-05 Construction of New Water Supply System in Peleliu
Ut-16 Development of New Final Disposal Site & Purchase of Vehicles

** Only the cost for Master Plan is included.

7.2.3 Projects and Programs for Pre-Feasibility Study

In the previous section, 20 priority projects and programs have been selected. Out of the 20, two projects and programs were selected for a pre-feasibility study. The following criteria were utilized for the selection of the projects.

Evaluation criteria

- Contribution to the environmental preservation and the improvement;
- Contribution to the economic development; and
- Readiness to implement the projects by Palauan side.

(2) Selected Projects and Programs for Pre-Feasibility Study

Peleliu Island Tourism Development Plan (Pel-TDP)

The development budget of the GOP is very limited and the expansion of private sector is crucial to provide the growth in the revenue of the GPO. It is obvious that tourism, including its related industries, is a unique industry to lead and expand the economy of Palau.

Although most of the well-known diving spots in Palau are located near to the Peleliu Island, the diving station is currently located at Koror.

Considering the number of beneficiaries, potential for diving tourism, and impacts on the national and local economy, Peleliu Island Tourism Development Plan, including the related infrastructure development, is one of the highest priority projects for the development of Palau.

Under these circumstances, it is proposed that the Peleliu Island Tourism Development Plan be implemented by public and private partnership. In this case, the public sector should develop the minimum infrastructure and utilities, such as airport, port, water supply and waste management. The public development costs, including the operation and maintenance cost, should be recovered by beneficiaries through user charge, tax and/or fees.

In the pre-feasibility study, tourism development scheme with public and private partnership will be focused.

Table 7.2.2 shows a project package of Peleliu Tourism Development Plan for the pre-feasibility study.

Table 7.2.2 Project Package for Pre-feasibility Study "Peleliu Tourism Development Plan"

Project Package	Code	Projects and Programs
Peleliu Island Tourism Development Plan	To-05	Peleliu Tourism Promotion Zone Development
	Tr-09	Improvement of Peleliu Airport
	Tr-12	Improvement of Existing Peleliu Port (Etochel)
	UF-09	Construction of New Water Supply System in Peleliu
	Ut-16	Construction of New Final Disposal Site in Peleliu

Source: JICA Study Team

Solid Waste Management Program for Koror and Babeldaob

It is recommended that the current dumpsite, which is located near the M dock in Koror Island, be closed because of its limited capacity and lifespan. In the mean time, solid waste disposal becomes a key issue in the populated areas such as Koror and Airai States, since there is no other large dumpsite in the areas. Further, the relocation of the capital to Melekeok will require the establishment of a new solid waste management system in Babeldaob.

In this context, the Solid Waste Management Program for Koror and Babeldaob (K-B SWMP) has been selected as priority project for a pre-feasibility study. The program

includes the collection and haulage system in Koror State and Babeldaob Island and the development of a new final disposal site in Aimeliik State and closure of the existing dumpsite as shown in Table 7.2.3.

Table 7.2.3 Project Package for Pre-feasibility Study on "Solid Waste Management Program for Koror and Babeldaob"

Project Package	Code	Projects and Programs
Solid Waste Management Program for Koror and Babeldaob	Ut-10	Study on Solid Waste Management in Palau
	Ut-11	Design and Construction of A New Final Disposal Site for Koror and Babeldaob
	Ut-12	Development of Intermediate Treatment Facilities
	Ut-13	Purchase of Collection and Haulage Vehicles
	Ut-05	Purchase of Vehicles for the New Disposal Site
	Ut-16	Closure of Existing Dumpsite at Koror

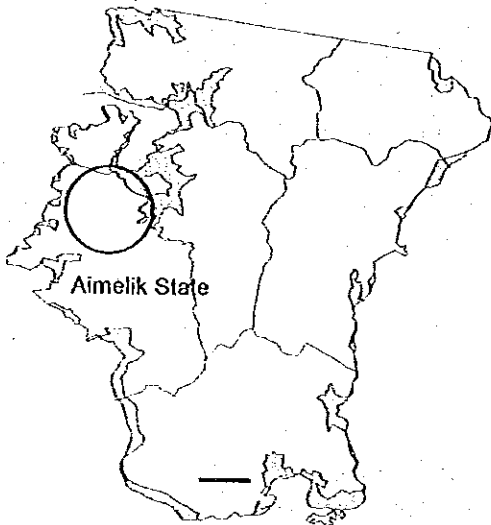
Source: JICA Study Team

7.3 Project Profile

Project profiles of the priority projects are shown in the following pages. They are:

- Project Profile 1 Improvement of Plant Nursery (Ag-01);
- Project Profile 2 Establishment of Hygienic Slaughterhouse (Ag-06);
- Project Profile 3 Emergency Treatment of Fruit Fly Infestations and Strengthening of Quarantine Control (Ag-08);
- Project Profile 4 Small Fishing Boat Maintenance Training (Fi-02);
- Project Profile 5 Marine Product Processing in Palau (Fi-03);
- Project Profile 6 Ngarchelong Tourism Base Development Project (To-03);
- Project Profile 7 Kayangel Island Resort Development Project (To-04);
- Project Profile 8 Peleliu Tourism Development Plan (To-05, Tr-05, Tr-09, Ut-05 & Ut-12);
- Project Profile 9 Integrated Watershed Management (En-01);
- Project Profile 10 Consolidation Plan of Elementary Schools in Babeldaob Island (So-01);
- Project Profile 11 Marine Center Development (Ur-01);
- Project Profile 12 Improvement of Connecting Road (Tr-02);
- Project Profile 13 National Road Rehabilitation (Tr-05);
- Project Profile 14 Extension of Runway at Palau International Airport (Tr-08);
- Project Profile 15 Expansion of Malakal Port (Tr-10);
- Project Profile 16 Sanitation Improvement Project/Sanitary Core Unit Extension (Ut-09);
- Project Profile 17 Study on Solid Waste Management in Palau (Ut-10);
- Project Profile 18 Development of a New Final Disposal Site for Koror and Babeldaob (Ut-11);
- Project Profile 19 PNCC Service Improvement Program (TI-01); and
- Project Profile 20 Radio Tower-Marine Safety (TI-04).

PROJECT PROFILE 1 (Sector: Agriculture Ag-01)

<p>Project Title: Improvement of Plant Nursery</p>	
<p>Project Implementing Agency: Plant Industry Section, Agricultural Office, Division of Agriculture & Mineral Resources, Ministry of Resources & Development</p>	
<p>Project Location:</p> <ul style="list-style-type: none"> a. Forestry Experiment Station, Nekken, Aimeriik State b. Plant Nursery, Nekken, Aimeriik State <div style="text-align: center; margin-top: 20px;">  <p>A map of the island of Palau, divided into several states. The westernmost state, Aimelik State, is circled with a black circle. A scale bar is located at the bottom center of the map.</p> </div>	<p>Project Description:</p> <p>The project is aimed at the improvement of facilities and function of the Nursery of the Forestry Experiment Station and Nursery of the DAMR, both located in the Nekken, Aimeliik State. The operation of nursery would be more functional in supplying various seedlings, providing convenient services to farmers, and conducting necessary experiments.</p> <p>The project intends to increase the production scale of the forestry nursery from the current production of 25,000 to the targeted production of 60,000 seedlings per annum. Various forestry seedlings for timber such as Mahogany and Nara, land preservation tree such as Akasia and Rhizophora are nurtured and distributed. Also, for the fruit tree nursery, it is expected to increase the production scale from 2,000 to 20,000 seedlings per annum. Various fruit tree seedlings, like Avocado, Soursoop, Guava, Rambutan, Mangosteen, Tangerine, and Betelnut are planned to be nurtured and distributed to customers by order. In order to increase efficiency in the multiplication of seedlings, a laboratory room related to Tissue Culture is attached to the nursery.</p> <p>Regarding seedlings of vegetables, grafting technique will be introduced for eggplant family, like Tomato, Eggplant, etc. Also, various varieties of vegetables which are new to Palau such as Shallot, Asparagus, Celery, Chinese Kale, Cauliflowers, Chieve, and Chinese Parceleley are tested for the adaptation for the future production.</p> <p>By advance order, various herbs, flowers and ornamental plants having commercial utilization may be produced.</p>
<p>Project Schedule: Fiscal year 2002-2004</p>	

Statement of Need:

Seedling industry in Palau is still in her cradle. In spite of a large demand for seedling of trees in forest, fruit trees, vegetables, herbs and ornamental, the supply is very limited, and it is hindering the sound development of agriculture, forestry and horticulture.

Presently, a plant nursery for forest trees is being operated at the Nekken with the production capacity of 25,000 seedlings per annum, and a nursery for fruit tree is under the construction adjacent to the above station under DAMR with the production capacity 2,000 seedlings per annum. These production scales are rather small and far less to meet the annual demand in this country for 60,000 forest trees, and 20,000 fruit trees. There is no nursery specialized for vegetables, herbs, flowers and ornamental seedlings.

Project Benefit:

The project has the following benefits in agriculture, horticulture and forestry by supplying improved seedlings in the whole area of the ROP:

- a. Increase of food production and supply of rich and fresh vegetables and fruits,
- b. Promotion of forest industry by supplying of timber tree seedlings, like mahogany,
- c. Promotion of the green product industry by supplying rich production materials,
- d. Contribute to production and export of flowers and ornamental plants, and
- e. Useful to land and mangrove preservation.
- f. About 200,000US\$ of income is expected annually from sales of seedlings.

