

# NIUE

## 1.0 INTRODUCTION

Niue is located in the South West Pacific ocean at the approximately co-ordination of 19 deg south and 170 deg west. The Island is an elevated coral outcrop with a coral reef fringing precipitous and broken coastline. In general, information it takes the shape of two terraces, the lower coastal being about 28 metres above sea level. The upper terrace, which forms the bulk of the Island, is about 69 meters above sea level. It is also believed to be the largest coral atoll in the world with a land area of about 259sq. km and 13 villages spread around the coast. The population is approximately 1700 people and about 18,000 opting to live in New Zealand. Niue's economy is substantially dependent on overseas aid, principally provided by New Zealand. With a decline in population New Zealand has subsequently reduce the aid package and placing more emphasis in promoting the Private Sector Development.

There are no surface runoffs in the form of rivers, streams, pools or lake on the island and water can only be sourced from the underground water lens and collection of rain water. In the olden days fresh water can only be found in subterranean caves and considered by the older generation as a very precious commodity. Gathering fresh water was indeed a dangerous task, more so as the sources were fiercely guarded as there were not many around.

Most of the fresh water used for human consumption, agricultural and industrial was source from the ground water lens. The ground fresh water reserve has not been accurately quantified but estimation from earlier surveys showed the reservoir appears to be an exceptionally large reserve.

It is estimated that about two thirds of the Niue's annual rainfall evaporates. The remainder permeates through the porous coral until it reaches salt water that has seeped horizontally under the Island from the Pacific Ocean. Aided by lower density, the fresh water forms a pool over salt water and is known as the 'Lens'.

The water quality of the lens is naturally suitable for drinking and it is piped untreated to all consumers in all villages. About 85% of the water pumped is for domestic use, 10% for agricultural use and 5% for industrial use. All costs for pumping and distribution of water is met by government. Attempts to introduce a user pay system were decline by previous governments and is one of the essentive to stop further decline in population.

All villages on the Island has its own system which consist of a submersible pump and a water reservoir except for Alofi who have four submersible pumps and two water reservoirs. Up until 1998, although most of the water infrastructure were already in place and pumps sometimes operating 24 hours, most consumers were experiencing water shortages. This was reflected on the annual electricity cost of around one hundred thousand dollars for all submersible and booster pumps.

The main problem identified in 1992 was that a lot of water was wasted due to leakages in residences, industrial water outlets and from the reservoirs. Storage reservoirs and water pumps at the time were still manually operated by part-time pump attendants which resulted in reservoirs overflowing. People were very reluctant to report any leakages around the households because of costs of repairs.

The Water unit of Public Works was poorly-equipped and staff not properly trained to carry out proper maintenance to the system. People were negligence in their attitudes in conserving water.

The underground fresh water reservoir is very prone to contamination from land-based contaminants because of the very porous coral that act as an aquifer.

Most house holds on the island have a septic system but most do not comply with the WHO standards. There are currently no drying pits for the sludge from the septic tanks, these were just pumped into a selected area far from any bore sites and about 1.5 km from the coastline. There is no proper waste dump although an attempt was made to upgrade one of the existing dump near the main town into a proper and main dump. Later on, this dump will be used as a transfer station for the main dump to be set up on the southern side of the island. Agricultural fertilizers and pesticides is one area of concern which is being addressed by the Pesticides Committee.

In 1997, a request from the Niue Government was approved by AusAID to provide funding for a Water and Waste Management Project. As part of the package, a Water Engineer was recruited to manage the water management part of the project. This has not only resulted in having a Maintenance Programme being established and staff members of the water unit sufficiently trained to competently carry out the work but a major achievement of about 40% savings of electricity. A Waste and Sanitation Consultant was also recruited which resulted in improvement to the management of the waste and sanitation part of the project and the establishment of the Waste and Sanitation Master Plan. However, the plan is yet to be implemented due to financial constraints.

## **2.0 NATIONAL CONSULTATIONS**

Under the World Summit Sustainable Development [WSSD] and International Waters Program [IWP], wide consultation took place and water development was very much part of the process. To conduct another consultation process will probably not only produce no more useful information but those involved will see it as a non-profitable exercise, especially the private sector.

Those involved in the consultation processes were: Water Unit of Public Works, Environment Unit, Department of Agriculture, Fisheries and Forestry, Health Dept., Education Dept., Customs, Village Councils, Council of Women, Youth Council, Tourism, Chamber of Commerce and Fisherman's Association.

All key stakeholders unanimously agreed that water is a very important element for the country's survival and that all concerns related to water should be treated separately.

