



Government of the Republic of Kiribati

National Water Resources Implementation Plan

**Sustainable Water Resource Management, Use,
Protection and Conservation**

A 10 Year Plan

**Coordinated by the National Water and Sanitation Committee
Under the Ministry of Public Works and Utilities**

November 2008

This Plan has evolved over a period of 15 years starting with the UNDTCD (now the UNDESA) Draft 10 Year Master Plan in 1992 and subsequent revisions by the Water Engineering Unit, assisted by the Public Utilities Board, both in the Ministry of Public Works and Utilities. A comprehensive revision was initiated under the EU Pacific Water Governance Project, coordinated by SOPAC, and continued under KAPII by Professor Ian White, Australian National University. There has been broad consultation on draft versions of this policy amongst, key ministries, stakeholders and with the community and Workshops with peak committees. All Government Agencies with responsibilities in the water and sanitation sector were involved through the National Water and Sanitation Committee and the National Adaptation Steering Committee in its drafting. The water and sanitation service providers, the Public Utilities Board in South Tarawa, the Water Engineering Unit of MPWU and the Ministry of Health and Medical Services, the Rural Planning Unit, Ministry of Internal and Social Affairs and the Public Works Department of the MLPID for Kiritimati have all contributed to the development of the NWRP. Non-government organisations and Councils, the Churches and businesses have been given opportunities to comment and many have suggested improvements. Implementation of this policy is addressed in the accompanying National Water Resources Implementation Plan.

This Implementation Plan sets out strategies for implementing the Government of Kiribati's *National Water Resources Policy*. A companion document *Background to the National Water Resources Policy and Implementation Plan* provides background information that led to the development of this plan.

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1: OPPORTUNITIES, ISSUES AND CONSTRAINTS

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, the widely dispersed villages, crowded urban centres, 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 Kiribati are amongst the most difficult in the world.

This National Water Resources Implementation Plan provides objectives and strategies to address priority needs in the national freshwater resources sector in the Republic of Kiribati. It is the implementation plan for the National Water Resources Policy “*Water for Healthy Communities, Environments and Sustainable Development*” which expresses the vision of the Government and people of Kiribati for the future of water resources in the country.

The following summary of the opportunities, issues and constraints in the water and sanitation sector explains the issues that need to be addressed by this plan

1.1 Opportunities

1.1.1 Growing concerns

Wide ranging consultations with communities throughout Kiribati over the past 6 years have identified key problems and concerns over the availability and safety of freshwater. There is a growing recognition of the issues and of their vital importance, particularly in view of potential climate change impacts, and there is an emerging consensus on the overall goals which are expressed in the Draft National Water Resources Policy.

1.1.2 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 UNDP, UNDTCD, AusAID and ADB projects. These have raised people’s perception of the importance of improved water supply and sanitation systems.

1.1.3 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. At the inaugural Asia Pacific Water Summit, in Beppu, Japan, in December 2007, Te Beretitenti, His Excellency Anote Tong, reaffirmed his government’s determination to protect, conserve and use island water resources wisely. The draft National Water Resources Policy, “*Water for Healthy Communities, Environments and Sustainable Development*” expresses the vision of the government for the water sector.

1.1.4 Improving cost recovery

There is considerable potential for improved cost recovery for urban water systems. This, however, will require the installation of water meters in most households in South Tarawa and Kiritimati and the collection of fees. The MPW&U policy to establish a revolving fund for Outer

Island water supplies should also improve cost recovery for maintenance and replacement of Outer Island water supplies.

1.1.5 Improving urban water system efficiency

The SAPHE project in South Tarawa dramatically decreased water losses from the rising main between Bonriki and Teoraereke. The KWASP project in Kiritimati similarly improved water supply. Unaccounted for water through leakages, however, remains unacceptably high within village and town distribution systems, particularly in Betio and Banana. Significant gains in efficiency and therefore in cost recovery can be made by reducing levels of water losses.

1.1.6 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 successful in South Tarawa. The challenge is now to attempt to extend that scheme to rural areas and Outer Islands and to non-government employees in Tarawa. The inclusion of adequate rainwater harvesting systems, required by the building code, in new domestic and public buildings is not enforced. This needs attention as rainwater is an important source of water.

1.1.7 A focal point for water resources

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

1.1.8 Promoting community-based management

The *Pacific Regional Action Plan on Sustainable Water Management* has raised the importance of 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 but needs to be reactivated and strengthened. The involvement of village communities in the protection and management of their water sources is essential in managing the nation's widely dispersed water sources.

1.1.9 Access to external funds

Water is a high priority in 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.

1.2 Issues

1.2.1 Incidence of water-borne diseases

The high incidence of preventable deaths and illness due to water-borne diseases is an indicator that communities, particularly vulnerable children under the age of 5 and older people 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.

1.2.2 Linkage between water and sanitation

Water and sanitation systems are intimately linked and are directly related to public health, especially in atolls. There is an urgent need for the development of a complimentary national sanitation policy to provide direction to donor agencies, government ministries and the community and to decrease contamination of drinking water.

1.2.3 Equitable access to safe freshwater

Many schools, clinics, rural and outer island populations do not have access to water from protected water sources. There needs to be a concerted effort by government and communities to protect water sources from contamination. There also needs to be greater emphasis on improved rainwater harvesting. Mechanisms to assist in the development of household rainwater tanks and rainwater tanks on community buildings need to be further developed. Domestic water wells are widely used to supplement water supplies. The safety of these wells needs to be examined in some areas.

1.2.4 Unaccounted Water Losses and Leakages

In the reticulated water supply systems, unaccounted water losses and leakages are estimated to be at least 50%. This means that energy is wasted in pumping and treating groundwater which is then lost from the system. This further restricts the supply of freshwater available to consumers. In addition, because there is only a fixed fee for water supply there is no incentive for people to fix leakages in domestic plumbing

1.2.5 Sustainable water supply systems and climate variability and change

Reliable estimates of sustainable groundwater extraction and pumping rates have only been determined for a small number of locations in Tarawa and Kiritimati. The sustainable rates of groundwater extraction from all groundwater lenses in all inhabited islands and particularly planned growth centres need to be assessed particularly in terms of the potential impacts of climate variability and change. At present the maintenance and operation costs of urban and rural water supply systems are not covered by water charges to consumers and the systems are not economically sustainable and there are no conservation messages in current fixed fee tariffs.

1.2.6 Protection of freshwater sources

Only the current fresh groundwater sources in South Tarawa have specific 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. Ways of educating and involving the community and school children in the protection of water sources need to be developed.

1.2.7 Improved knowledge and monitoring

There are significant gaps in knowledge on the quantities of groundwater and rainwater available for use and their quality in urban and rural areas and on Outer Islands. As well, water use patterns by households, businesses and institutions in both urban and non-urban locations are poorly known. In addition, early warning systems to advise governments on extreme climatic events, including droughts needs to be built into government planning and operations and into a public communications strategy.

1.2.8 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 to form a stakeholder committee to improve management of water reserves on South Tarawa have lapsed due to lack of effort by all parties. Education, particularly of school children and communication campaigns are important elements in improving participation and need to be implemented. The formation of village water and sanitation committees is an important mechanism for increasing participation at the local level.

