



Drought Report Republic of Palau



June 2016

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Acronyms

CAT	Civil Action Team (U.S. Military)
EQPB	Environmental Quality Protection Board
GPD	Gallons Per Day
JICA	Japan International Co-operation Agency
MCCA	Ministry of Community and Cultural Affairs
MOE	Ministry of Education
MOH	Ministry of Health
MOS	Ministry of State
NEC	National Emergency Committee
NEMO	National Emergency Management Office
NOAA	National Oceanic and Atmospheric Administration



Background information and Situation Overview

The Republic of Palau is a small independent island nation located in the Western Pacific about 500 miles East of the Philippines with a total land area of 171 sq. miles (444 sq. km). Palau has a population of approximately 20,956 (based on 2011 reports). The economy of Palau is predominantly based on tourism.



More than 3700 households and business establishments in Koror and Airai are connected to the water system, 75% of total connections. It is well documented that the average household water usage is about 169 gallons per person per day.

There are currently 18 small water systems located throughout the remaining states of Babeldaob servicing a total of 965 households and businesses. These outlying water systems have holding capacities of over 1 million gallons with a monthly consumption of over 7.4 million gallons. Storage volumes in the tanks and at the low head dams for stream intakes are small and not sufficient to substantially supplement stream shortfalls during dry periods. Four states (Ngiwal – Babeldaob), Peleliu and Angaur (limestone atolls), and Kayangel (coral atoll) each have water systems that have groundwater supply sources. These four states are quite vulnerable, as they are dependent on the rains to recharge their groundwater sources and water lenses. It is probable that these water sources will experience increased salinity. The outlying States of Sonsorol and Hatohebei rely heavily on individual home and community water catchments and wells. It is probable that these water sources will also be affected by increased salinity.

Very low levels at water sources can increase turbidity in the water and severely affect water quality. Poor water quality poses a major health risk to those relying on the public water systems for potable water. About 80% of the areas in Palau are now experiencing a decrease in water supply and have incurred some sort of undue hardship. Farming and crops are and will be damaged, health issues such as bacteria in the water and food, lack of food and dehydration will most likely increase. The risk of wildfires is amplified. Many water bottling companies in Palau have temporarily stopped production of bottled water due to the water shortage.

The most vulnerable sectors that are affected by this prolonged dry period are Health (Hospitals and Clinics), pregnant women, babies, the elderly, the bed-ridden, persons with disabilities and Education (Schools). Small businesses such as retail stores and hotels and motels (less than 50 rooms) will likely have their operations restricted or may have to completely shut down. The Division of Fire will have limited access to water supplies in case fires occur. Critical infrastructure like the Palau International Airport will be affected and tourism arrivals may decrease.

A decrease in water levels, production and rationing will compromise existing pumps and valves and related components causing operational setbacks. PPUC's primary base load generators at the Malakal Power Plant (MPP) have a cooling tower system which uses excessive water and is not circulated but exposed and evaporated. PPUC has made changes to its operational scheme at its main power plants wherein Aimeliik Power Plant (APP) now provides the bulk of generated electricity. However, this will have significant impacts on delaying the scheduled overhaul of the Mitsubishi (APP) generators.

The National Emergency Committee (NEC) convened on March 21, 2016 to discuss the effects of the drought conditions that the Republic of Palau is currently experiencing. The extenuating circumstances reported by members of the NEC and other relevant information are listed below:

