



An Overview of Integrated Water Resources Management in Pacific Island Countries: A National and Regional Assessment

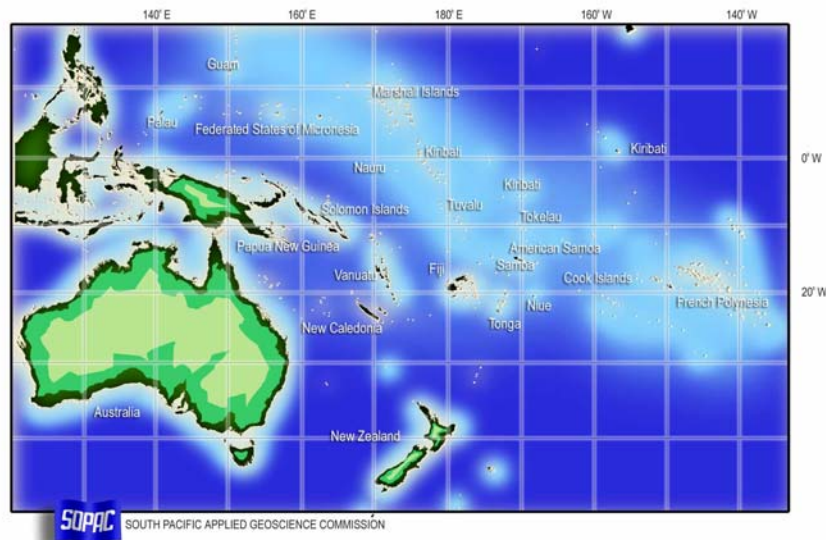
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An Overview of Integrated Water Resources Management in Pacific Island Countries: A National and Regional Assessment

Status Report for GWP – Integrated Water Resources Management (IWRM)
Prepared for the South Pacific Applied Geoscience Commission (SOPAC), January 2004



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Section 1: Background

1.1 Introduction

This report serves as to create an overview of Integrated Water Resources Management (IWRM) progress and activities in the Pacific Island Countries (PICs). The overview is to form part of a submission by the GWP (Global Water Partnership) Secretariat at the forthcoming;

“(i) donor meeting to mobilise and seek support for IWRM in February, 2004, and the (ii) CSD conference in New York, March, 2004”.

The report concentrates on regional and national progress and activities in the Pacific region on IWRM, and where relevant refers to national and sub-national level examples of “roll-out” of these developments.

The report concludes with an assessment of selected Pacific Island Countries (PICs) that are member states of SOPAC being categorised according to their potential to develop national IWRM plans by 2005.¹ Justifications for the classification of each country are provided and suggestions are made on how IWRM may be progressed at the regional and national levels in the PIC's.

1.2 Structure of the Report

The report is structured as follows:

- (i) Section 1: Introduction
- (ii) Section 2: Contextual setting for Pacific Island Countries
- (iii) Section 3: IWRM as a concept in Pacific Island Countries
- (iv) Section 4: Country assessments
- (v) Section 5: Directions for IWRM in Pacific Island Countries

¹ Due to time and budgetary constraints, this report focuses on 10 countries of the 18 SOPAC island member states.

Section 2: Contextual Setting for Pacific Island Countries

2.1 Background

This report focuses on a regional and national assessment of IWRM and progress in the water sector generally. Time constraints in preparing this report have necessitated that a representational, rather than all 18 SOPAC island member countries (Australia and New Zealand are also member countries) could be reviewed in this report. To ensure the breadth and depth of Pacific water sector issues are accurately assessed and reported, SOPAC member countries have been selected from the 3 sub regions within the Pacific, namely, Micronesia, Melanesia and Polynesia. The Pacific Island Countries that fall within consideration of this IWRM assessment are:

Pacific Island Country (PIC)	Political Status
Cook Islands	Independent 1965 NZ-affiliated
Federated States of Micronesia	Independent 1979 US-affiliated
Fiji	Independent 1970
Kiribati	Independent 1979
Nauru	Independent 1968
Niue	Independent 1974 NZ-affiliated
Papua New Guinea	Independent 1975
Tonga	Independent
Vanuatu	Independent 1980
Samoa	Independent 1962

2.2 Characteristics of the Pacific Region

The Pacific region is characterised by widely scattered countries composed of numerous islands that vary considerably in their size, physical and hydrologic characteristics. The region contains a wide variety of island types, ranging from the large, high volcanic islands of Papua New Guinea (PNG) to the tiny low coral atolls of Kiribati and Marshall Islands in Micronesia; from states with relatively few inhabited islands to those inhabited and highly populated islands; from those states such as Papua New Guinea, with mighty river systems that run through many linguistic and socio-cultural systems, to those that have no natural surface water systems such as Niue, and are completely dependent upon rainwater catchments and groundwater.

In this context, the diversity of water resources characteristics of PIC's warrants attention to water governance at different scales. There are also other factors that characterise the region as a whole. These include the generally small populations, impacts of isolation caused by distance from larger populations and developed areas, and the particular socio-cultural characteristics of the PIC's within the region. In addition, some countries are composed of or contain small and low-lying islands that are highly vulnerable to climate change (prolonged drought, cyclones and potential sea-level rise), storm events and the danger of human threats to limited water resources. These all combine to present many challenges for sustainable water management including good water governance.

2.3 Hydro-physical and water resources

As mentioned above, the Pacific region is characterised by geographical isolation, both from larger landmasses and between PIC's. Further isolation is experienced within those PICs where transport and communications to outer islands is limited. The region is also vulnerable to general climatic factors, El Niño and La Nina cycles and climate change being serious considerations, all

impacting on water availability including the potential threat of sea level rise to low-lying islands and coastal zones.

PIC's exhibit significant differences in their territorial and physical characteristics, which are reflected in the characteristics of their water resources. The larger countries have elevated land (with some areas having high rainfall over 4,000 mm per year), while there are countries with areas of less than 100 sq miles, some comprising a single island only and some comprising numerous small low lying islands.

In regard to surface water characteristics, perennial streams and springs occur mainly in high volcanic islands such as Samoa where the permeability of the rock is varied. Many streams are in small steep catchments and are not perennial. Some flow for several hours or days after heavy rainfall while others flow for longer periods but become dry in droughts. Freshwater lagoons and small lakes are not common but are found on some small islands. These can occur in the craters of extinct volcanoes or depressions in the topography. Low lying coral islands such as in Kiribati do not have fresh surface water resources except where rainfall is abundant. Many small island lakes, lagoons and swamps, particularly those at or close to sea level, are brackish and not suitable for drinking water. (see Table 1 – summary of water resources in selected SOPAC PIC's).

Table 1: Summary of Water Resources and Water supplies in selected SOPAC PIC's.