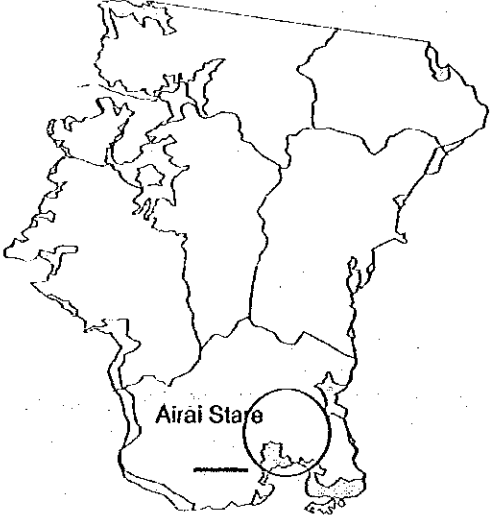
Project Cost Estimate:

Draft estimate costs are as under-mentioned:

- a. Construction and equipment (\$465,000)
 - Renovation of Forest Experiment Station: 50,000 \$/forestry, 80,000\$/fruits
 - Renovation and construction of Plant Nursery of DAMR/ 200,000\$/vegetables, herbs, ornamental, flowers
 - Laboratory related
 - Vehicle \$135,000

- Total
 - Public US\$ 465,000
 - Private US\$ 0

PROJECT PROFILE 2 (Sector: Agriculture Ag-06)

Project Title: Establishment of Hygienic Slaughterhouse	
Project Implementing Agency: <ol style="list-style-type: none">Project Implementation Agency: Animal Industry Section, Agricultural Office, Division of Agriculture & Mineral Resources, Ministry of Resources & DevelopmentManagement of slaughterhouse: This project and its facility will be operated and managed under cooperation of the third sector form under the condition of local breeding farmers to organize a cooperative.A proposal on the regulatory control: It is recommended to legislate that animals for the public consumption shall require inspection first by an authorized inspector, then slaughtered and processed in such slaughterhouse prior to deliver to the market.	
Project Location: <p>One of the places of traffic convenience and safe from flood danger in the basin of the Ngerikill River, Airai State</p> 	Project Description: <p>The project is composed of the following components:</p> <ol style="list-style-type: none">Slaughtering house, including conveyance of animals from breeding farmers,Meat treatment facility and processing into standard cuts,Sanitation facility and checking veterinary disease,Marketing and refrigerating storage, including delivery services to customers.
Project Schedule: Fiscal year 2005-2007	

Statement of Need:

Presently, 600 to 700 head pigs are slaughtered annually in Palau at the commercial basis and another 150 to 250 heads at the village level for various ceremonies every year. This disposal is conducted at the backyard in a primitive and barbarous manner. If the situation is not improved and left as it is, epidemic diseases which could not be found at an early date may extend to inhabitants. If the self-sufficiency will be attained in supplying pork, about 1,500 heads of pig would be disposed annually, i.e. daily four head pigs. It is a must to dispose pigs in a hygienic facility and to examine them for veterinary diseases. If this will not be practiced, supermarkets, hotels and restaurants in the Koror City would not be able to purchase domestic meat and would continue to depend on imports.

Project Benefit:

The project has the following benefits to all consumers as well as local breeding farmers:

- a. All consumers to be supplied with hygienic pork,
- b. All residents being safe from contagious virus disease,
- c. Local breeding farms with an increased demand for locally produced pork,
- d. Retailers, supermarkets, restaurants and hotels by a direct delivery of hygienic and fresh pork.

Project Cost Estimate:

Draft estimate costs are as under-mentioned:

- a. Construction & Equipment (\$200,000)

Building(5 x 10 x 20m)

Apparatus for slaughtering and meat treatment Laboratory,

Waste disposal, Refrigerator (2tons), Truck /10tons for animal conveyance (1), and Refrigerator car/2tons (1)

Total Public US\$ 200,000

Private US\$ 0

- b. O/M Cost

- Government Administration (Public)

i) Human resources \$24,000

ii) Vehicle related \$7,000

iii) Public relation \$5,000

Total US\$46,000

- Private Sector (Slaughterhouse)

i) Human resources \$60,000

ii) Building/Equipment \$25,500

Total US\$85,000

PROJECT PROFILE 3 (Sector: Agriculture Ag-08)

Project Title:

Emergency Treatment of Fruit Fly and Strengthening of Quarantine Control

Project Implementing Agency:

Division of Agriculture & Mineral Resources, Ministry of Resources & Development

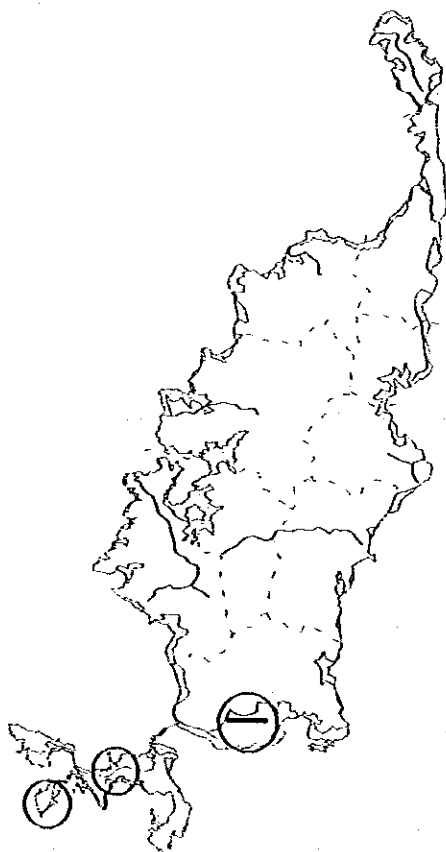
Project Location:

Whole of Palau

Quarantine Control

i) Quarantine Section at Agricultural Office, Division of Agriculture & Mineral Resources, Ministry of Resources & Development

ii) Inspection Site at the Palau International Airport and the Malakal Seaport

**Project Description:**

The upgraded surveillance revealed that around 90% of guava, star fruit are infested while banana, soursop and papaya are heavily infested by fruit fly. The damage causes huge economic loss. In addition, Palau may lose good customers because Palau cannot export the fruit vegetables to neighboring countries such as Guam and Saipan.

The project consists of two component:

1) Emergency Treatment for Eradication of Oriental Fruit Fly

- Conduct urgent action program for the eradication

2) Strengthening Quarantine Control Activities

The project is aimed at conducting quarantine control activities as follows:

- Inspection equipment,
- Fumigation apparatus,
- Laboratory equipment/microscope,
- Incinerator/disposal,
- Communication device/Inter-net
- Vehicle

Project Schedule:

Fiscal year 2001-2009

Statement of Need:

The Oriental Fruit Fly propagates all over Palau, especially epidemic level in Koror and Airai States causing considerable damage to vegetables and fruits.

Under this current condition, effective actions should be taken. Harmful and dangerous diseases and insects would invade the country freely and may cause another damage in its neighbor countries. Insufficient eradication and quarantine control activities may cause international troubles seriously and repeatedly in the future. This situation must be improved immediately.

Various and large quantity of agricultural products are imported in Palau. These are marketed everywhere in Palau. Palau is exposed to danger of new blight and noxious diseases, and insects from foreign countries. However, necessary equipment and materials to conduct eradication activities and quarantine inspection are inadequate.

Project Benefit:

Through the implementation of the project, economic loss on agricultural sector can be diminished. In addition, Palau can export the fruit vegetable to foreign countries after the eradication of fruit fly, and this will improve balance of payment.

Project Cost Estimate:

a. Emergency Treatment (2001-2002): \$45,000

\$5,000 (annual operating cost for 2003-2009)

b. Quarantine Control at Palau International Airport and Malakal Port: \$170,000 (Initial Investment for 2001-2002)

\$125,000 (annual operating cost for 2003-2009)

Total Investment Cost: Public \$215,000

Annual operating cost for 2003-2009: Public \$130,000

(Project after 2009)

Implementation of Eradication Action Program: \$4,800,000 (initial investment for 2010-2013)

\$150,000 (annual operating cost for 2014-2018)

PROJECT PROFILE 4 (Sector: Fisheries Fi-02)

Project Title:

Small fishing Boat Maintenance Training

Project Implementing Agency:

Ministry: Division of Marine Resources, Ministry of Resources and Development

Project Description:

Establishment training course for practical use of local small boat.

- Lecturing and training with 2 to 3 classroom

- Subject:

Basic navigation technique;

Basic rules and regulations for fishing and cruising;

Skills to repair and maintain boats;

Offshore fishing technique;

Fish processing method; and

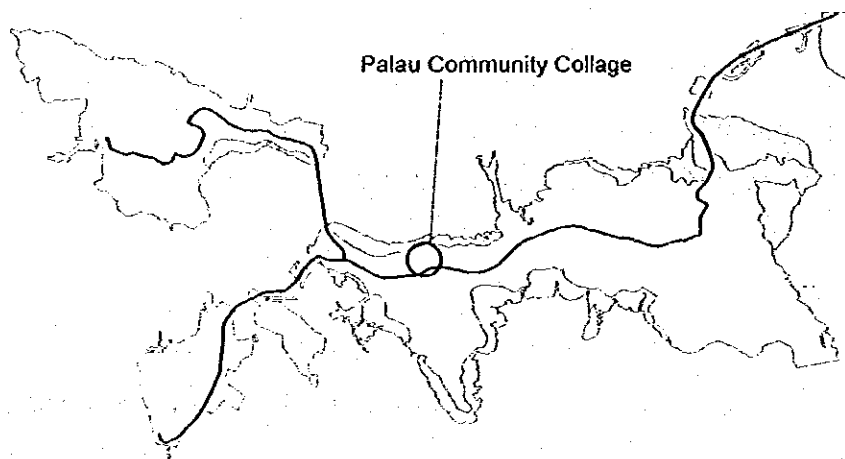
Other relevant programs.

Multipurpose training boat: LOA (length over all) will be 8 m, 10 gross tonnage, and 3 crewmembers on board.

Experienced lecturers and trainers are required for the course.

Project Location:

Palau Community College in Koror



Project Schedule:

2002: Study for the scale and function of the course

2003 - 2004: Preparation of establishing the course

2005: Start to open the course

Statement of Need:

The catch volume of fish and number of fishermen are declining year by year in this country. The number of full-time fishermen in Palau is estimated as about 30 to 50, and they are all aged over 30, and some are even over 60. The young generation in Palau is not attracted by fishing industries at all.

A marine training course for the young generation in Palau will help to increase the new generation who are interested in fisheries in Palau, and also to make the fisheries in Palau enchant to the young to develop the future fisheries in Palau.

Project Benefit:

The program will provide courses for not only fishing, but also for fishing boat operation and engines, aquaculture, marine product processing and treatment of post-harvest fish, and their transportation and marketing.

The center will give the great benefit to the young who aim the fishing industries in Palau, and will be to the good of this country as well.

This is a non-profit project, and is to improve the present Palauan fisheries, and also to develop the new fisheries (fishing, culturing, and processing) in the future for Palau.

Project Cost Estimate:

The training center for lecturing and training with 2 to 3 classrooms: \$200,000-.