1.2.9 Better water governance

Policy provides direction for action by government ministries and island communities. Extensive community discussions have taken place which led to the development of the National Water Policy which needs to be endorsed by Cabinet. It is critical that national policy be widely propagated to provide direction for planning and strategy development and that implementation plans be endorsed to carry out that policy. Draft National Water Legislation has been under consideration since 1992 but has not been enacted. The lack of coordination and cooperation between government ministries with responsibilities in water has been identified over many years. The National Water and Sanitation Committee has been reformed to overcome these barriers and a Water Quality Monitoring Committee has been established under the National Committee.

1.2.10 Institutional capacity and training

Attracting, mentoring and training young staff in the water and sanitation sector remains a major challenge, particular in outer islands. Strategies to attract, retain and train young people in the sector need to be developed. 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.

1.2.11 Cost recovery, demand management

The Government heavily subsidises water and sanitation is provided free of charge in urban areas. The flat rate charge for water whether delivered by the reticulation system or the water tankers provides no demand management signals. While there are two proposals for improving cost recovery in the water sanitation sector they are yet to be implemented. Cost recovery and demand management using a tiered tariff scheme requires the widespread installation of water meters and water tanks in over 5,000 households in South Tarawa alone. In order to collect revenue, the reliability of service, particularly in Betio will need to be improved, which will include reducing water losses throughout the reticulation and household systems.

1.2.12 Water resource ownership

Water resource ownership remains a difficult and contentious issue. The traditional view of groundwater ownership is that landholders have rights over the groundwater. Land on most islands is exclusively owned by individuals. The government only owns land in Kiritimati, and has long-term leases in areas of Betio and Bairiki in South Tarawa. Harvesting of groundwater for community use, particularly external communities some distance away, 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 will remain a contentious issue. Some villages seek to restrict access to groundwater resources, to control distribution and demand compensation for restrictions on land use. The declaration of water reserves with restricted access rights is problematic. It has not been successful on South Tarawa and several reserves have had to be abandoned due to encroachment by settlements. Declaration of reserves generates conflicts with landowners and causes others to see the reserve as a free resource for

harvesting trees, raising pigs and mining gravel. A practical and equitable solution to this issue is urgently required.

1.3 Constraints

1.3.1 Increasing urban growth and climate variability and change

Increasing urbanisation in South Tarawa and Kiritimati is a major constraint for the water and sanitation sector. This growth is occurring both by natural growth and through inward migration from rural areas and Outer Islands. In terms of safe water supply, the sustainable population for South Tarawa may already be close to the limit. While alternate growth centres have been identified there is an urgent need to address directly the continued growth in urban populations. The limited opportunities and increased costs of attempting to supply more freshwater for South Tarawa could limit development. The impacts of climate variability and change further stress already limited freshwater resources.

1.3.2 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 these issues cut across ministerial boundaries. It requires improvements in information systems, better coordination and ensuring that there is free access to information, regular analysis of data and reporting of information.

1.3.3 Geographic spread

A major constraint in the delivery of improved water and sanitation services to island communities in Kiribati is the geographic spread of the population. Outside South Tarawa, there are 169 villages with an average population of 310 people. These are 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 at the village level, with centralised support, is the only viable solution.

1.3.4 Governance

The absence of a declared national water resources policy, national water legislation, regulations protecting all water sources, endorsed national water plans and the lack of national coordination to direct and draw together government and community actions for the water and sanitation sector are severe constraints. The lack of national policy and underpinning national water legislation limits the ability to plan and act strategically.

1.3.5 Land ownership in groundwater source areas

Experience has shown that the issue of land ownership and restrictions on land use of areas such as water reserves 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 by some illegal. Acceptable and equitable solutions need to be found before further public water supply systems can be developed in other islands.

1.3.6 Human resources

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

1.3.7 Financial resources

The failure to achieve adequate cost recovery from urban and rural systems results in insufficient funds for routine monitoring, maintenance and operations and severely restricts 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 capital water and sanitation 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.

1.3.8 Public perceptions and attitudes

Water is still regarded by many as a free resource despite its high delivery costs. While 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, particularly those aimed at school students.

1.3.9 Poorly maintained rural and Outer Island assets

Safer water supply systems installed in Outer Islands throughout the Gilberts in the 1990s through the UNDP/UNDTCD 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.

1.4 The Future

Faced with the continuing public concerns over the quality and quantity of available freshwater and the threats of climate variability and change and increasing population, "*business as usual*" is not a viable option and will lead only to a long-term decline in service levels and negative and potentially harmful impacts on water resources, the natural environment, economic growth and human health. The necessary foundations of policy, strategy formulation and implementation planning have to be laid before prioritised actions can be pursued.

Major commitment is required to enable the sector to take the necessary steps toward a more sustainable system of management and operation. 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, protection conservation and operational efficiency.

The following Sections set out the overall goals and key objectives for medium-term (up to 10 years) sector development and means to achieve these.

2: GOALS, KEY OBJECTIVES AND ACTIVITIES

2.1 Goals, Objectives and Activities

The overall goals of this implementation plan are those of the National Water Resources Policy, *Water for Healthy Communities, Environments and Sustainable Development*, which builds on the previous policies, decisions, community consultation and development strategies and plans. The goals are to:

- 1. Provide safe, socially equitable, financially, technically and environmentally sustainable water supplies to enhance the welfare and livelihood of I- Kiribati.**
- 2. Protect and conserve freshwater sources for public water supplies.**
- 3. Deliver freshwater efficiently and effectively.**

These goals contain some very important policy directives. The first is that water supplied to communities has to be safe and equitable; the second is that the water supply systems have to be environmentally, technically and financially sustainable; the third is the determination that sources of water will be protected and water resources conserved and the fifth is a commitment that these services will be delivered well.

There are seven specific policy objectives which have supporting activities beneath them to achieve these policy goals.

Policy Goal 1.

Provide safe, socially equitable, financially, technically and environmentally sustainable water supplies to enhance the welfare and livelihood of I- Kiribati

- 1. Increase access to safe and reliable water supplies**
 - 1.1 Identify priority villages and islands for urgent attention.
 - 1.2 Decrease the incidence of water-borne diseases by improving the safety of freshwater supplied from groundwater and rainwater systems.
 - 1.3 Improve water supplies for schools, hospitals and clinics.
 - 1.4 Improve outer island and rural water supplies.
 - 1.5 Improve reliability of urban water supplies.
 - 1.6 Increase the use of improved rainwater harvesting.
 - 1.7 Increase access to safe, basic sanitation removed from water source areas.
- 2. Achieve sustainable water resource management**
 - 2.1. Develop policies, instruments, regulations and procedures to help manage demand, allocation and conjunctive use of water sources.
 - 2.2. Determine sustainable groundwater extraction rates for all inhabited islands.
 - 2.3. Identify acceptable land use practices for water source areas.
 - 2.4. Examine the impacts of groundwater extraction on the environment.
 - 2.5. Undertake timely maintenance and repairs of water supply systems, and improve operation of such supplies.

Policy Goal 2.

Protect and conserve freshwater sources for public water supplies

3. *Improve understanding and monitoring of water resources and their use*

- 3.1 Improve knowledge of the quality and quantity of the nation's freshwater resources.
- 3.2 Improve understanding of water demand in urban, rural and outer Island situations and the capacity to pay for water.
- 3.3 Improve knowledge and management of water resources under climatic extremes and the impacts of climate change.
- 3.4 Improve monitoring, data collection, storage, analysis and reporting of information on water resources.

