



Government of the Republic of Kiribati

National Plan and Strategies for Sustainable Water Management and Use

Draft 10 Year Water Resources Plan For Discussion

Coordinated by the National Water and Sanitation Committee
Under the Office Te Beretitenti

August 2006

This Plan has evolved over a period of 14 years starting with the UNDCP Draft 10 Year Master Plan in 1992 and revisions by the Water Engineering Unit in the Ministry of Public Works and Utilities in 2000. These draft plans have been comprehensively revised under the EU Pacific Water Governance Project, coordinated by SOPAC. It was developed by Ian White, Australian National University, with advice from Tony Falkland Ecowise, Environmental, and Marc Overmars, SOPAC. It involved substantial inputs from:

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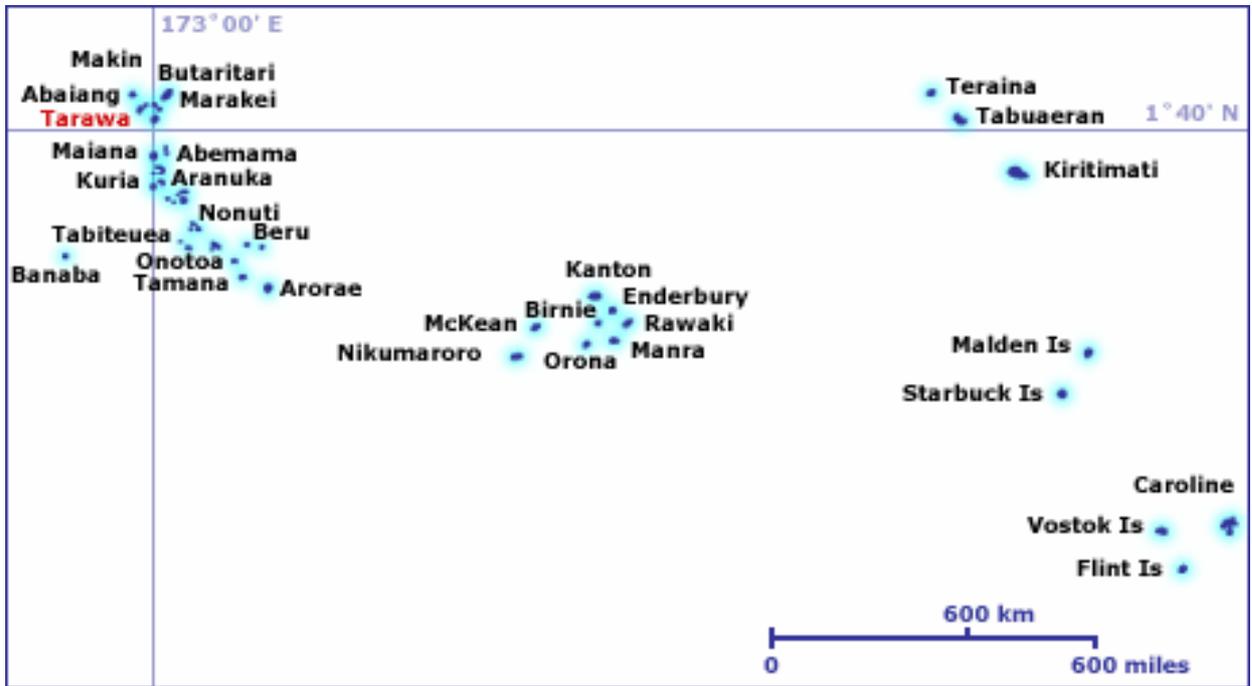
Preface

Water is a vital, strategic resource that underpins human well-being, health, cultural and spiritual values, sustains environments and provides development opportunities. The nature of coral islands and atolls, demographic trends, climatic variation and change and the impacts of human activities all combine to impose significant risks to water supplies for island communities and their environments. The challenges faced in the water and sanitation sector in small island states are amongst the most difficult in the world.

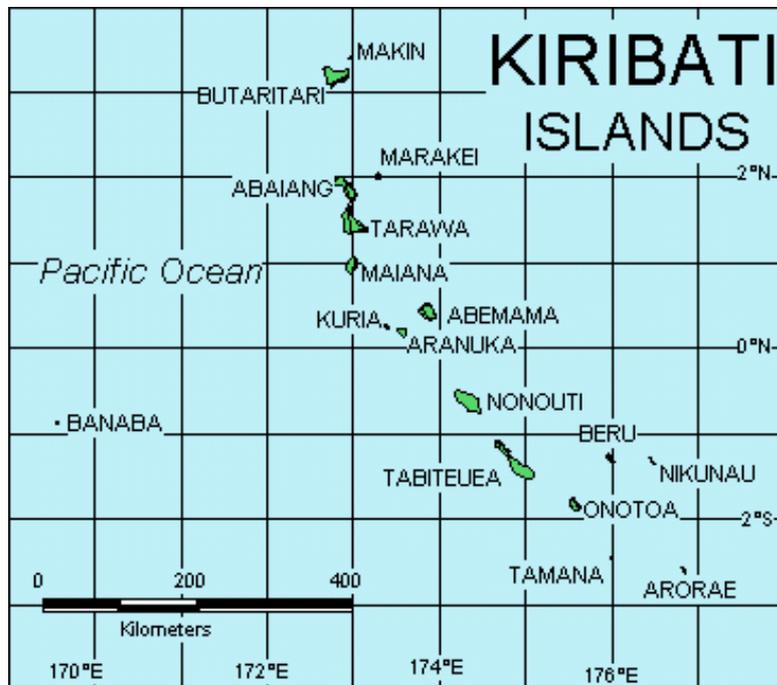
Infant mortality rates in Kiribati due to water-borne diseases and lack of adequate hygiene are amongst the worst in the Pacific. Water-borne diseases also have substantial social and economic costs amongst adult populations. Previous reports have identified the need for policy formulation, better coordination and clearer identification of roles and responsibilities in the water and sanitation sector and the involvement of the community in planning and management. Draft Master Plans for the water and sanitation sector have existed and been revised for over a decade but have not been ratified. The draft National Water Resource Policy provides a firm basis for the complete revision of plans and strategies for the water and sanitation sector. for the next decade.

The draft “*National Plan and Strategies for Sustainable Water Management and Use*” describes plans and strategies to address priority needs in the water and sanitation sector. It is based on the Draft National Water Resource Policy “*Water for Healthy Communities, Environments and Sustainable Development*” which expresses the vision of the people of Kiribati for the future of water and sanitation in the country. This in turn relied on the results of national consultations conducted under the Kiribati National Consultation on Sustainable Water Management, conducted as a lead up to the Pacific Regional Consultation on Water in Small Island Countries in 2002, and the extensive consultations carried out throughout the Gilbert Group for the National Adaptation Program of Action, Kiribati Adaptation Project Phase I in 2004. It also is built on the Kiribati Water Sector Road Map developed under the 2004 Asian Development Bank technical assistance project, *Promotion of Effective Water Management Policies and Practices*. This draft plan describes planned objectives, strategies and priorities to help guide future interventions and investments.

The water and sanitation sector is at critical stage. The “business-as-usual” approach is not adequate to deal with the increasingly complex and vital issues being faced in the sector. Commitment to common action based on an integrated sector-wide approach that incorporates a whole-government and community partnership is necessary. Difficult decisions may be required in the short-term if longer-term benefits are to be achieved. The challenge for government, industry and communities is to build on past experiences and to develop plans, policy, legislation strategies and a phased programme of actions that deliver sustainable water and sanitation systems that provide adequate and safe water and sanitation services that improve the health of the community, protect the environment and encourage development opportunities.



Atolls and Islands in the Gilbert, Line and Phoenix groups, Republic of Kiribati



Atolls and Islands in the more heavily populated Gilbert Group, Republic of Kiribati

Abbreviations

| | |
|--------|----------------------------------------------------------------|
| ADB | Asian Development Bank |
| AGO | Attorney General's Office |
| ACIAR | Australian Centre for International Agricultural Research |
| AMAK | Kiribati Women Federation |
| AusAID | Australian |
| CC | Chamber of Commerce |
| EU | European Union |
| ECD | Environment and Conservation Division (MELAD) |
| EHU | Environmental Health Unit (MHMS) |
| KANGO | The Kiribati Association of NGOs |
| KAPII | Kiribati Adaptation Project Phase II |
| MCTTD | Ministry of Communications, Transport and Tourism Development |
| MELAD | Ministry of Environment, Land, and Agricultural Development |
| MEYSD | Ministry of Education Youth & Sport Development |
| MFED | Ministry of Finance and Economic Development |
| MHMS | Ministry of Health and Medical Services |
| MISA | Ministry of Internal and Social Affairs |
| MLPID | Ministry of Line and Phoenix Island Development |
| MO | Meteorology Office (MCTTD) |
| MPWU | Ministry of Public Works and Utilities |
| NCC | National Council of Churches |
| NEP | National Economic Planning (MFEP) |
| NSAID | New Zealand Aid |
| OB | Office Te Beretitenti (the President) |
| OICWSP | Outer Island Community Water Supply Project |
| PUB | Public Utilities Board |
| PWD | Public Works Division (MLPID) |
| RPU | Rural Planning Unit (MISA) |
| SAPHE | Santitation, Public Health and Environment Improvement Project |
| SOPAC | South Pacific Applied Geoscience Commission |
| UNCDF | United Nations Capital Development Fund |
| UNDP | United Nations Development Program |
| WEU | Water Engineering Unit (MPWU) |

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1: INTRODUCTION

1.1 International Goals for Water and Sanitation

The UN General Assembly, in its Millennium Declaration in 2000, resolved “*to halve by the year 2015 the proportion of the world’s population who are unable to reach or afford safe drinking water*” and “*to stop the unsustainable exploitation of water resources*”. The World Summit on Sustainable Development in Johannesburg in 2002 also set a new target of “*halving the proportion of people who do not have access to basic sanitation by 2015*”. These global goals are particularly relevant to population centres and outer islands in small island nations in the Pacific where provision of adequate supplies of appropriate quality water is a major challenge. In 2004 the Government of Kiribati adopted a policy of to make outer island water supply systems sustainable, consistent with the Millenium Declaration.

1.2 Regional Imperatives

Freshwater resources in small island nations in the Pacific are amongst the most vulnerable in the world to human and climate influences. This is particularly so in low-lying atolls, which rely on shallow groundwater. Limited quantities of safe groundwater, increasing demands, seawater intrusion, pollution from human and animal wastes, high rates of infant mortality due to water-borne diseases, social and economic costs of gastroenteritis, over-extraction, lack of demand management and limited resources and capacity are typical of the problems faced. Urbanisation and the impacts of climate change impose additional threats to the resilience of island populations in coping with these challenges. In these countries, water is a fragile, strategic resource on which communities and economic growth depend, and whose security needs to be assured.

As a precursor to the Third World Water Forum (3rdWWF) in Kyoto in 2003, the Pacific Regional Consultation Meeting on Water in Small Island Countries at Sigatoka, Fiji Islands, 29 July – 3 August 2002 identified the following key issues, concerns and constraints:

- Freshwater availability

- Increasing demands for water.
- Water quality degradation in surface and groundwater catchments, with consequent down gradient impacts on human health and the environment.
- Insufficient knowledge of island freshwater resources.
- Insufficient education, training and capacity in water resources.
- Inappropriate technology and methods, in relation to rural water supplies.
- Catchment and groundwater reserve management issues.
- Vulnerability of water resources to natural hazards, climate variability and change;
- Insufficient community education, awareness and participation;
- Water leakage and other losses including wastage in distribution systems;
- Legislation, policy, planning and administrative issues;
- Role of donor agencies and financing organizations in water resources projects.

It was found that in many small island communities significant deficiencies in monitoring and assessment of water resources prevent small island nations from properly planning, developing and sustainably managing their limited and vulnerable water resources. The meeting identified that there was generally no systematic, coordinated approach to address these deficiencies.

The *Pacific Regional Action Plan on Sustainable Water Management*, which resulted from that meeting, was endorsed by all Pacific Island Nations Heads of State during the Pacific Island Leaders meeting in Auckland in 2003, and presented at the 3rdWWF in Kyoto. The Action Plan called for broadly-based national water visions, design of capable institutions, national water action agenda and plans, empowerment of communities, and integrated investment plans. It recognised that both behavioural change and long term collaboration and partnerships between governments and communities were essential for improvement.

1.3 National Priorities for Water and Sanitation in Kiribati

In the Republic of Kiribati, numerous Government of Kiribati (GOK) supported projects have emphasised the major and continuing challenges in ensuring that island communities have access to safe and adequate freshwater and opportunities for economic development. Approximately 43.5% of the national population of over 92,400

people lives on urban South Tarawa with population densities as high as 15,000 people/km². Mortality rates for children under the age of 5 years in Kiribati due to water-borne diseases are amongst the highest in Pacific Island Nations (Table 1.1).

Table 1.1. Mortality rates in 2005 for children under the age of 5 years in Pacific and selected countries (Source Country Health Information Profiles, 2005-WHO).

| Country | Infant mortality rate (/1000) | Infant mortality rate caused by Diarrhoeal diseases (/1000) |
|--------------------------------|-------------------------------|-------------------------------------------------------------|
| Kiribati | 49 | 10.7 |
| Papua New Guinea | 67 | 10.3 |
| Marshall Islands | 52 | 7.3 |
| Fiji | 16 | 1.7 |
| Tonga | 21 | 2.1 |
| Samoa | 25 | 2.4 |
| Solomon Islands | 34 | 3.0 |
| Federated States of Micronesia | 19 | 1.5 |
| Malaysia | 10 | 0.54 |
| United States | 6 | 0.006 |
| Australia | 3 | 0.003 |

These vital challenges involve sometimes island-specific, health, technical, economic, social and cultural issues that are interrelated and cut across traditional sectoral administrative divisions. In the past the issues in urban South Tarawa have tended to dominate priorities in the water and sanitation sector. Outer islands, however, have problems that are also pressing. In some islands the availability and quality of freshwater remains to be assessed.

The very high incidence of diarrhoeal diseases, particularly amongst young children on South Tarawa, led to the GOK requesting Australian assistance in upgrading the sanitation and water supply systems on South Tarawa. AIDAB's Pacific Regional Team

conducted a field appraisal of the proposal in 1993. It concluded that the problem in South Tarawa was critical and that it should be addressed in as comprehensive manner as possible if sustainable and effective development is to be achieved. It recommended a multi-disciplinary, coordinated, long term (at least 10 years) program with multiple components being conducted in parallel rather than by implementing individual components and with annual budgets of several million (1990) dollars.

The main issues the Team identified were water supply systems, sewerage systems, sewerage disposal in non-sewered areas¹, solid waster disposal and population aspects including population density, resettlement and education programs. The Team recommended that community health, education, water supply, sanitation, appropriate technology, institutional strengthening and management aspects needed to be considered in a coordinated approach and that the GOK should develop suitable strategies and policies for addressing the issues.

In a statement to the Maneaba ni Maungatabu (Kiribati Parliament), on the opening of its fifth session on October 31, 1994, Te Beretitenti (The President) of the Republic, presented an outline of the Government policy on all areas of its responsibility. Those policies that had direct or indirect implications for the water sector of Kiribati were:

- Strong emphasis is placed on the improvement of living standard, particularly health, employment opportunities and education, of an I-Kiribati.
- Resources and efforts will be directed towards developing subsistence and employment opportunities, and improving living conditions.
- Efforts to reduce population growth will continue.
- The resettlement programme will continue to be developed, new sources of livelihood explored, and basic essential services ensured and expanded.
- Efforts to promote Kiritimati Island as a focus of development will continue.

The *Draft National Water Plan*, developed with assistance from the United Nations Department of Technical Cooperation for Development (UNDTCD) in 1992, and updated in

2000 by the Water Engineering Unit of the then Ministry of Works and Energy, identified some of the urgent national issues in water management that needed to be addressed. The most important were the need for national policy guidelines in order to develop priorities and to coordinate the water sector. It also pointed out that authority for overall water resources management had not had been vested in any Government authority and that competence for water resources management and conservation was not identified in any of the then directions assigning Ministerial responsibilities. This was partly addressed in the *Directions Assigning Ministerial Responsibility*, August 2003.

The Kiribati National Consultation on Sustainable Water Management, conducted as a lead up to the Pacific Regional Consultation on Water in Small Island Countries in 2002, identified the continuing need for adequate supplies of safe drinking water and for better coordination of the water sector. The consultations throughout the Gilbert Group conducted for the National Adaptation Program of Action, Kiribati Adaptation Project identified 10 water and sanitation -related priority strategies in the top 25:

- Water pumps/pipes to get water from good source to settlement areas and homes
- Protect water wells
- Assess and locate available water on the islands
- Water conservation at home (including awareness raising)
- Improve sanitation, construct toilets
- Water conservation in piping systems
- Install rainwater tanks
- Install desalination plant
- Collect water from further away in the bush
- Proper use of land

The Asian Development Bank (ADB) Technical Assistance Project, *Promotion of Effective Water Management Policies and Practices* in 2004 which excluded South Tarawa because of the then ongoing ADB Sanitation, Public Health and Environment project,

¹ In outer islands with low population densities, people defecate on the beach. In highly urbanised South Tarawa about 60% of the population still continue this practice. Most families have shallow, open dug wells to supplement water supplies and many keep pigs, dogs and chickens and some have pit latrines so the potential for contamination is large.

developed a 20 year Kiribati Water Sector Road Map that set out strategies and a long-term action programme. Strategies were identified under four key areas:

- Water resource assessment and monitoring
- Community assessment, consultation and participation
- Institutional arrangements and policy framework
- Water and sanitation development and arrangement.