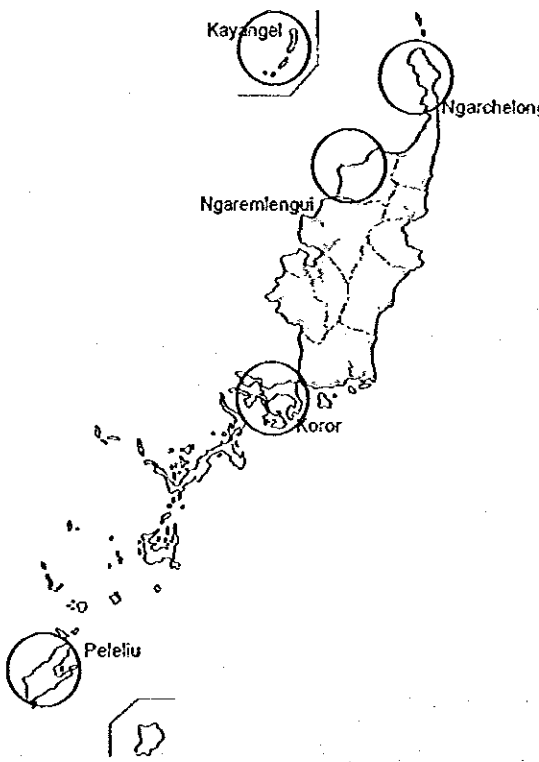
Multipurpose training boat: LOA (length over all) will be 8 m, 10 gross tonnage, and 3 crewmembers on board. The estimate cost will be \$400,000-.

Total Public \$600,000

Private \$0

Total \$ 600,000

PROJECT PROFILE 5 (Sector: Fisheries FI-03)

Project Title: Marine Product Processing in Palau	
Project Implementing Agency: Ministry: Division of Marine Resources, Ministry of Resources and Development Agency: Private sectors at each state	
Project Location: 	Project Description: To study how to preserve the fish and other marine lives with simple ways of processing is the urgent subject in Palau. Preservation of marine goods is the measures to a big haul, and it will develop the new market of Palauans taste and at the same time, it will reduce the importation of processed marine foods. Processing with complex work like canning and for exporting products is omitted in this project. The project covers: manufacturing preserved foods by process of salting, drying, smoking, grinding, and cooking. Kayangel: Medium (100 m ²), 1 and 3 Ngarchelong: Small (40 m ²), 3 Ngaremlengui: Medium (100 m ²), 1 and 3 Koror: Large (150 m ²), 1, 2, 3, 4 and 5 Peleliu: Small (40 m ²), 3 1: Salted and Dried Fish 2: Salted Down Fish in Bottle (shlokara) 3: Smoked Fish and Namaribushi 4: Ground Fish Meat (surimi) 5: Boiled Down Fish in Soy (tsukudani)

Project Schedule:

1st year (2002): Start construction of factory in Koror, also start processing of ①②③④⑤ by 2 Japanese technicians (smoking and grounding)

2nd year (2003): Construction of factory in Kayangel ①③, Ngarchelong③, Ngaremlengui①③, Peleliu③ and start processing.

Statement of Need:

Palau is importing many kinds of general foods and beverage as well as marine products such as frozen fish, canned fish, dried and salted fish and ground fish and other various forms from Asia, USA, EU, and Oceania countries.

Study and enforcement for preservation of fish and other marine produce with simple ways is necessary in Palau. This is countermeasure for rich fish hauls and will keep this country from overflowing of huge volume of imported fish.

Project Benefit:

To process the marine products is the countermeasure for rich fish harvest at a time. It will prevent a sudden decline in fish price since the fishermen and wholesalers are able to preserve the big volume of fish by processing.

Locally made fish and marine products will reduce the huge volume and amount of importation of foods product from over the world. Improvement of Palau's fish processing industries contributes to the Palauan international revenue.

Project Cost Estimate:**Facilities and Equipments:**

- ① Salted and Dried Fish: \$3,000-.
- ② Salted Down Fish in Bottle (shio kara): \$500-.
- ③ Smoked Fish and Namaribushi: \$3,000-.
- ④ Ground Fish Meat (surimi): \$36,000-.
- ⑤ Boiled Down Fish In Soy (tsukudani): \$2,500-.

Factory Building:

Kayangel: Medium (100 m²): \$8,000-.

Ngarchelong: Small (40 m²): \$5,000-.

Ngaremlengui: Medium (100 m²): \$8,000-.

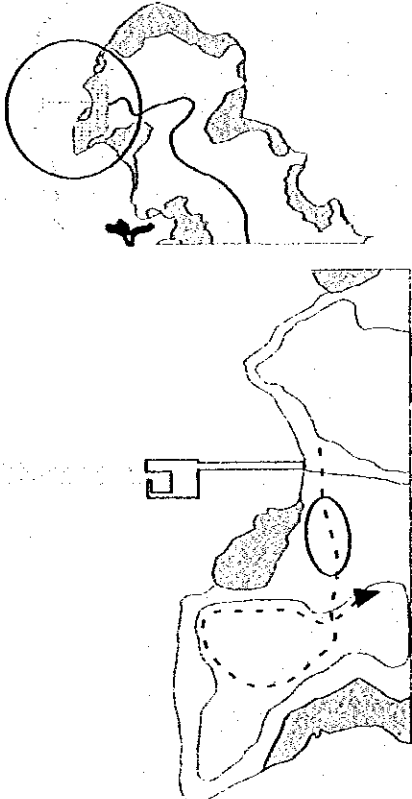
Koror: Large (150 m²): \$13,000-.

Peleliu: Small (40 m²): \$5,000-.

Total cost Public \$0

Private \$84,000-.

PROJECT PROFILE 6 (Sector: Tourism To-03)

<p>Project Title: Ngarchelong Tourist Base Development Project</p>	
<p>Project Implementing Agency: Ngarchelong State and Foreign Investor(s) is/are main player(s) of this project. All other agencies are requested to advice or support the project implementation. Minimum interference by Government Agencies but support is required.</p>	
<p>Project Location: Ollei in Ngarchelong state</p> <div style="text-align: center; margin-top: 20px;"> <p>Ngarchelong State</p>  </div>	<p>Project Description: The project consists of:</p> <ol style="list-style-type: none"> (1) Provision of investment environment for Foreign Direct Investment, formulation of development body and actual development. (2) Contract with Development Management Contractor. They are also a developer of the tourist facilities promotion zone. (3) Expansion and improvement of existing dock facility by the state government. (4) Construction and operation of tourism facilities such as hotel, restaurants, shops and recreational facilities in tourist facilities promotion zone, which provided by the state government. <p>Investment cost will be \$1.5 million of the Ngarchelong state and Palau government and \$ 10 million of the private investors.</p> <p>Approximately 10% of facility development cost will require for their operation and maintenance.</p> <p>11% of turn over in other word tourist expenditure will be government revenue.</p>
<p>Project Schedule: Total Project Period 2003-2012 (10 years) 2003-2005: Preparation of project (land legislation and reform, contract with developer, design and implementation scheduling, EIA and other administrative process) 2005-2006: Construction of dock facility by the state (dredge 5000 sq meter to depth of 2 meter) 2006-2012: Construction of Hotels and Tourism Facilities (Hotels, Restaurants and Shops)</p>	

Statement of Need:

Tourism is one of the most significant economic activities in Palau.

Tourism attraction in Palau is mainly marine oriented activities especially diving. Palau is known as one of the world finest diving spot in the world.

Number of tourists visiting Palau has been grown steadily until 1997. In recent year's tourist inflow reduced, because of economic recession in originate countries and rather poor service provided by Palauan tourism industries.

One of the constraints is limited tourist base location. Although, there are many potential diving spots and recreational fishing areas in Palau, tourism activity area is limited, because almost of all tourists stationed at Koror.

To improve tourism industry performance and increase the number of tourists, diversification of tourism products and tourist bases is strongly recommended by this study.

In order to expand accommodation capacity and diversify the tourism base in the Ngarchelong State, establishment of new tourist base(s) is significant and urgent.

Ollei in Ngarchelong State locates at the northern end of the Babeldaob Island. It is expected be an attractive diving and fishing field in Palau. North of Babeldaob area is well known but not be used due to the accessibility from Koror. And also one of the potential recreational fishing areas is between the Ngarchelong State and the Kayangel Island.

People will easily access to the Ngarchelong State by car from the Palau International Airport after completion of the Compact Road.

Establish new tourist's base in Ollei in the Ngarchelong State is one of the most effective tourism development and promotion of local economy in rural area in Palau.

Project Benefit:

Diversify tourist from congested Koror and create job opportunities.

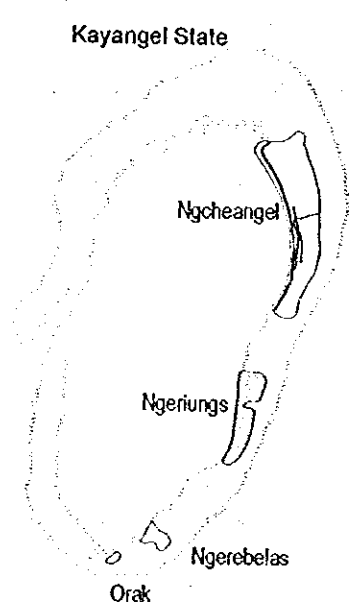
Reduction of the speedboat traffic between Koror and diving spots will contribute reduction of oil consumptions and environmental impact.

Generate employment opportunity in the remote area and also provide opportunity for small-scale business such as fishing boat driver/ guide, fishing gear shop, restaurants, etc. by the community members.