4. *Improve protection of public freshwater sources*

- 4.1. Identify areas that have the potential to be used as water sources for public water supplies.
- 4.2. Review the regulations regarding Declaration of Water Reserves and their application to all public groundwater sources, and ensure their implementation.
- 4.3. Find ways of involving local communities in protecting water sources for public water supply systems.
- 4.4. Identify acceptable land uses for water source areas.
- 4.5. Improve educational and community awareness programs on protecting water sources
- 4.6. Develop a National Sanitation Policy.
- 4.7. Support regional and international projects with an aim to protect and conserve ground water resources and improve sanitation systems.

5. *Increase community participation in water management and conservation*

- 5.1. Improve understanding of the most effective ways of increasing community participation in the water and sanitation sector.
- 5.2. Increase community awareness and understanding of water resource issues, including protection and conservation.
- 5.3. Establish and resource water and sanitation committees at the island and/or village level.
- 5.4. Develop mechanisms for minimising conflicts over water resources.
- 5.5. Include community representation at the national level in water and sanitation planning.
- 5.6. Develop education programs for schools on protecting and conserving water supplies and wise water use.

Policy Goal 3.

Deliver freshwater efficiently and effectively.

6. *Improve governance in the water and sanitation sector*

- 6.1 Review, revise and make recommendations on water and sanitation policy.
- 6.2 Review, recommend and enact procedures for implementing policy and monitoring the effectiveness of policy.
- 6.3 Review, revise, and where necessary enact legislation, regulations and codes relevant to water and sanitation and to the declaration and protection of water reserves.
- 6.4 Improve coordination and cooperation between agencies with responsibilities in the water and sanitation sector and with relevant community organizations.

- 6.5 Develop strategic water and sanitation plans for urban South Tarawa and designated growth centres,
- 6.6 Improve capacity of personnel involved in providing and ensuring safe and sustainable supplies of freshwater.

7. Decrease unaccounted for water losses and improve cost recovery

- 7.1 Develop effective leak detection, loss reduction and remediation programs for reticulated water supply systems.
- 7.2 Increase cost recovery for water supply systems.
- 7.3 Explore alternate sources of freshwater

Measurable indicators and outputs to monitor performance and development in the water and sanitation sector are given in the following section.

2.2 Performance Indicators for Plan Objectives and Activities

Activity	Indicators/ Outputs
1. Increase access to safe and reliable water supplies	
1.1 Identify priority villages and islands for urgent attention	1. A set of criteria for identifying villages and islands with urgent water resource needs. 2. A prioritised list of villages and islands for water supply improvements. This is a 6 month project
1.2 Decrease the incidence of water-borne diseases by improving the safety of freshwater supplied from groundwater and rainwater systems.	1. Targets are 30% decrease from 2005 levels of the number of diarrhoeal and dysentery cases by 2013 and a 50% decrease by 2018. 2. A 10% increase over 2005 levels in the percentage of the population with access to safe water sources by 2013 and a 20% increase by 2018. On-going improvement with initial 5 year Phase I.
1.3 Improve water supplies to schools, hospitals and clinics.	1. A 50% increase in improved water supplies to schools, hospitals and clinics by 2013 with a 100% improvement by 2018. On-going improvement with initial 5 year Phase I.
1.4 Improve outer island and rural water supplies.	2. A 20% Increase in the number of outer islanders with safe water supplies from protected water sources by 2013 and a 40% increase by 2018. On-going improvement with initial 5 year Phase I.
1.5 Improve reliability of urban water supplies.	A 20% increase in the reliability of water supplies for urban areas by 2013 with a 50% improvement by 2018. On-going improvement with initial 5 year Phase I.
1.6 Increase the use of improved rainwater harvesting.	1. Review and enacting of building code and regulations requiring the installation of rainwater catchments in new buildings 2. Strategy developed to enforce building code for installation of

	<p>rainwater tanks.</p> <ol style="list-style-type: none"> 3. Financing scheme established for purchasing domestic rainwater catchments outer islands. 4. Trial of improved rainwater harvesting and storage systems with first flush devices. 5. A 15% increase in the number of households and public buildings with rain catchments by 2013 and a 30% increase by 2018. <p>Strategy developed and rolling fund established within one year. On-going improvement with initial 5 year Phase I.</p>
1.7 Increase access to safe, basic sanitation removed from groundwater source areas.	<ol style="list-style-type: none"> 1. 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. 2. Improved recommendations on the positioning of sanitation systems relative to wells and water sources <p>On-going improvement with initial 5 year Phase I.</p>
<p>2. Achieve sustainable water resource management</p>	
2.1 Develop policies, instruments, regulations and procedures to help manage demand, allocation and conjunctive use of water sources	<ol style="list-style-type: none"> 1. Development of urban and national growth centre water supply policies and master plans. 2. Development of water pricing systems, regulations and incentive schemes for urban and outer Island water supply which encourage conservation. 3. Installation of water meters on all connections in all reticulated supply systems. 4. Establish procedures for facilitating the use of rainwater catchments. <p>10 year time frame</p>
2.2 Identify sustainable groundwater extraction rates for all inhabited islands.	<ol style="list-style-type: none"> 1. Reports on successfully completed assessments of islands and villages. 2. Database of island water resources and estimated sustainable groundwater extraction rates. <p>Initial 5 year phase but a projected 20 year program.</p>
2.3 Identify acceptable land use practices for water source areas.	<ol style="list-style-type: none"> 1. Establish a project to examine the impacts of land use practices on water resources. 2. Deliver a report on the project results <p>5 year project</p>
2.4 Examine the impacts of groundwater extraction on the environment.	<ol style="list-style-type: none"> 1. Develop a study program involving the community to monitor the impacts of groundwater extraction on the environment. 2. Secure funding for the study. 2. Report of the findings of the study and recommendations to GoK. <p>5 year time frame.</p>
2.5 Undertake timely maintenance and repairs of water supply systems, and improve operation of such supplies.	<ol style="list-style-type: none"> 1. . Production of master plans, operations and maintenance schedules for water supply systems 2. Undertake all repairs in a timely manner. <p>2 year project for item 1, and item 2 on-going.</p>