Pacific Island Country (PIC)	Main water resources	Access to safe water (% of population)	Water supply coverage (% of population)
Cook Islands	SW, GW, RW	95	100
FSM	SW, GW, RW	44	–
Fiji	SW, GW, RW, D (tourist resort only)	77	47
Kiribati	GW, RW, D (limited)	76	47
Marshall Islands	RW (from airport catchment and buildings), GW, D (emergency)	82	–
Nauru	D (regular use), RW, GW (limited)	100	–
Niue	GW, RW	100	100
Palau	SW, GW, RW	86	79
Papua New Guinea	SW, GW, RW	24	42
Samoa	SW, GW, RW	100	99
Solomon Islands	SW, GW, RW	64	71
Tonga	GW, RW	95	100
Tuvalu	RW (primary), GW (limited), D (emergency)	85	100
Vanuatu	SW, GW, RW	87	88

Notes:

1. SW = Surface water, GW = groundwater, RW = rainwater; D = desalination.
2. Estimates from UNDP (1999).
3. Estimates for 2000 from WHO/UNICEF (2000) based on UNDESA (1999).

Groundwater is an extremely important water resource in the Pacific region, although volumes are limited in comparison to 'mainland' regions. Perched aquifers commonly occur over horizontal confining layers (aquicludes) in volcanic terrains. Dyke-confined aquifers are a less common form of perched aquifer and are formed when vertical volcanic dykes trap water in the intervening compartments (e.g. some of the islands of Hawaii and French Polynesia). On many small coral and limestone islands, the basal aquifer takes the form of a 'freshwater lens' (or 'groundwater lens') that underlies the whole island but varies in width and depth. Basal aquifers generally have larger storage volumes but are vulnerable to saline intrusion owing to the freshwater-seawater

interaction. As such, such limited resources must be carefully managed to avoid over-exploitation and consequent seawater intrusion.

When considering water resources management, PIC's may be grouped into those countries with:

- low-lying islands in which surface water is limited or virtually absent apart from rainfall runoff, and
- those islands with significant surface water resources, namely the 'high' volcanic islands and territories, such as Papua New Guinea (PNG), the Solomon Islands, Vanuatu and Fiji. PNG, for example, has some of the wettest territory in the world, but also experiences prolonged dry spells in other low-lying and island areas, which are subject to El Niño climatic fluctuations.

On small islands, where the only usable resource apart from rainwater is in the form of fresh groundwater lenses no more than several metres deep, the resource is highly vulnerable to damage through over-use or inappropriate use or pollution and degradation. Examples of atoll countries of this nature are Tuvalu, Marshal Islands and Kiribati.

The region is subject to disasters caused by storm events, climatic disasters and may experience drought from time to time. Cyclone damage and droughts have been sufficiently severe to lead to calls for major international assistance by some countries – which have been affected by drought, loss or damage to water supplies, infrastructure damage or pollution of water sources resulting from the foregoing events. Niue and to a lesser degree Samoa most recently received international assistance for major damage from Cyclone Heta in January, 2004.

In summary, there are common factors of concern in PIC's but also great variety in physical and hydrologic conditions including climate vulnerability. This is a feature that reinforces the need for a targeted approach to water issues from country to country within the Pacific region.

2.4 Population, economic and social issues

The populations of PIC's are small in global terms, ranging from around 5 million persons in PNG to less than 2,000 persons in Niue, with the majority of countries having populations in the range of 50,000 to 200,000 persons. The comparatively small size of populations and the lack of natural resources is a severe constraint to economic growth in most countries. The limited population in many PICs gives rise to particular governance and management challenges, stemming from:

- limited governing capacity and experience in relation to national and international economic pressures and the intervention of foreign agents in natural resources exploitation;
- limited human and technical resources including indigenous professional and technical qualifications, skills and experience;
- rising development pressures on small taxation base or governments and consequent inability to provide resources for 'lower order priority' natural resources management;
- the impact of the traditional sector including the influence of 'local' social and cultural groupings on the management and operation of water services.

The constraint of geographical isolation limits trade between the region and other regions, between countries and within countries. Distance also imposes high costs and limits interchange in such fields as education, health and professional disciplines important to the water sector.

The Pacific region has great diversity and complexity in population, as well as socio-cultural features and economic conditions among three geographic divisions, namely, Melanesia, Micronesia and Polynesia. While the scattered islands in the Pacific region contrast in their socio-economic settings, geography, culture and resource base, high rates of urbanisation and an absence of urban management practices, skills and commitment to comprehensively tackle urban

problems are commonplace. The growing need for effective urban management as a result of urbanisation will become one of the most significant development issues for Pacific Island Countries in the 21st century as governments and communities are unable to keep pace with the rapidity of urban growth.

For example, in some parts of Polynesia and Micronesia, the population growth is almost completely offset by emigration. This reflects the related socio-cultural concern resulting from small size and isolation – the difficulty of retaining active and younger people, particular those who wish to receive higher education or are educated to higher levels. PIC's have a mixture of rural and urban populations, with approximately 40% of the populations now living in urban areas, a trend that is increasing. The steadily increasing migration to urban areas of PICs is not yet generally appreciated. National urban growth rates are 50 to 100% higher than the already large overall population growth rates of average 2-3%/year (see Table 2). In this context, of considerable concern is the fact that urban growth rates continue to outstrip national growth rates in most Pacific Island Countries. Education, lifestyle choices, increasing centralisation of government sector bureaucracy, moderate industrialisation and private sector development, have all fuelled the movement of population to Pacific Island cities and towns, further reflecting the permanency of the rural urban transformation.

Table 2: Selective PIC Populations of SOPAC Member Countries, 2000².

Pacific Island Country (PIC)	Last census	Population as counted at last census	Urban population (%)	Annual intercensal urban growth rate (%)	Annual intercensal national growth rate (%)
Cook Islands ³	1999	16,000	63	-1.0 ⁴	-2.2
Fiji Islands	1996	785,000	46	2.6	1.6
Kiribati	1998	85,000	37	2.2	2.5
Marshall Islands	1999	50,840	65	1.8	2.0
Niue	2000	1,700	35	1.2	-3.1
Palau	1995	22,000	71	2.9	2.2
Papua New Guinea	2000	5,100,000	15	4.1	4.4
Samoa ⁵	2001	175,000	35	2.0	1.0
Solomon Islands ⁶	1999	409,042	12	3.4 ⁷	...
Tonga	1996	98,000	32	0.8	0.6
Tuvalu ⁸	2002	9,500	47	1.7	0.5
Vanuatu	1998	182,000	21	4.3	3.0

In addition to urban population growth, squatter settlements are increasing and housing densities continue to rise, domestic household and industrial waste is increasingly visible as collection systems (if they exist) try to match supply, crime and family breakdowns including youth suicide are now commonplace, urban land cases continue to escalate before the courts, and generally, access to basic water, sanitation and road infrastructure cannot keep up with the demand for services. As such, water governance demands such as the need to be involved in the planning process, access to information and greater financial transparency of how public monies are spent and where in the urban areas of PICs, are on the increase. There are major implications for water resources management in urban areas in PIC's. In particular the rate of urbanisation will stretch the capacity of PICs to keep pace with basic services (water supply and sanitation), increasing urban and wastewater pollution, urban and peri-urban land degradation and water degradation from inadequately controlled development, and the difficulty of applying measures for water

² Primary source: Secretariat of the Pacific Community, Noumea. See www.spc.int.nc/demog/pop_data2000

³ Preliminary census results, Cook Islands Office of Statistics, Ministry of Finance and Economic Management.

⁴ Urban population for Cook Islands includes all people on the island of Rarotonga.

⁵ The 2001 Household Income and Expenditure Survey data has been used to calculate total Samoa population

⁶ Population Unit, Ministry of National Planning.