1. A National Oceanic and Atmospheric Agency (NOAA) weather report dated March 21, 2016 placed the Republic of Palau in Extreme Drought Level 3 of 4, which reported that the cumulative rainfall for Koror over the past 4 months was the lowest recorded since 1951 at 17.65 inches.
 2. Palau Public Utilities Corporation (PPUC) reported that the two water sources for the Koror-Airai Water System had been declining for the last few months and at that time one of the sources (Ngerimel Dam) had been shut down. The remaining source of water was from the Ngerikiil River, which produced only 750,000 gpd, 19% of the normal production of 3.8 million gpd. (Currently, the Ngerikiil River production is down to 500,000 gpd.)
 3. PPUC reported that the water levels have been declining since January 2016. PPUC placed Koror and Airai on an Emergency Water Rationing Schedule on Saturday, March 12, 2016. At that time, the water rationing permitted five hours in the morning and five hours in the evening for all areas. As of Saturday, March 19, 2016, the water rationing was reduced to four hours in the morning and evening. Effective March 22, 2016, water rationing was further reduced to three hours in the morning and evening. (Two days later, rationing reduced provision of water to two hours in the morning and evening, and on March 29, hamlets were divided into two groups, one receiving three hours of water in the mornings and the other receiving three hours of water in the evenings.)
 4. The Ngerimel Dam had been practically exhausted, to the extent that the few feet of water remaining had become stagnant and posed a health risk. Replenishing this water source would require a major effort to flush the reservoir and clean the debris of dead fish and other contaminants.
 5. Due to the continuous decline in water level, PPUC also reports that other parts of Babeldaob, including the larger states of Ngaraard, Ngarchelong, Aimeliik, as well as the
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outer islands of Kayangel, Peleliu, Angaur and the Southwest Islands, are experiencing diminished water resources and have placed their communities on water rationing schedules.

6. The Ministry of Health (MOH) reported that the health impacts associated with the current drought could lead to disease outbreaks (diarrhea, pink eye, etc.), food and water borne illnesses and air quality related illnesses. MOH facilities continue to rely on the public water system to operate.
7. The Ministry of Education (MOE) reported that they had a 3-4 day onsite water storage, but also continue to rely on the public water system to refill their water storage. With the water rationing implemented by PPUC, MOE recognizes the increased risk to student health and hygiene.
8. According to Belau Tourism Association (BTA), average arrivals are nearly 13,000 visitors per month. With the water rationing implemented by PPUC, BTA is concerned that the level of water service may not be able to support that many visitors.

Given the above reports and information, the NEC recommended that a State of Emergency be declared in accordance with Article VIII, Section 14 of the Constitution of the Republic of Palau. His Excellency President Tommy E. Remengesau, Jr. issued an Executive Order No. 389 on March 22, 2016, declaring a State of Emergency due to an Extreme Drought. Any State of Emergency, by law, will continue for ten days.

At the end of the initial 10-day emergency period, conditions in Palau had not improved. In fact, the situation had significantly deteriorated to the point that water from the main water source at the Ngerikiil Reservoir could no longer provide adequate amount water to all hamlets in Koror and Airai, and water distribution by truck became necessary for certain areas. Demands on local retailers completely exhausted all available stocks of drinking water. As a result, MOH, MOE and EQPB have implemented their emergency plans to increase awareness of the need to take precautions regarding the quality of drinking water and to educate the public about water conservation measures.

On April 1, 2016, due to the worsening water situation, the NEC recommended to the President that the State of Emergency be extended for another 10-day period. Later the same day, President Remengesau wrote to the leadership of the Palau National Congress requesting an extension of the State of Emergency and the related temporary legislative powers for an additional ten days as of April 1, 2016. On the evening of April 4, 2016, the Congress approved the continuation of the extension of the State of Emergency to take effect on April 1, 2016 immediately after the expiration date of the initial declaration. The current State of Emergency will continue through April 11, 2016, allowing the NEC to effectively and efficiently mitigate the ongoing efforts to address the effects of the drought.

On April 10, 2016, the NEC recommended to the President that a second extension of the State of Emergency is needed to continue support to ongoing efforts to address the emergency situation created by the extreme drought conditions, and to maintain the sense of urgency and ensure continuity of the ongoing emergency response including the securing of international

aide. The Palau National Congress did not confirm the second extension of the constitutional state of emergency; therefore the first constitutional State of Emergency expired on April 11, 2016.

In response to the continued extreme drought conditions, a Presidential Directive No. 16-17 was signed and issued on April 18, 2016 by His Excellency President Tommy E. Remengesau Jr. directing the Executive Branch to continue responding to the emergency situation and operating as if there was a continued constitutional State of Emergency.