3. Improve understanding of water resources and their use	
3.1 Improve knowledge of the quality and quantity of the nation's freshwater resources.	<ol style="list-style-type: none"> 1. Data base established 2. Annual reports to Cabinet of the quantity and quality of water available and on potential threats to freshwater sources. <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>
3.2 Improve understanding of water demand in urban, rural 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 3 year project with data to be collected from selected priority areas.</p>
3.3 Improve knowledge and management of water resources under climatic extremes and the impacts of climate change.	<ol style="list-style-type: none"> 1. Develop data base on the impact of climate extremes on the availability of water in urban and outer island locations. 2. Update a system for warning the Government, Ministries, NGOs and the community of possible droughts and water shortages. 3. Report to GOK on the possible impacts of climate extremes and change on freshwater resources. <p>This is a 2 year project to establish data base with assistance from external agencies. Continuing responsibility for early warning.</p>
3.4 Improve monitoring, data collection, storage, analysis and reporting of information of water resources.	<ol style="list-style-type: none"> 1. Establish a data base incorporating rainfall, water quality (including both salinity and bacterial measures) and water quantity in priority locations. 2. Annual reports to Government on the condition of the nation's freshwater resources. <p>Data base establishment one year project. Ongoing responsibility for monitoring and reporting</p>
4. Improve protection of public water source areas	
4.1 Identify areas that have the potential to be used as water sources for public water supplies.	<ol style="list-style-type: none"> 1. Assessment of island water resources in 1.1 used to identify water source areas for public water supplies included in a report to GoK. 2. Monitoring and reporting regimes established documenting the quality of public freshwater sources. <p>3 year phase of a 20 year project but with annual reporting to GoK</p>
4.2 Review the regulations regarding Declaration of Water Reserves and their application to all public groundwater sources, and ensure their implementation.	<ol style="list-style-type: none"> 1. A critical review of regulations on the Declaration of Water Reserves in a summary report to Government including recommendations for improvements and extensions to other atolls and islands. 2. Passing of legislation or regulations for the protection of all sources of public freshwater supplies throughout Kiribati. 3. Implementation of legislation <p>Three year project for steps 1 and 2, and step 3 on-going.</p>
4.3 Find ways of involving local communities in protecting water sources for public water supply systems.	<p>A review of techniques used to engage and support the local communities in developing ways of protecting water sources for public water supply systems. Report with recommendations to GoK (linked to 5.2)</p> <p>Six month project</p>
4.4 Identify acceptable land uses for water source areas	<p>A study of possible land use in water source areas and recommendations to GoK on safe and acceptable land uses in water reserves.</p> <p>Two year project</p>
4.5 Improve educational and community awareness	<ol style="list-style-type: none"> 1. Development of a communication and awareness raising campaign on the protection of water sources.

programs on protecting water sources	2. Development of curricula material for schools on the protection of water sources and water conservation. Two year project with 5 yearly revisions.
4.6 Develop a National Sanitation Policy	Draft National Sanitation Policy submitted to GoK. A five year project
4.7 Support regional and international projects with an aim to protect and conserve ground water resources and improve sanitation systems	Participation in regional and international projects focused on solving local water supply and sanitation problems. Summary reports on outcomes to GoK. Ongoing program
5. Increase community participation in water management and conservation	
5.1 Improve understanding of the most effective ways of increasing community participation in the water and sanitation sector.	Review and summary report of methods of including community participation in water resource management. Recommendation to Government and Ministries (to tie in with 5.2). Three year project
5.2 Increase community awareness and understanding of water resource issues, including protection and conservation	1. Production of community awareness and education programs and information materials. 2. Regular media segments and maneaba meetings on water & sanitation issues. 5 year time frame but on-going activity
5.3 Establish and resource water and sanitation committees at the island and/or village level	1. Establishment of village level water committees with plumber and mechanic for system maintenance. 2. Provide training and redefine role of island water technicians. 3. 30% of villages with water committees by 2013 with 60% by 2018 3 year time frame for initial actions but on-going activity
5.4 Develop mechanisms for minimising conflicts over water resources	1. Report to GoK on strategies and mechanisms for reducing conflict between village communities, between villages and between the community and government over water resources and supplies. 2. Pilot project established in South Tarawa. 3 year time frame.
5.5 Include community representation at the national level in water and sanitation planning.	Increased membership of The National Water and Sanitation Coordination committee with representation from Chamber of Commerce, Church, NGO and community organisations. One year time frame for establishment but on-going.
5.6 Develop education programs for schools on safe water supplies and sanitation	1. Development of a curriculum for schools on water resources, health, protection of water sources and water conservation. 2. Production of educational materials to support the curriculum. 3. Annual reports on the program. Two year time frame but on-going activity
6. Improve governance in the water and sanitation sector	
6.1 Review, revise and make recommendations on water	1. Announcement of a National Water Policy. One year time frame.

and sanitation policy.	<p>2. Develop National Sanitation Policy</p> <p>Five year time frame</p> <p>4. Review implementation and outcomes and report to government.</p> <p>Every 5 years</p>
6.2 Review, recommend and enact procedures for implementing policy and monitoring implementation.	<p>Effective procedure established for reporting implementation of policy against targets.</p> <p>One year time frame but on going reporting of implementation every 5 years</p>
6.3 Review, revise, and where necessary enact legislation, regulations and codes relevant to water and sanitation and to the declaration and protection of water reserves	<p>1. Review report with recommendations to Cabinet</p> <p>2. Revised National Water Legislation for consideration by Cabinet</p> <p>3. Regulations for the protection of all water source areas in Kiribati.</p> <p>Three year time frame with 5 year reviews.</p>
6.4 Improve coordination between agencies with responsibilities in the water and sanitation sector and with relevant community organizations.	<p>1. Review and where necessary clarify organisational roles and responsibilities of all agencies with responsibilities in water resources.</p> <p>2. Development of joint projects between Ministries</p> <p>3. Successful operation of the National Water and Sanitation Coordination Committee.</p> <p>One year time frame with annual reviews.</p>
6.5 Develop strategic water and sanitation plans for Tarawa and designated growth centres	<p>1. Development & approval of specific water master plans for urban Tarawa and development centres.</p> <p>2. Development of sanitation plans for Tarawa and development centres.</p> <p>Three year time frame with reviews every five years.</p>
6.6 Improve capacity of personnel involved in providing and ensuring safe and sustainable supplies of freshwater.	<p>1. Identification of skills and personnel required in various agencies</p> <p>2. Identification of skills needed and current capacity</p> <p>3. Establishment of a training program in water resource management.</p> <p>4. A succession plan established for key water resources staff</p> <p>2 year time frame for 1, 2 and 4, and ongoing for step 3</p>
<p>7 Decrease unaccounted for water losses, improve cost recovery and find alternate sources of water</p>	
7.1 Develop effective leak detection and remediation programs.	<p>1. Established leak detection program with annual reporting of performance.</p> <p>2. Develop a plan for the reduction of leakage losses in reticulated water supply systems.</p> <p>3. Reduce leakage losses by 50% by 2013.</p> <p>Initial development 3 years with on-going reporting a 10 year project.</p>
7.2 Increase cost recovery for water supply systems.	<p>Implementation of urban and rural cost recovery programs. 80% of costs of maintenance and operation to be recovered by 2018.</p> <p>10 year time frame</p>

7.3 Explore alternate sources of freshwater	Report to Government on the costs and energy consumption of alternate sources of freshwater, especially for Tarawa. 1 year project with ongoing review of new sources.
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2.3 Organisational Responsibilities for Implementation

