

Ebeye 2008 Situation Report



Office of the Chief Secretary
Majuro, Marshall Islands

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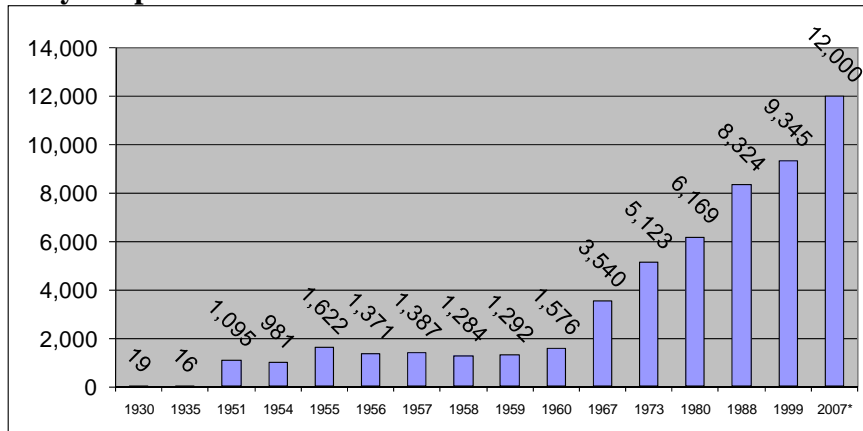
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Some Basic Facts on Ebeye

Population

The population on Ebeye has grown rapidly since the 1960s. The mid-2007 estimate of around 12,000 persons means that the Ebeye population has doubled since 1980. Ebeye now holds nearly one quarter of the RMI's total population.

Ebeye Population: 1930 to 2007*



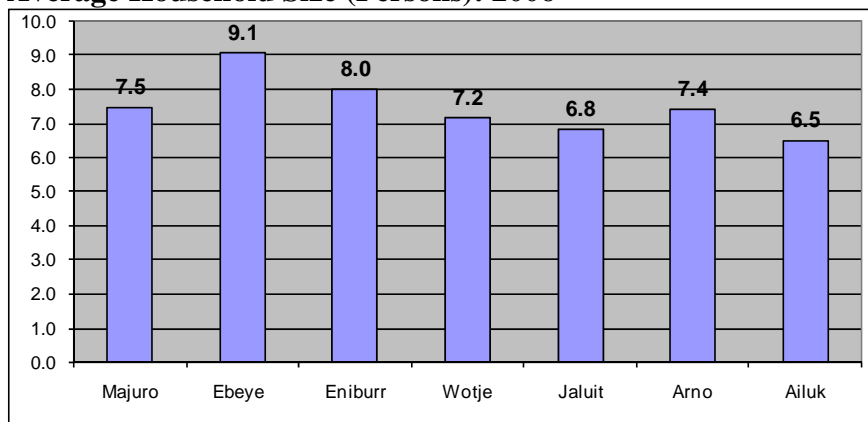
Source: RMI Census Reports, EPPSO, team estimates for 2007

* 2007 estimated, includes all islands along causeway

Households

There are roughly 1,300 households on Ebeye (including the islands along the causeway). Households on Ebeye are much more crowded than households in other areas of the RMI. Both the 1999 Census and the 2006 RMI Community Survey showed an average household size of 9.1 persons.