The strategies were arranged under 8 projects within these areas. A central initial 12-month task proposed was the development of national policies and procedures for the improvement of operation of the water sector.

The Kiribati National Development Strategy 2003-2007 includes some policies and goals of direct relevance to the water sector:

- Raise the quality of life by improving supply and quality of water.
- Ensure sustainable use of water resources,
- Promote community participation for better use of water resources,
- Provide sound infrastructure and services at reasonable costs,
- Rehabilitate and expand existing water supply systems,
- Improve collection, storage, treatment and distribution of water,
- Rehabilitate the sewerage and sanitation system and improve its operation and management,
- Improve maintenance standards for government assets, and
- Ensure that all future construction projects comply with the Environment Act.

Finally, The Cabinet decision in XXX 2004 to make outer island water supply systems sustainable provides a clear policy direction but one that needs to be imbedded in a broader national water policy framework.

The above provide the basis for summarising a list of priorities for the water and sanitation sector:

- Increase per capita supplies of safe freshwater to improve health;

- Control demands for water and decrease losses from reticulation systems and storages;
- Protect groundwater sources and rainwater stores from contamination;
- Improve sanitation;
- Increase rainwater harvesting;
- Increase community understanding of and participation in the water and sanitation sector;
- Move towards sustainable water supply systems;
- Improve assessment and monitoring of island freshwater resources;
- Increase capacity in water resources planning and management;
- Develop and implement appropriate technology for rural water supplies and sanitation services.
- Improve risk assessment for water resources to climate variability and change;
- Review and improve legislation, policy, and administrative issues;
- Set the agenda for donor agencies and financing organizations in water resources and sanitation projects.

1.4 This Plan

This *National Plan and Strategies for Sustainable Water Management and Use* aims to respond the identified priorities and government agenda in Kiribati's water and sanitation sector and to provide a framework for the sustainable supply of appropriate quantities water of adequate quality and sanitation services to meet community, health, environmental and development needs and to benefit all I-Kiribati. This Plan cannot be seen in isolation and builds on a number of earlier assessments, studies, and documents.

This *National Plan and Strategies for Sustainable Water Management and Use* framework elaborates specific strategies in order to guide the medium-term (10 year) development of the sector, and to provide a way of identifying how best the resources of the Government, NGOs, private sector, community organisations , donor and loan agencies may be best invested in technology appropriate to our local circumstances. .

It is intended that implementation of the Plan will be monitored and assessed through a set of indicators and milestones.

The objectives of this plan are to:

- Implement Government policy in the water and sanitation sector
- Establish a basic framework for the orderly planning, development conservation and use of water resources and the provision of adequate sanitation services;
- Ensure the good quality and sufficient quantity of drinking water through the protection of water resources and safe disposal of human waste
- Establish sustainable water supply systems
- Increase community understanding of and participation in water and sanitation planning and management
- Establish a system for monitoring outcomes and the regular review and updating of the plan.

2: ORGANISATIONAL SETTING FOR THE WATER SECTOR

2.1 Ministerial Responsibilities

Water and sanitation cut across traditional sectoral boundaries so that no single ministry entity has complete responsibility for the water sector and sanitation sectors in Kiribati. It is however a vital and strategic sector that requires coordination.

2.1.1 Office Te Beretitenti

The *Directions Assigning Ministerial Responsibility* (5 August 2003) includes “Ministerial Coordination” and “Cabinet taskforces Chairmanship” in the responsibilities of Office Te Beretitenti (the President, OB). The strategic national importance of water and health indicates that government and community activity in water and sanitation should be coordinated by the OB within the National Strategic Policy and Risk Assessment Unit (NSPRAU). The role of the NSPRAU is to:

- Provide support to Cabinet and the President on Cabinet Memoranda
- Review national policies of strategic national importance and of long-term risk;
- Facilitate inter-ministry coordination on specific issues of national importance;
- Oversee disaster and crisis management arrangements.

The *Directions Assigning Ministerial Responsibility* (5 August 2003) also specify particular line Ministry responsibilities in water:

- Minister for Public Works and Utilities – water management; sewerage systems
- Minister for Health and Medical Services – health inspectorate services and environmental health
- Minister for the Environment, Lands and Agricultural Development – environment and conservation; waste and pollution management.

2.1.2 Ministry of Public Works and Utilities - Public Utilities Board

The Public Utilities Board (PUB) was established on 1st July 1977 to coordinate and manage water supply and sewage disposal in urban South Tarawa. The PUB is a Government owned corporation under the Ministry of Public Works and Utilities responsible for power generation, water supply, and sewerage. The PUB's Board of

Directors are directly accountable to the Minister for Public Works and Utilities. Regulations under the PUB Act permitted the declaration of water reserves over major groundwater sources in South Tarawa. These prohibit settlement and allow eviction of existing dwellers and land owners from the Reserves. In South Tarawa the lands overlying the freshwater lenses in Buota, Bonriki, and Teoraereke were declared Water Reserves. Teoraereke is no longer used as a freshwater source in South Tarawa because of continued encroachment by human settlement which is a continued threat to all water reserves because of increasing settlement pressures in South Tarawa and limited available land area.

2.1.3 Ministry of Public Works and Utilities - Water Engineering Section

The Water Engineering Unit, WEU of the Ministry of Public Works and Utilities was established in March 1986, to coordinate Outer Island water project activities by conducting investigation of new water supply schemes, preparing designs and estimates, preparing project documents for funding submissions, implementing and managing outer islands water supply projects (except Kiritimati). WEU has water technicians in all inhabited outer islands except Canton. WEU has recently been delegated responsibility for overall water resources management in the country, including South Tarawa and Kiritimati. This responsibility includes water resource assessment, monitoring, planning, controlling demand and the provision of water supplies in rural areas. The Ministry of Public Works and Utilities also has responsibility for establishing building regulations that include installation of rainwater collection systems.

2.1.4 Ministry of Health and Medical Services

In the late 1960's responsibility for water supply in the Outer Islands was under the then Ministry of Health and Family Planning. In 1985, this was transferred to the then Ministry of Works and Energy, firstly to the PUB but then to the newly established Water Engineering Section. The Ministry of Health and Medical Services retains the responsibility for monitoring the quality of drinking water and for the provision of sanitary facilities to the villages outside South Tarawa which includes construction of pit toilets.

2.1.5 Ministry of Environment, Lands and Agriculture Development

The Environment and Conservation Division within the Ministry of Environment, Lands and Agriculture Development is responsible for carrying out Environmental Impact

Assessment on major water resource developments, sanitation and waste disposal projects to assess their impacts on the environment. In addition, it has responsibility for ensuring the appropriate protection of groundwater reserves, of ensuring the conservation of freshwater sources and assessing the implication of climate change on freshwater and associated land resources. The Lands Division of the Ministry is responsible for the oversight of lease agreements with landowners on water reserves in South Tarawa.

2.1.6 Island Councils and the Ministry of Internal and Social Affairs

Island Councils play a key role in the implementation of rural water and sanitation schemes. A UNDP/UNCDF Outer Islands Community Water Supply Project (OICWSP) was undertaken in 73 villages in 13 islands of the Gilbert Group in the 1990's. The project reached an agreement between the Water Engineering Unit and Island Councils that Councils involved in the project should take responsibility for the basic maintenance of hand pumps, and contribute voluntary labour and local materials. In addition, the Island Council sanitary aides, who were employed by the then MHFP network, were recruited as water technicians by the then MPWU and are responsible for regular quality control and water supply in the villages. All Councils come under the Ministry of Internal And Social Affairs, MISA.

2.1.7 Other Ministries

In addition to those with direct responsibilities in the water and sanitation sector, other ministries have influence, interests and responsibilities in the water and sanitation sector. Funding water projects and on-going maintenance costs as well as cost recovery programmes in the water sector are Ministry of Finance and Economic Development (MFED). Water supply and sanitation services in the Phoenix and Line Groups of islands are run by a Public Works Department under the Ministry of Line and Phoenix Islands Development (MLPID). Climate and especially rainfall monitoring and measurement is the responsibility of the The Meteorology Office, within the Ministry of Communications, Transport and Tourism Development (MCTTD [MO]). Finally outer island water supplies and sanitation and their attendant development opportunities are of special interest to the Rural Planning Unit, MISA. In addition, community groups and organisations such as the Kiribati Women Federation (AMAK) also fall under MISA.

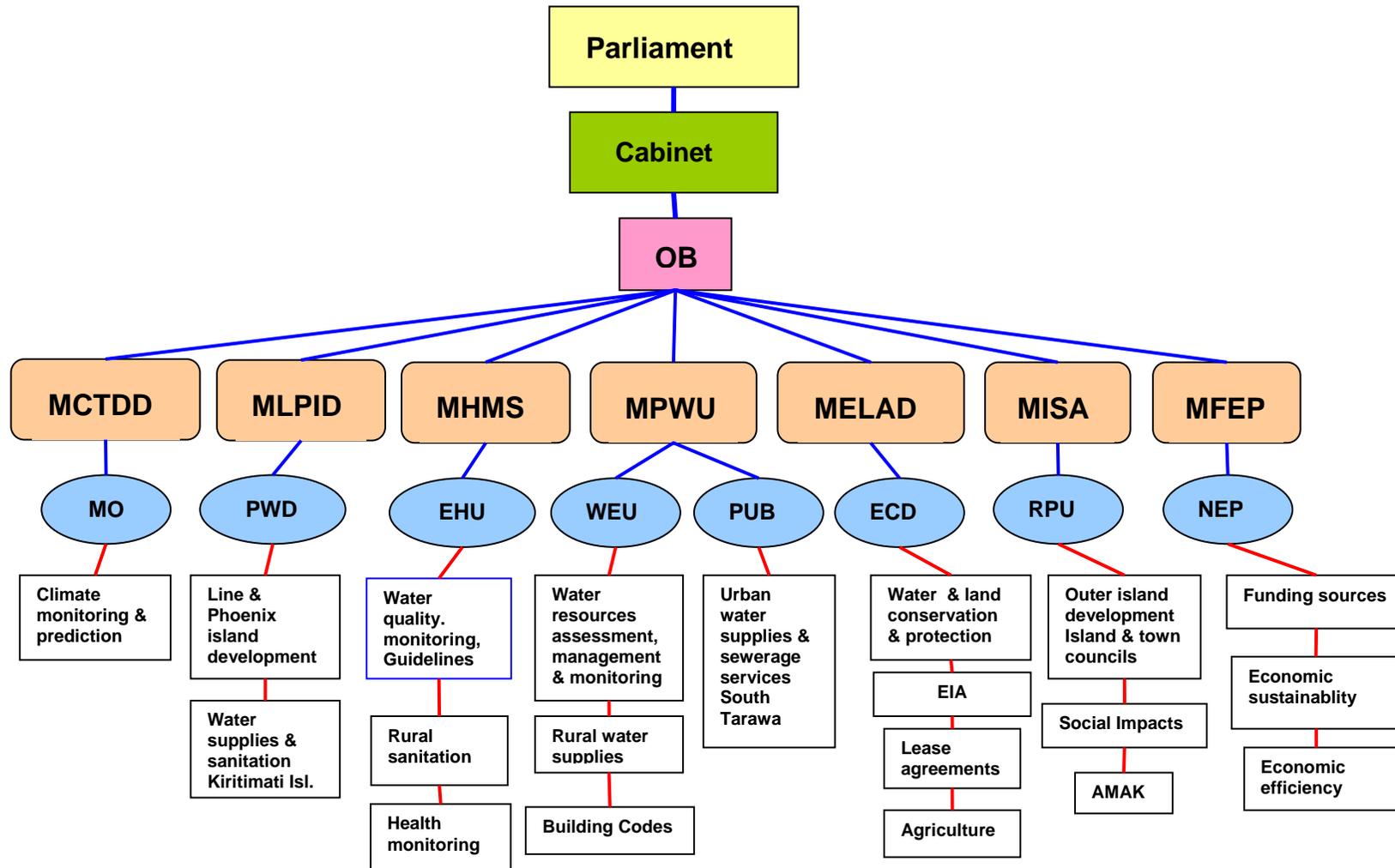


Fig. 1.1 Kiribati Water Sector Organisational & Responsibility Diagram

2.2 External Organisations

A number of external organisations have contributed to the development of the water and sanitation sector in Kiribati. The New Zealand and Australian Governments contributed to the development of a reticulated water supply system for South Tarawa sourced from groundwater in the early 1970's and later in the mid 1980's. The Australian government, through AIDAB, constructed a salt water sewerage system for Betio, Bairini and Bikenibeu in South Tarawa from 1978 to 1983. AIDAB also funded assessments of groundwater resources in Tarawa and Kiritimati.

Assistance from the UNDP/UNDTCD produced the first Draft National Water Plan in 1992 and the UNDP/UNCDF OICWSP Project started in the early 1990's provided safe water supply systems for rural areas and outer islands in the Gilbert Group. As part of this project draft water legislation and organizational arrangements for the water sector of Kiribati were also proposed. An UNESCO IHP project in the late 1990's reassessed recharge estimation to improve estimates of sustainable groundwater yield and an ACIAR project determined the impacts of pumping and landuse on the freshwater lens as well as introduced methods for minimising conflict over water resource use.

In the early 2000s the ADB funded Sanitation, Public Health and Environment, SAPHE, Project saw improvements to the water treatment and reticulation and waste disposal systems in Tarawa. This project also included a substantial community consultation and education component. At the same time a range of technical assistance projects were undertaken under AusAID, ADB and EU funding.

As a precursor to the 3rd World Water Forum, The South Pacific Applied Geoscience Council, SOPAC and the ADB sponsored a series of national consultations throughout the Pacific that culminated in the *Pacific Regional Action Plan on Sustainable Water Management*, endorsed by all Pacific Island Nations Heads of State. This provided a framework for improvements in the water sector in many small island countries. Following on from this an ADB technical assistant project *Promotion of Effective Water Management Policies and Practices* helped develop a road map for the Kiribati water

sector for the next 20 years focussed mainly on outer islands. The road map proposed the establishment of a National Water and Sanitation Committee (or a number of committees) to advise the Government on all aspects of water supply and sanitation for all of Kiribati.

As a response to the potential impacts of climate change, Kiribati and Colombia were the first countries in the world to be selected under the Global Environmental Facility (GEF) Strategic Priority on Adaptation. Extensive community consultations carried out throughout the Gilbert Group for the World Bank-GEF supported National Adaptation Program of Action, Kiribati Adaptation Project Phase I in 2004 identified 50 seven out of the top ten priorities were water and sanitation-related. The World Bank implemented project *Kirabati Adaptation Program – Pilot Implementation Phase (KAPII)*, supported by AusAID and NZAID has recently been signed and involves a significant number of projects on water related to the Kiribati road map.

EU sponsored project run by SOPAC, the Pacific Water Governance Project has chosen Kiribati as a pilot study to implement practical water governance. This project is designed to be a precursor to KAPII and seeks to facilitate the setting up of a National Water and Sanitation Coordination Committee involving a whole-of-government and community approach to integrated water and sanitation management.

While all these largely externally-driven projects have proved beneficial to Kiribati, they have tended to be relatively short term and many were addressing immediate problems. What is needed is a strategic ordering of priorities and actions within a broader framework so the longer term issues can be addressed in a systematic fashion. This plan is aimed at providing such a framework.

2.3 Whole-of-Government Approach

The challenges faced in the water and sanitation sector in small island states are amongst the most difficult in the world. Numerous studies have recommended a cross-sectoral approach involving better coordination of the water and sanitation sectors. An earlier whole-of-government water committee eventually faltered due to loss of initial

enthusiasm after project initiation; disputes over what Government Ministry should be the lead Ministry, a traditional reluctance to share knowledge, and a lack of clear definitions of responsibilities and terms of reference. Instead project-specific multi-ministry steering committees have been formed, but these lack continuity and strategic direction and are driven by the goals of the project rather than national priorities. It has been proposed to reform a National Water and Sanitation Coordination Committee under the National Strategic Policy and Risk Assessment Unit, OB which will include the Ministries listed in section 2.1 as well as NGO organisations.

The suggested goal of the committee is:

To coordinate, facilitate and enhance Government and community activities in the water and sanitation sector to ensure that communities have access to water of suitable quality and appropriate quantities and to appropriate sanitation to meet all reasonable health, environmental, and development needs.