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

Activity	Responsibility
1 Increase access to safe and reliable water supplies	
1.1 Identify priority villages and islands for urgent attention.	<u>NWSCC</u> , Cabinet
1.2 Decrease the incidence of water-borne diseases by improving the safety of freshwater supplied from groundwater and rainwater systems.	<u>MHMS(EHU)</u> , <u>MPWU(PUB & WEU)</u> , KANGO, MEYSD
1.3 Improve water supplies for schools, hospitals and clinics.	<u>MHMS(EHU)</u> , <u>MPWU(WEU & PUB)</u> , <u>MEYSD</u> , Private organisations which run schools
1.4 Improve outer island and rural water supplies.	<u>MPWU(WEU & PUB)</u> , MLPID(PWD), MISA(RPU)
1.5 Improve reliability of urban water supplies.	<u>MPWU(PUB)</u> , MLPID(PWD)
1.5 Increase the use of improved rainwater harvesting.	<u>MPWU(WEU)</u> , MISA (Urban and Island Councils)
1.6 Increase access to safe, basic sanitation removed from groundwater source areas.	<u>MHMS(EHU)</u> , <u>MPWU(PUB)</u> , MLPID(PWD), MISA
2 Achieve sustainable water resource management	
2.1 Develop policies, instruments, regulations and procedures to help manage demand, allocation and conjunctive use of water sources	<u>OB</u> , AGO, MFEP, <u>MPWU(PUB & WEU)</u> , MISA, MLPID(PWD)
2.2 Identify sustainable groundwater extraction rates for public water supply systems.	<u>MPWU(WEU)</u> , MELAD(ECD), MCTTD(MO),
2.3 Identify acceptable land use practices for water source areas.	<u>MELAD(ECD)</u> , <u>MHMS(EHU)</u> , MISA, KANGO
2.4 Document the impacts of groundwater extraction.	<u>MELAD(ECD)</u> , <u>MPWU(PUB & WEU)</u> , KANGO
2.5 Undertake timely maintenance and repairs of water supply systems, and improve operation of such supplies.	<u>MPWU(PUB & WEU)</u> , MFED, MLPID(PWD)
3 Improve understanding of water resources and their use	
3.1 Improve knowledge of the quality and quantity of the nation's freshwater resources.	<u>MPWU(WEU)</u> , <u>MHMS(EHU)</u> , MLPID(PWD), MELAD
3.2 Improve understanding of water demand in urban and Outer Island situations and the capacity to pay for water.	<u>MPWU(WEU & PUB)</u> , MISA, MFED, MLPID(PWD)
3.3 Improve knowledge and management of water resources under climatic extremes and impacts of climate change.	<u>MCTTD(MO)</u> , <u>MELAD(ECD)</u> , <u>MPWU(WEU)</u> , MLPID(PWD)
3.4 Improve monitoring, data collection, storage,	<u>NWSCC</u> , <u>MPWU(WEU & PUB)</u> , <u>MHMS(EHU)</u> ,

analysis and reporting of information.	MISA, MCTTD(MO), MELAD(ECD), MLPID(PWD)
4 Improve protection of public water source areas	
4.1 Identify areas that have the potential to be used as water sources for public water supplies.	<u>MPWU(WEU)</u> , MELAD, MHMS(EH), MISA
4.2 Review the regulations regarding Declaration of Water Reserves and their application to all public groundwater sources, and ensure their implementation.	<u>AGO</u> , MPWU (WEU & PUB)
4.3 Find ways of involving local communities in protecting water sources for public water supply systems.	<u>KANGO</u> , MISA, MPWU(PUB)
4.5 Identify acceptable land uses for water source areas	<u>MELAD(ECD)</u> , MPWU(PUB & WEU), KANGO
4.6 Improve educational and community awareness programs on protecting water sources	<u>MEYSD</u> , KANGO, MISA
4.7 Develop a National Sanitation Policy	<u>MHMS</u> , MPWU (PUB)
4.8 Support regional and international projects with an aim to protect and conserve ground water resources and improve sanitation systems	<u>MFAI</u> , MFEP
5 Increase community participation in water management and conservation	
5.1 Improve understanding of the most effective ways of increasing community participation in the water and sanitation sector.	<u>KANGO</u> , MISA, MELAD(ECD), MPWU(WEU & PUB)
5.2 Increase community awareness and understanding of water resource issues, including protection and conservation	<u>MISA</u> , KANGO, MPWU(WEU), MHMS(EHU), MEYSD
5.3 Establish and resource water and sanitation committees at the island and/or village level	<u>KANGO</u> , MISA, MHMS(EHU)
5.4 Develop mechanisms for minimising conflicts over water resources	<u>MISA</u> , KANGO, MELAD, MPWU(WEU)
5.5 Include community representation at the national level in water and sanitation planning.	<u>OB</u> , MISA, KANGO
5.6 Develop education programs for schools on safe water supplies and sanitation	<u>MEYSD</u> , MELAD(ECD), MPWU(PUB & WEU)
6 Improve governance in the water and sanitation sector	
6.1 Review, revise and make recommendations on water and sanitation policy.	<u>OB</u> , NWSCC, MPWU(WEU & PUB), MHMS, MELAD
6.2 Review, recommend and enact procedures for implementing policy and monitoring implementation.	<u>OB</u> , NWSCC
6.3 Review, revise, and where necessary enact legislation, regulations and codes relevant to water and sanitation and to the declaration and protection of water reserves	<u>AGO</u> , OB, NWSCC
6.4 Improve coordination between agencies with responsibilities in the water and sanitation	<u>OB</u> , NWSCC

sector and with relevant community organizations.	
6.5 Develop strategic water and sanitation plans for urban South Tarawa and designated growth centres	<u>MPWU(WEU & PUB)</u> , MFED
6.6 Improve capacity of personnel involved in providing and ensuring safe and sustainable supplies of freshwater.	<u>NWSCC</u> , MPWU, PUB, NWSCC
7 Decrease unaccounted for water losses, improve cost recovery, find alternate sources of freshwater	
7.1 Develop effective leak detection and remediation programs.	<u>MPWU(PUB)</u> , MLPID(PWD)
7.2 Increase cost recovery for water supply systems.	<u>MFEP</u> , MPWU(PUB & WEU), MLPID(PWD), MISA, KANGO
7.3 Explore alternate sources of freshwater	<u>MPWU(WEU & PUB)</u> , MELAD

The time schedule for these activities is given in section 5. Section 4 presents guiding principles and strategies for working through these objectives. Priority actions are given in the following section.

3: PRIORITY ACTIONS

Section 2.2 above identifies 72 outcomes planned under the 38 activities within the 7 major objectives of the National Water Resources Policy and this Implementation plan. While all these outcomes are necessary not all are of equal importance. The highest priority issues that need to be addressed first are listed in the following.

1. Improve understanding of water resources and their use

- 1.1 Identify priority rural villages and outer islands whose water supplies require urgent attention.
- 1.2 Assess the location, quantity, quality of their groundwater and its sustainable pumping rate.
- 1.3 Assess the water requirements of the priority locations.
- 1.4 Monitor regularly the salinity, water quality and thickness of the freshwater lenses in locations that are used for public water supplies.
- 1.5 Report assessment and monitoring results to government regularly.

Responsibility: MPWU (WEU), MHMS (EHU), MELAD (ECD), MLPID (PWD), NWSCC

Comments: There is no point in attempting to improve island water services before island freshwater sources are identified and assessed and their needs evaluated.

2. Increase access to safe and reliable water supplies

- 2.1 Install improved public water supplies in assessed priority rural and outer island locations.
- 2.2 Assess the water requirements of schools, hospitals, and clinics.
- 2.3 Improve the water supply to schools, hospitals and clinics.
- 2.4 Increase the use of improved rainwater harvesting
- 2.5 Assess the adequacy and safety of water supply systems in urban areas.
- 2.6 Develop proposals for improving urban water supplies.

Responsibility: MPWU (WEU & PUB), MHMS (EHU), MEYSD, MELAD (ECD), MLPID (PWD), OB

Comments: Outer island and rural areas are high priorities in order to attempt to decrease inward migration to population centres. Vulnerable groups such as school children and hospital patients are also high priority and increased use of rainwater will decrease demand on public water sources.