## **3. VISION, ISSUE AND CONSTRAINTS**

### **Theme 1 – Water Resource Management**

There was no recent survey and studies on the underground water lens in Niue since 1980. A Hydrogeology report produced by Jacobson and PJ Hill during their studies in 1980 provides some guidelines on the status of the underground water in Niue. As stated in the report that an average rainfall of 2041mm, evapotranspiration of 417mm, and a recharge rate for the lens of 624mm. They also estimated that the layer of fresh water lens on the Island may be no less than 35 meters deep in the centre and possibly more than 100 meters deep in some areas. It is the only report in regards to the underground water lens that has any significant value as a basis for managing the resource.

Modelling of the underground water lens for Niue is urgently in need for a better and clear understanding of the characteristics of the lens and also to monitor for possible contamination from land base activities... Water pumped from the lens is stored in reservoirs and directly fed to the consumers without treatment. Most of the water bore sites are located on the upper terrace and at a minimum distance of about 1.5 km from the coastline.

The aquifer of about 50-60 meters is porous and ground level contaminants can be easily filtered through to the lens. However, there has been no known outbreak of disease which relates to un-treated water and no complaints from the visitors to the island. Nevertheless, it is advisable to boil the water before drinking.

The Public Health unit of the Health Department carry out tests for bacteria contamination on a quarterly basis. Sometimes both types of bacteria were detected in the test results on water bores with human habitation a few miles away and no other activity which might cause contamination within the vicinity. It is very difficult to explain how this might have happened without obtaining verification data. The question is, can bacteriological contamination occur naturally in the water?

The Health Department however, do not have the right type of equipment to carry out tests for fertilizer or pesticides elements in the water. This is one area that needs urgent attention. It is very important that testing methods and equipment comply with WHO standards.

## **Theme 2 – Island Vulnerability**

(Disaster Preparedness, Climate Adaptation, Dialogue on Climate and Water)

No country can ever be fully prepared for any disaster, in whatever form it may strike. The same can be said about climate change, we adapt to suit the condition of the climate.

Small island countries can be very vulnerable and however prepared small islands can be, limited resources would very much be the killing factor.

The effect and impact the sea rise will have on the island's fresh water lens cannot be determine at this stage. However, one thing is certain is that Niue will not be able to cope with the current capabilities and resources. Any large scale contamination to the fresh water lens will have a significant impact on the island's livelihood and Niue will need, in the very near future, seriously look at establishing alternative plans to harness other sources.

Establishing a rainwater catchments legislation for all households would be the easiest and cheapest method in a long run. In the early eighties a policy was approved for all new buildings and extensions to have a minimum of 400 gallons water storage tank as back up and also no household to be connected direct from the system, but fed from the header tank. The implementation of the policy was more difficult than first anticipated and the authority allowed the direct connections to the households. It was more a cost factor that the policy became just an empty policy. However, the policy is still current.

Community rainwater catchments and concrete holding tanks where once were the main source of fresh water during dry periods were allowed to rot away and some already demolished. The old concrete tanks can be anything from 50 to 120 kilolitres and these can be repaired as community backup fresh water reservoirs. However, the government cannot fund the repairs from its own recurrent budget.

## **Theme 3 – Awareness**

(Advocacy, Political Will, Community Participation, Environment Understanding, Gender)

Often people become too complacent with the way of life that sometimes we only act when problems occur. Understanding ones environment and community participating in protecting it can only lead to achieving positive outcomes. The political will to establish policies and ultimately legislation towards protecting the environment must have the approval and backing of the people.

Some regional organisations have had in the past years provided technical and financial assistance in running awareness programs in special television footages, radio, float parades, singing competitions, poster competitions. Both the public and the schools took part in most of the programs which water was sometimes included as part of the overall theme.

Awareness programs exclusively for water campaigns, were mostly run in the schools. The young generation was especially targeted as we believe that through these young people, the older generation who are so set in their habits, might change their ways and also as future leaders of the country the message in look after the environment would become natural and that its just part of life.

Funding to continue these awareness programs is the main hurdle at this stage. With no continuity there is a potential for the young generation to adopt the bad habits of the older generation.

The Water Supply Management is continuing to dialogue with the Education Department Management to include in the school curriculum campaign against water wastage and contamination of the ground water lens.

## **Theme 4 – Technology**

(Appropriate Technologies for Water Supply and Wastewater Treatment, Demand Management and Conservation, Human Resource)

Sustainable Development for small island nations can only be achieve through having appropriate technology, human capability, natural resources and financial capability, sadly Niue rely heavily on External Aid for development.

Niue is very fortunate to already have a water works infrastructure in place and it would be fair to say that the current infrastructure can comfortably sustain a population of about 5,000.

However, having mentioned the above, maintaining the infrastructure requires a skilled labour force and appropriate equipment.