Average Household Size (Persons): 2006



Source: RMI 2006 Community Survey, EPPSO

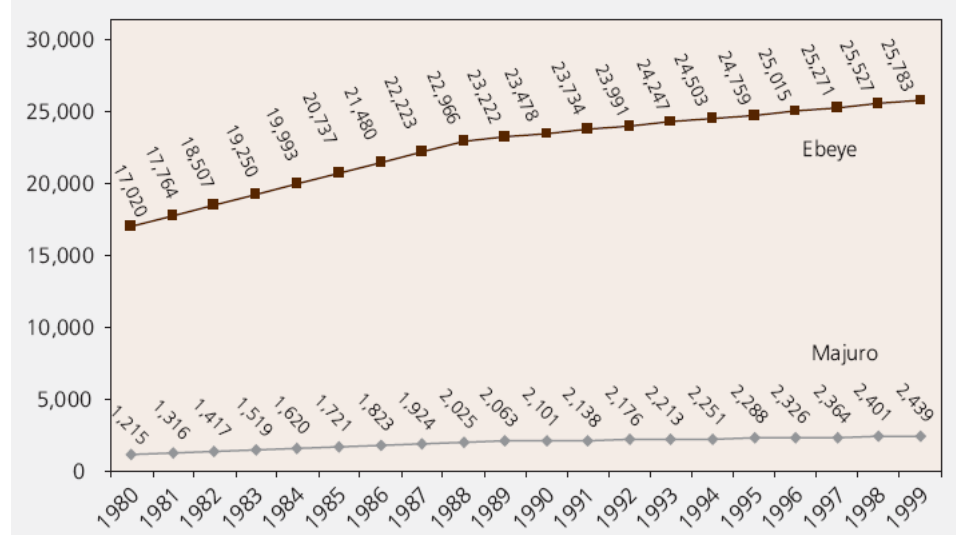


The crowded living conditions on Ebeye have had social, health, environmental, and other impacts on the people. But in recent years, with the steady deterioration of basic services, including power, water and wastewater services, the people of Ebeye have faced ever-increasing hardship. All of this has been well documented in the media and in various studies.

Population Density

Crowded households mean very high population density. Ebeye's population density (persons per square kilometer) as of the 1999 census was nearly 26,000. As of 2007, with an estimated population of 12,000, the population density would have exceeded 30,000 persons per square kilometer. This is arguably the highest population density for any island in the Pacific.

Population Density, Persons/km²: 1980 to 1999



Source: Juumemmej RMI 2005 Social and Economic Report

Major Social Problems

In the 2006 survey, residents were asked to list their community’s major problems (e.g., the major sources of their hardship). The top five problems identified by the people of Ebeye were:

1. Power problems
2. Water problems
3. High cost of living
4. Overcrowding
5. Poor sanitation

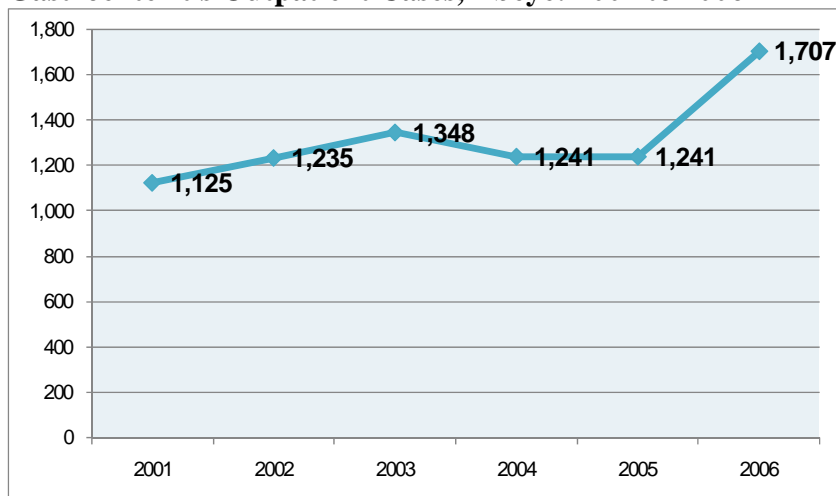
Education and Health Issues

Ebeye has a more serious non-attendance problem among its students compared to other areas. In 1999, 82% of Ebeye children between ages of 6 to 14 were actively attending school. In 2006 the percentage was only slightly higher at 85. Ebeye’s attendance rates are among the lowest in all the RMI and residents attribute this, at least in part, to the poor quality of basic services on the island, especially power and water.

SCHOOL ATTENDANCE 6 TO 14 YEARS	Total	Majuro	Ebeye	Eniburr	Wotje	Jaluit	Arno	Ailuk
2006 survey	88%	87%	85%	88%	90%	96%	97%	92%
1999 census	84%	83%	82%	88%	85%	92%	81%	71%

In addition, gastroenteritis outpatient cases at Ebeye hospital have grown rapidly in recent years. Gastroenteritis is a leading cause of severe diarrhea in both adults and children stems largely from poor sanitation. In 2007 gastroenteritis outpatient cases hit the alarming 1,700 mark.

Gastroenteritis Outpatient Cases, Ebeye: 2001 to 2006



Source: EPPSO

As described throughout this report, and as is already well known, Ebeye faces many challenges. The status quo on is not sustainable and resources should be mobilized immediately to first stabilize the basic services and then over the longer term to set Ebeye on a more sustainable path.