⁷ Includes Honiara only

⁸ Figures quoted are preliminary provided by the Tuvalu Office of Statistics.

conservation and water quality protection in the social conditions fostered by increased urbanisation.

Groundwater resources in many PICs are polluted or at risk from pollution from human settlements, particularly resulting from the most common sanitation systems, pit latrines and septic tanks. In some PICs, over-pumping or inappropriate pumping systems in coastal zones of large islands and in parts of small islands has caused saline intrusion. The greatest impacts are felt on small coral islands where groundwater resources in the form of 'freshwater lenses' are limited in extent and thickness and very vulnerable due to thin, highly permeable soils.

Despite the above rising urban issues and concerns, urban governance in the PIC's continues to be weak, ineffective and inadequate. This is primarily because Pacific Island Governments continue to keep at 'arms length' from their urban futures, often due to the prevalence of the strong traditional socio-cultural order coexisting side by side with the modern decision making structures of government. In Polynesia, for example, separate urban governance structures of a formal nature are almost non-existent, often because of the smallness of the countries involved and the socio-cultural sensitivities and political implications of modifying traditional decision making structures which decide where and how lands, primarily customary lands, are used and developed. In Kiribati, Fiji and Solomon Islands both urban and rural local government exists, but they are weak and under resourced.

These factors point to the need for improved governance in the form of planning and management processes and systems in order to assure the achievement of water management objectives in an urban as well as rural setting.

2.5 Economic Sectors

The economies of the PIC's cover a mixture of sectors including natural resources (for example, forest products, marine fisheries) and minerals, although some PICs have minimal resources. Mining has been a dominant economic activity in some PICs, but has also brought serious environmental impacts in some cases. The exploitation of natural resources has not always been well governed, particularly in cases where external interests have dominated.

Tourism is an extremely important contributor to many economies in the region, with the balance between tourism development and environmental sensitivity increasingly difficult to maintain. Tourism is a significant consumer of water in those locations where facilities have been developed, and may also contribute to the pollution of freshwater and marine waters. Large-scale tourism is seen by some as contributing to environmental degradation and causing concern about the environment. The pollution of water resources is of concern chiefly where the disposal of wastes is affecting freshwater lens and coastal marine waters.

Within the Pacific region, commercially organised agriculture is a major part of national economies, with few exceptions. Copra is still an important sector in many countries as it supports and augments the village economy in rural areas. The sugar industry is important in Fiji. There is little irrigation in the region, partly because many PICs do not have land resources to allow agriculture as a significant sector and partly because irrigation is not a traditionally practised activity.

2.6 Land tenure

Resolving land tenure issues and balancing traditional customary rights to land with those of the 'public interest', is a recurrent theme that lies at the heart of many attempts to improve both urban management and land planning generally throughout the Pacific. This includes the planning and protection of water resources including water catchments and groundwater lenses. However, the reality is that both urban and non-urban environments are increasingly fragile and under

enormous pressure for change from both population and development pressures. The need for governments and communities to work together to find new solutions to improve the quality of life is now paramount.

Successful IWRM and governance arrangements in the Pacific must incorporate an approach to land tenure and local accountability that adequately involves traditional decision-makers while at the same time enabling more modern forms of development to be introduced. The failure to deal directly with land tenure and traditional organisation has caused projects to fail in the past.

Land tenure is relevant to water resources management and water governance because traditional ideas about land tenure and family and community rights can create complexity when it comes to identifying the right to take, use and manage water. If the complex issues surrounding land and water rights are not properly resolved, IWRM initiatives will not succeed. In this context, dealing with land and its underlying socio-cultural norms and values are an integral part of dealing with the governance of IWRM in PIC's.

2.7 Socio-cultural factors

Socio-cultural factors in the Pacific region are very important when considering any form of management or governance improvement. Water resources management is affected by:

- the importance in urban and rural areas of traditional forms of governance based on traditional socio-cultural structures;
- the role of land tenure and attitudes towards land among traditional 'owners', which is embedded in the local community systems and structures;
- the general attitude to change and external influences, in which the critical need to create local commitment and the perception of 'ownership' of projects and proposals if progress is to be made and sustained.

In addition, the relatively recent independence of most PIC's means that they are attempting to establish national identities against their history of the dominance of external cultural and organisational forms inherited from the colonial era. Such a process demands sensitive consultation with governments and officials on proposals for change.

These factors need to be actively taken into account in the development of IWRM programme, The most important social issue for IWRM and water governance generally is the need to ensure that water projects and management measures are designed and implemented in a consultative manner, so that clear understandings are negotiated with those who are affected or need to participate. If solutions are designed without respect for traditional cultural attitudes and social structures, commitment will not be obtained and long-term success and sustainability is unlikely. A lack of such cooperation and lack of understanding of the prevailing socio-cultural order has characterised many projects in the past. Such issues can also be a problem for officials of central government agencies in their relationship with regional and rural communities.

2.8 Water resource management issues

Water resource management issues vary from country to country, however, some issues are common. Those facing PICs are:

- the need to provide adequate urban water supply facilities and services to meet burgeoning increases in urban populations;
- a shortfall in the provision of adequate sanitation in urban and peri-urban areas, with associated drainage deficiencies;

- provision of rural access to clean and safe water supply, either through piped scheme or wells and bores, including the management of such schemes through local groups;
- need to strengthen institutional capacity to manage water supply and sanitation at all levels, from urban reticulated schemes to locally managed village schemes;
- periodic threats to water resources availability from drought and climatic changes;
- sustainable use of limited water resources, in particular limited fresh groundwater where population increases threaten the quality of water;
- the threat to water quality from urban and industrial development and mining,
- threats to water quality, both surface water and groundwater sources, from local contamination including domestic and rural waste disposal, and
- health threats resulting from water pollution and contamination.

Other trends include:

- degradation of near-shore fisheries and ecosystems;
- forest clearing and erosion in water supply catchments;
- increasing pesticide and herbicide use;
- rising sea levels and unpredictable weather.

The following key issues, concerns and constraints were identified at the Pacific Regional Consultation Meeting on Water in Small Island Countries Sigatoka, Fiji Islands, 29 July – 3 August 2002:

- Freshwater availability issues including increasing demands for water.
- Water quality degradation in surface water and groundwater catchments, with consequent downstream 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 management issues.

Other key water resource management issues and concerns are:

- Vulnerability of water resources to natural hazards and 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 other financing organizations in water resources projects.

Within PIC's, it is important to take into account the differences in regard to (i) the nature of the water management issues they face, and (ii) the different situations experienced on large and small islands, which may occur within the same country. Integrated water resource management involves complex national level management issues, with sectoral and organisational issues operating at the national, regional and local levels. Importantly in all PIC's, there is a need to work at the local scale. Some island water resources such as freshwater lenses in Kiribati where the lands are still used for copra and local vegetable gardens must be managed in partnership with local community-based organization and processes if there is to be sustainable outcomes.