7 Improve protection of public water source areas

- 3.1 Identify all potential freshwater source areas for public supplies in priority locations.
- 3.2 Review and where necessary amend the regulations regarding Declaration of Water Reserves and their application to all public groundwater sources.
- 3.3 Review and where necessary amend the regulations regarding the protection of Water Reserves from adverse impacts.
- 3.4 Develop incentives and strategies for engaging local communities in protecting water sources for public water supply systems and form village water and sanitation committees.
- 3.5 Develop a National Sanitation Policy and Plan
- 3.6 Increase educational and community awareness programs on protecting water sources

Responsibility: AGO, MELAD, MISA, KANGO, MPWU (WEU & PUB) MEYSD, MELAD (ECD)

Comments: Settlement on water reserves has caused the abandonment of some water reserves. Regulations for protecting water reserves in South Tarawa exist but not in all Kiribati. The experience at Bonriki shows that regulations alone are insufficient to protect water source areas.

4. Decrease unaccounted for water losses and improve cost recovery

- 4.1 Develop effective leak detection and remediation programs and decrease losses from supply and domestic systems to 25%.
- 4.2 Increase cost recovery for water supply systems.

Responsibility: MPWU (PUB), MLPID (PWD), AGO, MISA, KANGO

Comments: Up to at least 50% of water pumped from groundwater reserves is lost through leakage from the public and private domestic reticulation system and households. There are no incentives for conserving water and the cost recovery by the government for water services is minimal.

5. Improve governance in the water and sanitation sector

- 5.1 Improve coordination and cooperation between agencies with responsibilities in the water and sanitation sector and between those agencies and relevant community organisations.
- 5.2 Provide terms of reference for the National Water and Sanitation Coordination Committee.
- 5.3 Form multi-Ministry teams to assess and report on the nation's water resources.
- 5.4 Institute an annual report on the state and condition of the nation's water resources.
- 5.5 Develop strategic water and sanitation plans for urban areas and designated growth centres
- 5.6 Develop training programs and succession plans and for water specialists and island water technicians.
- 5.7 Include NGO representatives in the National Water and Sanitation Coordination Committee.

Responsibility: OB, MPWU (WEU), MELAD (ECD), MHMS, MISA, MFEP

Comments: Projects over the past 30 years has identified major governance issues in the management of the nation's water resources. These issues include: lack of comprehensive water resources policy and legislation; the absence of medium-term Cabinet-endorsed plans; poor cooperation and coordination between government agencies; almost no community-participation in the protection and management of water resources; and the absence of reporting to government on the state and condition of the nation's freshwater sources. The National Water and Sanitation Coordination Committee was set up to improve these governance issues, however, it needs strengthening, refocusing and the endorsement of Cabinet.

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

4: SECTOR STRATEGIES

4.1 Guiding principles

A number of guiding principles can be identified to ensure sector development brings equitable and sustainable benefits. Of paramount importance is the concept of Integrated Water Resource Management (Figure 1) which encompasses good governance, economic development, environmental sustainability and social well-being. Other important principles include:

- Provision of safe water to all communities
- Taking care of the most vulnerable and needy
- Developing sustainable water supply systems and decreasing losses
- Ensuring benefits and opportunities are shared equitably by urban and rural communities
- Protection of water sources
- Use of multiple sources (conjunctive water use)
- Building partnerships between government and the community
- Developing appropriate demand management and conservation strategies
- Engaging students in the protection, conservation and wise use of water
- Better coordination of water and sanitation agencies and organisations.

4.2 Framework for Action

Seven mutually reinforcing strategies have been identified under this plan that correspond to the sector objectives, consistent with Kiribati Development Plan 2008-2011 and built on the National Water Resources Policy. These are:

1. Increase access to safe and reliable water supplies
2. Achieve financially, technically and environmentally sustainable water resource management
3. Improve understanding and monitoring of water resources and their use
4. Improve protection of water source areas
5. Increase community participation in water management and conservation
6. Improve governance in the water and sanitation sector
7. Decreases unaccounted for water losses, improve cost recovery, and explore alternate sources of freshwater

4.3 Plans are a Living Document

This plan is not a static document. Successful plans evolve, grow and are modified depending on their success and usefulness. This implementation plan is part of the policy cycle (Figure 2) and is meant to be reviewed and modified as part of that cycle.

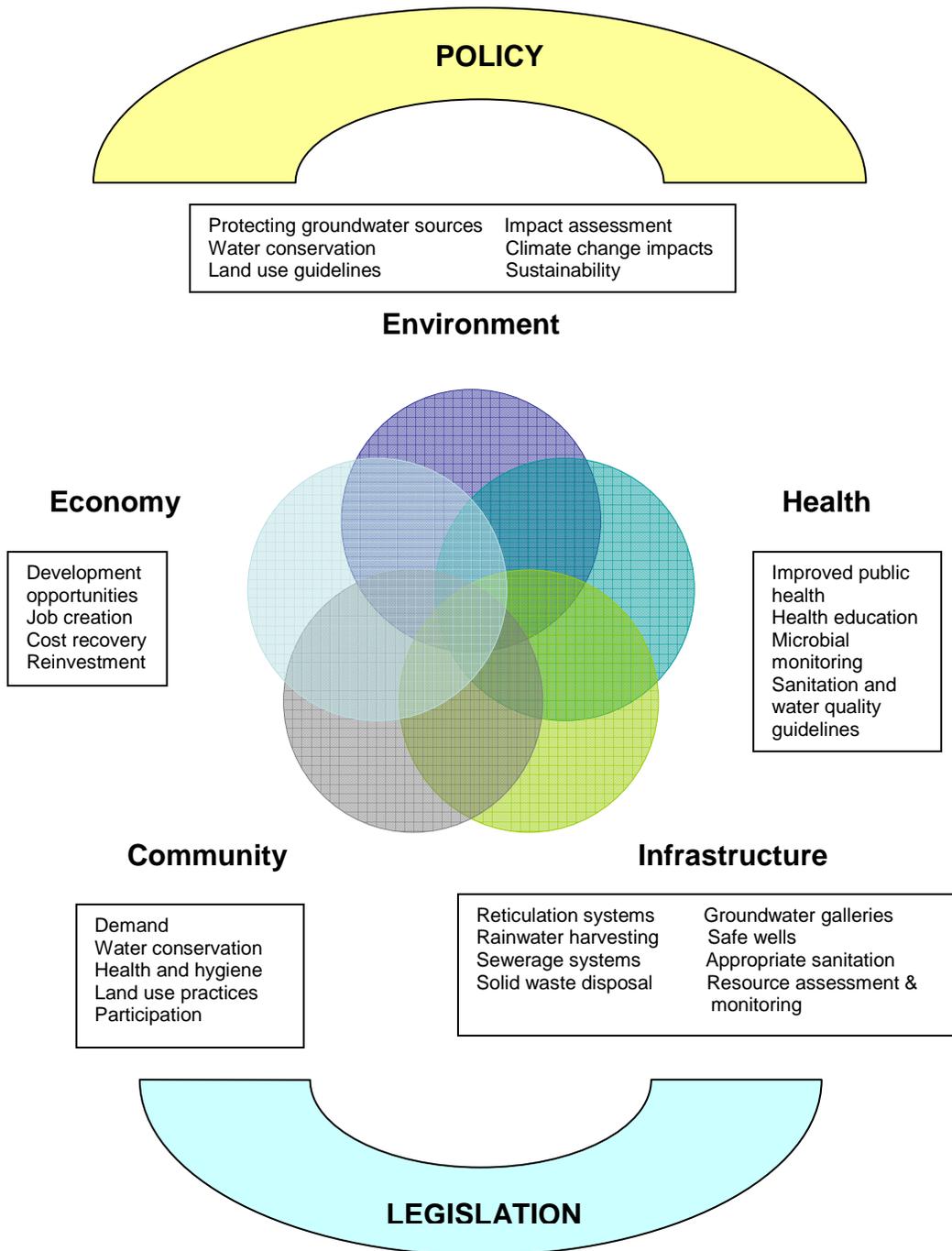


Figure 1. Interdependencies in the water and sanitation sector in Kiribati requiring integrated water resources management