Project Cost Estimate:

a.	Administration	\$ 0.5 Million	(State and community)
b.	Expansion of existing dock facilities (pubic)		
		\$ 1 Million	(include break water and pontoon)
c.	Construction of Tourism facilities by facility owner or developers (Private)		
	First Phase 30 rooms	\$ 1Million	(Lodges, Restaurants and Shops by local people)
	Second Phase 90 rooms	\$ 9Million	(Standard class hotels and restaurants by developer)
Total	Public	\$1,500,000	
	Private	\$10,000,000	

PROJECT PROFILE 7 (Sector: Tourism To-04)

<p>Project Title: Kayangel Island Resort Development Project</p>	
<p>Project Implementing Agency: Kayangel State and a Foreign Investor are main player of this project All other agencies are requested to advice or support the project implementation Minimum interference by Government Agencies but support is required.</p>	
<p>Project Location: Southern island in the Kayangel State</p> <div style="text-align: center;">  <p>The map shows the outline of Kayangel State. Four specific locations are marked with brackets and labels: Ngcheangel (top right), Ngeriungs (middle right), Ngerebelas (bottom right), and Orak (bottom left).</p> </div>	<p>Project Description: The project consists of:</p> <ol style="list-style-type: none"> (1) Provision of investment environment for Foreign Direct Investment, formulation of development body and actual development. (2) Contract with Development Management Contractor. They will be not only a developer of the Island Resort but also a facility management company of the Kayangel State as a whole. (3) Construct utilities not only for the resort but also for the resident in the Kayangel State. (4) Construction and operation of Island Resort in designated island. Operation and management on the whole utilities in the State also will be carried out. <p>Investment cost will be \$0.1 million of the Kayangel stat and Palau government and \$14 million of the private investors.</p> <p>Developer will pay Land lease charge to the state but not to the individuals. Land matters among state and clan, clan and individuals, between individuals are all matters of state government.</p> <p>Appropriate user charge of power and water will be collected from residents of the state by the developer</p>
<p>Project Schedule: Total Project Period 2003~2014 (12 years) 2003-2006: Preparation of project (land legislation and reform, contract with developer design and implementation scheduling, EIA and other administrative process) 2007-2009: Construction of first phase (utilities and 20 rooms of hotel rooms) 2010-2014: Construction of second phase (additional 20 rooms)</p>	

Statement of Need:

The National government has provided public services to the remote islands. Basic services such as water and power supply in remote island with scarce population always costly from the per capita public management cost point of view.

For the people living in a remote island has difficulty to get job with cash income. Many of young and middle aged people leave island and work in Koror to generate cash income.

If a private company can provide all necessary utility services, it will save both investment and recurrent cost of the National Government.

Hideaway type exclusive island resorts become popular among executives in western countries. They spend several days in a resort where completely away from daily urban life. Their requirement is complete isolation and relaxation with security and safety. Such island resort can be found in the Carib, Maldives, Tahiti and New Caledonia.

Kayangel is one of the ideal islands to be identified as an Island Resort Development in Palau.

If consensus among all community members of the state can be made, this proposed Island Resort Development could be promoted.

Although number of rooms is not much, required manpower to provide services is high. Twenty to forty employments will be required from Kayangel residents. At the same time demand of fresh fishes for the guest will provide income opportunity to the fishermen in the Kayangel State.

Being close to such establishment will provide better access to information and social services for the resident of the state.

Project Benefit:

Diversify tourism products in Palau.

Generate employment opportunity in a remote area.

Since private investor provides utility services for the community member, public service cost by the government will be reduced.

Project Cost Estimate:

a. Utility and support facility development (Power, water, sewer and solid waste treatment)

\$ 5 Million (staff housing and facilities are included)

b. Construction of Tourism facilities by private investor

First Phase 20 rooms \$ 5 Million (Lodges and Restaurants)

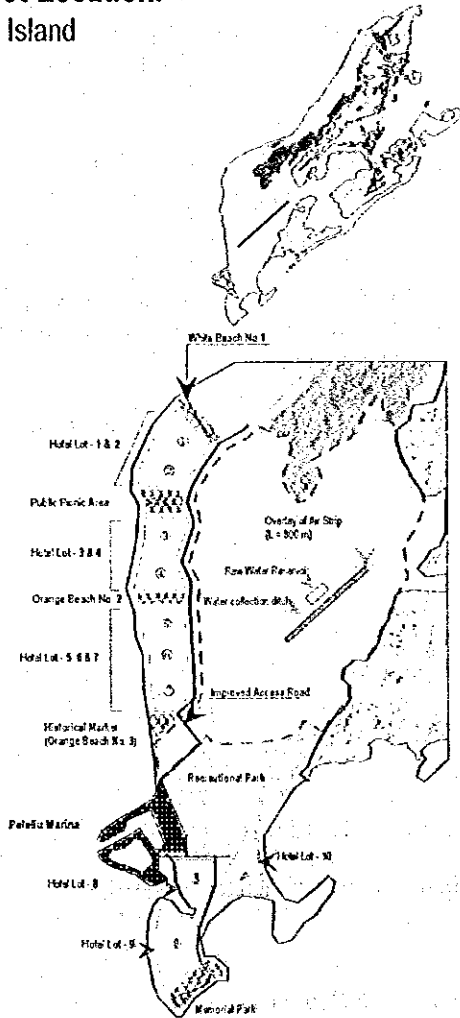
Second Phase 20 rooms \$ 5 Million (Expansion of facilities)

c. Administration (Public / recurrent) \$ 0.1 Million (State and community)

Total Public \$100,000

Private \$15,000,000

PROJECT PROFILE 8 (Sector: Tourism To-05)

<p>Project Title: Peleliu Tourism Promotion Zone Development Project</p>	
<p>Project Implementing Agency: Peleliu State and Foreign Investor(s) is/are main player(s) of this project. All other agencies are requested to advice or support the project implementation. Minimum interference by Government Agencies but support is required.</p>	
<p>Project Location: Peleliu Island</p> 	<p>Project Description: The project consists of:</p> <ol style="list-style-type: none"> (1) Provision of investment environment for Foreign Direct Investment, formulation of development body and actual development. Operation and maintenance will be implemented by the development body (private) (2) Contract with Development Management Contractor. They also be a developer of the tourism development area(s) (3) Design and construction of basic facility development, which include clearing site, installation of utilities line and rods, key infrastructure such as Marina. (4) Construction and operation of tourism facilities such as hotel, restaurants, shops and recreational facilities. <p>Total Investment cost will be \$90 million for the private investors.</p> <p>Approximately 10% of facility development cost will require for their operation and maintenance.</p> <p>11% of turn over in other word tourist expenditure will be government revenue.</p>
<p>Project Schedule: Total Project Period 2003-2018 (16 years) 2003-2005: Preparation of project (land legislation and reform, contract with developer design and implementation scheduling, EIA and other administrative process) 2005-2007: Construction of basic facilities (land preparation, infrastructure and utility construction by contractor) 2007-2009: Construction of Hotels and Tourism Facilities (Hotels, Restaurants and Shops) 2009-2018: Expansion of Tourism Facilities</p>	

Statement of Need:

Tourism is one of the most significant economic activities in Palau.

Tourism attraction in Palau is mainly marine oriented activities especially diving. Palau is known as one of the world finest diving spot in the world.

Number of tourists visiting Palau has been grown steadily until 1997. In recent year's tourist inflow reduced, because of economic recession in originate countries and rather poor service provided by Palauan tourism industries.

One of the constraints is limited tourist base location. Although, there are many potential diving spots and recreational fishing areas in Palau, tourism activity area is limited, because almost of all tourists stationed at Koror.

To improve tourism industry performance and increase the number of tourist's, diversification of tourism products and tourist base is strongly recommended by this study.

In order to expand accommodation capacity and diversify the tourism base in Palau, establishment of new tourist base(s) is the most significant and urgent.

Peleliu Island Locate at middle of most attractive diving and fishing field in Palau. Most of the popular diving areas are in the 30 minutes distance by speedboat from the Island. And also one of the most potential recreational fishing areas is between Peleliu and Angaur Island.

Moreover Peleliu is the only island resort area with large capacity because of almost flat terrain.

Establish new tourists' base in Peleliu is one of the most effective tourism developments in Palau.

Project Benefit:

Diversify tourist from congested Koror and create job opportunities.

Reduce the speedboat traffic between Koror and diving spots cause reduction of oil consumptions and environmental impact.

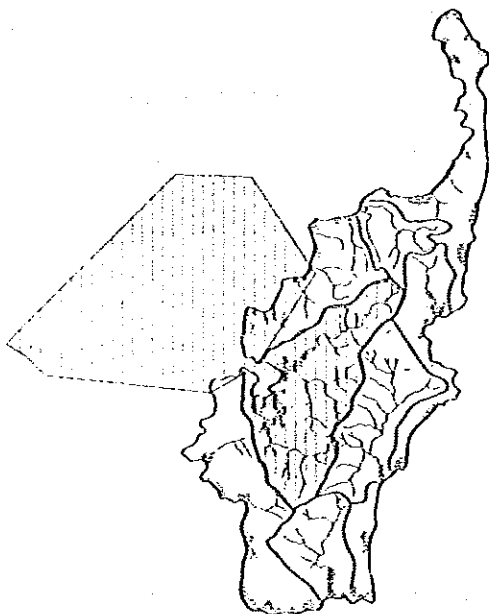
Create international standard tourist base will improve the Image of Palauan tourism industries and it reflect to improvement of services through personnel training in the international standard establishment.

Project Cost Estimate:

- | | | |
|-------|--|---|
| a. | Project Management (Private) \$15 Million | (Foreign Investor for 15 years, incl. Utility management) |
| b. | Construction of Infrastructure and Utilities in the development area (Private) | |
| | \$15 Million | (exclude water main and power supply) |
| c. | Construction of Tourism facilities by Facility owner or developers (Private) | |
| | First Phase 300 rooms \$30 Million | (Hotels, Restaurants and Shops) |
| | Expansion of facilities \$30 Million | |
| Total | Private | \$900,000,000 |

PROJECT PROFILE 9 (Sector: Environmental Management En-01)

Project Title: Integrated Ngaremeduu Watershed Management	
Project Implementing Agency: State Governments of Aimeliik, Ngeremlengui, and Ngatpang	
Project Location: Whole watershed area of Ngaremeduu, in Aimeliik, Ngeremlengui and Ngatpang States Proposed Ngaremeduu Conservation Areas, including inshore of Ngaremeduu, Nekken, and Aimeliik States	Project Description: Project could be divided into the following two components: 1) Land Conservation This component is focused on land conservation practices such as soil erosion prevention taking into account the relationship between uplands and costal areas for resources deterioration. a. Implement some reforestation at vulnerable upland areas using fast growing trees such as <i>Acacia</i> b. Establish an appropriate land zoning within the watershed based on each management need c. Consider an appropriate mechanism of revenue generation through conservation area management, which includes the coastal area 2) Mangrove Conservation This component is focused on mangrove conservation practices taking into account the relationship between uplands and costal areas for resources deterioration. a. Prohibit and patrol for mangrove cutting b. Establish specific management guideline for the mangrove area c. Assess the mangrove ecological functions through water quality monitoring and sedimentation surveys
Project Schedule: Fiscal year 2001-2004: Implementation phase Fiscal year 2004-2005: Project monitoring phase	



Statement of Need:

The governors of the Aimeliik, Ngeremlengui, and Ngatpang States as well as the traditional chiefs officially approved the Ngaremeduu Watershed as the Ngaremeduu Conservation Area (NCA) in 1997. Some of the preparation works has been done with involving the several organizations. On the other hand, the NCA has also been designated as compensatory mitigation for adverse environmental impacts to coastal and marine resources from the construction of the Compact Road.