Its suggested principle aims are to:

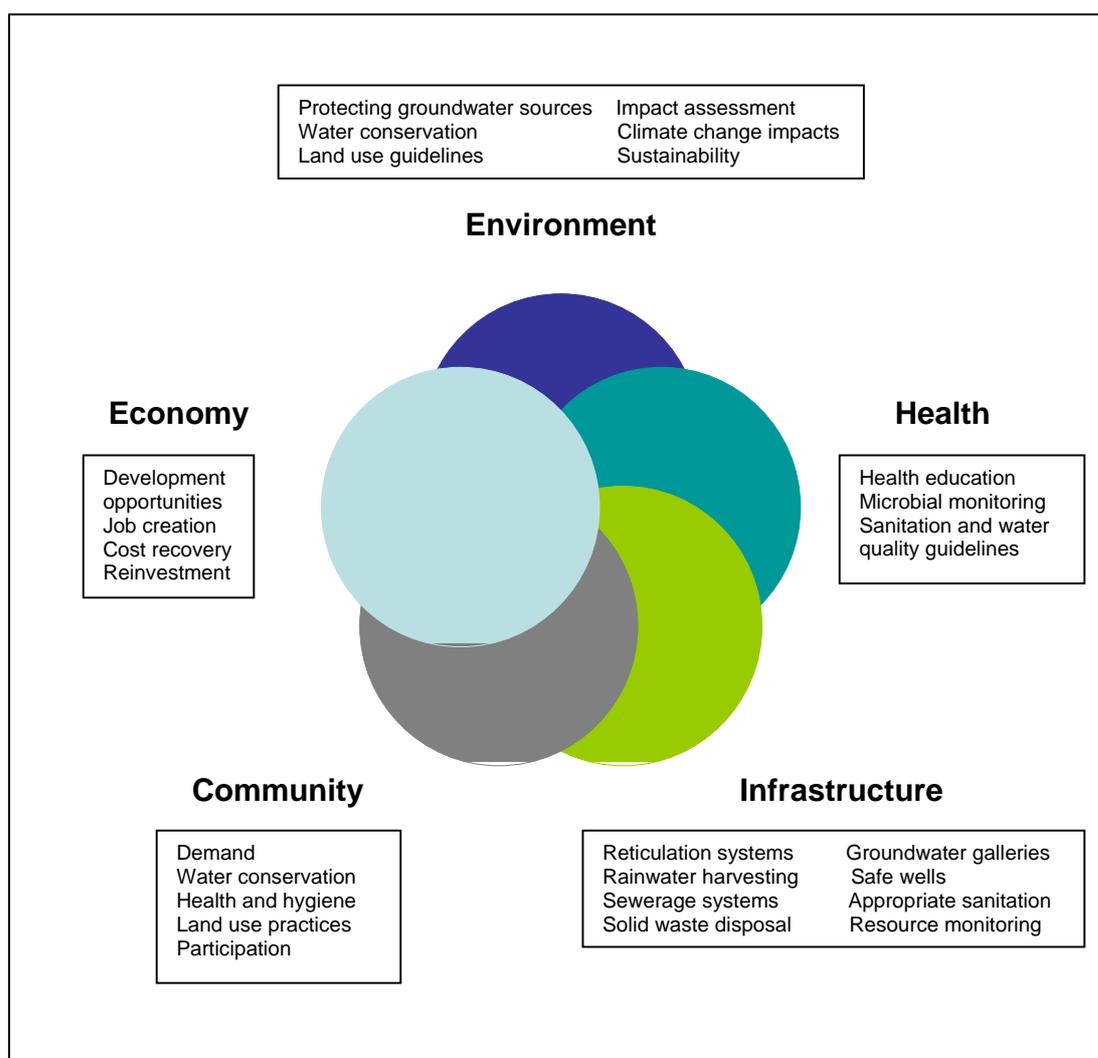
- 1. Promote the sustainable management, conservation and use of water and related land resources by coordinating and enhancing Government and community activities and involvement.*
- 2. Facilitate and enhance initiatives to raise the quality of life by improving the quality and availability of safe water and decreasing illness and infant mortality rates due to water-borne diseases.*
- 3. Coordinate and facilitate information gathering and assessment, policy and instrument development, and identification of other needs for the water and sanitation sector throughout Kiribati.*
- 4. Provide broadly-based strategic advice to the Government of Kiribati, the community, non-government and donor organisations on the nation's water resources and sanitation service and their management and use.*

One of the suggested terms of reference of the Committee is to *facilitate and coordinate the review and assessment of water and sanitation-related policies, regulations, plans, instruments and standards and make recommendations to Government on policy*

development, program implementation and potential improvements. The successful promulgation and monitoring of this plan depends crucially on this national Committee.

2.4 Interdependencies in the Water Sector

A soundly based Water and Sector Plan must recognise the strong interdependencies between nationally important factors which cannot each be considered in isolation. Community needs and behaviour are intimately linked to the economy, health, the environment and infrastructure. These interdependent factors are overlain by national policy, legislation and regulation.



The interdependencies and complexities in the water and sanitation sector is best managed as a complete sector, bringing together all aspects under one coordinated, strategic action programme under a framework of Integrated Water Resource

Management, IWRM.

2.5 Identified Problems and Concerns

National consultations and numerous studies have identified and widely discussed concerns in the water and sanitation sector. Some are partly addresses in policy documents and cabinet decisions. Identified challenges to be addressed can be summarised as follows:

| Water resource challenges | Water and sanitation service challenges |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> • Limited freshwater resources • Sustainability of water harvesting • Impacts of settlement and landuse on water quality • Fragmented control, management and protection of water resources • Increasing demands for water resources • Insufficient knowledge and understanding of water resources nationwide; • Social and environmental impacts of water abstraction proposals • Land ownership in water reserves • Limited use of rainwater harvesting • Lack of community understanding and appreciation of responsible water management • Lack of conservation incentives • Limited community involvement in water resource management and protection • Impacts of human waste • Lack of national water policy and legislation • Impacts of storm surges on groundwater • Predicted impacts of climate change | <ul style="list-style-type: none"> • Highly variable and inadequate levels of service • High levels of leakage and unaccounted for water loss at household levels • Low levels of cost recovery and non-financially viable operations • Excessive water demand and usage by users • Limited available and relevant technical skills and capacity • Insufficient knowledge and understanding for planning and management • Inadequate attention paid to wastewater disposal and sanitation measures • Inadequate appreciation of responsible water management and use by users • Limited community involvement in water service planning, management and delivery • Uncoordinated development across • Deteriorating water quality and quantity at supply sources • Landuse in water reserves • Safe water supplies and sanitation in rural areas |

The next section reviews current information on the sources and demands for water.

3: WATER SUPPLY AND SANITATION SERVICES IN KIRIBATI

This section provides an analysis of the current situation in factors influencing the delivery of water and sanitation services to communities throughout Kiribati. In presenting this analysis it is intended to set a baseline against which achievements can be measured and related to policy outcomes and targets. This analysis also assists in identifying what needs to be addressed.

3.1 Geographic Setting

The geographic setting of Kiribati provides significant constraints on the provision of water and sanitation services. The Republic of Kiribati consists of 32 low lying coral islands and 1 raised coral island in 3 main island groups scattered over three million square kilometres of sea in the Central Pacific, between 4° N and 3° S, and 172° E to 157° W. Twelve of these islands are currently unoccupied. The total land area is 810.8 square km. The Gilbert Group, with a land area of 285.7 square km, contains the capital on Tarawa atoll. South Tarawa is highly urbanised and has 43% of the nation's population. Island population densities there are over 15,000 people/ square km.

There are 8 largely uninhabited islands with a total land area of just 28.6 square km in the Phoenix Group, located some 1750 km east of Tarawa. The only inhabited island of the Phoenix group is Kanton (Canton) Island with the land area of 9 square km. The Line Group has 8 islands with a total land area of 496.5 square km, extending over a north-south 2,100 km long line, located at a distance of between 3,280 and 4,210 km east of Tarawa, and beginning 800 km south of Hawaii. This Group includes the largest island in Kiribati, Kiritimati Island, a designated growth centre, having an area of 388.4 square km. Population is scattered throughout 169 villages in the outer islands. There are a total of 14712 households throughout the nation with an average household size of 6.5 people.

Most islands are usually not more than 2 km wide, and, except for the raised island of Banaba, are not more than 6 m above sea level. The climate is tropical. Weather is controlled by the seasonal movements and annual variations of the Intertropical Convergence Zone and the Equatorial Doldrum Belt. Long droughts of up to 16 months

are common with an average frequency of 6 to 7 years. Average yearly rainfall in the Gilberts ranges from 1,300 mm in the south near the equator to 2,000 mm on Tarawa, and over 3,200 mm in the northernmost islands while it is less than 1000 mm in Kiritimati in the Line Islands. Rainfall is highly variable from year to year. Table 3.1 summarises the known rainfall and coefficients of variability for atolls and islands in Kiribati.

Table 3.1 Mean annual rainfalls and coefficients of variability in Kiribati

| Atoll/Island | Island Group | Annual Rainfall (mm) | Coefficient of Variability |
|------------------------|----------------|----------------------|----------------------------|
| Banaba | Gilbert | 1,847 | 0.60 |
| Makin | | 2,821 | 0.37 |
| Butaritari | | 3,107 | 0.29 |
| Marakei | | 2,053 | 0.45 |
| Abaiang | | 2,158 | 0.41 |
| Tarawa (North) | | 1,949 | 0.50 |
| Tarawa (South) | | 1,949 | 0.49 |
| Maiana | | 1,543 | 0.55 |
| Abemama | | 1,518 | 0.49 |
| Kuria | | 1,518 | 0.64 |
| Aranuka | | 1,518 | 0.67 |
| Nonouti | | 1,507 | 0.65 |
| Tabiteuea (North) | | 1,418 | 0.59 |
| Tabiteuea (South) | | 1,418 | 0.74 |
| Beru | | 1,355 | 0.57 |
| Nikunau | | 1,242 | 0.63 |
| Onotoa | | 1,230 | 0.59 |
| Tamana | | 1,425 | 0.65 |
| Arorae | | 1,826 | 0.51 |
| Kanton | Phoenix | 958 | 0.80 |
| Orona (Hull) | | 1171 | 0.60 |
| Enderbury | | <i>1000</i> | |
| Birnie | | <i>1000</i> | |
| Rawaki (Phoenix) | | <i>1000</i> | |
| Manra (Sydney) | | <i>1000</i> | |
| Mackean | | <i>1000</i> | |
| Nikumaroro (Gardner) | | 1319 | 0.57 |
| Teraina (Washington) | Line | 3,021 | 0.36 |
| Tabuaeran (Fanning) | | 2,107 | 0.43 |
| Kiritimati (Christmas) | | 974 | 0.75 |
| Malden | | 676 | 0.91 |
| Starbuck | | 700 | |
| Vostock | | 800 | |
| Millennium (Caroline) | | 900 | |
| Flint | | 1,000 | |

Rainfalls in italics for uninhabited atolls in Table 4.1 are estimated.

Four locations Beru, Butaritari, Tabiteuea North in the Gilberts and Kiritimati island in Line Islands group have been chosen as Growth Centres in the latest National Development strategy. While a survey of the water resources of Kiritimati has been completed those of the others are poorly known.

This geographic setting imposes significant problems for the delivery of water and sanitation services across widely dispersed and isolated communities, from low density subsistence populations to high density urban areas, with mostly limited land areas (except Kiritimati), increasing populations and with significant climate variability.

3.2 Sources of Water

The permeability of coral sands and limited land area in most island in Kiribati combine to make groundwater and rainwater the predominant sources of freshwater with a very minor contribution by desalination. The situation is between urban systems on South Tarawa and Kiritimati and rural systems in the rest of the islands. A comprehensive inventory of the number and type of the various shallow domestic groundwater wells and rain tanks located in villages and islands together with water consumption data does not exist, and there is no orderly monitoring and recording of their status or water quality. The MHMS statistics for 2002 (as reported by WHO) claim that 77% of the urban population have access to safe water supplies and 59% have access to improved sanitation. This is hard to reconcile with official census statistics which claim that 60% of people on South Tarawa defecate on the beach or in the bush. Even in urban areas with access to reticulated water, almost all households use domestic groundwater wells to supplement water supplies.

3.3 Groundwater

3.3.1 Reticulated groundwater systems

Both South Tarawa and Kiritimati have reticulated groundwater systems. In South Tarawa, Water is pumped from long collection galleries installed in two fresh groundwater lenses from two islands on the southeastern corner of Tarawa, Bonriki (22 galleries) and Buota (6 galleries). Extensive hydrogeologic investigations have been carried out in Bonriki and to a lesser extent in Buota and the sustainable yield of the groundwater system is known.

The combined discharge of the infiltration galleries is chlorinated and air sparged to remove H₂S before being chlorinated and transferred to the 30 km long 225 mm diameter rising main for distribution via elevated tanks to communities along the island chain. In Betio at the end of the rising main, water is stored in ground level reservoirs and is chlorinated again before redistribution. Because of the large number of squatters, water is also distributed via tankers. Few domestic connections have water meters and the collected fees do not cover operational and maintenance costs.

The freshwater reticulation system in South Tarawa has been recently upgraded under the ADB SAPHE project. This has reduced losses from the rising main. As part of that project 2,229 500 L storage tanks were installed at households throughout South Tarawa. These had a constant flow trickle feed and were designed to supply about 500L/household/day and to allow pumping for 24 hours/day. Difficulties in maintaining supply and tampering with tanks mean that water is now only supplied to households at 500L every alternate day. To cope with the limited quantity of water available, the PUB's new water quota is 250 litres per households per day, irrespective of the number of people living in a household. Households are expected to use well water, rainwater and the PUB water tanker service to meet other water demands. Plans to extract additional water from other islands in North Tarawa appear problematic because of land ownership and compensation issues and costs. The two-fold problem is to supply people in South Tarawa with adequate quantities of safe reticulated water while developing strategies that encourage decentralisation.

The protection of groundwater sources has been a major problem because of encroaching settlements which has seen the abandonment of groundwater sources on Betio and Teoraereke. In order to address this, regulations under the PUB Act permitted the declaration of water reserves over major groundwater sources in South Tarawa. These prohibit settlement and allow eviction of existing dwellers and land owners from the Reserves. This has generated on-going friction between the communities affected especially at Bonriki and the government. Currently the government pays commercial rent to the landowners. Additional problems arise because of community

concerns over the impacts of pumping on the productivity of traditional subsistence crops such as coconuts and taro.

Reticulated water supplies on Kiritimati Island are also sourced from groundwater at several locations throughout this, the largest island in the country. Water supply systems exist at Decca, supplying Ronton and the public buildings of Tabakea; Banana supplying Main Camp, Banana and the Fisheries building near Kiritimati Airfield; and Boran (Poland). The public water supply system on Kiritimati was upgraded in the late 1990's with new infiltration galleries, pumps, distribution pipelines, header tanks and disinfection systems being installed together with constant trickle flow 500 L tanks with water meters for households. Installation of a reticulation system at Banana has been delayed pending the relocation of Banana away from the groundwater source. The Government is the landowner in Kiritimati, so ownership problems over declaration of water reserves do not arise. Problems still persist with the water supply systems in Kirimati.

3.3.2 Infiltration galleries

Fresh groundwater in low coral islands exists as a thin freshwater lens, usually less than 30 m thick, overlying seawater. Extraction of groundwater using conventional vertical groundwater wells causes salinisation of extracted water due to the up-coming of the underlying sea water. In order to overcome this, long horizontal infiltration galleries, placed just below the groundwater surface are used to skim freshwater from the lens.

On Kiritimati Island there are several open trenches, each 150 m long and approximately 3 m wide, dug to about 0.5 m below the water table. The sides of the trenches are supported usually by slabs of coral stone and trenches are sometimes covered by a sheet metal or timber boards. Water was pumped from the trench. These systems are open to contamination and are less easier to construct than buried infiltration galleries.

The infiltration galleries installed in South Tarawa, Kiritimati and in some outer islands, unlike conventional wells are designed to skim fresh water from the top of the freshwater lens minimising watertable drawdown and saline water up-coming from underlying seawater. The gallery systems are located close to the thickest parts of the groundwater

lens and a few hundred meters away from dwellings the village to minimise risk of pollution. Power for pumping either is supplied by mains electricity (Bonriki, Buota, Kiritimati?), diesel (Kiritimati?) solar (outer islands, Kiritimati) or wind power (Kiritimati). Most of the solar power pumps installed in outer island galleries by the UNDP/UNCDF are not operational.

3.3.3 Domestic water wells

Open hand-dug wells are the traditional method used by the I-Kiribati to obtain freshwater for their basic needs from shallow groundwater lenses. Wells 1-2 metres in diameter, are excavated to less than 0.5 m below the watertable. The walls are usually supported by stones and the well is left uncovered, for people to scoop up water as needed. Because they are open, the water is exposed to contamination and algal blooms. Villagers also tend to dig these wells close to their dwellings, and pigs and other domestic animals. The introduction of pit latrines, in numerous villages as part of a sanitation program poses significant risks for drinking water from shallow hand-dug domestic wells. These domestic wells are a major source of water in both urban and rural areas. There is almost no monitoring of the quality of water in domestic wells.