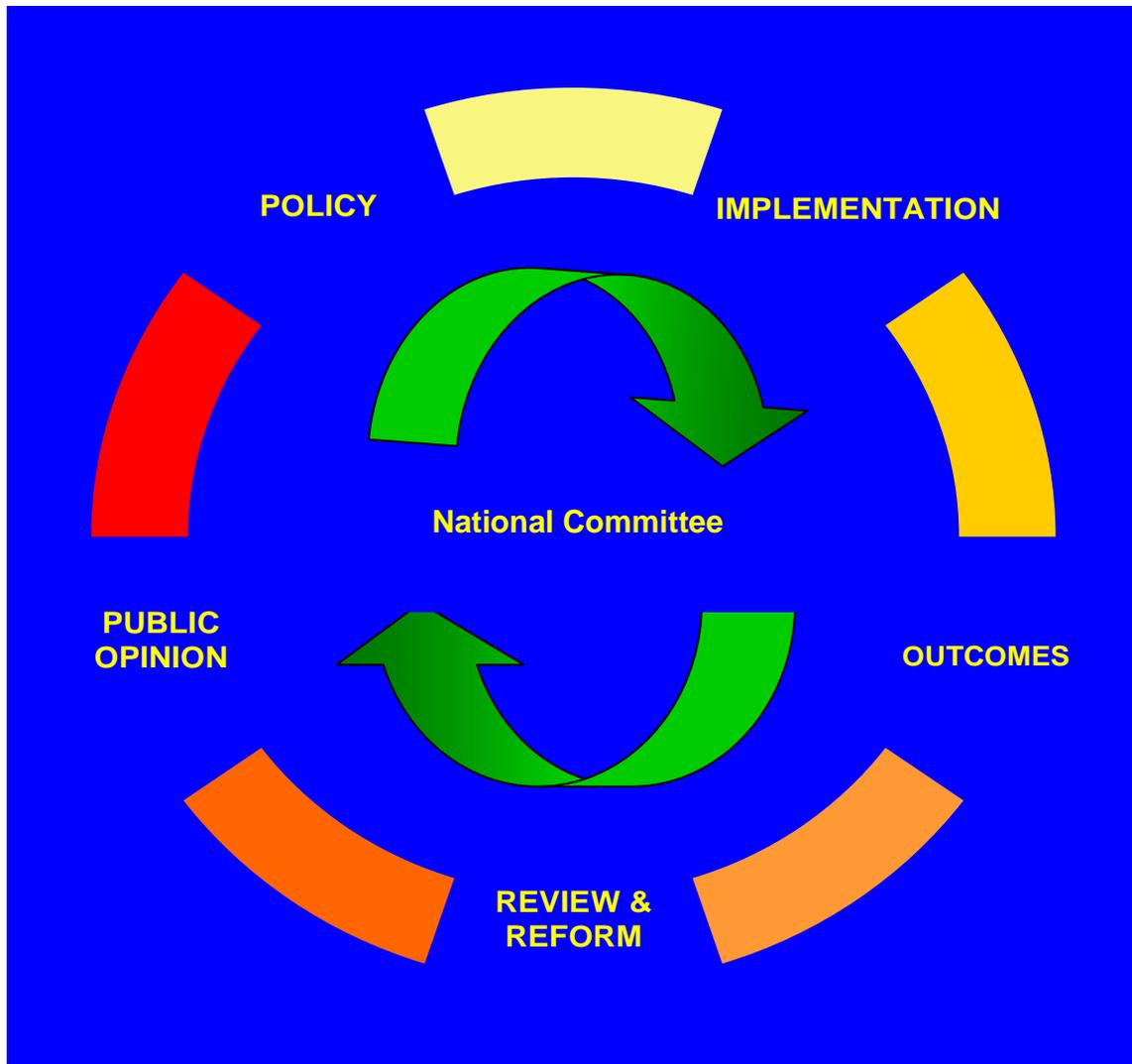


Figure 1. The policy cycle. This Implementation Plan is part of the mechanism implementing government policy. It is a living document designed to be modified depending on the outcomes of the policy and plan and on review of those outcomes and their subsequent impact on public opinion.

4.4 Sector strategies and actions

Strategy 1: Increase access to safe and reliable water supplies

Issues:

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 50%. As well school water supplies are generally poor and some clinics need improved and safe water supplies.

Addressing the issues:

A four-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. The fourth is priority improvement of school, hospital, clinics and outer island water supplies.

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 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 2: Achieve financially, technically and environmentally sustainable water resource management

Issues:

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 issues:

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 3: Improve understanding of water resources and their use

Issues:

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 and the lead Ministry to facilitate and coordinate the collection, storage, analysis and reporting of information from the agencies responsible for information gathering and analysis. This committee 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 4: Improve protection of public water source areas

Issues:

The high rates of transmission of water through the coral sands overlying the shallow fresh groundwater systems in most of the islands in Kiribati means that groundwater is easily polluted by surface contamination due to human settlement and activities. 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. The regulations also permit the purchase of land by the government for the purpose of protecting water reserves. These are exceedingly unpopular with landowners as they remove long established land and resource use rights that accompany land ownership.

In South Tarawa, the lands overlying the freshwater lenses in Buota, Bonriki, and Teaoraereke were declared Water Reserves. Teaoraereke has long been abandoned as a freshwater source in South Tarawa because of continued encroachment by human settlement. There is a continued threat to existing water reserves because of increasing population pressures in South Tarawa and the limited available land area for settlement. Currently in Bonriki, settlement of squatters on the reserve and gravel extraction from the water reserve is a particular concern despite being illegal. Public water source areas in other islands have no legal protection. In order to engage the community in protecting their water sources, a Committee for Water Reserve Management, involving government-community participation, was established in the early 2000s in Tarawa. There was little enthusiasm from participants and the Committee is now defunct.

Addressing the issues:

National regulations for the protection of public water source areas are required throughout all of Kiribati. There is, however, little evidence that passing regulations prohibiting pollution of water source areas on their own provides any long-term protection for water source areas. What is required is a fundamental change of behaviour involving a student education of water, hygiene, health, conservation and protection and community awareness programs. Coupled to this the establishment of adequately resourced, local committees for the protection and management of water source areas should return some ownership of the problem to the local level.

In addition, local land owners and villagers need some form of encouragement to contribute local water resources to external water users. Methods for providing that encouragement will be explored. They also require some assurance that groundwater extraction will not damage their traditional livelihoods and welfare. A project involving community monitoring of impacts of groundwater extraction is planned to address those concerns.