Also, it is proposed a new national landfill area close to the watershed recently. Environmental threat potentials such as water pollution for drinking water by inappropriate waste management should be concerned for the watershed. It is imperative to support concrete management actions and measures for the watershed more comprehensive.

Furthermore, mangroves of the NCA is essential for filtering sediments and buffering nutrients entering Ngaremeduu Bay from adjacent uplands, and provides critical habitat for the marine species. As Ngaremeduu watershed has 44 % of Palau's total area of Mangroves, this management practices could provide the Palau's practical management guideline.

Project Benefit:

The project could be expected the following benefits:

- a. Prevent soil erosion and water pollution by human impacts
- b. Provide a land zoning model within a watershed based on each management need
- c. Provide a framework/mechanism of revenue generation through conservation area management, which includes the coastal area
- d. Maintain the mangrove ecological functions for inshore fisheries and marine species.

Project Cost Estimate:

Draft estimate costs are as follows:

1. Capital Cost**a. Implementation phase: \$886,000**

- Land conservation (Reforestation (seedling, etc.) US\$ 356,000
- Mangrove conservation US\$ 220,000
- Water quality and sedimentation survey US\$ 310,000

b. Monitoring phase: \$100,000

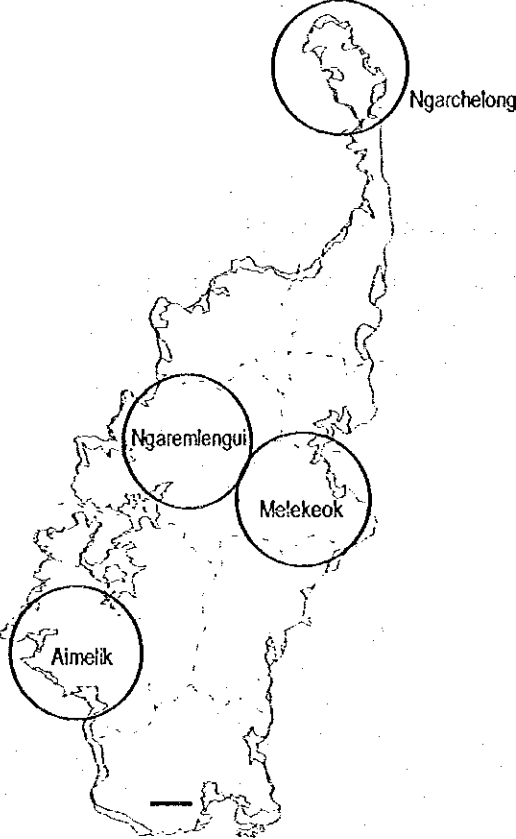
- Preparation Document
(Zoning & management guidelines) US\$ 100,000

2. O/M Cost

US\$ 150,000 (up to year 2005)

Total Cost Public \$1,136,000

PROJECT PROFILE 10 (Sector: Social So-01)

Project Title: Consolidation Plan of Elementary Schools in Babeldaob Island	
Project Implementing Agency: Bureau of School Administration, Ministry of Education	
Project Location: 4 states in the Babeldaob Island	Project Description: 10 elementary schools will be consolidated to 4 elementary schools. Ngiwal ES (Elementary School), Melekeok ES, Ngchesar State will be one elementary school in Melekeok. Aimerik ES, Ngatapang ES, Ibobang ES will be one elementary school in Aimelik. Ngaremlengui ES, Ngardmau ES will be one elementary school in Ngaremlengui. Ngaraard ES, Ngchelong ES will be one elementary school in Ngarchelong. Facilities of four elementary schools are prepared by re-use of existing school building in four states.
 <p>The map shows the outline of Babeldaob Island. Four specific regions are highlighted with circles and labeled: Ngarchelong (at the northern tip), Ngaremlengui (in the central-western part), Melekeok (in the central-eastern part), and Aimelik (in the southern part). A small horizontal line is drawn at the bottom of the island's outline.</p>	
Project Schedule: After completion of the Compact Road FY 2004 – FY 2005	

Statement of Need:

Average number of elementary school pupils per teacher in Palau was 14.2 in March 2000, and it is not qualified educational system but ineffective educational system. Such a situation brings out higher educational cost and generation of unqualified teachers.

Though such ineffective educational system comes from a lack of road transportation network in Babeldaob Island, the situation will change by the completion of Compact Road. It enables for students to go to distant elementary schools by school buses.

Project Benefit:

By consolidation of elementary schools, average ratio of students to teachers could increase. It will bring out savings of educational cost by the government through the reduction of maintenance cost of the school buildings, the reduction of the number of teachers and other staffs. The reduction of teachers could also bring about upgrading of the quality of teachers through more keen competition of employment.

Project Cost Estimate:

Project cost is estimated as follow:

Total cost: \$100,000-

Reform of 4 existing elementary schools (\$25,000 x 4)

PROJECT PROFILE 11 (Sector: Urban Development Ur-01)

Project Title:

Marine Center Development

Project Implementing Agency:

Koror State, International Coral Reef Center, Marine and EQPB

Project Description:

The project consists of the following components:

1) Marina Area Development

New land is constructed by reclamation alongside the Phase I of the Reef Road. Marina with a pier, pedestrian deck, promenade, repair-shops for small boats, fishing shops, restaurant and coffee shops, and parking space are the main facilities.

2) Tourism Facility Development

Tourism information center, amusement center, restaurants, park and landscape area, and parking space are the main facilities.

3) Int'l Coral Reef Center (Existing)

The following activities will be held:

a. Environmental education for divers

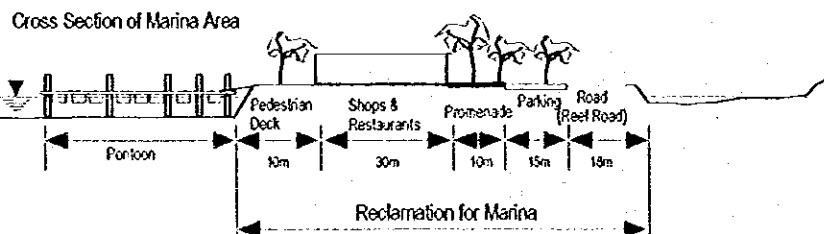
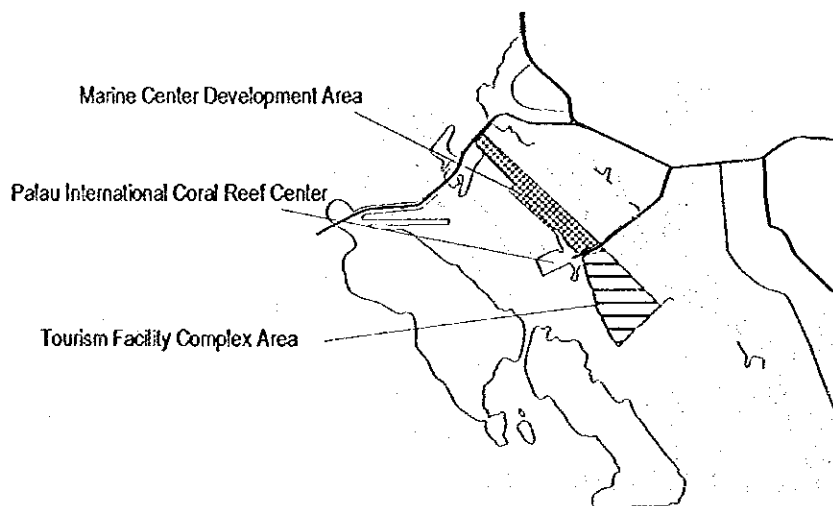
Conduct an environmentally sound dive briefings, which include the impacts of diving on the reefs and diving manners for the conservation within the ICRC

b. Environmental education for the Palauan

Educate the Palauan concerning the importance for the conservation of the reef and the marine habitats for Palau using facilities of the ICRC with enjoyment.

Project Location:

International Coral Reef Center (ICRC) and surrounding areas, Koror State



Project Schedule:

Fiscal year 2005-2020

Marina Area: Public 2005-2009 (Dredging for provision of land)

Private 2010-2020

Coral Reef Center: Existing

Statement of Need:

There are no prominent core amenity facilities in Koror, which tourists look around. Tourism development is one of the key elements to promote the economic activities in Palau. In this view, it is necessary to create multiplier effects to take advantage of among various facility development.

- Marina and related facility development is expected to boost marine leisure activities, which is one of possible fields to attract visitors.
- Tourism Facility Complex is also expected to attract many tourists, who cannot find any tourist spots at present.
- It is necessary to decrease human impacts especially by divers in Palau. One of the main causes for the damages of the coral reefs is the human impact. The adverse diving activities such as boat anchoring, kicking and holding of coral by the divers are observed especially in the popular diving spots.

Moreover, the ICRC will provide a good opportunity to improve the environmental awareness for the Palauan, especially for marine environment.