Section 3: IWRM as a Concept in Pacific Island Countries

3.1 Background to IWRM in the Pacific

IWRM is a relatively new “brand” in the Pacific Islands. However, the concept and the approaches it embodies - namely, the need to take a holistic approach to ensure the socio-cultural, technical, economic and environmental factors are taken into account in the development and management of water resources - has been practised at a traditional level for centuries in the Pacific Islands. The concept that all activities affect each other, given the very small landmasses involved in the Pacific, is well understood by people living in the islands. The concept of competing land pressures, the choice of whether to use precious land for a plantation, a water reserve, a school or recreation area, are appreciated at the household, village and community level. In particular, every coastal village community understands the connection between activities on the land and in the sea, as they impact on freshwater, fisheries stock and coral reefs.

The formal development of the IWRM management approach within governance structures at the national level has not been a widespread reality. This has largely been a function of inherited colonial government structures with their inherent line ministries and poor inter-ministerial liaison and collaboration, with a general tendency for government administrations to be inadequately resourced and weak compared to local and traditional governance structures. This has been a persistent constraint that water is everybody’s business and therefore no ones responsibility.

Basin and transboundary IWRM, the scale at which IWRM first took hold and was seen to be of value, are not issues in the Pacific. Basins or catchments are generally too small to manage individually except at the community level, and with no international land borders in the region, transboundary in the Pacific refers to marine pollution and migratory fish stocks.

3.2 IWRM Island Style

Growing recognition since the late 1990’s and into the new millennium that sustainable water resources management was not being achieved in the PICs started to focus water stakeholders on identifying the causes. It was increasingly understood that competing activities in watersheds had to be tackled together if the water resources of the catchments were to be managed adequately.

Cyclone and drought events, to which the PICs are especially vulnerable (due to the small size of the catchments and aquifers and therefore the lack of natural storage) affected all water users, whether they be urban or rural water supplies, commercial forestry and agriculture, subsistence agriculture, and of course the fisheries/reefs and tourist developments. The need for drought and disaster preparedness plans became two forms of climatic extreme water resources management, recognised as national priorities in many PICs. Additional mounting evidence was suggesting that pollution on land from inadequate wastewater disposal, increased sediment erosion and industrial discharges, were impacting upon coastal water quality and fisheries stock which sustain the entire island populations.

This led in the islands to looking at managing water resources not only within the watershed but also the receiving coastal waters. In the Pacific this management concept is referred to as “Ridge to Reef”. In the Caribbean it is known as “White Water to Blue Water”. Whilst demonstration schemes have been occasionally tried in the Pacific, for example, forestry conservation on Pohnpei, Federated States of Micronesia, the small size of the countries really necessitates a national approach to capacity building and awareness to address this issue. In the Pacific this has been called “Island System Management” (ISM) and in the Caribbean “ Integrated Watershed and Coastal Area Management” (IWCAM).

Recognition of the need for all government stakeholders to be involved in water resources management can be identified in a number of countries that have made attempts to introduce either formal or informal inter-ministry/departmental partnership mechanisms. These include for example, National Water Committees (Vanuatu, Fiji, Tonga), National Water Councils (Kiribati, Tuvalu, Samoa) and/or cross-sectoral water policies developed in these countries in the last five to ten years. The political will to support these instruments has however been debatable until recently.

IWRM whilst being synonymous with partnership, is also closely linked to legislation in other parts of the world. In the Pacific where government administrations are relatively weak and under resourced, traditional/custom land and water ownership rights are strong, and internal country communications and access difficult, the significance of legislation is often overstated. The reality that legislation cannot be regulated or enforced has put the emphasis upon awareness and education of local communities to improve their water management. Examples of participatory catchment management initiatives involving local communities monitoring their own impact upon the water resources as well as commercial activities in the catchments include the UNESCO supported Catchment and Communities project in 8 catchments in Vanuatu and the River Care project in Viti Levu, Fiji. Both projects demonstrate an island adaptation of IWRM concepts to the needs and realities of the Pacific.

3.3 Awareness of IWRM – building political commitment

IWRM as a consistent buzz-phrase has been introduced into the Pacific recently. Countries and government officials are more familiar with the language of cross-sectoral approaches, as demonstrated above. IWRM was however considered by the PICs to be of sufficient importance to be included as a fundamental issue in the Pacific Regional Consultation Meeting on “Water In Small Island Countries”, held in 2002. The outcome of this consultation, which included multi-ministerial delegations from 18 Island States plus civil society, development agency and donor representatives, was the *Pacific Regional Action Plan on Sustainable Water Management* (Pacific RAP). It is now increasingly accepted that IWRM can be undertaken at the level of surface water catchment such as river basin or watershed, or at the groundwater catchment (groundwater basin) as these are the natural units of managing water resources in PICs. In an island context, IWRM can therefore be applied at the ‘total island’ level such as for atolls and low lying islands or for those islands that have multiple small surface water catchments.

Originally endorsed by the 18 island state delegations, the *Pacific Regional Action Plan* has since been confirmed firstly at Ministerial level by 14 PICs and now at Heads of State level by 14 PICs. The role of IWRM in achieving sustainable water management is clearly articulated in this regional strategy (see Table 3) and encouraged to be applied at the national level. In Fiji Islands, for example, ESCAP have just launched an IWRM pilot project in the Nadi River Basin while the University of the South Pacific based in Suva, Fiji Islands (the regional university covering 14 countries) is due to commence courses on physical land use planning and IWRM in 2004.

3.4 National frameworks for broad stakeholder participation for IWRM

Regional advocacy and strategic development of sustainable approaches can only take the countries so far. Eventually the capacity building and awareness raising have to develop into nationally owned processes and institutional reforms within the individual PICs themselves. The Pacific RAP has provided those countries with a broad framework within which to strengthen their national water committees, and with an approach and political commitment to formalise these arrangements.

Table 3: Themes and Components of Pacific Regional Action Plan for Sustainable Water Management.

Theme Name	Theme Components
Theme 1: Water Resources Management	<ol style="list-style-type: none"> 1. Water resources assessment and monitoring 2. Rural water supply and sanitation 3. Integrated water resource and catchment management
Theme 2: Island Vulnerability	<ol style="list-style-type: none"> 1. Disaster preparedness 2. Dialogue on Water and Climate
Theme 3: Awareness	<ol style="list-style-type: none"> 1. Advocacy 2. Political will 3. Community participation 4. Environmental understanding 5. Gender
Theme 4: Technology	<ol style="list-style-type: none"> 1. Appropriate technologies 2. Demand management and conservation 3. Human resources
Theme 5: Institutional Arrangements	<ol style="list-style-type: none"> 1. Institutional strengthening 2. Policy, planning and legislation
Theme 6: Finance	<ol style="list-style-type: none"> 1. Costs and tariffs 2. Alternative models 3. Roles of donor organizations and financing institutes

Since the finalisation of the Pacific RAP in August 2002, **Fiji** have created an interim National Water Committee and drafted a cross-sectoral water policy; **Papua New Guinea** have held national consultations on developing a multi-sectoral water policy and established a National Water Association; **Tuvalu** have reviewed their national water plan including the need for more integrated management approaches; **Samoa** have just completed a further round of national multi-stakeholder consultations on drafting a national water policy and are strengthening their existing national water committee; **Kiribati** are presently carrying out a year long review of national water resources management, including institutional reform, policy and legislation, and capacity building.