Improvements have been introduced in the construction of dug wells by the villagers. The walls are supported by concrete rings, that are placed up to about half a metre above ground level, a concrete apron is cast around the well to impede the seepage of mud from the surface into the water, and a concrete cover is placed over the well, with an opening for drawing water out with a bucket or completely covered and using a simple but almost fool-proof Tamana pump to draw water. This type of well is intended to serve five households and it has been estimated that there are about 1600 of them in the country. A major impediment with these wells is that they are usually still located close to dwellings and pit latrines.

In order to decrease contamination, the UNDP/UNCDF project installed covered wells located up to 750 m from rural villages with water drawn through pipes to the village using a hand suction pump. These systems usually consisted of up to three pumps sucking through the same transmission main, with each pump designed to supply 10 families, at

an assumed per capita consumption rate of 30 litres/day. Maintenance of the heavily used hand pumps proved to be a major problem and none of these systems are now operating.

Where the distance from the well and galleries to the village exceeds 750 m a solar powered pump has been installed near and discharges into 2-3 13.5 m³ capacity tanks. Water is distributed to up to 6 stand-pipes in the village and each tank is intended to supply up to 20 households. Again, maintenance of solar pumps was a problem and few of these systems remain operational. There has been no systematic monitoring of water quality from these more sophisticated rural village water supplies.

3.4 Rainwater Harvesting

The westernmost island of the nation, Banaba, relies almost totally on the collection of rainfall for its water supply. There, however, the sophisticated rainfall collection and storage scheme installed in the 1960's under the British Phosphate Commission is in urgent need of restoration. In some other islands, such as Kiebu in Makin, and atolls Nonouti, also in the Gilbert Group, groundwater is brackish particularly during droughts and rainwater harvesting is important. Rainfall collection has been used in Kiribati for many years, but it is regarded, at best, as a supplementary source of water. The potential for increasing rainwater harvesting is large and enactment of building regulations obliging house owners to construct gutters and tanks for the harvesting of rainwater is recognition of its importance.

There are several reasons why rainwater is underused. Firstly, the cost of rainwater collection and storage is beyond many particularly in outer islands, so that building regulations are largely ignored. Secondly, there is a cultural preference for the taste of groundwater. Thirdly many of the roofs of buildings using traditional materials such as pandanus thatch are less than ideal for rainwater harvesting. Fourthly, many conventional sized affordable rainwater tank systems would fail during the frequent droughts. Fifthly people do not realise the risks in drinking untreated groundwater. Despite the regulations, many public buildings with large suitable roof areas, such as maneaba's, continue to be constructed without rainwater collection and storage systems. There is currently little information about the quantity, condition or quality of rainwater harvesting systems.

A Loans Scheme for private individuals to install rainwater harvesting and/or sanitation facilities, has been operating in South Tarawa since 2002. This scheme based on a revolving fund was established under the SAPHE Project. In the years 2002 to 2004, about 710 loans were given for roof rainwater harvesting and storage equipment. Repayments of loans of up to a maximum of \$1,500 are guaranteed by ensuring loans are given only to people with regular incomes and by recovering regular repayments from fortnightly salaries. The scheme is administered by a Loans Manager within the Kiribati Housing Corporation. Under KAPII it is planned to attempt to trial this scheme in rural areas and outer islands.

3.5 Subterranean Caves and Bulk Importation

The raised island of Banaba uniquely has fresh water pools in subterranean caves that could serve as an emergency source of water in times of severe drought. In addition, during the British Phosphate Commission period water was imported in phosphate boats and stored in large 4,500 m³ storage tanks on the island. Water in these tanks is currently unused because of the presence of rust suspension in the water.

3.6 Bottled Water

Bottled water was produced in South Tarawa from a privately owned reverse osmosis plant and seawater. This is no longer operational due to quality problems. Currently, between 300 and 500 m³ of bottled water is imported annually. Its price of about \$1.40/L means that it is beyond the reach of squatters and subsistence communities.

3.7 Desalination

Public reverse osmosis desalination plants capable of producing up to 100 m³/day have been installed in South Tarawa and Banaba. Only that on Banaba is currently partially operational. Problems with maintenance, the expense of spare parts and the costs of supplying power limit the longevity of desalination in many developing Pacific Island nations. It is much cheaper and less risky to firstly develop groundwater extraction and rainwater collection systems

3.9 Sanitation

In rural areas it was the customary practice to defecate on the beach or from over-sea latrines and allow the tide to remove waste. In high population density urban areas this practice presents problems. Before 1977, the only toilet facilities on South Tarawa were septic tanks, pit latrines and over-sea latrines. Following the outbreak of cholera in 1977, the Australian Government funded the Tarawa Sewerage Project. This Project, which ran from 1978 to 1982, provided sewerage services for communities in Betio, Bairiki and Bikenibeu. Because of the limited freshwater supply, reticulated seawater is provided for toilet flushing, and sewerage is macerated by pumps and disposed untreated via ocean outfalls at the three locations. There is some evidence to suggest that a plume of sewerage can swing around the western edge of the Betio and enter into the lagoon. Because of limited coverage of this system, the unsuitability of some of the public toilets and the large number of squatters on South Tarawa, about 60% of people in South Tarawa, according to census data, continue to defecate on the beach despite it being declared as illegal to do so.

In rural areas as part of a WHO program, pit latrines have been installed with assistance from MHMS Environmental Health Unit. Pit latrines are excavated down to the shallow groundwater and are supposed to be installed at least 30 m down gradient from the nearest water well, on the ocean or lagoon edge of the island. There is no monitoring to determine if any contamination from these sources has occurred. Composting toilets, which do not pollute groundwater, have been trialled in South Tarawa and Kirimati but there is currently strong community resistance to composting toilets.

3.10 Water Demand

Water is used by the community for consumption and washing, for agriculture, and for industry. In agriculture, water is used by traditional crops, such as coconuts and babai (swamp taro), vegetable and fruit crops and livestock, mainly as pigs and chickens. It is estimated that there are almost 2.5 pigs and 4 chickens per household given an estimated total number of over 34,000 pigs and 55,000 chickens in the country. Apart from coconuts, there is little information on fresh water use in either agriculture or in industry, although it is estimated that 2 pigs require the water of one human. Mature

coconut trees are estimated to use approximately 150 L/day of groundwater. The highest priority is to meet the demand for safe drinking water for people.

There is little information on actual water use from various available water sources in either urban or rural areas. In urban areas, per capita demand is growing as acquisition of water using devices such as washing machines increases. In the absence of that information, estimates of the daily per capita potable water requirements have varied between 30 and 100 L, with the WHO recommending a lower limit of 40L/person/day. Well water, even when brackish or polluted is accessed for washing and other non consumptive uses. Freshwater reticulation and Outer Island supply projects have aimed at supplying design demands of 30 to 50L/person/day. The key information then has been the expected number of people in any community. Population census data have been collected in the country at intervals since 1921. Figure 3.1 shows the growth of total country, Outer Island and urban population in South Tarawa up to the latest census in 2005.

Since 1963 the average exponential growth rate of the total population of Kiribati has been 1.8% while that of Outer Islands has been 0.9% and that of South Tarawa is 4%. These figures reflect the impacts of internal, inward migration from Outer Islands to South Tarawa. If these trends continue, the total population of Kiribati is expected to exceed 113,000 and South Tarawa is likely to have well over 60,000 people by 2020. If a low estimate of consumption rate of 50 L/person/day of reticulated water is assumed for South Tarawa then demand has already exceeded the current estimated sustainable yield of Bonriki and Buota water reserves. In some of the Outer Islands and North Tarawa, there are relatively large fresh groundwater reserves capable of sustaining higher populations than currently, however, in most cases the actual quantities of water available for extraction remain to be ascertained.

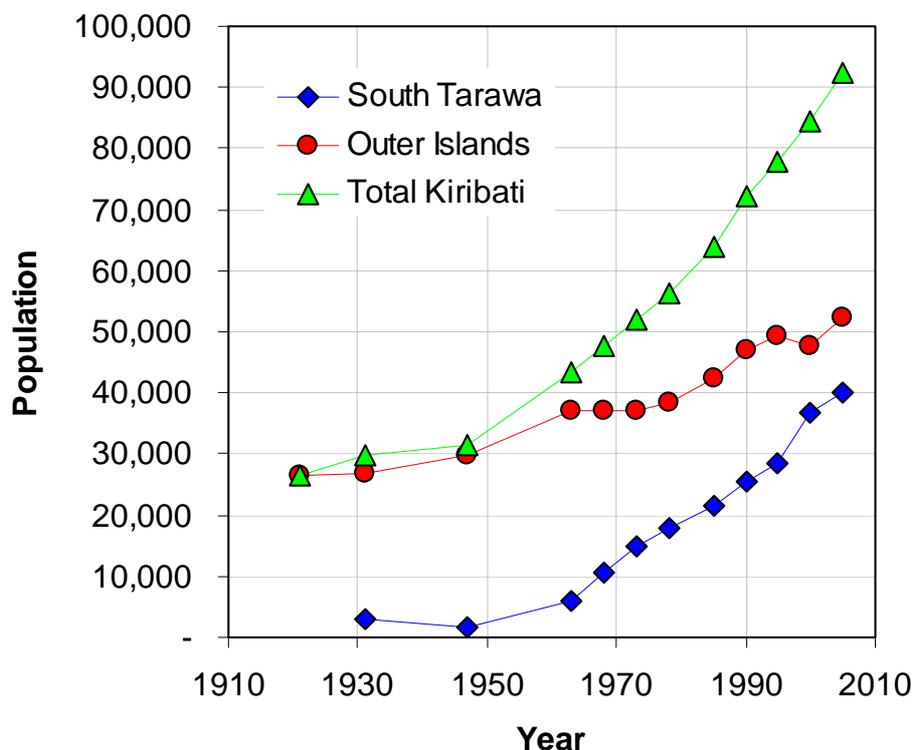


Fig. 3.1 Growth in total Kiribati, Outer Island and urban South Tarawa populations.

Table 3.2 provides a crude estimate of the sustainable yield of atolls in Kiribati and an estimate of the maximum population that is likely to be sustained by fresh groundwater resources. This is based on the estimated sustainable yields in ADB 2004 study *Promotion of Effective Water Management Policies and Practices*.

In Table 3.2 it has been assumed that the design per capita demand is 100L/person/day. This figure allows for a small quantity of water for agriculture and industry. The current PUB design figure for South Tarawa is 250 L/household/day. The assumption here is that safe water will be the limitation for population support. No attempt has been made to determine if these populations would encroach on water reserves, thereby limiting the volume of safe groundwater available. In these rough estimates of the sustainable fresh groundwater extraction rates and maximum populations that can be supported by groundwater resources, no allowance for rainwater harvesting has been made.

Table 3.2 Estimated sustainable groundwater yield and estimated maximum population sustained by groundwater assuming a demand of 100 L/person/day.

| Atoll/Island | Island Group | Estimated Sustainable Yield (m ³ /day) | Estimated Max Population | Population 2005 |
|-----------------------------|----------------|---------------------------------------------------|--------------------------|-----------------|
| Banaba | Gilbert | ? | ? | 301 |
| Makin | | <i>2790</i> | <i>27900</i> | 2388 |
| Butaritari | | <i>8755</i> | <i>87550</i> | 3267 |
| Marakei | | <i>626</i> | <i>6260</i> | 2738 |
| Abaiang | | <i>2766</i> | <i>27660</i> | 5478 |
| Tarawa (North) | | <i>4620</i> | <i>46200</i> | 5704 |
| Tarawa (South) | | 2000 | 20000 | 40212 |
| Maiana | | <i>1315</i> | <i>13150</i> | 1909 |
| Abemama | | <i>3156</i> | <i>31558</i> | 3398 |
| Kuria | | <i>1867</i> | <i>18665</i> | 1081 |
| Aranuka | | <i>1263</i> | <i>12634</i> | 1158 |
| Nonouti | | <i>1722</i> | <i>17216</i> | 3176 |
| Tabiteuea (North) | | <i>2025</i> | <i>20248</i> | 3603 |
| Tabiteuea (South) | | <i>537</i> | <i>5370</i> | 1306 |
| Beru | | <i>1155</i> | <i>11554</i> | 2238 |
| Nikunau | | <i>978</i> | <i>9776</i> | 1912 |
| Onotoa | | <i>404</i> | <i>4040</i> | 1611 |
| Tamana | | <i>480</i> | <i>4795</i> | 869 |
| Arorae | <i>1381</i> | <i>13806</i> | 1254 | |
| Kanton | Phoenix | <i>483</i> | <i>4831</i> | 41 |
| Orona (Hull) | | <i>142</i> | <i>1418</i> | ? |
| Enderbury | | <i>181</i> | <i>1812</i> | 0 |
| Birnie | | <i>68</i> | <i>680</i> | 0 |
| Rawaki (Phoenix) | | <i>227</i> | <i>2270</i> | 0 |
| Manra (Sydney) | | <i>272</i> | <i>2719</i> | 0 |
| Mackean | | <i>181</i> | <i>1812</i> | 0 |
| Nikumaroro (Gardner) | | <i>344</i> | <i>3440</i> | 0 |
| Teraina (Washington) | Line | <i>7268</i> | <i>72682</i> | 1154 |
| Tabuaeran (Fanning) | | <i>6546</i> | <i>65464</i> | 2536 |
| Kiritimati (Christmas) | | 2000 | 20000 | 5094 |
| Malden | | <i>1105</i> | <i>11047</i> | 0 |
| Starbuck | | <i>725</i> | <i>7253</i> | 0 |
| Vostock | | <i>53</i> | <i>534</i> | 0 |
| Millennium (Caroline) | | <i>200</i> | <i>1999</i> | 0 |
| Flint | | <i>340</i> | <i>3398.30137</i> | 0 |
| Total | | <i>57,974</i> | <i>579,740</i> | 92,428 |
| Total (Outer Island) | | <i>55,974</i> | <i>559,740</i> | 52,216 |

Note: Figures in **Bold** represent careful estimates of sustainable yield, figures in *italics* represent crude estimates.

The estimated maximum population of the nation in Table 3.2 that can be sustained by the estimated groundwater resources is about 580,000. From the exponential total population growth curve in Fig. 3.1 it is expected that this population will be reached in the year 2110 if this population growth rate continues. Of the island groups in Table 3.2, The Phoenix group has by far the smallest estimated groundwater sources and accounts for the fact that all but one island in the group are uninhabited. South Tarawa stands out in Table 3.2, since the estimated maximum population sustainable from the groundwater reserves at Bonriki and Buota is half the present population. On South Tarawa, the agricultural demand is smaller and people are expected to supplement their water requirements from domestic wells, many with dubious quality water, and some from stored rainwater. It is emphasised here that the numbers in Table 3.1 are a guide only. The available safe groundwater resources of most of these islands and atolls have yet to be assessed.

4: NATIONAL VISION FOR WATER AND SANITATION

4.1 National Goals and Objectives

In a statement to the Maneaba ni Maungatabu (Kiribati Parliament), on the opening of its fifth session on October 31, 1994, Te Beretitenti (The President) of the Republic, presented an outline of the Government policy on all areas of its responsibility. In this statement strong emphasis was placed on the improvement of living standards of all I-Kiribati, particularly with relation to health and employment opportunities. This emphasis continues to be reflected in the National Development Strategy 2004-2007 which contains a number of goals relating to water and sanitation and protection of the environment. In 2004 Cabinet decided to make outer island water supply systems sustainable and this provides a clear policy direction.

A 20-year water sector Roadmap for outer islands was developed during in 2004 as pa of an ADB technical assistance project. The Roadmap provides key milestones and targets for sector development in four strategic areas:

- 3 Institutional Arrangements and Policy Framework;
- 4 Water Resource Assessment and Monitoring;
- 5 Community Awareness, Consultation and Participation; and
- 6 Water and Sanitation Development and Management.

The highest priority under the first category was the development of national water policy.