Project Benefit:

- Tourism promotion
- Strengthening the amusement and commercial functions in Koror
- Mitigate adverse human impacts by the divers on the coral reefs
- Improve environmental awareness especially for marine environment for the visitors and Palauan

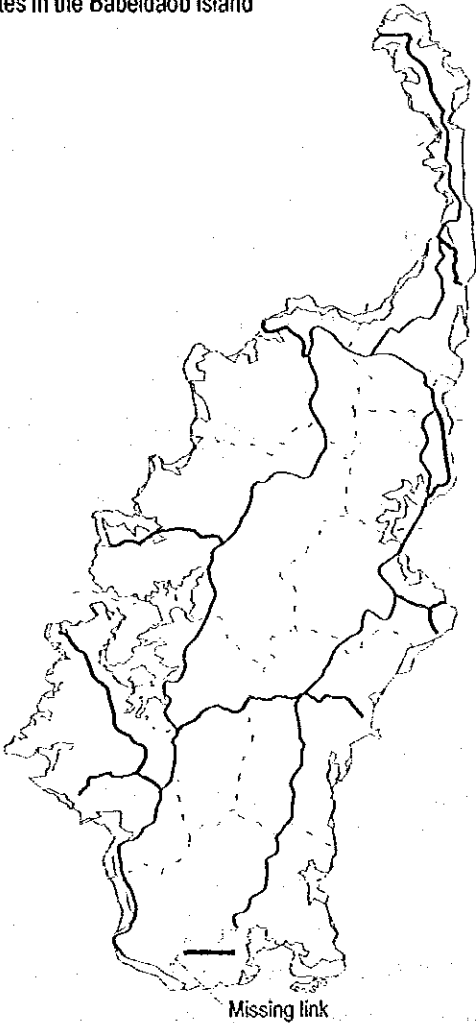
Project Cost Estimate:

Marina Area: US\$ 9,800,000 (Public investment of \$5,300,000 for provision of area and private investment of \$4,500,000 for construction of facilities, and construction cost of the Reef Road Phase I of \$2,600,000 is excluded)

Tourism Facility Development: \$14,460,000 (This cost is appropriated in the tourism development project, private sector)

Total Cost: Public \$5,300,000 for Marina Area (\$5,300,000 up to the year 2009)
Private \$18,960,000

PROJECT PROFILE 12 (Sector: Transportation Tr-02)

Project Title: Improvement of Connecting Road including Missing Link	
Project Implementing Agency: Ministry of Resources and Development, State Government in Babeldaob	
Project Location: 10 States in the Babeldaob Island	Project Description: The project consists of the following two components: 1) Fulfilling the missing link of the Compact Road (3.5km) Construction of the Compact Road is in progress and expected to complete in 2003. However, a part of the Compact Road in Airai State is missing at present. Fulfilling the missing link of the Compact Road is essential with a view to function as a ring road in Babeldaob. 2) Construction of Connecting Road (50.2km) Construction of roads to connect the respective capital of the state and major docks to the Compact Road.
 <p>The map shows the outline of Babeldaob Island divided into 10 states. A dashed line indicates the Compact Road route. A solid line segment at the bottom of the island is labeled 'Missing link'.</p>	
Project Schedule: Fiscal year 2001-2005	

Statement of Need:

The project consists of the following components:

- Fulfilling the missing link of the Compact Road in the Airai State (24 feet carriageway with asphalt concrete); and
- Construction of roads connecting the capitals of the states to the Compact Road including another missing link of the Compact Road in the Ngarchelong State (18 feet carriageway with asphalt concrete).

1) Needless to say, the Compact Road will not function as a ring road without fulfilling the missing link in the Airai State.

2) Balanced development is one of the focal issues for national economic development perspective. The Compact Road is expected to contribute to the local economic development and also enhancement of quality of lives of the residents in Babeldaob. It is essential to fully take advantage of the development of the Compact Road. In this context, construction of connecting road is indispensable for the development of the Babeldaob.

Project Benefit:

- Promotion of local economic development in Babeldaob.
- Ensuring easy access to the Koror and Melekeok States, new capital of Palau, and every state each other as well.
- Integration of the states in Babeldaob.

Project Cost Estimate:

Design: \$200,000

Fulfilling the missing link of the Compact Road (3.5km): \$3,600,000

Construction of Connecting Road (50.2km): \$27,100,000

Total Cost: \$30,900,000

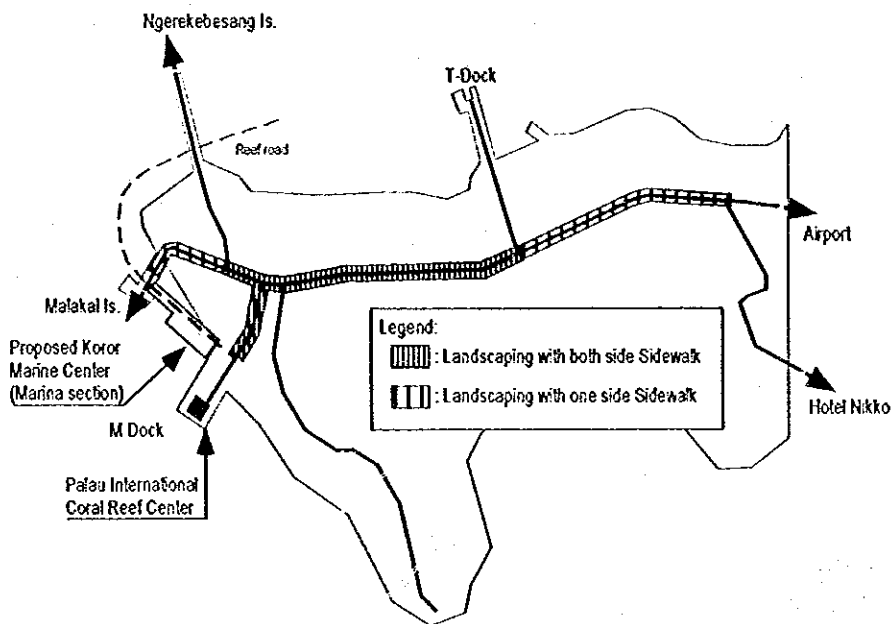
PROJECT PROFILE 13 (Sector: Transportation Tr-05)

Project Title:
National Road Rehabilitation in the Koror State

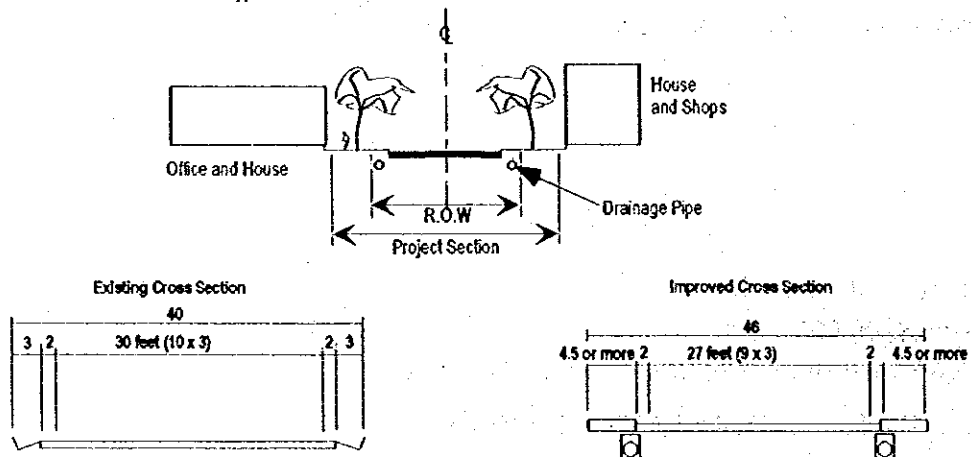
Project Implementing Agency:
Bureau of Public Works, Ministry of Resources and Development

Project Description:
Rehabilitation of trunk roads in the Koror State including overlay, provision of sidewalks, beautification and others.

Project Location:
Koror State



Typical Cross Section of the Road Section of Both Side Side Walk



Project Schedule:

Fiscal year 2001-2003

Statement of Need:

The project consists of the following components:

- Overlay of pavement from Mariculture Demonstration Center at Malakal to the K-B Bridge (9.7km),
- Reinforcement of Sakura Bridge (20m span),
- Provision of sidewalks and beautification of townscape in Koror (4.1km)

1) The pavement condition of the national road in the Koror State is partly damaged due to heavy traffic of around 20,000 vehicles per day on average. It is necessary to repair and improve the current national road to ensure safe and smooth traffic passing.

2) Passing of heavy loaded vehicles, which is more than 16 tons, is limited at Sakura bridge due to cracked slab. Traffic demand of heavy loaded trucks will increase between Malakal and Babeldaob in the future. Reinforcement of the bridge at least enabling vehicles with total weight of more than 25 tons to pass through is inevitable for smooth traffic.

3) Many tourists are embarrassed by inconvenience to walk around in the center of the Koror State due to inadequate provision of sidewalks. In addition, sense of beautification is lacking in townscape. Consideration on this matter will contribute to tourism promotion.

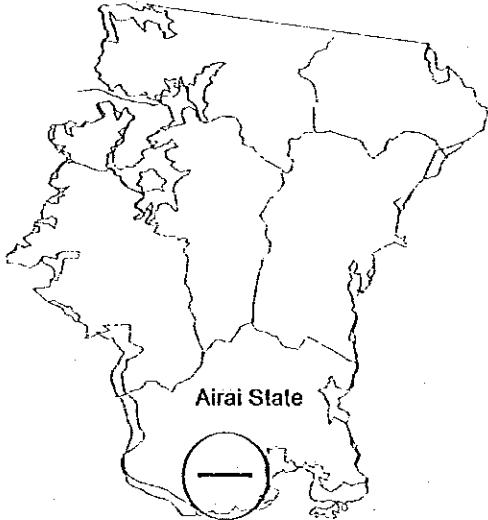
Project Benefit:

- To ensure safe and smooth traffic
- Tourism promotion in Koror, which will still be a base of tourism in Palau.

Project Cost Estimate:

Total Cost: US \$7,000,000

PROJECT PROFILE 14 (Sector: Transportation Tr-08)

Project Title: Extension of Runway at Palau International Airport	
Project Implementing Agency: Division of Transport, Ministry of Commerce and Trade	
Project Location: Existing Palau International Airport in Airai State	Project Description: Extension of the runway of Palau International Airport to meet requirement of flight service by wide-body aircraft to cope with future tourism demand and provision of modern navigation system
	
Project Schedule: Extension 2007 - 2009	

Statement of Need:

The project consists of the following components:

- Extension of runway with a total length of 3000 meters,
- Provision of modern navigation system,
- Entering direct regular flight service from Narita, Japan, and
- Staff training to cope with modern operation system.

1) The total number of visitors is estimated at 90,000 in 2009 and the around 25,000 visitors out of 55,000 Japanese arrivals will come to Palau via Narita New Tokyo International Airport. This number is far beyond the current visitors, 12,000 arrivals, coming from the Republic of China. This fact leads to possibility of entering direct flight service from Japan (Narita). Prior to the entering direct flight service from Japan, it is necessary to extend the runway to around 3,000 meters with a view to cope with wide-body aircraft such as B767.