There is also increasing activity in addressing urban water management issues in a more cross-sectoral approach. Wastewater and stormwater management are being tackled as inter-departmental issues now in **Port Vila, Vanuatu** and **Apia, Samoa**. In Apia this has gone as far as institutional restructuring to create a municipal agency including representatives and links to all relevant government departments.

Examples of community level IWRM type activities where both communities and government have come together are increasing. In **Kiribati** for example, this level of activity has been brought about by the small size of the water resources and the strength of traditional land rights versus government powers. The resource in question is a freshwater lens only 2km long by 0.5 km wide existing within the land of two villages - Buota and Bonriki - but as a resource being of national importance being the source of the urban water supply for South Tarawa. Issues of water abstraction have to be integrated and considered alongside traditional land use activities of subsistence agriculture, commercial agriculture, and conventional domestic lifestyle activities. Over considerable time, a **Committee for the Management of the Water Reserve** has been established, which is a partnership of local and national government and local landowners. While this Committee is in its developmental phase – established 2002 – it has the potential to address sensitive local issues such as annual land compensation and forced removal of the local people. Without this partnership, the nationally vital water resource would be almost unmanageable.

3.5 Overview of on-going IWRM related activities

The following is a list of examples of known regional, national and community level activities and initiatives on-going and planned in the Pacific Island Countries. These include:

- i) **Pacific Regional Consultation on Water In Small Island Countries, 2002:** mainstreaming IWRM in a holistic approach to achieving sustainable water management in the Pacific, through the implementation of the Pacific Regional Action Plan on Sustainable Water Management;
- ii) **ESCAP/SOPAC Regional Workshop on Strategic Planning and Management of Water Resources Development, 2002:** an advocacy and capacity building workshop on cross-sectoral approaches to water management and policy development;
- iii) **EU EDF8 Island Systems Management Programme (2002-2006):** a capacity building, advocacy and awareness programme in 8 PICs to develop planning and management systems using GIS and Satellite Imagery to strengthen cross-sectoral management of land resources (including water);
- iv) **EU EDF9 Island Systems Management Programme (proposed 2005-2009):** an extension to the above programme including a further 6 PICs;
- v) **ESCAP National Water Consultations (2002-2004):** support to Fiji on development of a cross-sectoral (resources, supply/disposal, irrigation and drainage) national water policy and formation of a national water committee in 2002. Possibly 2 other countries to receive such support;
- vi) **EU Programme of Water Governance (proposed 2004-2006):** a 2 year programme to demonstrate good water governance in 3 target countries, at the national level, institutional/municipal and community levels;
- vii) **UNU/UNDESA/SOPAC/USP Distance Learning IWRM Course (proposed 2004):** a modular 250-hour IWRM/land use planning course, developed by UNU, to be piloted at the University of the South Pacific (USP) as a Virtual Water Learning Centre (VWLC). Curriculum testing nearly finalised. Course expected to commence in 2004.
- viii) **Joint Caribbean - Pacific Programme for Action on Water and Climate:** a programme of 22 common actions to address water and climate issues in both regions. Uses an IWRM approach to address climate adaptation in the water sector.
- ix) National partnership building and policy development in Fiji (2002);
- x) National partnership building and policy development in Papua New Guinea (2003);
- xi) National partnership building and policy development in Samoa (2003);
- xii) National partnership building and policy development in Kiribati (2003);
- xiii) National partnership building and policy development in Tuvalu (2002/3);
- xiv) Municipal partnership building and policy development in Apia, Samoa (2002);
- xv) Municipal partnership building and policy development in Port Vila, Vanuatu (2002);
- xvi) Catchment watershed management on the Island of 'Eua, Tonga (2001 on-going)
- xvii) Catchment watershed management in Pohnpei, FSM (1980- on-going);

- xviii) Community watershed management and protection in Viti Levu, Fiji (2002/3)
- xix) Community freshwater lens management in South Tarawa, Kiribati (2000/3)

Section 4: Country Assessments

4.1 Introduction

This section examines selected PICs in regard to adopting IWRM, either formally under the banner of the IWRM concept or as part of the wider development of their water resources management capacity and efficiency. At the end of this section, Table 4 summarises each country against key IWRM attributes such as existence of national water committees, water legislation and the current catchment projects (if any). Table 5 summarises where each country is in relation to the key steps (outputs) in the IWRM planning process.

The common trend emerging from the country analysis is that while IWRM as an overarching national concept has not been widely used, most PIC's have made gains in the water sector generally including (i) institutional arrangements for water resource management and supply and (ii) application of IWRM and catchment principles at the local and regional levels including development of partnerships.

4.2 Fiji Islands

Fiji Islands – Key Country Facts

Capital – Suva; Land area – 18,272 square kilometres over 300 plus islands; Population 1996 Census – 785,000 persons; Languages – English, Fijian, Hindi; Currency – Fiji \$; Key economic sectors – agriculture, clothing, fisheries, sugar and tourism

Responsibility for Fiji's water resources falls within the jurisdiction of the Director of Water and Sewerage in the Public Works Department. The Fiji Public Works Department has responsibility to supply potable water supply to over 80% of the country population. The consistent development of water resources and supply strategies in Fiji has been thwarted by a lack of clear and comprehensive legislation compounded by the number of government agencies that are mandated to deal with water at one level or another. These include the Ministry of Public Works, the Ministry of Lands and Mineral Resources, Health, Regional development, Ministry of Housing Local Government Squatter Settlements and Environment and Agriculture and Irrigation. Hydrology falls within Public Works while the Ministry of Lands and Resources assists in the planning and assessment of ground water resources. Although Fiji is fortunate to have a plentiful supply of freshwater with high rainfall from volcanic islands, droughts and floods over the last twenty years have caused major interruptions to the collection, treatment and reticulation of potable water supplies issues. The symptoms of these impacts have been most noticeable in the towns and cities of Fiji where major water supply shortages and breakdown have been the norm, but also on small outer islands that rely mainly on rainwater.

Legislation related to water resources in Fiji is outdated but has generally served the nation well until recent times given the plentiful supply. Legislation identified as being in need of review to reflect current policy includes the Water Supply Act, Rivers and Streams Act, Native lands Act, Crown Acquisition of Lands Act and Electricity Act. The commercial use of water from groundwater supplies as well as resource management issues in catchments including logging, underlies the need for a comprehensive review of national policy followed by legislation. Many of these issues are politically and socially sensitive in Fiji, with the shortage of water supply in towns and cities and need for major infrastructure investment being a major national 'front page' issue for the last decade.

Unfortunately, development in Fiji Islands over the last 15 years has been severely contained by the political coups in 1987 and more recently in 2000. However, there is much optimism in both the community and government as reflected in the Governments Strategic Development Plan 2003-2005⁹ that places a strong focus on water resource development, primarily in the context of improved supply to the major urban centres of Suva and Nausori. This includes the continued implementation of the Suva/Nausori Regional Water Supply Master Scheme improvements and expansion programme, as well continued support for the Self Help Rural Water Supply Scheme for rural communities. While the government's vision and action statements relate primarily to the provision of adequate, reliable and safe water supply, it falls short of 'addressing water and water use in a holistic and integrated manner that considers the multitude of water users'.¹⁰

Like many PIC's, the resources given to the assessment of water resources, their sustainability and protection have been far less than resources given to the development of water infrastructure to ensure potable supply. Notwithstanding this, projects are up and running in Fiji which have a clear catchment basis including the Live and Learn River Care project which focuses on mobilising sugar cane communities in the upper inland catchments and the ESCAP funded Nadi River Basin project which takes an integrated approach with stakeholders to managing the important Nadi River catchment from mountains to sea. The need for integrated water resource management including water sector coordination is well recognised and in 2002 the Government established a National Water Committee to oversee the development of a Strategic Water Management Plan (SWMP) for Fiji. The main goal of the committee is to establish a plan and draft national water policy that has a major focus on water resources planning and management including addressing IWRM issues at the national and regional level. A draft national 'Water Policy for Fiji' was released in 2003.