Because this strategy requires behavioural change it is seen as a long-term (20 year) project but the establishment of educational and awareness programs can be carried out within 3 years.

Strategy 5: Increase community awareness of and participation in water management and conservation

Issues:

The community has little input into or ownership of water management, water conservation and in the protection of groundwater reserves. The necessary water reforms and improvements will not be possible without active participation and engagement of the community as all levels but particularly at the village level.

Addressing the issues:

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 assisted to form local level Village Water Committees to oversee the development, use, maintenance and support of local safe water supplies. This will involve the appointment of a village plumber and water mechanic for each village and the establishment of strategies for training and supporting them. In addition village-level strategies for at least partially recovering operations and maintenance costs will be developed.

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 school students will be developed to foster the use of safe water, hygiene, the conservation of water and the protection of water sources.

Strategy 6: Improve governance in the water and sanitation sector

Issues:

National policy provides the strategic direction for the nation in the water sector and legislation and regulations are 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 in Kiribati.

Addressing the issues:

As a first step a National Water and Sanitation Coordination Committee will be established 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 assist in the development of 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.

Strategy 7: Decrease unaccounted for water losses, improve cost recovery, and explore alternate sources of freshwater

Issues:

Unaccounted for water losses from public water reticulation systems are unknown. Estimates are that these losses may amount to at least 50% of extracted fresh groundwater. Because of the energy required to extract this water and the scarcity of treated water in Kiribati, these losses need to be reduced urgently.

The costs of installing and supplying water through piped systems and their maintenance are increasing. Current levels of cost recovery for reticulated systems are small. Because the current fixed-fee water tariffs have no conservation message there is little incentive for householders to fix leakages within the house.

The scarcity of groundwater and rainwater in some islands and atolls means that water supply is limiting development in those areas. Kiribati has used reverse osmosis desalination plants in the past but they had large energy consumptions and were unreliable and expensive. There is a need to continue to explore new technologies and alternate systems for producing freshwater using renewable energy and for securing alternate sources of water.

Addressing the issues:

Reduction of leakage losses from urban reticulation systems and from domestic plumbing is an urgent priority that needs to be addressed. It requires an on-going program. Plans for leak detection strategies and for the remediation of public water supplies and domestic plumbing need to be developed and implemented. The costs of remediation works should be recovered from customers.

The installation of water meters on all connections to water supply systems coupled to a tiered water-use tariff system will greatly improve cost recovery in water supply.

An on-going review of current and new technologies for water production and critical reviews of the financial and energy costs of alternate water sources as well as their impacts on greenhouse gas emissions need to be conducted. The possibility of importing water from islands with higher rainfall needs also to be considered as does the infilling of swampy areas to construct groundwater recharge areas.

5: IMPLEMENTATION

5.1 *The Role of Government*

Implementation of this Plan requires 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 sustainable development strategies. Enhancing the capacity of line ministries and corporations, empowering community participation and 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.

5.2 *The role of Communities and NGO's*

Participation of island and village communities and NGO's at all levels and all phases of this plan is fundamental to success. This includes planning, design and implementation phases, cost recovery, maintenance, operation and protection of water sources. Communities could also play an increasing role in monitoring. The development of village level water and sanitation committees possibly through existing Village Welfare Groups will raise community awareness and increase effective participation. Capacity will need to be built to enable these roles to be carried out effectively but should be channelled through appropriate NGO and community-based organisations. 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.

5.3 *Resource and Financial Implications*

To effectively implement this policy, three additional water specialists will be required. One to concentrate on sanitation issues in urban areas, one to focus on outer island supplies and services and the last to concentrate on community education, awareness, participation and non-polluting sanitation systems. One position is currently being funded under KAPII and the other two positions could be funded from improved cost recovery from water pricing in urban areas. The accompanying 10 Year National Water Resources Plan identifies water and sanitation projects costing approximately \$A15M. The EU, under EDF10, has already made a commitment to fund approximately €6.7M of outer island water supply and sanitation projects. The policy and plan can be used in proposals to donors and funding agencies to highlight the priorities of Kiribati in water resources. Briefs for a number of projects for which donor funding could be sought are given in the Background to the National Water Resources Policy and Implementation Plan.

5.4 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.

5.5 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 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.

5.6. Legislative Implications

There is a need to review all legislation, regulations and building codes pertaining to water and sanitation, to the protection of groundwater supply sources and to the statutory basis for agencies involved in the sector. Rationalisation, improvements and new legislation may be required. A review of enforcement of existing regulations and incentives for compliance is also necessary.

5.6 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 Millennium 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. 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.

5.7 The Success of this Plan

This National Water Resources Implementation Plan sets out key goals and targets for the sector for the next 10 years and elaborates a framework for action to achieve these. The plan is built on the National Water Resources Policy which details the vision of the government of 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 provides 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 embrace fully the fact that everybody is vitally dependent of water so that **water is everybody's business**.

6: TIME SCHEDULE FOR ACTIVITIES

Sections **turquoise** represents an activity. Those in **grey** represent on-going activities and **light yellow** sections are reviews

Objective	Activity	Year																			
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1. Increase access to safe and reliable water supplies and appropriate sanitation	1.1 Identify priority villages and islands for urgent attention.	Turquoise																			
	1.2 Decrease the incidence of water-borne diseases by improving the safety of freshwater supplied from groundwater and rainwater systems.	Turquoise	Turquoise	Turquoise	Turquoise	Turquoise	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey
	1.3 Improve water supplies for schools, hospitals and clinics.	Turquoise	Turquoise	Turquoise	Turquoise	Turquoise	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey
	1.4 Improve outer island and rural water supplies.	Turquoise	Turquoise	Turquoise	Turquoise	Turquoise	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey
	1.5 Improve reliability of urban water supplies.	Turquoise	Turquoise	Turquoise	Turquoise	Turquoise	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey
	1.6 Increase the use of rainwater harvesting.	Turquoise	Turquoise	Turquoise	Turquoise	Turquoise	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey
	1.7 Increase access to safe, basic sanitation.	Turquoise	Turquoise	Turquoise	Turquoise	Turquoise	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey
2. Achieve sustainable water resource management	2.1 Develop policies, instruments, regulations and procedures to help manage demand, allocation and conjunctive use of water sources	Turquoise	Grey																		
	2.2 Identify sustainable groundwater extraction rates for all inhabited islands.		Turquoise	Turquoise	Turquoise	Turquoise	Turquoise	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey
	2.3 Identify acceptable land use practices for water source areas.				Turquoise	Turquoise	Turquoise	Turquoise	Turquoise	Turquoise	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey
	2.4 Document the impacts of groundwater extraction.					Turquoise	Turquoise	Turquoise	Turquoise	Turquoise	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Grey

	6.4 Improve coordination between agencies with responsibilities in the water and sanitation sector and with relevant community organizations.	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
	6.5 Develop strategic water and sanitation plans for South Tarawa and designated growth centres	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
	6.6 Improve capacity of personnel involved in providing and ensuring safe and sustainable supplies of freshwater.	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
7. Decrease unaccounted for water losses, improve cost recovery and find alternate sources of freshwater	7.1 Develop effective leak detection and remediation programs.	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
	7.2 Increase cost recovery for water supply systems.	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█
	7.3 Explore alternate sources of freshwater	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█	█