2) Provision of modern navigation system

Installation of navigation system (new generation ILS).

3) It is necessary to train the staff with a view to use the modern equipment efficiently.

Project Benefit:

- To support tourism development.
- To secure passengers from accidents in landing and taking off.

Project Cost Estimate:

Total Project Cost: \$ 43,000,00

PROJECT PROFILE 15 (Sector: Transportation Tr-10)

Project Title:

Expansion of Malakal Port

Project Implementing Agency:

Division of Transportation, Ministry of Commerce and Trade

Project Description:

Almost all cargo is transported to Palau by ships. Currently, volume of 2,740 units container (one unit is equivalent to 20 feet container) is handled at Malakal Port. Therefore, sea transportation is very important for this country. However, the handling space for cargo is limited at present.

1) Feasibility Study

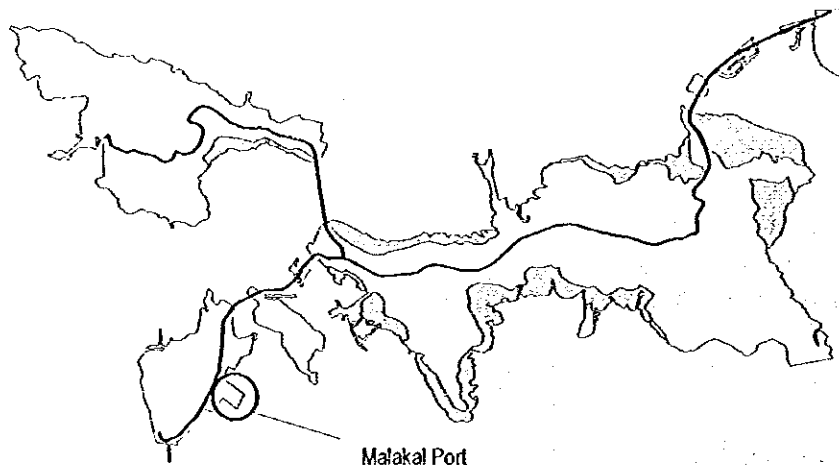
This study contains two subjects; plan of Malakal Port Expansion and necessity of a new commercial port in Babeldaob Island.

2) Expansion Work of Malakal Port

Project is aiming at expansion of current container handling space with additional 2500 m² to meet the current and future container volume.

Project Location:

Malakal Port in the Koror State

**Project Schedule:**

Fiscal Year 2003-2006

Feasibility study: 2003

Expansion: 2004-2006

Statement of Need:**1) Feasibility study**

One of the objectives of the feasibility study is to shape necessary space for container handling at Malakal Port. The other is to analyze necessity of construction of new commercial port in Babeldaob Island since Malakal Port currently has a tenure problem.

2) Expansion of Malakal Port

As cargo volume of Malakal Port is stable these years. However, the container transport is one of the major possible cargoes in future sea transport in the world. The space for container handling is inadequate and cramped at present. It is necessary to expand the current container handling space with a view to improve the current situation and to cope with future increase of container cargo.

Project Benefit:

Smooth shipping and discharging is expected and this will eventually result price down of commodities.

Project Cost Estimate:

a. Feasibility Study: \$10,000 (public, 2003)

b. Expansion of Malakal Port: \$4,990,000 (public, 2004 - 2006)

Total Public \$5,000,000

PROJECT PROFILE 16 (Sector: Wastewater Ut-09)

Project Title:

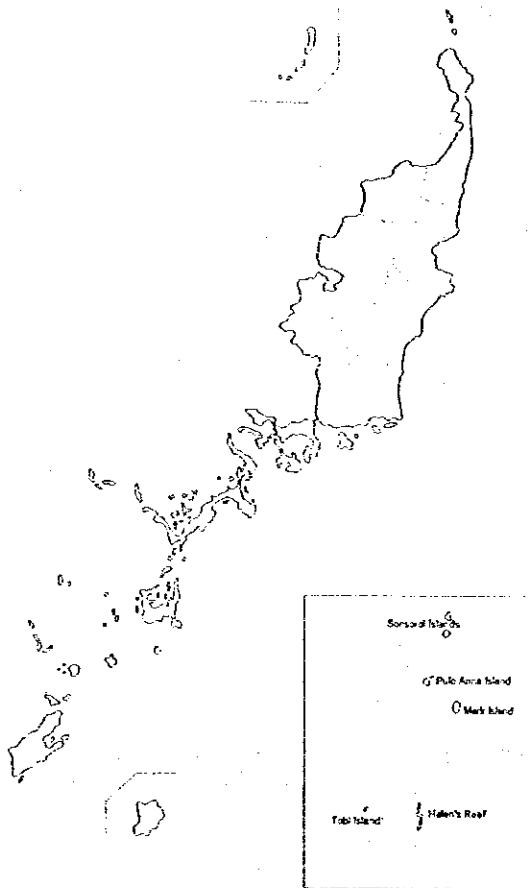
Sanitation Improvement Project (Sanitary Core Unit Extension)

Project Implementing Agency:

Bureau of Public Health, Ministry of Health

Project Location:

All states in Palau

**Project Description:****(1) Construction of outhouse**

The government provides a septic tank and other materials for an outhouse with flush toilet, shower room and laundry room to households who will install them themselves. The government also provides technical assistance to install them.

Final target number of installation of septic tank is 600 in the project area, and the installations of 60 septic tanks are set as annual target.

(2) Implementation

Project cost will be partly shared by households by use of revolving fund scheme. Each household, which has installed septic tank, will pay back annually 10% of material cost to the government. The government will use this money as a part of fund to purchase new materials of outhouse.

Project Schedule:

2001-2010

Statement of Need:

About 1,230 housing units (41% of total housing units in Palau) in Koror State could get sewage treatment service from public sector in Palau in 1995. Remaining housing units (1,745) treated their sewage by their own disposal facilities such as septic tank, cesspool, etc. And according to information from the Ministry of Health, 64% of housing units in six states in the Babeldaob Island had privies or pit latrines in 1999. However, more than 55% of them had non-compliant privies (bad condition of sanitation). Such privies play an important part in indirect mode of transmission of disease.

Though the government subsidizes healthcare cost of Palauan people, it is a heavy burden for the government. Therefore the reduction of the medical cost is needed through the improvement of primary healthcare.

Project Benefit:

This project can provide sound, healthy and comfortable living environment in the rural areas and will contribute to equilibrium on urban and rural development. This project also could contribute to the savings of medical cost of the country through the improvement of primary healthcare.

Project Cost Estimate:**Cost**

- Material cost per one household is US\$6,000. Total material cost for a outhouse: \$3,600,000 (600 houses) from 2001 to 2010

- Cost for installation of septic tanks and construction of outhouse will not be charged because each household does them.

- Revolving fund system is introduced. Each household, which installed septic tank, pays US\$600 (10% of total cost) to the government annually. US\$1,620,000 will be financed from repayments. Therefore project cost will be saved to US\$1,980,000 (US\$3,600,000 – US\$1,620,000) until 2010.

Total Cost from 2001-2009

Public: \$1,944,000

Private: \$0

Total: \$ 1,944,000

PROJECT PROFILE 17 (Sector: Waste Management Ut-10)

Project Title:

Study on Solid Waste Management in Palau

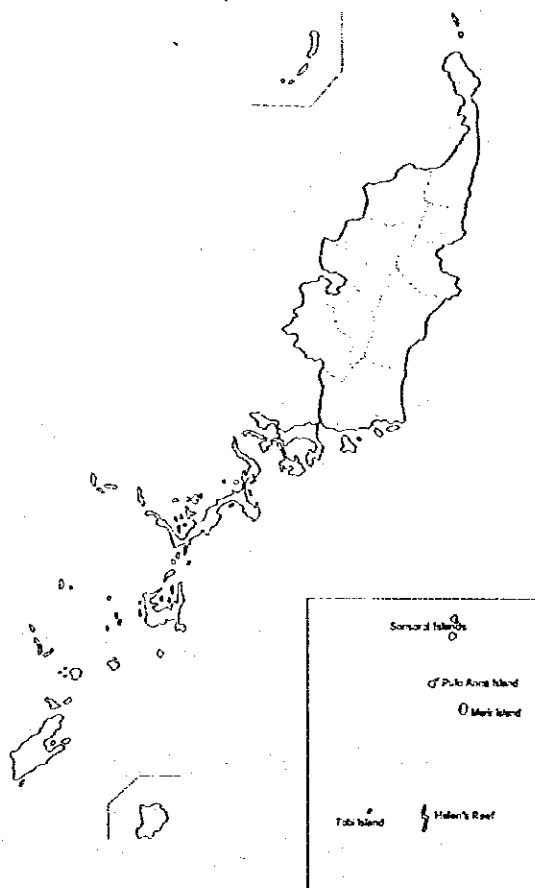
Project Implementing Agency:

Ministry: Ministry of Resource and Development

Agency: Bureau of Public Utilities

Project Location:

Republic of Palau

**Project Description:**

This study consists of 2 parts as follows:

1) Plan on Solid Waste Management for the Republic of Palau (ROP)

In this part, existing and /or current condition and/or situation on solid waste (from waste generation to final treatment) will be studied. Based on this, future waste management plan/program for the ROP will be made.

2) Feasibility Study

In this part, feasibility study on a new final dumpsite, transfer station and closure of the existing dumpsite in Koror State will be implemented.

Project Schedule:

Fiscal Year 2001 (12 months)

Statement of Need:

Solid waste management is one of the most important key issues in Palau where the tourism is the main industry.

The present management of solid waste is not implemented adequately at all of the states. Almost every kind of waste is collected and carried into a dump at each state. However, these dumps do not have proper facilities to protect the environment of dumpsites and surrounding areas. This makes an environment of dumpsite and surrounding areas very bad.

Furthermore, a dumpsite in the Koror State that is the biggest waste generator is almost full and has no space to expand. An immediate construction of a new final dumpsite, therefore, is necessary as soon as possible.

Considering this situation, the Study on Solid Waste Management in Palau should be implemented as soon as possible before starting the construction of a new dumpsite.