4.3 Cook Islands

Cook Islands – Key Country Facts

Capital – Rarotonga; Land area – 240 square kilometres over 15 islands; Population 1999 Census – 16,000 persons; Languages – English, Cook Islands, Maori; Currency – New Zealand \$; Key economic sectors – agriculture, tourism, black pearls, offshore banking, fisheries

The Cook Islands sources its water from two main sources. In the Southern Group of islands which includes the capital Rarotonga, surface water is sourced from springs and streams within catchments valleys, while in the Northern Group of islands, water is sourced from rainwater and groundwater as the islands are coral atolls. Like many PIC's, since water supply issues are dominant in the management of water resources, attention generally has focused on the areas of greater population, namely, the towns and cities. In the Cook Islands, the trend is no different, with the primary focus having been on water supply systems within the capital Rarotonga. The responsibility for water management including regulation falls under the auspices of the Ministry of Works (MoW), but other agencies also have a key interest including the Environment Service, Cook Islands Investment Corporation, Ministry and Finance and Economic Management, and Ministry of Health. The Department of Water Works within MoW is responsible for managing water supply in Rarotonga in consultations with island councils.

The common theme in reviewing the water sector in the Cook Islands is that water management and water sector policy generally is not advanced. There is no single national water supply legislation in place except for scattered provisions that address the supply of water to the public such as the Rarotonga Waterworks Ordinance of 1960. In the absence of such a framework, water supply projects especially on the outer islands have been historically implemented without full assessment of their viability, sustainability and impact on the local community and

⁹ Title – "Rebuilding Confidence for Stability for Peaceful and Prosperous Fiji".

¹⁰ Source: Fiji Country Briefing Paper, Sigatoka Consultations for Kyoto, 2002

environment. There is no national policy on water, sewerage or sanitation and there is no effective regulatory framework in which the public utilities operate to control and manage water.¹¹ There is a lack of commercialisation within the water sector – water is provided free in Rarotonga – and there is generally a lack of capacity and expertise including human and technical resources in the water sector, both government and private sector.

The government recognises that improvements to water supply and water resource including catchment management have a direct impact on maintaining a clean environment and attracting tourism to assist economic development. However, like many PICs, the growing capital towns such as Rarotonga continue to be the focus of major infrastructure investment for water supply including major rehabilitation of the distribution network. Such focus continues despite the lack of water supply, sewerage tariffs and ‘demand management’ approaches, and the need for communities to take a greater responsibility for sanitation, wastewater and the environment including the catchment generally. These issues are being addressed albeit slowly by Government of the Cook Islands.

Positive changes in governance arrangements are in place – for example, the devolution of responsibility from central government to island councils such as on the island Council of Aitutaki where Mayors have been elected to allow communities to have a greater say and responsibility in managing local affairs. Furthermore, there is greater awareness of the fragility of the island system and the interdependence between urban and rural land use, water supply, health and environmental issues. This includes the impact of wastewater at the household and island level. Rarotonga, for example, the Rarotonga Catchment Protection Committee has been established to promote awareness of the importance of land use activities in the catchments and the effects on water quality and environmental health downstream. Like many PIC’s, the Cook Islands face increasing development pressures spread out over many islands but with limited and financial, human and technical resources to address its water sector issues.

4.4 Federated States of Micronesia (FSM)

Federated States of Micronesia – Key Country Facts

Capital – Pohnpei; Land area – 700 square kilometres over 600 islands; Population 1998 Census – 114,000 persons; Languages – English, Micronesian languages; Currency – United States \$; Key economic sectors – agriculture, fisheries, tourism

The Federated States of Micronesia (FSM) varies from coral islands to large mountains of volcanic origin. The states of Chuuk, Pohnpei and Yap comprise the main islands and outer islands except for the State of Kosrae, which is a single island state. The main island groups are volcanic while the outer islands are coral atolls. Approximately 60% of water exists as surface water from catchments while the remaining 40% is sourced as groundwater.

Management of the water sector is complex in FSM as it is managed by a number of tiers of government, namely,

- the FSM national government which provides guidance and assistance including funding support for infrastructure projects to the state governments;
- State governments, which provide funding for capital improvements and operation and maintenance funds in each state. The key utility corporations in each state are the Pohnpei Utility Corporation (PUC), Chuuk Utility Corporation (CPUC), Kosrae Utility Corporation (KUC), Yap State Public Service Corporation (YSPSC) who take the lead role in the management, operations and maintenance of water supply and water resources management in each state, and

¹¹ Source: Cook Islands Country Briefing Paper, Sigatoka Consultations for Kyoto, 2002

- Municipal government, which contribute to funding for capital improvements to local; water supply systems. Municipal governments working with community group and NGO's maintain many community water systems.

The government of FSM does not have any direct role in setting policy frameworks for the sector. The national government through the Department of Finance and Administration coordinates the mobilisation of funding for water supply projects for State and municipal governments to consider. Existing community based water projects are driven from the state and municipal level. There have been a number of IWRM projects in FSM including the Pohnpei Forestry Watershed Management Project that started in the mid 1980's. In nearly all of the island states, there are no overarching policies and plans to protect and safeguard watershed and groundwater resources. NGO's water based projects are few, with many local initiatives taken at the community level with municipal government support. Contamination of indiscriminately discharged human and livestock wastes is a common threat to freshwater resource in all states of FSM. Problems of land access in most states especially in Chuuk makes enforcement difficult. There is no national water committee and no overarching national plan developed to date. Given the diversity of tiers of government and dispersed nature of the populated islands, capacity and expertise in technical, design and planning of the water sector in FSM is limited.

The major threat to the development of the water sector and FSM generally comes from the potential termination of United States (US) funding under the US-FSM Compact of Free Association funding agreements. The US government has been involved in supporting some FSM states in water resource management as a basis to improve water supply quality in villages and towns. They have also been supporting water utilities by providing grants and hence the sustainability of many utilities would be under question if this support were to be reduced and phased out totally. Both national and state governments have recognised the need for realigning the institutions in the water sector to make them more efficient, including financial viability. At the national level, the need for integrated water resources legislation, clear policy and consistent planning approaches for improvement of a sustainable management sector are well recognised by government.¹² Like many PIC's, donors and development banks such as ADB assist in reform of the water sector primarily with a focus on infrastructure and investment needs. Such needs including water supply, are reflected in the FSM Infrastructure Development Plan, 2003-2017.