4.2 National Water Policy

There is currently no unified national policy on water and sanitation. Rather there are a collection of statements, decisions and interventions which make up the body of policy. Attempting to develop a sector plan in the absence of any unified and policy is difficult. A draft policy has been developed under an EU Pacific Water Governance Project and it will be used as the basis for this plan. The proposed national policy has as its goal:

“To ensure that communities have affordable access to sustainable water supply systems providing water of suitable quality and appropriate quantities and to appropriate sanitation to meet all reasonable health, environmental, and development needs”

4.3 Policy Objectives

| Objective | Comments |
|-----------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. To improve the safety of freshwater supplied from groundwater and rainwater systems. | Illness and death due to water-borne diseases are of great social and economic costs to the nation. Key elements here are improving the protection of water sources, supplying simple, cost-effective methods for treating community water supplies and increasing community understanding of water quality and water treatment. |
| 2. To protect fresh groundwater resources from adverse human impacts. | The protection of groundwater sources used for supporting communities is essential to the planning and management of groundwater supply systems in low islands. This involves questions of appropriate landuses, and appropriate regulatory and management strategies. |
| 3. To sustainably manage all aspects of the use and conservation of freshwater. | Sustainable management and protection of freshwater and associated land resources and controlling demand are essential for addressing declining quantity and quality of water resources, developing environmentally responsible solutions and for guaranteeing future opportunities. |
| 4. To improve knowledge of the quality and quantity of the nation's freshwater resources and demand for them. | To sustainably manage and use water resources it is essential to have reliable, up-to-date information on the stocks and flows of water, on its quality and on current and projected demand for water. A key step is monitoring and analysis |
| 5. To improve knowledge and management of water resources under climatic extremes. | To manage water and sanitation services during climatic extremes, such as droughts, heavy rains and storm surges it is necessary to have information on the onset of extreme conditions |
| 6. To improve outer island water supplies | Outer island water supplies require special attention. The provision of timely assistance, advice and training opportunities is essential |
| 7. To increase community awareness and understanding of water resource and sanitation issues | Greater community awareness and better understanding of water resource and sanitation issues can lead to improvements in health, water conservation and improved participation. |
| 8. To increase community participation in water resource and sanitation management. | Increased participation by the community is essential for strengthening community ownership of water and sanitation systems, for supporting conservation strategies and for building partnerships between government agencies and the public. |
| 9. To increase the use of rainwater harvesting. | Rainwater is an underused resource despite existing building regulations. Increase in the use of rainwater can reduce risk of contamination and increase resilience. |
| 10. To develop instruments to help manage demand and allocation of water. | Controlling increasing demand and ensuring equitable allocation of water is an essential step in sustainable water management. A range of policy, regulatory and economic instruments are available to manage demand and allocation and to use water efficiently. |
| 11. To review and revise, where necessary, all legislation, regulations and organisational responsibilities relevant to water and sanitation. | Improving the efficiency, transparency, responsiveness, and coordination of government institutions in water and sanitation will improve planning, services and partnerships with the community. |
| 12. To ensure cost effective planning, operation and maintenance of water supply and sanitation systems. | Effective planning operation and maintenance of water supply systems is essential to efficient service provision, the reduction of unaccounted for water losses, and cost recovery. |

4.4 Intended Policy Outcomes

The national water policy is intended to address priority concerns in both the short and long term. Expected outcomes from policy implementation are aimed at attaining sustainable management of water and related land resources with increased community participation and the sustainable delivery of safe water services.

| Expected outcomes of national water resources policy implementation |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> • Improved public health due to a decrease in water-borne diseases; • Equitable access to safe freshwater; • Sustainable water supply systems; • Protection of freshwater resources from adverse impacts of human activities; • Better knowledge of the quantity and quality of fresh water resources, and improved monitoring; • Efficient allocation of water to various users; • Improved risk assessment and management for the water sector; • Greater public awareness of water resources issues; • Enhanced water and sanitation educational programs; • Increased stakeholder involvement in water protection of freshwater sources; • Increased community participation in the conservation and management of water and water sources • More effective governance and clear identification of roles and responsibilities, • Increased ability to respond quickly to water crises; • Strengthened institutional capacity and training in the water sector;; • Improved levels of cost recovery; • Improved access to donor and loan schemes. |

The next sections discuss the current status, assess performance, recommend intermediate targets and milestones, and identify a framework for action to achieve these targets.

5: CURRENT WATER AND SANITATION PERFORMANCE

5.1 Public Health

The main aim of public water supply and sanitation systems is to improve public health, particularly in relation to water-borne diseases. The infant mortality rate due to diarrhoeal disease (Table 1.1) in Kiribati is amongst the highest in the Pacific. In 2005, almost 1 person in 4 was affected by diarrhoea or dysentery to the degree that requires a visit to a clinic. In 2005, 56% of these cases were in South Tarawa and of them 54% came from clinics in the crowded Betio island. Direct links to the contaminated groundwater cannot necessarily be inferred from such statistics, although it appears to be the likely cause. Table 4.3 presents data on recent incidence of presumed water-borne infections.

Table 5.1 Incidence of Diarrhoea and Dysentery at Health Clinics in Kiribati

| Year | 2003 | 2004 | 2005 |
|----------------|-------|-------|-------|
| Illness | | | |
| Diarrhoea† | 11678 | 7451 | 13991 |
| Dysentery | 8781 | 5623 | 8597 |
| Total | 20459 | 13074 | 22588 |

† Diarrhoea is an Indicator and not a disease in itself.

It is estimated that many more people suffer from the effects of waterborne diseases than are reported in the statistics from Health Clinics.

5.2 Equitable Access to Water Supply and Sanitation Services

5.2.1 Access to treated, reticulated water supplies

Only communities in urban South Tarawa and Kirimati have access to treated, reticulated water supplies. Even there, not all communities are served by reticulated water supplies. Table 5.2 summarises the water supply for South Tarawa. About 61% of households there are served by treated water and even for these, water supply is often supplemented by potentially contaminated domestic well water.

Table 5.2 Households with connections to the reticulated water system in urban South Tarawa

| Item | No. of Households |
|-------------------------------------------------------------------------------|-------------------|
| Total number of households in South Tarawa from 2005 census (excluding Buota) | 5238 |
| Households connected to reticulation system | 3,224 |
| Households with new SAPHE connections | 2229 |
| Households with low level taps | 178 |
| Households with open pipes | 817 |

5.2.2 Metered water supplies

A few PUB customers on South Tarawa have old water meters. These are not read and cannot be considered as a contributor to demand management since customers on the reticulated supply system are not charged for water. Only customers of bulk reticulated water delivered by tankers are charged for water. In Kirimati (????), the water supply to households is not metered (???). The installation and reading of water meters is an essential precursor before any demand management and price recovery scheme can be implemented.

5.2.3 Outer Island water supplies

Around 95% of the population rely on domestic water wells even in urban areas with reticulated water. The UNDP/UNCDF OICWSP provided safer water supplies to 73 villages in 13 islands of the Gilbert Group in the 1990's. These used hand pumps or solar pumps to draw water from wells or infiltration galleries that were remote from dwellings. Unfortunately, due to lack of maintenance and operations training, inadequate maintenance, inappropriate equipment, the refusal by villagers to accept ownership of the systems, lengthy delays in processing requests for replacement parts and insufficient resources to purchase new equipment, most of these systems are now no longer operational.

5.2.4 Access to basic sanitation

With assistance from the WHO, XXX??, pit latrines have been installed in YYY rural villages, chiefly throughout the Gilbert Group. The potential for pit latrines to contaminate domestic well water is high and requires investigation. About 40% of people in urban

South Tarawa have access to a saltwater flushed sewerage systems. Table 5.3 shows the number of households in South Tarawa connected to the sewerage system. The remaining population use the traditional beach or bush. Compositing toilets have been trialled in South Tarawa and Kirimati. There is a strong resistance by local communities to the use of composting toilets.

Table 5.3 Households with connections to the saltwater sewerage system in urban South Tarawa

| Location | No. of Households |
|-------------------------------------------------|-------------------|
| South Tarawa from 2005 census (excluding Buota) | 5238 |
| Bikenibeu | ? |
| Bairiki | ? |
| Betio | ? |
| Total Households connected | 2100(?) |

5.2.4 Wastewater treatment and disposal

Sewerage from Betio, Bairiki and Bikenibeu in South Tarawa is macerated by pumps and disposed from three ocean outfalls in these locations. There is some evidence that some of the sewerage plumes from Betio and Bairiki may sweep around the western end of South Tarawa and enter the heavily bathed in lagoon.

5.3 Sustainability of Water Supply Systems

The Cabinet decision in 2004 to make Outer Island water supply systems sustainable provides a clear policy direction. A daft proposal has been prepared to recover the maintenance and operational costs of Outer Island water supply systems. However this only addresses the financial aspects of sustainability. In order to ensure sustainable groundwater extraction rates in Outer Islands it will be necessary to assess island water resources in terms of both quality and quantity and to identify sustainable groundwater extraction rates. It is also clear that village level participation in planning and managing the water supply system is essential for sustainability.

In urban South Tarawa, reliable estimates of the sustainable groundwater extraction rates have been determined for the sources of fresh groundwater for the reticulation system,

Bonriki and Buota water reserves (Table 3.2). The current combined groundwater extraction rate is 2,100 m³/day, 5% above the sustainable rate. Because charges for reticulated water are only levied on bulk tanker-delivered water, the operational and maintenance costs of the water supply system are not covered. A Committee for Water Reserve Management, involving community participation, was established, however it is now defunct and there is little participation of the two urban Town Councils in water supply and sanitation.

5.3.1 Demand management

A current proposal for a three-tiered water pricing scheme with different rates for domestic and industrial users is under consideration for urban South Tarawa. This, however, relies on the presence of currently no-existence water meters to assess water consumption. Under the SAPHE project, water demand was to be controlled by supplying water in a trickle-feed to 500 L household tanks, to limit supply to approximately 50 L/person/day. This has proved ineffective in controlling demand, partly because not all households were supplied with this system and partly because there was no community education and communication program on the use of the system. Currently demand is controlled by supplying water to different urban locations on alternate days.

5.3.2 Environmental impacts

Landowners in water reserves have raised concerns over the impact of groundwater extraction on traditional crops such as coconuts and swamp taro. Extensive testing under the ACIAR project has found that the infiltration galleries meet their design specifications and have much less impact on the level of groundwater than the diurnal tidal cycle. Instead it found that the generally poor performance of coconut trees on the water reserve was due to the senescence of coconut trees and poor management. Swamp taro pits are not recommended on the water reserves because of the potential for the open pits to pollute groundwater. These concerns by landowners point to the need to actively involve the community in the management and protection of water sources.

5.4 Protection of Water Sources

The high transmission rates of coral sands overlying the shallow fresh groundwater systems in most of the islands in Kiribati means that groundwater is easily polluted by surface contamination. Because of this, Regulations under the PUB Act permitted the declaration of water reserves over major groundwater sources in South Tarawa which prohibit settlement and allow eviction of existing dwellers and land owners from the Reserves. In South Tarawa, the lands overlying the freshwater lenses in Buota, Bonriki, and Teaoraereke were declared Water Reserves. Teaoraereke is no longer used as a freshwater source in South Tarawa because of continued encroachment by human settlement. This is a continued threat to water reserves because of increasing population pressures in South Tarawa and the limited available land area for settlement. Currently in Bonriki gravel extraction from the reserve is a particular concern despite being illegal. The the community-government Committee for Water Reserve Management was intended to address such issues.

In Kiritimati ??????

There are no equivalent regulations for the protection of groundwater sources in Outer Islands.

5.5 Improved Knowledge and Monitoring of Water Resources

The Office of Meteorology is responsible for the monitoring, collating and reporting of climate data. Although rainfall data is patchy and incomplete across the country, there are only a few atolls in which rainfall has not been measured (Table 4.1). Table 4.2, however, shows that the quantity of fresh groundwater and the rates at which it can be sustainably extracted are only known in South Tarawa (Bonrini and Buota Islands) and in Kiritimati. In addition, groundwater assessments have also been conducted at Abatao and Tabiteuae in North Tarawa. Knowledge of the quantity of rainwater harvested in urban and rural areas is also incomplete.

The quality of water produced by the groundwater extraction system for supply to the South Tarawa reticulation system is monitored daily by the PUB for chlorine and salinity

levels and periodically for microbiological contaminants(*E. Coli* ?) by the Environmental Health Unit of the Ministry of Health and Medical Services.

The Water Engineering Unit (WEU) of the Ministry of Public Works and Utilities, has the delegated responsibility for overall water resources management in the country, including South Tarawa and Kiritimati. The WEU periodically monitors the condition of freshwater lenses in Bonriki, Buota, Abatao and Tabiteuae and when required the quality of water in outer islands. There is no systematic monitoring of water quality in domestic wells in urban South Tarawa.

The 1998-2001 drought demonstrated that the country does not have protocols in place to warn the government of the potential onset of droughts or their likely impacts on the availability of water resources. Banaba, which relies totally on rainwater, is particularly vulnerable to droughts.

An important deficiency in the current system of monitoring is that there is no central database repository for monitoring and assessment data from urban and rural locations and there is no apparent mechanism for triggering action should values exceed critical levels.

5.6 Community Participation and Involvement

The draft proposal for the National Water and Sanitation Committee includes NGO, community and industry groups in the Committee in order to provide inputs and feedback at the highest level from the community. The Committee has yet to be initiated. The community-government Committee for Water Reserve Management to oversee management of the Bonriki and Buota Water reserves was intended to be a model for Village or Island Water Committees to oversee the management and protection of groundwater sources in outer Islands. Unfortunately, the Water Reserve Committee is now defunct and the Village or Island Water Committees have yet to be formed. Some Village Sanitation Committees have been formed through the Environmental Health Unit of MHMS and with the assistance WHO. Educational and Communication programs???

5.7 Improved Governance

Water governance is the *capability of a social system to mobilise energies, in a coherent way, for the sustainable development, management and use of water resources*. It includes the ability to design public policies that have as their goal the sustainable development, management and use of water resources. It also involves the marshalling of social acceptance and support for them and the development of strategies to implement them. The degree of water governance within a society is determined by:

- The degree of consensus about the linkages between society and water;
- Agreement on the bases for public policy that express those linkages;
- The existence of management systems that can effectively implement policies.

Numerous community consultations in Kiribati and studies have demonstrated a well-developed understanding at all levels of the intimate linkages between society and water. Current water and sanitation policy is *ad hoc* and fragmented and is not embedded within a framework of sustainable development. The draft National Water Policy developed under the EU Pacific Water Governance Project uses previous policy statements and community consultations to develop policy goals and objectives which have as an objective the sustainable development, management and use of water resources.

In order to implement policy, it is necessary to have in place appropriate management systems. Currently, three government departments have explicitly stated responsibilities in water and four others have administrative responsibilities that impinge on the water sector. Previous projects have recommended improved coordination between government ministries and clearer definitions of roles in the water sector. In order to implement policy, it is also necessary to form partnerships with the community and industry. The proposed National Water and Sanitation Coordination Committee is one mechanism for insuring that coordination and partnerships are formed and government policy is implemented.

5.7.1 Legislation and regulation

Another mechanism necessary for the implementation of policy is the enactment of supporting water legislation. While regulations exist specifically for the operation of the

PUB, there is no equivalent set of regulation for Outer Islands. Draft National Water Legislation was drawn up in 1992 and has been with the Office of the Attorney General since that time. It has yet to be enacted.

5.8 Strengthened Institutional Capacity and Training

The current government policy on retirement at age 50 means that staff who have built up considerable experience are exiting the sector. It is becoming increasingly difficult in small island states to attract high school graduates to training for engineering and technical positions. In addition, once trained, graduates tend to seek better paid jobs in overseas countries. There is a real need in the water and sanitation sector to address the training needs of the sector and the retainment of trained students and staff.

5.9 Improving Cost Recovery

5.9.1 Urban reticulated water supply systems

The reticulated water supply system for urban South Tarawa was upgraded under the SAPHE project which was completed in late 2005. The project replaced gallery pumps, installed an air sparging system to remove hydrogen sulphide and a main 400 m³ storage tank and distribution pumps, replaced the rising main to Teaoaraereke, built extra elevated 22 m³ pressure head tanks, and installed 2229 five hundred litre household tanks. There is a considerable investment in water supply assets as listed in Table 5.4.

Infiltration gallery groundwater pumping systems and reticulated systems were installed in Kiritimati under an AusAID funded project in the late 1990's. The water supply assets currently in Kiritimati are given in Table 5.5

5.9.2 Rural and outer Island water supply systems

It is been estimated that the current replacement value of galleries, solar and hand pumps, tanks, taps and pipe systems in Outer islands (excluding Kiritimati) installed under the UNDP/UNCDF OICWSP is around \$8 million.

Table 5.4 Water supply assets and their replacement value for South Tarawa

| Assets | 2006 | Replacement Value (\$) |
|----------------------------------|-------------|-----------------------------------|
| Infiltration galleries and pumps | 28 | ? |
| Chlorination plants | 3 | ? |
| Air-sparging systems | 1 | ? |
| Storage and elevated tanks | ? | ? |
| Rising main length (kilometers) | 25? | ? |
| Rising main diameter (mm) | 225 mm | ? |
| Control valves | ? | ? |
| 500 L household tanks | 2229 | ? |
| Water meters: | ? | ? |

Table 5.5 Water supply assets and their replacement value for Kiritimati

| Assets | 2006 | Replacement Value (\$) |
|----------------------------------|-------------|-----------------------------------|
| Infiltration galleries and pumps | ? | ? |
| Chlorination plants | ? | ? |
| Air-sparging systems | ? | ? |
| Storage and elevated tanks | ? | ? |
| Rising main length (kilometers) | ? | ? |
| Rising main diameter (mm) | ? | ? |
| Control valves | ? | ? |
| Water meters: | ? | ? |

5.9.3 Urban sewerage system

The assets and estimated replacement value of the salt-water sewerage system installed in three locations in South Tarawa is given in Table 5.6. The seawater system used is subject to corrosion problems and the ocean outfalls are at risk of damage during storms.