Immediate Actions

The present situation on Ebeye is not in a state of disaster, but the situation could further deteriorate into a disaster if no immediate action and resources are provided to stabilize the increasingly fragile infrastructure and other essential systems.

On such note, the RMI Government recently formulated the Ebeye Stabilization Project (ESP) as means to address the immediate needs and ensure the services of power, water, wastewater, solid waste, causeway and the drainage systems are provided. The focal point shall be the Office of the Chief Secretary to administer the ESP and further monetary the expenditures. It is envision that the ESP activities shall be implemented fully within an 18 month timeframe.

It is important to note that a long-term and more comprehensive development plan of Ebeye needs to be formulated. Hence the initial works and planning are already underway. The immediate resources shall be allocated in the following essential areas;

Consolidated Cost Estimates

Areas	Estimates
1. Power System	\$ 2,220,000
2. Water System	\$ 1,108,765
3. Wastewater System	\$ 680,000
4. Solid Waste System	\$ 173,000
5. Causeway	\$ 440,000
6. Drainage Systems	\$ 65,000
Total:	\$ 4,686,765

Major Issue 1: Power System

1. POWER SYSTEM

Ebeye has only two of its four generators operating that supply power to the communities of Ebeye, North Loi, South Loi, Bijinkur Island, Loj Island, and the small community of Guegeegue. The Kwajalein Atoll Joint Utilities Resource (KAJUR) has been working to resolve number of successful tasks since combining technical capacity with the Marshalls Energy Company (MEC) and the Majuro Water and Sewer Company (MWSC).

Last year, KAJUR was able to procure new and upgraded Cummins generator, similar to the current engines running but with special protection. Manufacture requires 9 months from the date of initial payment. There remains an outstanding balance for full payment. The remaining two operating engines are due for overhaul maintenance. A plan is in place to conduct a major over once the parts are available.

The Cat generator suffered a sudden fatal failure in early February 2008. Without this Cat engine, KAJUR needs to replacement unit and options are being explored. Funding for this additional unit had not been previously identified and will therefore be part of the ESP. Several units have just been identified and are currently been checked for compatibility and pricing.

2. FUEL STOCKS

Funding needs to be secured for the essential fuel for the generators. KAJUR currently consumes 105,000 gallons of fuel per month. This is approximately 1,260,000 gallons per year. If a fund was established for fuel purchasing, this would offer considerable savings and ensure supply of power for the immediate term.

Another immediate task is to install the piping systems within the power station for improved fuel monitoring and management. This, in turn, shall reduce the substantial risk from the current practice of hauling fuel by truck through the crowded streets of Ebeye to the power plant tank storage facility. All the relevant stakeholders have been consulted.

3. DISTRIBUTION

Larger equipments are urgently needed for proper maintenance and monitoring of the distribution system. The causeway overhead distribution line system need to be installed underground to ensure safety and sound power supply to the causeway island communities. Any improvement operations to the causeway facility will require provision of a utilidor, services conduits and pulpits. This provision would allow for power, communication and water supply systems.

4. COST ESTIMATES

Areas	Estimates
Power Operations;	
a. Balance of new engine purchased	300,000
b. Purchase of the Cat unit replacement	400,000
c. Installation of supporting equipments	80,000
d. Training of staff	40,000
Fuel Stocks;	
a. Three months of fuel stocks	1,000,000
b. Import line completion	50,000
Distribution;	
a. Bucket truck	90,000
b. Crane truck	80,000
c. Backhoe	80,000
d. General line maintenance supplies	100,000
Total:	2,220,000

Major Issue 2: Water System

1. WATER OPERATIONS

Currently, one of the three RO units is still running. The other two units need parts that have been ordered recently but pending availability of fund. A manufacturer's representative has just completed full assessment of the RO units in early December 2007. The two small ROs are capable of producing 100,000 gallons each per day and were installed in early 2003. The third and larger unit rated at 150,000 gallons per day, was installed in 2004.

The RO units are notoriously expensive to operate and maintain. For example, the needed special water circulation and pressure pumps cost between \$30,000 and \$50,000. The necessary filters and chemicals are also expensive but require frequent replacement. With limited financial resources received from sale of water, the annual subsidy for operation is required.

2. WATER STORAGE

Daily produced water is stored in three storage tanks located in the middle of the island, each with a capacity of 250,000 gallons. The combined storage is 750,000 gallons. There are two additional tanks of comparable size solely for storing salt water to feed the RO machines. The large storage capacity for salt water is necessary since the RO units require two gallons of salt water to produce a gallon of fresh water.