Project Benefit:

- Improvement of the living and natural environment and urban environment in Palau
- Reduction of the volume of solid waste
- Awareness to people
- Promotion of tourism Industry

Project Cost Estimate:

Total Cost: \$500,000

PROJECT PROFILE 18 (Sector: Waste Management Ut-11)

Project Title:

Development of A New Final Dump for Koror and Babeldaob

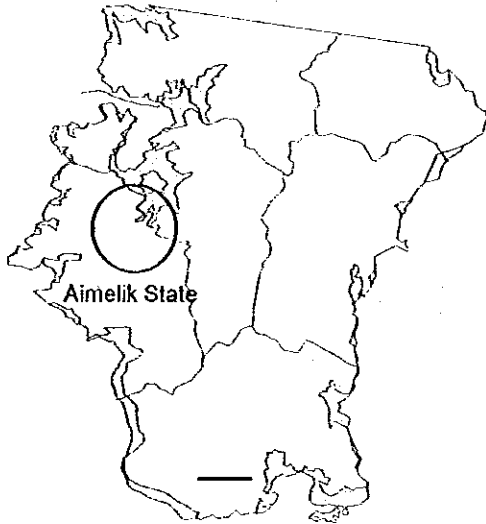
Project Implementing Agency:

Ministry: Ministry of Resources and Development

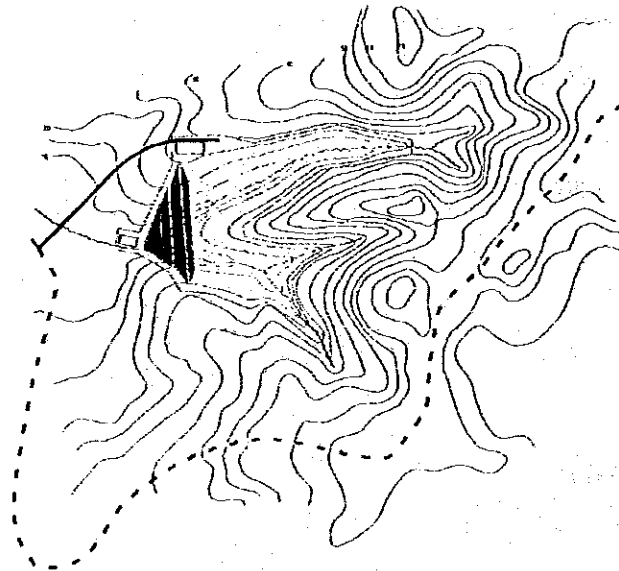
Agency: Bureau of Public Utility

Project Location:

Aimeliik State in the Babeldaob Island

**Project Description:**

- Design (including a topographic survey and borings) and construction of a sanitary landfill at the Aimeliik State.
- Purchase of vehicles for a new dump.
- One site at the Aimeliik State had been selected for a final dump among many candidates by the former study on the waste management.
- This final dumpsite will have a capacity of about 330,000m³ to receive waste from Koror and 10 states in Babeldaob for about 30 years (2005 ~ 2034).



Project Schedule:

Fiscal Year: 2002 – 2017

Design: Fiscal Year 2002

EIS Appraisal: Fiscal Year 2003

Construction: Phase I at Fiscal Year 2004, Phase II at Fiscal Year 2008 and Phase III at Fiscal Year 2017

Purchase of vehicles: Fiscal year 2004 and 2012

Statement of Need:

The project consists of the following components:

- Design of the sanitary landfill
- Borings (100m) and a topographic survey (15ha) for a landfill and an access road
- Construction of the dike for the sanitary landfill (about 330,000m³) and an access road (L=about 300m)

The existing dump in Koror is almost full and has no space to expand a site to the surrounding area. In addition, this site became an environmentally unsuitable place because of the poor countermeasure for an environment. Moreover, each state in Babeldaob has a dump at present. An environmental condition of dumps is also not good because of poor operation and maintenance.

To keep a good environmental condition is very important for this country. Therefore, it is necessary to develop a new sanitary landfill with enough capacity of volume accepting waste from 11 states at a proper place as soon as possible.

Project Benefit:

- People and tourists will be able to get a good living condition and an environment.
- Tourism industry in Palau will get benefit.
- This project will create new job opportunities in the waste industry.

Project Cost Estimate:

Design with borings and a topographic survey: \$750,000.-

EIA cost: \$8,000.-

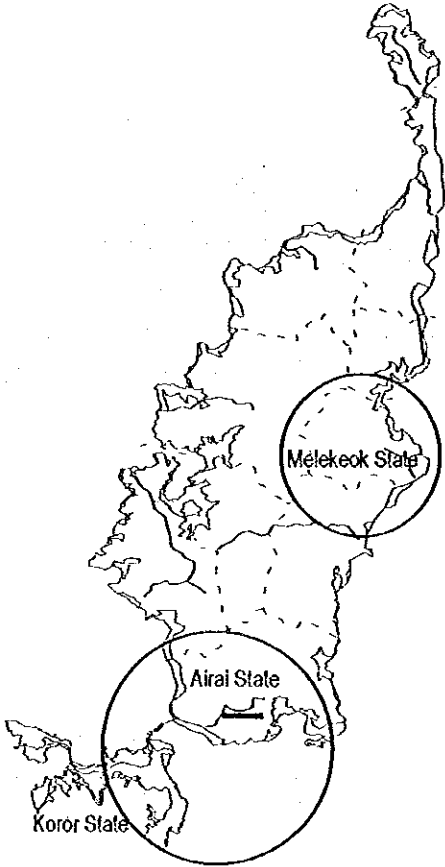
Construction of a sanitary landfill: Total \$9,721,000.- (Phase I: \$4,512,000, Phase II: \$2,514,000, Phase III: \$2,695,000)

Purchase of vehicles at Dumpsite: \$1,438,000.- (Year 2004: \$719,000, Year 2012: \$719,000)

Purchase of vehicles for collection: \$338,000.- (Year 2004: \$169,000, Year 2012: \$169,000)

Total Cost: \$12,255,000

PROJECT PROFILE 19 (Sector: Telecommunication TI-01)

Project Title: PNCC Service Improvement Program	
Project Implementing Agency: PNCC	
Project Location: 	Project Description: This program consists of 3 projects. <ol style="list-style-type: none">1. Construction of Second Earth Station with necessary equipment in Koror or Airai State,2. Upgrading Telephone Facilities for Melekeok State, and3. Expansion of Subscriber Network
Project Schedule: Fiscal year 2003-2007 2 nd Earth Station: 2003-2005 Upgrading Facilities for Melekeok: 2005-2007 Expansion of Subscriber Network: 2005-2006	

Statement of Need:

It is necessary to maintain reliability of international communications and supply additional channels for increasing telephone, data and internet demand.

Construction of Compact Road and New capital in Melekeok is now under going in Babeldaob Island. These will contribute promotion of the regional development in Palau. And this will cause increase of demand of international calls and internet connections in Palau.

Therefore, it is necessary to construct 2nd Earth Station, upgrade existing telephone facilities at Melekeok, and expand Subscriber Network in Palau.

Project Benefit:

Palauan people and tourists
Industrial world especially tourism industry in Palau
PNCC himself

Project Cost Estimate:

Project cost (All for PNCC)

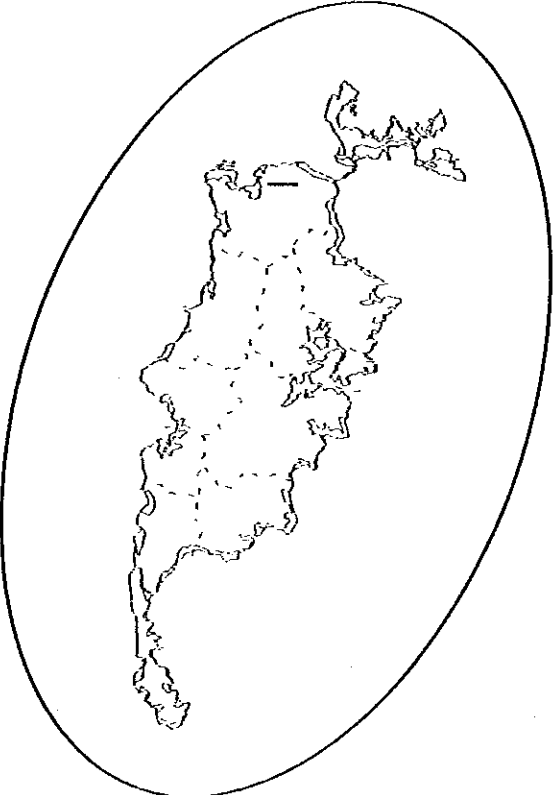
2nd Earth Station: \$5,000,000

Upgrading Facilities for Melekeok: \$500,000

Expansion of Subscriber network: \$2,000,000

Total Cost: \$7,500,000

PROJECT PROFILE 20 (Sector: Telecommunication TI-04)

Project Title: Radio Towers-Marine Safety	
Project Implementing Agency: Ministry of Commerce and Trade	
Project Location: Koror State and Babeldaob Island	Project Description: The project consists of purchase and installation of a maritime safety control office, 3 radio base stations, a microwave radio, which links between a control office (1 radio tower) and 3 radio base stations, and if necessary, connection to PSTN. Maritime communications will apply an international VHF radio system, and the coverage will be within the A1 area. A microwave radio system will have a capacity of several 2Mbps transmission lines (max. 16 2Mbps streams). a. VHF base station equipment: 156-163 MHz range, transmitter 50W, type F3E b. Microwave radio system: 2GHz band or 7 GHz band, transmitter 30 dbm (1W), modulation 4PSK, transmission line 4x2Mbps c. DLC: 30ch/2Mbps.
 A map of Koror State and Babeldaob Island, Palau, enclosed in an oval. The map shows the coastline and internal administrative boundaries.	
Project Schedule: Fiscal year 2002-2003 (2 years)	

Statement of Need:

In order to secure most of Palau islands under a maritime distress and safety system, especially safety for fishery and divers' boats, the installation of four radio towers and provision of maritime safety international VHF radio system is required.

Project Benefit:

Maritime distress and safety system for ships sailing near the Koror State and Babeldaob Island will be secured.

Project Cost Estimate:

Total Cost: \$5,000,000

a. Administration	\$250,000
b. Design	\$500,000
c. Construction	\$4,000,000
d. Contingency	\$250,000