Table 5.6 Sewerage system assets and their replacement value for Kiritimati

| Assets | 2006 | Replacement Value (\$) |
|--------------------------------|-------------|-----------------------------------|
| Sewerage pumps | ? | ? |
| Elevated salt water tanks | ? | ? |
| Seawater inlets | 3? | ? |
| Ocean outfalls | 3 | ? |
| Sewer main length (kilometers) | ? | ? |
| Sewer main diameter (mm) | ? | ? |
| Manholes | ? | ? |
| :Vacuum pumper | | ? |

5.9.4 Maintenance and operations costs

The PUB is a multi-utility organisation supplying electricity to South Tarawa and lower islands in North Tarawa, and water and sewerage services to parts of South Tarawa. The current government grant to PUB is \$7 million of which diesel fuel charges for electricity generation make up \$6 million. The costs of operating and maintaining the water supply and sewerage services is estimated to be ????. On Kiritimati the estimated annual costs of maintaining and operating the water supply system are estimated to be?????

The Water Engineering Unit in the MPW&U is responsible for operating and maintaining Outer Island (with the exception of Kiritimati) water supplies. The annual operations and maintenance budget for this Unit is ??????.

5.9.5 Water cost recovery mechanisms

The current mechanism for cost recovery for the urban water sector in South Tarawa is through charging for deliveries by tanker of bulk water charged at a rate of \$2.00/m³ for domestic use and \$5.00/m³ for commercial use with a \$10.00 delivery charge. The piped water supply is currently charged at \$10.00 per household per month for domestic water users and \$5.00/m³ for industrial users. The marginal cost of water is currently \$3.80/m³ if

the costs of leasing the water reserves from traditional landowners are taken into account or \$ 2.55 /m³ if they are set aside. In 2005 this charging scheme raised an estimated ??????, less than the operational and maintenance costs for water supply.

In Kiritimati ????????

At present there is no charge for water in Outer Islands due to the breakdown of community water supply systems installed under the OICWSP. Following the Cabinet decision to make Outer Island water supply systems sustainable, the MPW&U developed a policy to *put in place a sustainable water supply system on outer islands that uses solar powered pumps for the extraction and distribution of potable water to households by establishing a revolving fund through the user-fee concept*. The proposal is to charge households \$2/month for the use of the system and to use water technicians with the support of the Island Council and the village to collect the fee. The proposal is currently under review by MISA who are responsible for Councils.

5.9.6 Sewerage cost recovery

The delivery of sewerage services in South Tarawa costs \$XXXX?. The Government has decided that there will be no charge for sewerage services in South Tarawa.

5.10 Performance Monitoring

Performance monitoring in the water and sanitation sector has had a low priority. It relies on the presence of reliable and accurate information. This in turn needs effective mechanisms for data collection and performance measurement. These aspects require strengthening. Any improvements should consider a range of levels from operational aspects to higher-order goals as set out in national development targets.

6: OPPORTUNITIES, ISSUES AND CONSTRAINTS

6.1 Opportunities

6.1.1 A growing awareness

Wide ranging consultations with communities over the past 6 years have identified key problems and concerns. There is a growing recognition of the issues and an emerging consensus on the overall goals.

6.1.2 Building on recent achievements

Significant improvements to water supply infrastructure have been achieved in South Tarawa, Kiritimati and Outer Islands over the past decade through UNCDF, AusAID and ADB projects. These have raised in people's perception the importance of improved water supply and sanitation systems.

6.1.3 Government policy

The Cabinet decision in 2004 that Outer Island water supply systems shall be sustainable provides a clear policy direction and provides the opportunity for cost recovery, promoting the user pay principle to help preserve and conserve water resources.

6.1.4 Improving cost recovery

There is considerable potential for improved cost recovery for urban water systems through the introduction of a three tiered tariff system. This however will require the installation of water meters in most households in South Tarawa. The MPW&U policy to establish a revolving fund for Outer Island water supplies should also improve cost recovery.

6.1.5 Improving urban water system efficiency

The SAPHE project dramatically decreased water losses from the rising main between Bonriki and Teaoraereke. Unaccounted for water remains unacceptably high within village distribution systems, particularly in Betio. Significant gains in efficiency and therefore in cost recovery can be made by reducing levels of unaccounted for water.

6.1.6 Rainwater sources

The revolving fund set up under the SAPHE project to encourage the purchase of rainwater tanks to supplement safe water supply has proved remarkably successful in South Tarawa. The challenge is now to attempt to extend that scheme to rural areas and Outer Islands.

6.1.7 A focal point for water resources

Responsibilities for water resource management have been clarified over the past 4 years. The proposed National Water and Sanitation Coordination Committee is intended to provide a forum and a national focus of both government and community effort on water and sanitation issues.

6.1.8 Promoting community-based management

The *Pacific Regional Action Plan on Sustainable Water Management* has raised the importance building co-operation between government and communities to promote successful and sustainable water initiatives. The community-government Committee for Water Reserve Management to oversee management of the Bonriki and Buota Water reserves was a first step in this process.

6.1.9 Access to external funds

Water is a high priority on the international political agenda. Access to safe water supply and basic sanitation is a key Millennium Development Goal and is reinforced by calls for integrated water resource management. Kiribati has been successful in the past in attracting significant donor and loan funds to support to the sector. Continued success in this area will be dependent on developing effective coordination between government ministries and the community and in developing a national policy and planning framework.

6.2 Issues

6.2.1 Incidence of water-borne diseases

The incidence of water-borne diseases is an indicator that communities, particularly infants in high-density urban areas, do not have access to safe water supplies. While the principal source may be contaminated domestic wells, addressing and lowering the incidence is the highest priority issue for water management.

6.2.2 Equitable access to safe freshwater

Most rural and Outer Island populations currently do not have access to water from protected water sources. There needs to be a greater emphasis on rainwater harvesting and mechanisms to assist in the development of household rainwater tanks need to be further developed.

6.2.3 Sustainable water supply systems

Reliable estimates of sustainable groundwater extraction rates have only been determined for a small number of locations in Tarawa and Kiritimati. At present the maintenance and operation costs of urban and rural water supply systems are not covered by water charges to consumers.

6.2.4 Protection of freshwater sources

Only the current fresh groundwater sources in South Tarawa have regulations aimed at protecting them from contamination. Despite these regulations the groundwater reserves on South Tarawa are still impacted by inappropriate land uses such as gravel mining and squatter settlements. There are no equivalent regulations for protecting water sources in rural areas or Outer Islands.

6.2.5 Improved knowledge and monitoring

There are significant gaps in knowledge on the quantities of groundwater and rainwater available for use and its quality in rural areas and Outer Islands as well as water use patterns by households and water sources in both urban and non-urban locations. In addition an early warning system to advise governments on extreme climatic events, including droughts is required.

6.2.6 Increased community participation

There are currently no mechanisms by which the community can participate in the planning and management of water and sanitation services. Previous attempts have to form a stakeholder committee to improve management of water reserves on south Tarawa have lapsed. Education and communication campaigns are important elements in improving participation and need to be pursued.

6.2.7 Enhanced water governance

Policy provides direction for action. Extensive community discussions have taken place which could inform development of a national water policy. Water policy is currently a collection of poorly connected statements and decisions. There is no comprehensive national water policy although a draft has been developed. It is critical that a national policy be enunciated to provide direction for planning and strategy development. Draft National Water Legislation has been under consideration since 1992 but has not been enacted.

6.2.8 Institutional capacity and training

Attracting, mentoring and retaining young staff in the water and sanitation sector remains a major challenge in small island states. It is important to develop strategies to attract young people into the sector. Water resource planning and management is complex and requires a multi-disciplinary approach and the training requirements need to be addressed in a comprehensive manner.

6.2.9 Cost recovery

The Government heavily subsidises urban water and sanitation. While there are two proposals for improving cost recovery in the water and sanitation sector they are yet to be implemented. Cost recovery and demand management using a three-tiered tariff scheme will require the widespread installation of water meters.

6.2.10 Water resource ownership

Water resource ownership remains an issue of contention. The traditional view of groundwater ownership is that landholders have rights over the groundwater. Land on many islands are exclusively owned by individuals. The government only owns land in Kirimati, and in Betio and Bairik in South Tarawa. Harvesting of groundwater for common use therefore presents problems. The traditional view of water ownership colours people's opinions and is a strong element in the reluctance of people to pay for reticulated water. Because there is no national water legislation dealing with water ownership, it remains a contentious issue. Some villages seek to restrict access to groundwater resources, to control distribution and demand compensation for restrictions on land use. A practical and equitable solution to this issue is urgently required.

6.3 Constraints

6.3.1 Increasing urban growth

The increasing urbanisation in South Tarawa is a major constraint for the water and sanitation sector. Figure 3.1 shows that this growth is occurring both by natural growth and through inward migration from rural areas and Outer Islands. Table 3.2 suggests that in terms of safe water the sustainable population for South Tarawa may have already been exceeded. While alternate growth centres have been identified there is an urgent need to address directly the continued growth in urban populations. The opportunities and costs of attempting to supply increased water for South Tarawa could be limiting.

6.3.2 Inadequate knowledge base

A sound knowledge base of the sector is essential for understanding and for informed planning and decisions. Lack of baseline, accessible information, irregular reporting and lack of analysis of information exacerbate the problems. The gaps in knowledge at the country level span many different facets such as hydrology, meteorology, health, environment, finance, community attitudes, service performance, laws and regulations, and crosses ministerial boundaries. It requires improvements to information systems and ensuring that there is free access and regular analysis and reporting of information.

6.3.3 Geographic spread

A major constraint in the delivery of water and sanitation services to island communities in Kiribati is the geographic spread of the population. Outside of South Tarawa there are 169 villages with an average population of 310 people spread amongst 22 islands and atolls across three million square kilometres of the Central Pacific Ocean. The problem of providing services to these communities is difficult and strongly suggests that local management is the only viable solution.

6.3.4 Governance

The absence of a declared national water policy and the lack of a national coordination committee to draw together government and community actions for the water sector are severe constraints. The lack of national policy and underpinning national water legislation limits the ability to plan and act strategically.

6.3.5 Land ownership in water source areas

Experience has shown that the issue of land ownership and restrictions of land use of areas used to extract groundwater remains a contentious issue. In South Tarawa the Government gives traditional land owners of the water reserves in Bonriki and Buota an annual land lease payment for use of the water reserve. Under the Land acquisition Act, compensation should be a one-off payment and the current payment is considered illegal. Acceptable and equitable solutions need to be found before further public water supply systems can be developed in other islands.

6.3.6 Human resources

Skill shortages in the water and sanitation sector and the difficulty in attracting young graduates are significant concerns. Continuing education and skills upgrade for staff are important short-term goals whereas but elevating the status of the sector in society may be a longer term objective.

6.3.7 Financial resources

The failure to achieve adequate cost recovery from urban and rural systems results in insufficient funds for routine maintenance and operations and totally excludes the ability to make any major capital investment. There has been a dependence on donor support and development loans not only for initial capital expenditure but also for subsequent upgrade phases of the capital works. The sector needs to become more financially independent and to be a provider of economically viable services, with less dependence on both Government subsidy and donor support.

6.3.8 Public perceptions and attitudes

Water is still regarded by many as a *free* resource despite its high delivery costs. Whilst measures such as installing meters can contribute considerably to reducing water wastage, major changes in community attitudes are also required. Such change can only be achieved over extended timeframes and through complementary measures such as information and education campaigns.

6.3.9 Poorly maintained rural and Outer Island assets

Safer water supply system installed in Outer Islands throughout the Gilberts in the 1990s through the UNDP/UNCDF are now mostly inoperative. The reasons cited for this are

inadequate training, insufficient maintenance, inappropriate equipment, the refusal by villagers to accept ownership of the systems, lengthy delays in processing requests for replacement parts and insufficient resources to purchase new equipment. Any effort to refurbish these systems must address these issues.

6.4 The Future

Faced with the continuing issues in the water and sanitation sector, “*business as usual*” is not a viable option and will lead only to a long-term decline in service levels and negative impacts on water resources, the natural environment and health. The necessary foundations of policy and strategy formulation have to be made before but implementation can be pursued.

Major commitment is required to enable the sector to take the necessary steps toward a more sustainable sector environment. Difficult decisions, particularly in the short-term, will be required if longer term benefits are to accrue. The challenge is to institute a phased programme of improving services, management and operational efficiency.

The following Sections set out the overall goals and key objectives for medium-term sector development and a means to achieve these.

7: SECTOR GOALS AND KEY OBJECTIVES

7.1 Objectives

The National Development Strategy 2003-2007 includes some policies and goals of direct relevance to the water sector.

- Raise the quality of life by improving supply and quality of water.
- Ensure sustainable use of water resources,
- Promote community participation for better use of water resources,
- Provide sound infrastructure and services at reasonable costs,
- Rehabilitate and expand existing water supply systems,
- Improve collection, storage, treatment and distribution of water,
- Rehabilitate the sewerage and sanitation system and improve its operation and management,
- Improve maintenance standards for government assets, and
- Ensure that all future construction projects comply with the Environment Act.

The overall goal of the draft national water sector policy, which builds on the previous policies, decisions, community consultation and the National Development Strategy is to ***ensure that communities have affordable access to sustainable water supply systems providing water of suitable quality and appropriate quantities and to appropriate sanitation to meet all reasonable health, environmental, and development needs.***

This goal enunciates very important policy directives. The first is that water supplied to communities has to be affordable; the second is that the water supply systems have to be sustainable; the third is that both the quality and quantity have to be appropriate for, in order of priority, firstly human health, secondly the environment, and thirdly development of water-dependent industries. This order of priorities is a fundamental policy direction.

Specific objectives to achieve this overall goal include:

1. Improve understanding of water resources and their use

- 1.1 Improve knowledge of the quality and quantity of the nation's freshwater resources.
- 1.2 Improve understanding of water demand in urban and Outer Island situations and the capacity to pay for water.
- 1.3 Improve knowledge and management of water resources under climatic extremes and change.
- 1.4 Improve monitoring, data collection, storage, analysis and reporting of information.
- 1.5 Improve understanding of the most effective ways of increasing community participation in the water and sanitation sector.

2. Increase access to safe and reliable water supplies

- 2.1 Decrease the incidence of water-borne diseases.
- 2.2 Improve the safety of freshwater supplied from groundwater and rainwater systems.
- 2.3 Protect fresh groundwater resources from adverse human impacts.
- 2.4 Improve outer island water supplies.
- 2.5 increase the use of rainwater harvesting.
- 2.6 Increase access to safe, basic sanitation.

3. Achieve sustainable water resource management

- 3.1. Develop policies and instruments to help manage demand and allocation of water.
- 3.2. Develop effective leak detection and remediation programs.
- 3.3. Identify sustainable groundwater extraction rates for public water supply systems.
- 3.4. Identify acceptable land use practices for water source areas.
- 3.5. Document the impacts of groundwater extraction.
- 3.6. Increase cost recovery for water supply systems.

4. Increase community participation in water management and conservation

- 4.1. Increase community awareness and understanding of water resource and sanitation issues.
- 4.2. Facilitate the formation of water and sanitation committees at the Island Council and village level.
- 4.3. Develop mechanisms for minimising conflicts over water resources.
- 4.4. Include community representation at the national level in water and sanitation planning.
- 4.5. Develop education programs for schools on safe water supplies and sanitation

5. Improve governance in the water and sanitation sector

- 5.1 Review, revise and make recommendations on water and sanitation policy.
- 5.2 Review and recommend procedures for implementing policy and monitoring the effectiveness of policy.
- 5.3 Review and revise, where necessary, all legislation, regulations and organisational responsibilities relevant to water and sanitation and to the declaration and protection of water reserves.
- 5.4 Improve coordination between agencies with responsibilities in the water and sanitation sector and with relevant community organizations.
- 5.5 Improve cost effective planning, operation and maintenance of water supply and sanitation systems.

Indicators to monitor performance and development in the water and sanitation sector are presented below.