The all storage tanks all require pumps and constant maintenance to ensure sound operate. Currently, there are apparent minor leakages in the storage tanks and various saltwater pumps are in dire need of replacement. The present outflow of fresh is very low. But with financial supports, two pending two RO units are repairable and can resume full operation.

3. WATER DISTRIBUTION

Water distribution is another major challenge for past many years. There have been prior efforts to install a full reticulated system with adequate supplying pressurized water to reach all the houses. The last installed system designed was about 15 years ago which is still serviceable to limited section of the island. Number of new houses have been built since and needing water line services. With funding, the proper equipments shall be purchased to adequately distribute water to all section of the island.

4. COST ESTIMATES

Areas	Estimates
Water Operations;	
a. Parts and chemicals	250,000
b. Pumps and motors (inc. control panels)	250,000
c. Water Engineer (shared with MWSC annually)	50,000
Water Storage;	
a. Repair and upgrade tanks	75,000
Water Distribution System;	
a. New fresh water pumps	98,765
b. Fresh Water pumps control panel	45,000
c. Pump station building repairs	50,000
d. Pipes, valves and fittings	80,000
e. Water delivery truck	90,000
f. Backhoe	80,000
g. Road repair materials	40,000
	Total: 1,108,765

Major Issue 3: Wastewater System

1. SEWER OPERATION

Over the years, Ebeye community has suffered from series of epidemics resulted directly from poor sanitation disposal and treatment. The RMI had sought several different approaches to improve the system on Ebeye, but there are still operational aspects that need to be improved and rectified. Recent funding had addressed number of problems that were deemed urgent at the time but unfortunately the integrity of the sewer system is need of further works. The existing four sewer lift stations are all in need of major upgrades and repairs. There are no spare pumps, motors, valves and electrical control systems in place. In addition, the motor control systems and building structures of such stations are in very poor condition adjacent to crowded area.

2. SEWER COLLECTION SYSTEM

Salt water distribution has been a major problem as well for many years. The system was installed same time the water distribution system was installed and is barely operational. Limited water pressure only allows few households with salt water supply. Most of the pumps need evaluation and, in many cases, full replacement.

The most feasible way forward now is to obtain a qualified water engineer on a full time basis. Such engineer shall re-evaluate the existing system and its requirement. This would further ensure the correct pumps, equipment, pressures and flow rates are properly installed and maintained with the suitable system.

3. COST ESTIMATES

Areas	Estimates
Sewer Collection System;	
a. Intrinsic controls and protection (10 motors)	100,000
b. Pumps, motors, rerouting layout and station repairs	275,000
c. Station pump repairs	90,000
d. Pipes, valves, fittings and essential spares	165,000
e. Maintenance components	<u>50,000</u>
	Total: 680,000

Major Issue 4: Solid Waste System

1. Solid Waste System

The solid waste collection system and the dump site are managed by the Kwajalein Atoll Local Government (KALGov't), which is doing the best effort given its mere resources. The KalGov't presently has one operating collection truck with a wheeling bin system.

Collected wastes are dumped at the main landfill on north side of Ebeye. People reside very close to the open landfills. There are serious sanitation concerns compounded with flies, dogs, vermin, odors, health, and safety issues. The main dump is not fully fenced. Medical wastes are dumped in the landfill, which is burned supposedly on a regular basis. No cover sand is available or placed over the dump site due to lack of equipments and other resources.

Although a compactor is available, a cover sand method is not provided like Majuro. Furthermore, there are water-saturated sections of the dump causing the underground, hence preventing operation of heavy equipment for potential risk of the equipments and safety reasons.