4.5 Kiribati

Kiribati – Key Country Facts

Capital – South Tarawa; Land area – 726 square kilometres over 33 islands; Population 1998 Census – 85,000 persons; Languages – English, I-Kiribati languages; Currency – Australian \$; Key economic sectors – agriculture (copra), fisheries, seaweed, tourism

With a land area of only 726 square kilometres, Kiribati has a country area of over three million kilometres spread over 33 islands straddling the equator, the majority of which are coral atolls. Approximately 43% of the national population of 85,000 persons lives on urban South Tarawa, which has a land area of approximately 18 square kilometres. The remaining population is scattered on dispersed outer islands, inclusive of Kiritimati Island, which is located to the south west of Hawaii. Water on South Tarawa as well as outer islands is sourced from groundwater lens and where possible, supplemented with rainwater collection at the household level. An exception should be made for Banaba, a raised limestone island located west of Tarawa that relies on rainwater harvesting supplemented by small desalination plants. A larger desalination plant supplements the reticulated groundwater system on South Tarawa and was established in 1999

¹² Source: FSM Country Briefing Paper, Sigatoka Consultations for Kyoto, 2002

The institutional arrangements for water are shared between three main agencies – the Water Unit of the Ministry of Works and Energy (MWE), the Environmental Health Unit in the Ministry of Health and Family Planning and the Public Utilities Board (PUB), the water service provider on South Tarawa. The Water Unit in MWE has responsibility for overall water resource management and supply in Kiribati, both urban and outer island. The Environmental Health Unit in the Ministry of Health and Family Planning retains responsibility for water quality monitoring and provision of sanitary facilities in urban and rural villages. The PUB, a government owned corporation, has three key functional responsibilities – the urban water supply on South Tarawa, power generation and sewerage on South Tarawa. There has been a major realignment of functions in all the three main agencies over the last decade and institutional strengthening programmes continue in the PUB as well as the Water Engineering Unit (WEU) within MWE. This includes assistance with hydrology, water quality monitoring and resource assessment, and participatory water resource management and IWRM on the urban water reserves so as to conserve and protect the limited and valuable groundwater resource. A national resources management and protection plan is now being drafted with the assistance of ADB and a national steering committee is established as a result of this technical assistance. The need for overarching water legislation to reflect the refocused institutional roles and activities has been identified but has not been carried out.

The main problems in the water sector relate to (i) water supply on urban south Tarawa (ii) management and protection of the water resource, and (iii) development of capacity in the key water sector institutions including the PUB and WEU. In rapidly growing South Tarawa, drinking water from the existing reticulation system is insufficient, often restricted to one hour a day. Effective rainwater collection is often under-utilised or inoperative, mainly due to cost factors. The high incidence of water borne diseases on South Tarawa as compared to outer islands – approximately 60% of the population still defecate on the beach on South Tarawa, noting the figure is substantially higher on outer islands – can be attributed to the fact many people still use shallow hand dug wells for water which are contaminated by nearby sewage soak pits, leaking toilet pipes and faeces from Tarawa lagoon, ocean edge and pig pens. On outer islands where population densities are far less, villages still use wells supplemented by galleries which are often located inland from villages to avoid pollution of the sources. The relationship between sustaining good water quality and improving poor sanitation practices is clear in this atoll setting where low standards of living are the norm.

On South Tarawa, the reticulated groundwater is sourced from a major underground lens at Bonriki and Buota at the apex of South Tarawa and North Tarawa islands. Pumping rates remain conservative whilst water pressure is low due to limited water resources and variations caused by El Nino and climate change. Leakage loss is high due to the age of the systems (late 1970's aid funded project) and the numerous illegal connections. All of the above have made it difficult for the PUB to increase tariff charges. Given the rising demand for a sustainable urban water supply, the development of groundwater resources into North Tarawa at Abatao and Tabiteuea is a priority. Land issues compounded by the reality of land shortage and complex family land ownership has meant that water reserves set aside for 'public' water supply have been under increasing pressure from squatters and agricultural/plantation uses. These issues continue to plague the protection of the current major reserves at Bonriki and Buota, thus leading to the establishment in 2002 of Water Reserve Management Committees. These partnerships with communities and government are now working through the numerous water resource management issues including annual compensation payments, squatter removal, cemetery relocation and appropriate land use, all integral to sustaining the future of the water resource and health of the atoll.

There has been a major increase in awareness of water supply and resource management issues on both South Tarawa and outer islands. Nearly all major water projects including the current \$US17 million ADB funded water and sanitation project have piggybacked major community education and awareness programs, often facilitated by NGO's and government divisions at the community level. On outer islands, solar pumping systems are used to pump water from household and village infiltration galleries with funding assistance from UNDP while other donor

programmes support projects in tank making, water conservation practices, good sanitation and wastewater practice and changes to the school curriculum to incorporate water resource themes.

4.6 Samoa

Samoa – Key Country Facts

Capital – Apia; Land area – 2,934 square kilometres over 5 islands; Population 1998 Census – 175,000 persons; Languages – English, Samoan; Currency – Samoan Tala; Key economic sectors – agriculture, fisheries, tourism and manufacturing

Samoa has two main islands of volcanic origin, Upolu and Savaii, with Apia the capital and centre of government and commerce located on the main island of Upolu. The water supply systems in Samoa utilises rainfall, surface and underground water as the key sources of water supply for the country. The treatment mode for surface water that forms the main supply for the urban capital Apia is sand filtration followed by disinfection. Bore water used in many rural villages is either disinfected or pumped direct to household systems. Samoa generally has an acceptable level of access to surface and groundwater, with approximately 95% of the population having access to piped water, with approximately 65% supplied by surface water and 35% by borehole and rainwater.

The institutional arrangements for the water sector have been realigned following a Public Service Reform Program review in 2001 and 2002. This review identified fragmentation of functions, lack of overarching legislation and lack of financial resources as key water sector issues. The institutional arrangements currently being embedded focus on water supply being under the auspices of the government owned corporation, the Samoa Water Authority (SWA); the Ministry of Agriculture, Forestry, Fisheries and Meteorology having responsibility for watershed management and hydrology; while the Ministry of Natural Resources and Environment being responsible for national resource and environmental policy. This includes protection of the water resource. The SWA is the designated service provider for the country's water supply in both urban and rural areas, with coastal villages either being part of a larger reticulated system such as exists to the north west of Apia, or subject to community water schemes managed, operated and maintained by the SWA.

The SWA has under gone major institutional strengthening programs over the last decade in areas such as corporate, asset, human resource and financial management, with assistance from a range of agencies such as AusAID, EU and SOPAC. The SWA with major EU grant funding has also undertaken major upgrading of reticulation systems in Apia and the rural areas on Upolu and Savaii. Installation of water meters and tariff charges in urban Apia and rural areas has meant a reduction in water usage to around 280 litres per day and reduction in unaccounted losses. With funding from the EU, the government of Samoa is currently undertaking a National Water Resource Policy to identify key water resource management issues and means of resolution. A national steering committee now exists to identify and action priorities, and there is a keen enthusiasm within government and NGO's to make further gains in water sector, noting its strong relationship with environmental and resource management in a small island setting. The institutional framework for water resources

The concept of catchment management is well known in Samoa especially given the distance from the centre of the high dividing range to the fringing coast averages approximately 7 kilometres in length. Flash flooding during the wet season often followed by droughts in the dry season, has highlighted the interrelationship of urban and rural land use and other activities on the health of the catchment and water resource. Government and NGO's have and continue to undertake community education and awareness programs including projects on the care and management of rivers, streams and the wider catchments. FAO, for example, has implemented

watershed management projects under the former Ministry of Agriculture in the upper catchments in the 1990's. Unlike many other PIC's, the government of Samoa and key agencies such as the Ministry of Natural Resources and Environment, balance regulation and the problems of dealing with native landowners such as land access issues, with regular community education programs on all facets of protecting and sustaining the bio-physical environment. This includes a strong and sustained focus on water resource and catchment management.