7.2 Indicators

| Objective | Indicators |
|--------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Improve understanding of water resources and their use | |
| 1.1 Improve knowledge of the quality and quantity of the nation's freshwater resources. | <p>Data base and reports to Cabinet of the quantity and quality of water available to island community water supplies and on potential threats to freshwater sources.</p> <p>This is a 20 year project consisting of 4 five-year phases which address assessment of island water resources in order of priority.</p> |
| 1.2 Improve understanding of water demand in urban and Outer Island situations and the capacity to pay for water. | <p>Completed surveys and a summary report of case studies of water consumption, water sources and capacity to pay in a range of urban and Outer Island households.</p> <p>This is a two year project with data to be collected from selected priority areas.</p> |
| 1.3 Improve knowledge and management of water resources under climatic extremes and change. | <p>Develop data base and summary reports to Cabinet on the impact of climate extremes on the availability of water in urban and Outer Island locations. Development of a system for warning the Government of possible droughts and water shortages.</p> <p>Two year project to establish data base with assistance from external agencies. Continuing responsibility for early warning.</p> |
| 1.4 Improve monitoring, data collection, storage, analysis and reporting of information. | <p>Establish a data incorporating rainfall, water quality and water quantity in selected and expanding locations with annual reports to Government.</p> <p>Data base establishment one year project. Ongoing responsibility for monitoring and reporting</p> |
| 1.5 Improve understanding of the most effective ways of increasing community participation in the water and sanitation sector. | <p>Review and summary report of methods of including community participation in water resource management. Recommendation to Government</p> <p>One year project</p> |
| 2. Increase access to safe and reliable water supplies | |
| 2.1 Decrease the incidence of water-borne diseases. | <p>A 30% decrease from 2005 levels of the number of diarrhoeal and dysentery cases by 2010 and a 50% decrease by 2015.</p> <p>On-going improvement with initial 5 year Phase I.</p> |
| 2.2 Improve the safety of freshwater supplied from groundwater and rainwater systems. | <p>A 10% increase over 2005 levels in the percentage of the population with access to safe water sources by 2010 and a 20% increase by 2015.</p> <p>On-going improvement with initial 5 year Phase I.</p> |
| 2.3 Protect fresh groundwater resources from adverse human impacts. | <p>Passing of Regulations detailing acceptable and proscribed activities in water reserves. Monitoring</p> |

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| | and reporting regimes established documenting the health of water reserves. The formation of Water Reserve Management Committees. Initial phase two years then an on-going project |
| 2.4 Improve outer island water supplies. | A 10% Increase in the number of Outer Islanders with safe water supplies from protected water sources by 2010 and a 20% increase by 2015. On-going improvement with initial 5 year Phase I |
| 2.5 Increase the use of rainwater harvesting. | Strategy developed to enforce building code for installation of rainwater tanks. Revolving loan fund established for Outer Islands. A 10% increase in the number of households with raintanks by 2010 and a 20% increase by 2015. Strategy developed and rolling fund established within one year. On-going improvement with initial 5 year Phase I. |
| 2.6 Increase access to safe, basic sanitation. | A 10% increase over 2005 levels in the percentage of the population with access to safe sanitation by 2010 and a 20% increase by 2015. On-going improvement with initial 5 year Phase I. |
| 3. Achieve sustainable water resource management | |
| 3.1. Develop policies and instruments to help manage demand and allocation of water. | Development of national growth centre policies. Development of pricing systems for urban and outer Island water supply. Installation of domestic water meters in urban areas. Three year time frame |
| 3.2. Develop effective leak detection and remediation programs. | Established leak detection program with annual reporting of performance. Initial development one year with on-going reporting |
| 3.3. Identify sustainable groundwater extraction rates for public water supply systems. | Reports of successfully completed assessments. Initial 5 year phase but a projected 20 year program. |
| 3.4. Identify acceptable land use practices for water source areas. | Reports from studies of the impact of land use on water sources. Recommendations from studies on acceptable and proscribed activities. Three year time frame. |
| 3.5. Document the impacts of groundwater extraction. | Reports from studies of the impacts of pumping on land productivity. Inclusion of local communities in monitoring. Five year time frame. |
| 3.6. Increase cost recovery for water supply systems. | Implementation of urban and rural cost recovery programs. Three year time frame |
| 4. Increase community participation in water management and conservation | |
| 4.1. Increase community awareness and understanding of water resource and | Production of community and education programs and information materials. Formation of island water |

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| sanitation issues. | committees. Five year time frame but on-going activity |
| 4.2. Facilitate Island Council and village level water and sanitation committees | Establishment of village level water committees. One year time frame but on-going activity |
| 4.3. Develop mechanisms for minimising conflicts over water resources | Published strategies and mechanisms for reducing conflict between village communities, between villages and between the community and government over water resources and supplies. One year time frame. |
| 4.4. Include community representation at the national level in water and sanitation planning. | Establishment of The National Water and Sanitation Coordination committee with representation from NGO and community organisations. One year time frame for establishment but on-going. |
| 4.5. Develop education programs for schools on safe water supplies and sanitation | Production of an education program that targets younger school students. Annual reports on the program One year time frame but on-going activity |
| 5. Improve governance in the water and sanitation sector | |
| 5.1 Review, revise and make recommendations on water and sanitation policy. | Announcement of a National Water and Sanitation Policy. One year time frame |
| 5.2 Review and recommend procedures for implementing policy and monitoring implementation. | Review report on implementation and monitoring of policy to Cabinet. Effective procedure for reporting implementation of policy against targets. One year time frame but on going reporting of implementation |
| 5.3 Review and revise, where necessary, all legislation, regulations and organisational responsibilities relevant to water and sanitation and to the declaration and protection of water reserves. | Report with recommendations to Cabinet One year time frame with 5 year reviews. |
| 5.4 Improve coordination between agencies with responsibilities in the water and sanitation sector and with relevant community organizations. | Establishment of the National Water and Sanitation Coordination Committee. One year time frame with annual reviews. |
| 5.5 Improve cost effective planning, operation and maintenance of water supply and sanitation systems. | Publishing of plans, operations and maintenance schedules. Annual task |

7.3 Responsibilities for Implementation

The following table lists the Institutional responsibilities for the above objectives. The lead agency is listed first.

| Objective | Responsibility |
|--------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|
| 1. Improve understanding of water resources and their use | |
| 1.1 Improve knowledge of the quality and quantity of the nation's freshwater resources. | MPWU(WEU), MHMS(EHU), , MLPID(PWD) |
| 1.2 Improve understanding of water demand in urban and Outer Island situations and the capacity to pay for water. | MPWU(WEU & PUB), MISA, MFED, MLPID(PWD) |
| 1.3 Improve knowledge and management of water resources under climatic extremes and change. | MCTTD(MO), MELAD(ECD), MPWU(WEU & PUB), , MLPID(PWD) |
| 1.4 Improve monitoring, data collection, storage, analysis and reporting of information. | MPWU(WEU & PUB), MHMS(EHU), MISA, MCTTD(MO), MELAD(ECD), MLPID(PWD) |
| 1.5 Improve understanding of the most effective ways of increasing community participation in the water and sanitation sector. | MISA, MELAD(EH), KANGO |
| 2. Increase access to safe and reliable water supplies | |
| 2.1 Decrease the incidence of water-borne diseases. | MPWU(PUB & WEU), MHMS(EHU), KANGO, MEYSD |
| 2.2 Improve the safety of freshwater supplied from groundwater and rainwater systems. | MPWU(PUB & WEU), MHMS(EHU), MLPID(PWD) |
| 2.3 Protect fresh groundwater resources from adverse human impacts. | MELAD(ECD), MISA, MPWU(WEU), MLPID(PWD), MEYSD, KANGO |
| 2.4 Improve outer island water supplies. | MPWU(WEU), MLPID(PWD), MISA(RPU) |
| 2.5 Increase the use of rainwater harvesting. | MPWU(WEU), |
| 2.6 Increase access to safe, basic sanitation. | MHMS(EHU), MPWU(PUB), MLPID(PWD), MISA |
| 3. Achieve sustainable water resource management | |
| 3.1. Develop policies and instruments to help manage demand and allocation of water. | OB, MPWU(PUB & WEU), MISA, MLPID(PWD), |
| 3.2. Develop effective leak detection and remediation programs. | MPWU(PUB), MLPID(PWD), |
| 3.3. Identify sustainable groundwater extraction rates for public water supply systems. | MPWU(WEU), MELAD, MCTTD(MO), |
| 3.4. Identify acceptable land use practices for water source areas. | MELAD(ECD), MISA, KANGO |
| 3.5. Document the impacts of groundwater extraction. | MELAD(ECD), MPWU(PUB & WEU), KANGO |
| 3.6. Increase cost recovery for water supply systems. | MFEP, MPWU(PUB & WEU), MLPID(PWD), MISA, KANGO |
| 4. Increase community participation in water management and conservation | |
| 4.1. Increase community awareness and understanding of water resource and sanitation issues. | MISA, KANGO, MPWU(WEU), MHMS(EHU), MEYSD |

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| 4.2. Facilitate Island Council and village level water and sanitation committees | KANGO, MISA, MHMS(EHU) |
| 4.3. Develop mechanisms for minimising conflicts over water resources | MISA, KANGO, MELAD, MPWU(WEU) |
| 4.4. Include community representation at the national level in water and sanitation planning. | OB, MISA, KANGO |
| 4.5. Develop education programs for schools on safe water supplies and sanitation | MEYSD, MPWU(PUB & WEU) |
| 5. Improve governance in the water and sanitation sector | |
| 5.1 Review, revise and make recommendations on water and sanitation policy. | OB, NWSCC |
| 5.2 Review and recommend procedures for implementing policy and monitoring implementation. | OB, NWSCC |
| 5.3 Review and revise, where necessary, all legislation, regulations and organisational responsibilities relevant to water and sanitation and to the declaration and protection of water reserves. | AGO, OB, NWSCC |
| 5.4 Improve coordination between agencies with responsibilities in the water and sanitation sector and with relevant community organizations. | OB, NWSCC |
| 5.5 Improve cost effective planning, operation and maintenance of water supply and sanitation systems. | OB, NWSCC |

The next section looks at guiding principles and strategies for working through these objectives.

8: SECTOR STRATEGIES

8.1 Guiding principles

A number of guiding principles have been identified to ensure sector development brings equitable and sustainable benefits. Of paramount importance is the concept of Integrated Water Resource Management which encompasses good governance, economic development, environmental sustainability and social well-being. Other important principles include:

- Provision of safe water and sanitation to all communities
- Developing sustainable water supply systems
- Ensuring benefits and opportunities are shared by urban and rural communities
- Building partnerships between government and the community
- Developing appropriate demand management strategies

8.2 Framework for Action

Five mutually reinforcing strategies have been identified under this plan that correspond to the sector objectives, consistent with National Development Strategy 2003-2007.

These are:

1. Improve understanding of water resources and their use
2. Increase access to safe and reliable water supplies
3. Achieve sustainable water resource management
4. Increase community participation in water management and conservation
5. Improve governance in the water and sanitation sector

8.3 Sector strategies and actions

Strategy 1: Improve understanding of water resources and their use

Issue: There is limited information on the quantity and quality and variety of water sources available to island populations in Kiribati. There is also a dearth of data on health impacts of poor quality water, on domestic, industrial or agricultural use patterns, on the ability of urban and rural communities to pay, on the impacts of climate variability on water availability, on sustainable rates groundwater extraction rates and on the most effective ways of fostering community participation in the water sector. Without this understanding, it is difficult to plan and implement safe and sustainable water supply schemes and it is difficult to assess system performance.

Addressing the issue:

It is planned to establish a National Water and Sanitation Coordination Committee, encompassing key government and non-government actors, under the Office of the President to facilitate and coordinate the collection, storage, analysis and reporting of information from the agencies responsible for information gathering. but which builds on already established water-related committees, should be supported as an effective mechanism to guide sector development.

While this will be a long term, strategic program, priority areas where urgent identified water and sanitation problems exist will be targeted first. These will include islands, such as Banaba, which rely solely or largely on rainwater as the only source of potable water as well as designated growth centres.

Improvements in on-going monitoring, data storage and reporting are also planned under this strategy as well as the establishment of a drought early warning system. Current systems tend to be disengaged from one another and provide a disparate and incomplete picture of sector status.

It is envisaged that this strategy will require external funding assistance and a long term funding proposal is currently being developed.

Performance assessment is a key input into strategy implementation. Periodic assessment on an annual basis is required with more in-depth reviews of the progress in information gathering undertaken on a 3-yearly cycle.

Strategy 2: Increase access to safe and reliable water supplies

Issue: The incidence of water-borne diseases is amongst the highest in the Pacific. Most households use domestic groundwater wells close to dwellings and livestock, either as primary source of water or to supplement other sources. These have a high risk of contamination. In a few locations, rainwater is the predominant source of water. Domestic rain storages tend to be small and are prone to failure during severe droughts. In urban South Tarawa only 41% of households have newer connections to limited supplies of treated reticulated water. There population growth through natural increase and inward migration severely limit the per capital supply of treated water. In addition, leakage from the reticulated supply to households is estimated to be as high as 51%.

Addressing the issue:

A three-pronged approach will be developed to address this issue. The first is Outer Island or rural Water Supply project. The second is increasing the use of rainwater harvesting. The third is addressing supply and demand in urban South Tarawa.

In the rural sector, there are some 21 atolls and 1 raised island that are currently occupied with 165 villages in many islets. Not all have equal water needs. The first task will be to establish a priority list in four rankings of villages needing improved water supplies. Then in a four phase each of five years program rapid assessment of current groundwater resources will be undertaken for each priority ranking together with the formation of village or island level water committee. These committees will be used to develop strategies for local ownership, protection and control of water supply systems including identifying rules for water use and for local cost-recovery for maintenance and operation. Under the oversight of the local committees, solar powered pumping and water storages will be developed and sourced from groundwater at some distance from dwellings and livestock. As well investigations will be conducted of the impact of sanitation systems on rural water supplies. A review will be conducted at the end of each phase to identify strengths and weaknesses. It is planned this will be a 20 year program.

The revolving loans fund to assist householders in South Tarawa to install rainwater collection and storage tanks has proved a considerable success. This strategy will seek to extend that scheme to more areas in South Tarawa and to rural areas and to provide larger community storages to drier locations. A community awareness program will be conducted to increase understanding of the care, protection and maintenance of rainwater systems. This is considered to be a 5 year program.

The government's policy on decentralisation from South Tarawa to designated growth centres will be promoted to decrease inward migration. The Outer Island Water Supply project is designed to increase the attractiveness and amenity of Outer Islands also as an aid too decreasing inward migration. Refurbishment of the supply main has already been carried out in South Tarawa. The distribution system to households will be improved to lower leakage rates and new connections using trickle feed tanks with water meters will be installed in 80% of households and a water tariff system will be introduced. Urban Councils will form Water Management Committees to steer this process and a consumer education program will be undertaken on the use, protection and care of the system and on water tariffs. This is a planned 5 year program.

Strategy 3: Achieve sustainable water resource management

Issue: Five factors hamper sustainable water resource management. The first is a lack of information about the quantity and quality of water resources, especially groundwater available throughout the nation and the impacts of climate variability. The second is lack of understanding about the impacts of extraction of groundwater on the environment. The third is the lack of community participation in the planning, management, conservation and protection of water resources. The fourth is increasing demand, particularly in urban areas and leakage losses. The fifth is the absence of schemes to recover most of the operational and maintenance costs of water supply systems.

Addressing the issue:

The lack of information over water resources, climatic impacts and environmental impacts of groundwater extraction will be addressed under strategy 1. Community participation and the protection of groundwater resources will be dealt with under strategies 4 and 5.

There are two parts to the increasing demands in urban centres. One is the increase in per capita demands and leakage losses. The other is the increase in population numbers due to national growth and inward migration. The first part will be addressed through the community education and awareness campaign in strategy 4 and the refurbishment of household reticulation system under strategy 2.

Increasing urbanisation in South Tarawa will be pursued through the government's policy initiative of regional growth centres. These growth centres provide the opportunity for economy of scale and present significant health benefits through reductions in overcrowding. Ensuring sustainable, protected water resources for these growth centres will be a priority task.

In Outer Islands there is at present no scheme for recovering maintenance and operational costs of water supply systems. In order to improvements to be made in Outer Island water supplies, it is essential to have in place a community-supported cost recovery scheme. This will involve a partnership with Island Councils.

The Current block water pricing scheme in South Tarawa provide few conservation messages. The absence of household water meters means that a progressive charging scheme cannot be introduced. A first priority in urban areas will be the installation of water meters and wide community consultation on the introduction of a three-tiered increasing block tariff.

Strategy 4: Increase community participation in water management and conservation

Issue: The community has little input into water and sanitation management, water conservation and in the protection of groundwater reserves. The necessary water reforms and improvements will not be possible without active participation of community at all levels..

Addressing the issue:

At the national level, community and industry representatives will be important members of the National Water and Sanitation Coordination Committee. This Committee will explore methods for enhancing effective community participation at all levels.

Island and urban Councils, together with NGOs will be helped to form local level Water Committees to oversee the development, use, maintenance and support of local safe water supplies.

In Urban South Tarawa, the Committee for the Management and Protection of Water Reserves will be reformed and will develop plans and strategies for the protection of water sources.

Town Council Water Committees in South Tarawa will be actively involved in community education and awareness programs for the use of new connections to the reticulation system, for the conservation of water and for considering cost-recovery strategies. A major media campaign on water conservation will be launched with song and dance competitions.

A national education campaign aimed at primary school students will be developed to foster the use of safe water, hygiene, the conservation of water and the protection of water sources.