2. Solid Waste Operations

KalGov't has expressed the urgent need for second solid waste collection truck but lack the resources to purchase such essential asset. The Majuro Atoll Waste Corporation (MAWC) plans to work and in partnership with the KALGov't. Initial discussions are proceeding and plan to implement dumpsite modernization and improvement waste management program shall commence soon. Such arrangement would require the following components:

1. Established technical cooperation between the MAWC and KALGov't;
2. Hire Ebeye solid waste manager;
3. Install fence at the dump and one specifically for medical waste dumping area;
4. Establish dump operations facility and equipment storage;
5. Purchase needed equipments and other necessary operating equipments;
 - a. Flat bed truck for haulage and recyclables

- b. Dump compactor (heavy wheeled vehicle)
 - c. Front-end loader
 - d. Forklift
 - e. Fuel operation
6. Apply the dredge cover sand method;
The most economical option is to purchase used crane and dragline to provide sand coverage. Large quantities of sand shall be constantly needed to cover the dump daily to achieve effective land filling. This same method has made significant positive impact at the Majuro dump, hence reducing flies, odors, vermin and potential health hazards to a minimum.
7. Reduce liquification problems so that heavy equipment can operate on the dump;
Back-fill and compact behind existing seawalls to stop seawater entering on each high tide. Fill with heavy debris. Currently, too risky to operate heavy equipment according to KALGov.
8. Assist KALGov't with implementation of maintenance plan of the existing bin collection system.

3. COST ESTIMATES

Areas	Estimates
Solid Waste Operations;	
a. Solid Waste Expert	50,000
b. Establishment of station facility	10,000
c. Administration and office supplies	20,000
d. Fencing with secured gate (isolate medical waste)	40,000
e. Dump site operating equipments	120,000
f. Used crane and dragline for sand coverage	150,000
g. Operations and maintenance components	110,000
Waste Collection;	
a. Trash collection truck	<u>173,000</u>
Total:	673,000

Major Issue 5: Causeway

The causeway from Ebeye Island to the South Loi Island contains the protected slope with armor rock. However, there is an approximate 3.1 miles in length of unprotected areas from Ebeye to Gugeegue, which about 60% requires improve protection on both sides. Due to the strong wave action, more armor rocks protection are required on the ocean side than the lagoon water.

To make immediate improvement on the causeway, the initial plan is to rehabilitate the existing equipments within the KALGov't, the Department of Public Works. Such repairable equipments are the following;

G caterpillar grade	Case Back Hoe-Loader.
Caterpillar bulldozer.	Case 621 wheel loader.
Excavator/Back Hoe	Tampo road roller
Air compressor	Engine powered arc welder/generator

The equipments, once operational, can provide regular road grading and pot holes filling. Regular maintenance shall minimize the causeway road from further deteriorating. The next phase is to conduct a minimal slope protection by using dislocated armor rocks. This effort to strengthen the armor rock protection should provide adequate covering on the slope to also reduce the risk of erosion, particularly the most affected areas;

- Loi Island and Obioati Island area (approximately 0.30 mile or 528 yards).
- Obioati Island and Gugeegue Island (approximately 0.20 mile or 352 yards).

COST ESTIMATES

Areas	Estimates
Equipments Rehabilitation;	
a. Acquisition cost of needed equipments	90,000
b. Rehabilitation of repairable machines	52,000
c. Maintenance component	30,000
d. Operational supplies	18,000
Causeway road maintenance;	
a. Road grading and filling pot holes operation	135,000
b. Armor rock shore protection	90,000
c. Contingency	<u>25,000</u>
Total:	440,000

Major Issue 6: Drainage Systems

1. DRAINAGE SYSTEM

Ebeye constantly experience serious problems of drainage overflow during heavy rain event an. These problems are primarily caused by dysfunctional main road drainage system and combined with outdated drainage system designed. The most heavily affected areas of the island are the mid-corridor residential area and the Ebeye Public Elementary School. Such houses are often floated with debris whenever there is heavy rain.

The plan is to first determine the current capabilities of the Ebeye drainage pipe culvert network by conducting a general cleaning of all the concrete ditches and the pipe culvert lines. This process shall allow the necessary test and isolate the problematic drainage for effectively remedy. The general cleaning will serve as exploratory stage to further determine a needed comprehensive assessment of drainage network in entire island of Ebeye. Such project shall require the services a qualified civil engineer or equivalent qualification with years of similar work experiences to reside on Ebeye for medium term for sound analysis and documentation.

2. COST ESTIMATES

Areas	Estimates
Drainage system;	
a. Comprehensive general maintenance	41,000
b. Exploratory stage for the Expert	24,000
	Total: 65,000

Additional Images



Old sewer pump



Portion of the unprotected causeway



Old power generator



Damaged drainage





Non-operational sewer treatment plant



Lack of salt water pump



Reviewing the RO units



Needing replacement of parts



Empty water containers heading to



Kwajalein workers returning to Ebeye

Kwajalein for routine refills