On May 9, 2016, the amount of collected rainfall was sufficient enough for PPUC to resume back the 24 hours of water service for Koror and Airai States. PPUC reported that water levels at the Ngerimel Dam and the Ngerikiil Reservoir were adequate to fill water intake tanks even after filling water delivery tanks to optimal heights. PPUC expressed the importance of keeping water delivery tanks at optimal levels which allows continuous water flow to hamlets at higher elevations. In summary, PPUCs decision to resume the 24 hours of water service was due to following reasons:

1. Sufficient collection of water.
2. Water levels at both intakes maintained at optimal level.
3. Relieve water pressure on fragile water system.

The NEC continues to operate under the Presidential Directive No. 16-17 and meets every week to discuss updates and coordinates efforts to better assist the remaining States that continues to experience water shortfalls.

Relief Efforts

The NEC has taken a number of actions aimed at providing immediate relief from this severe drought. These actions may be divided into two major strategies 1) augmenting the available water supply from the Ngerikiil Reservoir, and 2) developing a distribution system to deliver water to areas most affected.

AUGMENTATION OF AVAILABLE WATER SUPPLY

PPUC has been working with the Bureau of Public Works to identify traditional water sources that could be tapped and used to provide additional water. To date, PPUC has identified six Well sites in Airai that could produce a total of about 120,000 gpd. Three of these sites are existing wells, of which two have been activated. The other three sites are boreholes, of which one has been tapped and is feeding water directly into the Ngerikiil Reservoir Intake. PPUC contracted local vendors in activating the wells in Airai. To access the boreholes, the Civic Action Team was utilized to clear access to the sites. PPUC was then able to install pumps and powerlines to link them to the power grid. Public Works identified two sites within Koror State where fresh water could be obtained, but the existing pumps were not operational. They have installed temporary pumps to activate these two wells, and have set up public water stations accessible to the public.

The NEC has contacted several contractors with the capacity to restore existing wells by installing new pumps, acquire and lay power lines to serve the pumps at these sites, properly test the water, and begin pumping and distributing the water from these wells. However, due to a limited local capacity to further explore and make reliable estimates of the quantity and quality of water from underground sources, the NEC has had to outsource off island qualified contractors who would be readily available to perform these type of work. In particular, this work requires a qualified hydrologist to assist in exploring and estimating the quantity and quality of water from underground sources.

Five of the States in Babeldaob continue to have a sufficient level of water to supply their small communities. Three of these States are now supplementing the water supply for Koror and Airai, as well as the other States that experience severe water shortages. Currently, about 20,000 gallons of water are being hauled each day. It should be noted however that these small water systems may also experience water depletion if lack of sufficient rainfall continues.

DEVELOPING AN EMERGENCY WATER DISTRIBUTION SYSTEM

The NEC began the process of acquiring, whether through donation, direct purchase, rent, water containers, tanks, and bladders, as well as small pumps, hoses, valves, etc. In the event of a complete water shortage in Koror, Airai, and the other States, these materials and equipment are necessary to collect, test, transport and distribute water from productive water sources to the community.

Because the pumps at wells in Koror are not capable of supplying optimal amount of water into the main line, platforms for water bladders were constructed at various water dispensing sites to provide water accessibility to the community.

- The Palau Red Cross Society was tasked to deliver potable water to all vulnerable individuals including homebound and elderly throughout Palau based on a list provided by MOH and MCCA. (**See Appendix 18**).
- The Bureau of Agriculture built a 1000-gallon water tank at its Ngchesar Agriculture Station. BOA has already been delivering water from this tank to livestock farms using a makeshift water buffalo. Other farmers report that their crops are suffering from lack of rain. This situation, unabated, is sure to lead to heavier reliance on imported meats and fresh produce.
- The Ministry of Health has expressed the need for at least one additional ambulance in view of the increased risk of injury and illness. Public Health is closely monitoring encounters with health providers. They have increased vector control surveillance and have also increased visitations to restaurants and other food handling establishments to inspect their level of sanitation. In addition, they are expanding water storage capacity at community health centers. Finally, they have escalated their community outreach efforts to increase public awareness about hygiene and sanitation practices that can minimize water-borne diseases. (**See Appendix 15**)
- The Ministry of Education activated their emergency response plan. They have taken several measures to conserve water, including the decision to use disposables rather than use precious water to wash utensils and dinnerware. MOE bought every last hand sanitizer available and distributed to all teachers and students. To date, MOE has not reduced school hours, but nevertheless they have monitored daily attendance and reported increased absenteeism. (**See Appendix 16**)