Loosing most of the island's academics and skilled trades people to New Zealand and Australia does have an impact on the island's ability to properly manage and monitor conservation practices. The demand is quite high considering the population and managing the water resource is important to the sustainability and quality of the resource.

Appropriate measures had already been established to avoid over pumping of any one particular water bore which might cause salt intrusion into the fresh water lens. One interesting theory was that, the island can have no rain for about seven years concurrently before the island can experience problems with salt water intrusion into the fresh water lens.

There are only seven personnel employed under the Water Supply Division of Public Works Department and who are responsible for managing the division on a daily basis.

The leak detection program established and implemented in 1997 have had some very positive outcome. The division is responsible for all repairs in private homes, free of charge. The annual cost for all the repairs has steadied at about ten thousand dollars since 1999. It was estimated that about 40% savings in electricity after about two years since the program was established and has steadied at that level ever since. The Water Supply Division is optimistic that a further 10% savings can be achieved.

Water is pumped un-treated to all consumers. It is hoped that with concerted effort and co-operation from all concerned parties in managing and avoid contaminating the underground fresh water lens, fresh water can continue to be pumped un-treated to the consumers. However, regular testing of the artesian water is recommended.

### **Theme 5 – Institutional Arrangements**

Currently although there is a Water Resource ACT already passed by Government in 1996, the enforcing of the ACT cannot be legally carried out until there is a regulation in place.

The previous government for political reasons rejected the regulation and the water utility is still trying to convince the current government that the protection of our water resource and proper management cannot be carried out unless the regulation is legalised.

The main stumbling block was the issue of ownership of catchment areas. Enforcing the ACT will deprive the land owners of the right to use their land for housing constructions or land based activities that might pose a threat to the groundwater lens. Understandably, the land owners would like some sort of compensation.

There was some dialogue with the landowners of government purchasing for the crown waterbore and water reservoir sites but was temporarily suspended.

The "User-Pay System" cannot be implemented without government support. However, Public Works Department, Water Division will continue to push for legalising the regulation in order to enforce the Water Act. We have a very clear framework, which is one of the advantages of being small, and there is no clear boundaries between urban and rural areas. I regard Niue as all rural

There has been some support for the re-introduction of "Rainwater Catchment Policy" , but still the political support is lacking.

### **Theme 6 – Finance**

Financing of the current supply of water to the people is still under the governments recurrent budget. There was also funding support from aid donors towards upgrading the village systems but has been becoming difficult to rely on this source.

Generating revenue from the User Pay Service needs the support of the government which would, if not all, offset operational and other costs.

There is a question of installation costs as against revenue because of the population. In the case of Niue, there is a question mark of whether the introduction of affordable water rates, in whichever form, can be financially sustainable.

#### **4.0 OBJECTIVES, ACTIONS ALREADY UNDERTAKEN, FUTURE ACTIONS NEEDED**

##### **Objectives:**

- To improve the supply of adequate quality water to the people
- To adopt an effective measure to address the vulnerability of the Island freshwater supply during natural disaster
- Profiling of the underground water lens
- Government approval of Water Resource and Regulations to legalise and enforcement of the Water Resources ACT 1996.
- To develop and adopt effective education awareness programs in the communities in protecting the islands main water source from contamination
- To include Water Awareness programs in the school Curriculum.

##### **Actions already undertaken:**

- Improvement of the Public Water Supply services through effective leak detection programs
- Have carried out awareness program in schools and communities
- Water Resource ACT approved in 1996 by Cabinet
- Drafting of the Water Regulations
- National Waste Management Plan in place
- Rainwater Catchment Policy
- Biological Quarterly Testing of Total Coliform and E. Coli bacterial

##### **Future actions needed:**

- Modelling of the Groundwater Lens
- Water Quality testing equipments
- Re-introduce and enforce the Rainwater Catchment Policy
- Legalising the Water Regulation
- Enforcing the Water Resource ACT 1996
- Establishing of the Water and Wastewater Committee
- Implement the National Waste Management Plan
- Capacity building and training
- Carrying out effective awareness program in community
- Implementation of the awareness program in schools

## 5.0 CONCLUSION

Addressing and satisfactorily finding solutions to all water related concerns would very much depend on the corporation of the government's, water utilities, NGO's , but most importantly the support and securing of funding assistance from the aid donors.

The external donors funding agencies having vested a lot in the region in addressing water concerns but the region still needed that support.

It is also clear that the government should take a leading role in bringing a message to the people “ that water is an essence of life” and should be protected and conserved.

The Water Unit, Public Works Department will endeavour to improve the supply of adequate quality water to the people of Niue. Enforcing the Water Resource ACT is a priority, but equally as important is the profiling of the groundwater lens.

It is clear that all stakeholders should contribute in consultation processes and this can be achieved in forming a “Water Committee” with equal representation from the government and private sector.