Strategy 5: Improve governance in the water and sanitation sector

Issue: National policy provides the strategic direction for the nation in the water and sanitation sector and legislation and regulations the legal underpinnings. However the existence of policy and legislation do not necessarily ensure action. Mechanisms are needed to implement policy in a coordinated way, to review progress towards policy goals and to identify impediments and imperfections. Numerous projects and project reviews have called for better coordination in the water and sanitation sector.

Addressing the issue:

As a first step a National Water and Sanitation Coordination Committee will be established under the Strategic National Policy and Risk Assessment Unit, Office of the President, bringing together all Government agencies with responsibilities for water and sanitation as well as NGO and industry associations with direct interest in water and sanitation. The first task of this Committee will be to develop a National Water Policy for transmission to the Cabinet. Once the policy is announced the Committee will then test the consistency of this National Water Plan against policy and develop a timetable for implementation.

The Committee will also: coordinate and enhance the strategic activities of Government Ministries in the water and sanitation sector to ensure sustainable management; facilitate and coordinate the review and assessment of water and sanitation-related, regulations, plans, instruments and standards and make recommendations to Government on program implementation and potential improvements; provide the Government with broadly-based, coordinated, strategic advice on priorities for water and sanitation and on water-related development opportunities; provide a national forum for the discussion of water and sanitation-related issues; coordinate and facilitate an annual, national, island-based assessment report on the quality and quantity of water resources, water consumption, rainwater harvesting and demand for water and encourage strategic, systematic monitoring; coordinate and facilitate assessments of risks in the water and sanitation sector and possible adaptation strategies in relation to global change and extreme events; enhance and coordinate strategies to improve community understanding of and participation in water and sanitation use and planning and in furthering water conservation and protection, particularly through the formation of island water committees; and coordinate the review and assessment of, and make recommendations on proposals for water and sanitation-related projects.

A key sector goal is to improve public health yet the link between this and improved water supply and sanitation provision is not always well documented and hard evidence is often hampered by poor data. Particular emphasis will be placed on this issue.

While some of these activities are on-going, it is planned that the development of policy, plans and regulations can be achieved within two years.

8.4 Priority Projects

8.4.1 : Provision of safe freshwater supplies for Outer Islands. Phase I.

This project is the first 5-year phase of a four phase, 20 year Outer Island Water Supply Project. This is intended to increase access to safe water in rural areas and enhance the amenity and attractiveness of Outer Islands in order to lower the inward migration rate to urban South Tarawa. Priorities for Outer Island water supply systems have already been determined under an ADB project with the highest priority islands, Nonouti, Abemama, Banaba, Abaiang, Tabuaeran (Fanning) and Kuria. This project will build on assessments undertaken under the KAPII project. Solar powered groundwater pumping, storage and distribution systems will be repaired or installed in selected islands and rainwater collection and storage systems will also be constructed. In addition, a scheme will be encouraged to facilitate the purchase of private household rain tanks. In the Island of Banaba the dilapidated but sophisticated rainwater collection systems built in the 1960's will be refurbished as a high priority. This project will include the enhancement of community participation in the management and protection of the freshwater sources and will incorporate a scheme for ensuring the financial sustainability of maintenance and operation. The two major outcomes planned are the reduction of the infant mortality rate due to water-borne diseases and the increase in amenity of Outer Islands. The cost of the first 5 year phase of this project is estimated to be \$9.0M.

8.4.2 Improving access to safe water supplies in South Tarawa

This project addresses the urgent needs of urban South Tarawa where demand for safe reticulated water is probably already equal to the sustainable extraction rate from current groundwater sources. The rate of exponential increase in population there has been about 4% since 1963 due to both natural growth and inward migration. The incidence of diarrhoea and dysentery there is disproportionately high particularly in densely populated areas. Refurbishment of the South Tarawa reticulated treated freshwater system under the ADB SAPHE project was completed in December 2005. The SAPHE project concentrated mainly on improving the bulk water supply component of the water supply system. It did not address the nearly 50% leakages that occur in the urban distribution systems to households and it provided improved connections to only 41% of households. This project aims to increase the number of households with improved connections to

80%, to decrease leakage to 25% and to install water meters to initiate charging for consumed water. This project is estimated to cost \$2.2M over 3 years.

8.4.3 Improved governance: Resourcing the Kiribati National Water and Sanitation Coordination Committee

This project seeks to improve governance by resourcing the National Water and Sanitation Coordination Committee through the provision of a support resource officer. This Committee will provide an integrated, whole-of-government and government-community partnership approach to management and planning of the water and sanitation sector in Kiribati. It is shown that the issues faced in Kiribati in this sector are amongst the most critical in the world. Previous projects have identified the lack of a coordinated approach involving all relevant government agencies and community organisations in developing long term strategies is hampering progress in the water and sanitation sector. The appointment for 10 years of a resource officer within the Strategic National Policy and Risk Assessment Unit in the Office of the President to assist the National Committee will provide the required strategic approach. It is also suggested that a mentoring team be appointed to provide encouragement and support for the resource officer. The estimated cost of this project is \$600K over 10 years.

8.4 Project Briefs

Project Title: Provision of Safe Freshwater Supplies for Outer Islands. Phase I.

Objective: To provide safe and adequate water supplies for the priority outer islands of Banaba, Nonouti, Kiebu in Makin, Abemama, Abaiang, Tabuaeran (Fanning) and Kuria.

Tasks: This project will:

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|-----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. | Liaise with the KAPII technical expert on water resource assessment for the priority islands and identification of safe sources of freshwater. |
| 2. | Prepare a project plan for the refurbishment of the rainwater catchment and storage system for the island of Banaba. |
| 3. | With Banaba Island Council establish an Island water management committee. |
| 4. | With Banaba water management committee and Island Council, develop strategies for ensuring community ownership, management and maintenance of community rainwater collection systems |
| 5. | Implement the refurbishment of the rainwater catchments on Banaba. Sustainably manage all aspects of the use and conservation of freshwater. |
| 6. | Conduct assessment of water sources, water quality and sustainable extraction rates in Stage I priority Outer Islands |
| 7 | Prepare plans for solar pumping, storage and distribution of fresh groundwater in the priority Outer Islands. |
| 8. | With island councils and community groups develop village water committees to oversee the equitable use, operation and maintenance of community water supply systems. |
| 9. | With island councils and community groups develop a charging regime that ensures the financial sustainability of maintenance and replacement of water infrastructure. |
| 10. | Install groundwater extraction systems where necessary, solar pumps and storage systems on selected priority Outer Islands. |
| 11. | Prepare plans for enhanced rainwater harvesting in priority outer islands. |
| 12. | With island water management committees and Island Councils, develop strategies for ensuring community ownership, management and maintenance of community rainwater collection systems |
| 13. | Install communal rainwater harvesting in priority outer islands. |
| 14. | With island councils and community groups develop education programs and regulations to protect water sources from contamination. |
| 15. | Provide training on the operation and maintenance of Outer Island Water Supply systems |
| 16. | Develop an educational program for primary school students in Outer Islands on the protection and use of water supply systems. |

Anticipated Outcomes:

The anticipated outcomes from this project are:

- Improved public health on priority Outer Islands due to a decrease in water-borne diseases;
- Equitable access to safe freshwater in Outer Islands;
- Sustainable water supply systems;
- Protection of Outer Island freshwater resources from adverse impacts of human activities;
- Improvement in the amenity and attractiveness of Outer Islands.
- Better knowledge of the quantity and quality of fresh water resources in Outer Islands;
- Greater village-level awareness of water resources issues;
- Increased community involvement in water protection of freshwater sources;
- Increased community participation in the conservation and management of water and water sources;
- Financially sustainable Outer Island water supply systems
- Strengthened training in Outer Island water supply systems and management;

Period of Project: 5 years with a possible extension for another 3 phases of 5 years each.

Institutional Home: Water Engineering Unit, Ministry of Public Works and Utilities and Rural Planning Unit, Ministry of Internal and Social Affairs.

Oversight of Project: National Water and Sanitation Coordination Committee

Reporting Period: Annual

Review Period: 3 years

Estimated Cost of the Phase I Project for 5 years: \$9.0M

Project Title: *Improving Access to Safe Water Supplies in South Tarawa.*

Objective: To provide safe, potable water to 80% of households on South Tarawa for at least 5-6 hours on every alternate day.

Subproject goals:

1. Provide an extra 1,400 household 500 L trickle tank connections to households on South Tarawa using the new standard house connection design.
2. Install water meters to all connected households to enable water charging on volumetric basis to commence.
3. Develop a three-tiered charging system and customer data base for water.
4. Conduct a consumer education and awareness campaign on operation of the 500 L tanks and on charging for water.
5. Construct of two 22 m³ capacity elevated tanks in Temaiku.
6. Acquire a high pressure jetting machine to clean blockages from sewer pipes and sewerage pump stations.

Tasks: This project will:

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| 1. Liaise with the KAPII technical experts on leak detection in Betio and on consumer education and awareness activities relevant to the refurbishment of household water supplies. |
| 2. Prepare a project plan for the detection of leaks and refurbishment of the urban distribution systems in South Tarawa. |
| 3. With urban Town Councils establish water management committees. |
| 4. With urban water management committees and urban Town Councils, develop strategies for ensuring community ownership, safe operation and maintenance of 500 L household water supply tanks. |
| 5. Implement the refurbishment of urban water distribution systems to households in South Tarawa. |
| 6. Install 1,400 500 L trickle feed household tanks. |
| 7. Install water meters for all household connections. |
| 8. With urban water committees, councils and community groups develop an equitable charging system for water. |
| 9. Design pressure head tanks for Temaiku. |
| 10. Construct, install and test two pressure head tanks for Temaiku pipeline. |
| 11. Form Temaiku Water Management Community with community groups. |
| 12. Acquire a high pressure jetting machine to clean blockages from sewer pipes and sewerage pump stations and provide training for staff in its operation. |

Anticipated Outcomes:

The anticipated outcomes from this project are:

- Improved public health in urban South Tarawa due to a decrease in water-borne

diseases;

- Equitable access to safe freshwater in 80% of households South Tarawa;
- Decrease in water leakage rates from the reticulation system to around 25%;
- Provision of reticulated water to the Temaiku;
- Establishment of an equitable 3-tiered pricing scheme for water;
- Recovery of a high proportion of the operations and maintenance costs for water supply;
- Improved community knowledge of and participation in local water conservation and management;
- Establishment of urban community water committees;
- Increased speed and safety of cleaning sewer blockages;
- Decreased risk from blocked sewers

Period of Project: 3 years

Institutional Home: Public Utilities Board, Ministry of Public Works and Utilities, Ministry of Finance and Economic Development, and Ministry of Internal and Social Affairs.

Oversight of Project: National Water and Sanitation Coordination Committee

Reporting Period: Annual

Review Period: 1½ years

Estimated Cost of the Project for 3 years: \$2.2M

Project Title: Improved Governance: Resourcing the Kiribati National Water and Sanitation Coordination Committee.

Objective: To assist development of a whole-of-government and government-community partnership approach for addressing and adapting to the critical issues in the water and sanitation sector by resourcing and coordinating the activities of the National Water and Sanitation Coordination Committee through the appointment of a Resource Officer within the Office of the President.

Tasks: Resource Officer will assist the National Water and Sanitation Committee to:

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| 1. Improve the safety of freshwater supplied from groundwater and rainwater systems. |
| 2. Protect fresh groundwater resources from adverse human impacts. |
| 3. Sustainably manage all aspects of the use and conservation of freshwater. |
| 4. Improve knowledge of the quality and quantity of the nation's freshwater resources and demand for them. |
| 5. Improve knowledge and management of water resources under climatic extremes and change. |
| 6. Improve outer island water supplies |
| 7. Increase community awareness and understanding of water resource and sanitation issues |
| 8. Increase community participation in water resource and sanitation management. |
| 9. Increase the use of rainwater harvesting. |
| 10. Develop instruments to help manage demand and allocation of water. |
| 11. Review and revise, where necessary, all legislation, regulations and organisational responsibilities relevant to water and sanitation. |
| 12. Ensure cost effective planning, operation and maintenance of water supply and sanitation systems. |

Anticipated Outcomes:

The anticipated outcomes from this appointment are:

- Improved public health due to a decrease in water-borne diseases;
- Equitable access to safe freshwater;
- Sustainable water supply systems;
- Protection of freshwater resources from adverse impacts of human activities;
- Better knowledge of the quantity and quality of fresh water resources;
- Efficient allocation of water to various users;
- Improved risk assessment and management for the water sector;
- Greater public awareness of water resources issues;

- Enhanced water and sanitation educational programs;
- Increased stakeholder involvement in water protection of freshwater sources;
- Increased community participation in the conservation and management of water and water sources
- More effective governance, monitoring and assessment of water resources;
- Increased ability to respond quickly to water crises;
- Strengthened institutional capacity and training in the water sector;
- Clear identification of roles and responsibilities;
- Improved levels of cost recovery;
- Improved access to donor and loan schemes.

Period of Appointment: 10 years with a possible extension for another 10 years.

Level of Position: Deputy Assistant Secretary

Institutional Home: Strategic National Policy and Risk assessment Unit, Office of the President (OB)

Line Manager: Permanent Secretary (OB)

Mentoring of Position: In order to support this position it is recommended that a mentoring committee of water specialists with experience in the Pacific be set up under the chairmanship of SOPAC. This committee will to provide encouragement and advice on developing the whole-of-government and community partnership approaches.

Reporting Period: annual

Review Period: 3 years

Estimated Cost of the Position for 10 years and Mentoring Support: \$600K.

9: IMPLEMENTATION

9.1 The Role of Government

Implementation of this Plan needs to ensure that the organisational roles and responsibilities of Government agencies are clearly specified and that effective mechanisms are in place to encourage collaboration and the sharing of information.. Implementation should strengthen local ownership, enact Government policy and support the Government's National Development Strategies. Enhancing the capacity of line ministries and corporations, empowering community participation involvement, and providing private sector opportunities are key elements of successful implementation. A balanced and appropriate role for Government departments or corporations working in partnership with the community should bring about increased access to safe water supplies. The opportunity to outsource infrastructure projects to the local private sector should be pursued. This approach ensures implementation is integrated with private sector capacity and opportunity.

9.2 The role of Communities and NGO's

Participation of island communities and NGO's at all levels and all phases of this plan is fundamental to success. This includes planning, design and impletation phases, cost recovery, maintenance, operation and protection of water sources. Communities could also play an increasing role in monitoring. Capacity will need to be built to enable these roles to be carried out effectively but should be channeled through the NGO and community-based organizations. NGO involvement should focus on awareness of health, hygiene, water conservation and protection and on the formation of village level water committees. Public ownership of the strategies in this Plan is essential.

9.3 Private Sector participation

Implementation should be geared toward developing a locally skilled and well-resourced private sector capable of providing lasting and sustainable support to benefit the water and sanitation sector.

9.4 Donor Coordination

Bi- and multi-lateral development co-operation plays an important role in Kiribati's economy and has provided major inputs into the country's water and sanitation sector over the past 16 years. It is important that co-ordination between donors and Government be well managed. The formation of the National Water and Sanitation Coordination Committee under the Office of the President is designed to provide a single point of contact for donors for water and sanitation projects and a forum to develop a strategic approach to the development of water and sanitation proposals.

9.5 Monitoring and Evaluation

The monitoring and evaluation of appropriate sectoral indicators is essential to the successful implementation of this Plan. Easily assessed quantitative indicators measuring inputs, outputs, outcomes and impact are the most appropriate. Performance monitoring at the highest-level is based on the Millenium Development Goals of increasing the number of people with access to safe freshwater supplies. The link between public health improvement and water service provision will draw on information from hospital and clinic databases and Environmental Health Unit records on water selected water-borne diseases. Present records on the number and location of incidences will be improved.

At a sector-level, the NWSCC will provide a focal point for coordinating monitoring and evaluation of the water and sanitation sector. Indicators of impacts on water resource development, protection and conservation will need to be developed as will monitoring of per capita water demand and losses. Groundwater availability and water quality monitoring will need to be strengthened to support these aspects as will drought forecasting. Performance will be reviewed and reported annually to Cabinet.

9.6 The Success of this Plan

This National Water Plan sets out key goals and targets for the sector and elaborates a framework for action to achieve these. The plan is built on the Draft National Water Resources Policy which details the vision of I-Kiribati for the future of water resources in the nation. This plan is a vehicle for clarifying where priorities lie, to elaborate key strategies and actions, and describe measures of progress.

Water is high on the international agenda at present and access to external technical and financial support is available. This will help tackle some of the immediate priorities. However, sustainability within the sector can only be realised once the costs of service delivery and resource management are internalised, when the technical skills and human resources are available locally and when the community is actively engaged

Integrated water resource development and management in small island nations presents many major challenges that cross sectoral boundaries. Coordination and cooperation through a partnership approach both within government and between the government and the community is essential. In doing this, we must all recognise and commit to common goals and actions and recognised fully that indeed everybody is vitally dependent of water so that water is everybody's business.