PLANNING & LOGISTICS SUBCOMMITTEE

The NEC created a subcommittee to compile a list of all donations. The master inventory listing ensures the precise accounting of all donations and supplies on hand to effectively coordinate distribution of resources. The committee is chaired by the Director of the Palau National Weather Service, Ms. Maria Ngemaes. (**See Appendix 11**)

Donations

Various local businesses, groups, individuals including foreign governments and individuals made donations towards the NEC efforts. **Appendix 11** lists all donations made to the NEC.

RECOMMENDATIONS

I. PLANNING & LOGISTICS SUBCOMMITTEE OF THE NEC:

1. NEMO to procure 2 additional 40 footer containers that will be utilized as NEMO storage.
2. Procure a Forklift and Hand Trucks:
 - a. 2.5 Ton max lifting Capacity
 - b. Hand Truck (4 pcs.)
3. Come up with Memorandum of Understanding between NEMO and Private Enterprises regarding utilization of their Appropriate Assets
4. Bore holes, wells, to continue being developed/commissioned and maintained
5. Tax relief for small businesses (In support of drought mitigating measures)
6. National Government appropriate funds to NDBP to soften impact on loan interest rates.

II. PALAU PUBLIC UTILITIES CORPORATION

- **Pending submission of Report & Recommendations**
- Refer to Appendix 13

III. MINISTRY OF FINANCE

- Refer to Appendix 14

IV. MINISTRY OF HEALTH

- Refer to Appendix 15

V. MINISTRY OF EDUCATION

- Refer to Appendix 16

VI. ENVIRONMENTAL QUALITY PROTECTION BOARD

- Refer to Appendix 17

VII. PALAU RED CROSS SOCIETY

- Refer to Appendix 18
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List of Appendices

Appendix No.	Appendix Name	Dates
Appendix 1	NEC Chairman/Vice President Letter to ROP President recommending State of Emergency	March 22, 2016
Appendix 2	Declaration of State of Emergency	March 22, 2016
Appendix 3	Executive Order No. 389 To Declare a State of Emergency Due to Extreme Drought	March 22, 2016
Appendix 4	RPPL No. 9-59 "To authorize and appropriate the amount of \$2,000,000.00 from the National Treasury General Fund Reserve for severe drought relief, including emergency operations, purchases, and construction works resulting from the Severe Drought of 2016, and for other related purposes".	March 25, 2016
Appendix 5	NEC Chairman/Vice President Letter to ROP recommending extension of State of Emergency	April 1, 2016
Appendix 6	Extension of State of Emergency confirmed	April 1, 2016
Appendix 7	Immediate & Near-term Drought Response Plan for the Republic of Palau	April 8, 2016
Appendix 8	NEC Chairman/Vice President Letter to ROP recommending extension of State of Emergency	April 10, 2016
Appendix 9	Extension of State of Emergency not confirmed	April 11, 2016
Appendix 10	Presidential Directive No. 16-17 In response to the continued extreme drought conditions, directing the Executive Branch to continue responding to the emergency situation and operating as if there were a continued constitutional state of emergency confirmed by the Olbiil Era Kelulau.	April 18, 2016
Appendix 11	NEC Planning and Logistics Committee (Master Inventory)	July 6, 2016
Appendix 12	NEC Meetings	March 17-May 11, 2016
Appendix 13	Palau Public Utilities Corporation	PENDING
Appendix 14	Ministry of Finance	July 14, 2016
Appendix 15	Ministry of Health Drought Report	May 11, 2016
Appendix 16	Ministry of Education Drought Report	May 12 2016
Appendix 17	Environmental Quality Protection Board Report	July 13, 2016
Appendix 18	Palau Red Cross Society Report	May 17, 2016