4.7 Tonga

Tonga – Key Country Facts

Capital – Nuku'alofa; Land area – 688 square kilometres over 176 islands; Population 1998 Census – 99,000 persons; Languages – English, Tongan; Currency – Pa'anga; Key economic sectors – agriculture, fisheries, tourism

The Kingdom of Tonga comprises some 176 islands of which 35 are inhabited. The islands are spread over four main groups, namely, Tongatapu, Ha'apai, Vava'u and the Niuaus, and are of either volcanic or uplifted limestone derivation. The water resources for Tonga are primarily derived from groundwater with surface water only present on a few volcanic islands. Groundwater is pumped from drilled bores and hand dug wells, some of which are 50 metres in depth. Like most PIC's, rainwater collection is the supplementary source of potable water.

There is a range of institutions involved in the delivery and management of water in Tonga. The key agencies are:

- the Ministry of Lands, Survey and Natural Resources who is responsible for assessment and monitoring of the water resource;
- the Tonga Water Board who is responsible for the planning, installation, operation and maintenance of the public water supplies in the selected urban areas including the capital Nuku'alofa on the main island of Tongatapu;
- the village water committees who are responsible for operating and maintaining the physical components of villages water supply systems outside of the reticulated systems;
- the Ministry of Health for implementing villages water supply schemes and undertaking water quality testing and monitoring, and
- the Water Resources Committee, a sub committee of the National Development Coordination Committee, who is responsible for initiating and reviewing development proposals as they relate to water resources and their planning and management.

The institutional framework for water resources is robust with a national water committee in existence and water master plans having been completed for the reticulated supply systems and for national water resource development.¹³ A draft Water Resource Bill is currently under consideration by government with a focus on ensuring the sustainable use of groundwater resources. Donor and aid projects have been active across a range of areas in the water sector including strengthening of the Tonga Water Board (for example, legislative review, leak detection programmes, improvement of the 'Neiafu and 'Eua water supply schemes including new infiltration galleries); establishment of local catchment management projects such as the catchment project to support sustainability of the 'Eua water supply; UNESCO study of groundwater resources; installation of solar panels for pumping on outer islands, and pilot projects in the construction of domestic rainwater tanks on all inhabited islands.

While substantial gains have been made in the water sector in Tonga, many institutional and governance issues still remain for resolution to protect and sustain the limited water resources of

¹³ Major Tonga Water Supply Master Plans completed include Tonga Water Resources Development Master Plan; Tonga Water Supply Master Plan – Community Component; Tonga Water Supply Master Plan – Water Resources and Water Supply Legislation

the dispersed islands.¹⁴ These include lack of enforceable rules and regulatory framework for water management including hazard waste pollution and disposal; lack of clear utility operational structure over a number of islands; the need for clarifying the role of the Ministry of Environment in water conservation; water metering and tariff setting; the need for upgrading the water reticulation infrastructure in Nuka'lofa; and issues of land tenure and land use as they impact on sustaining the quality of the water resource. While there is a reasonable degree of community awareness on issues of water and the environment associated with projects including catchment management, coordination between agencies and sustaining partnerships with key stakeholders has been identified as a major issue to sustainable management of Tonga's water resources.¹⁵

4.8 Vanuatu

Vanuatu - Key Country Facts

Capital – Port Vila; Land area – 12,190 square kilometres over 74 islands; Population 1998 Census – 182,000 persons; Languages – Bislama, English, French, local languages; Currency – Vatu; Key economic sectors – agriculture, fisheries, tourism

Vanuatu is an archipelago dispersed over 74 populated islands of volcanic origin. Approximately 21% of the population of 182,000 (1998 Census) are urban residing in the two main areas of Port Vila, the capital, and Luganville on the island of Santo. Water is sourced primarily from surface water in catchments and from groundwater wells and bores. Like other PIC's, land ownership issues and conflict are dominant in the culture, creating difficulties in many areas of water management including gaining access to water for supply, protecting water resources such as catchments, infrastructure maintenance and negotiating national projects such as hydropower generation.

The institutional arrangements for water are vested with 4 key agencies:

- the Water Division of the Department of Geology, Mines and Rural Water Supply is responsible for installation and maintenance of water systems in rural villages, urban water supply planning and approval, as well as water resource management, legislation;
- the Department of Health for water quality testing and monitoring, and
- the privately owned UNELCO, which, operates and manages the water supply system for the capital city, Port Vila, and
- The Department of Public Works Department which looks after water supply in Isangel, Lakatoro and Luganville, including infrastructure provision.

A number of other agencies such as Environment and Lands administer legislation and coordinate proposals that affect water resources such as leases and development applications.

A National Water Committee was established in 1994 to provide a forum for information exchange on key issues in the water sector, including national policy issues. The high level committee continues and has been an important conduit to consider major issues and projects such as the Rural Water Supply Master Plan, designation of water protection zones in and adjoining catchments, and draft water resources legislation currently before Parliament.¹⁶ There is currently no water legislation that clearly addresses issues such as private, customary and public access rights; protection of significant water resources and their catchments; development of policy and planning through the National Water Committee, and generally, provides for national water management and policy.

¹⁴ Source: Tonga Country Briefing Paper, Sigatoka Consultations for Kyoto, 2002

¹⁵ Source: Tonga Country Briefing Paper, Sigatoka Consultations for Kyoto, 2002

¹⁶ Legislation titled "Water Resources Management Act"

Water infrastructure in the urban areas has deteriorating rapidly, the majority of reticulated systems having been constructed in the 1950's and 1960's. Only the Lakatoro system was upgraded in 1995 and new sources for Isangel established in 1994. The transfer of water operation in 1994 from government to UNELCO has resulted in improved delivery and quality of water in Port Vila, with no marked increases in tariffs. Water supply for Port Vila continues to be sourced from groundwater and chlorinated. Water supply to the rural areas has been provided under the National Rural Water Supply Scheme that aims to provide potable water to all the rural population in Vanuatu. Community usage of water rather than individual tap connections has been the major focus of physical works, with approximately 65% of the rural population having access to formal water supply systems in 2001. The remaining 35% of the rural population access springs, rivers, private wells and water tanks to provide their water needs. Donors and agencies have been active in developing the water sector in both urban and rural areas.

NGO's, aid donors and other agencies have been active in supporting the development of the water sector with projects ranging from institutional strengthening projects to community river and catchment care – for example, the UNESCO/SOPAC Catchment and Communities Project in Maewo, Santo and Epule which focuses assisting communities understanding how their catchments work via mapping, education, installation and water gauges and water quality monitoring. A similar project is also under way in the Tagabe River with the Tagabe River Catchment Protection Committee. Other projects include the construction of ferro cement tanks for public, upgrading of community and private water supply including hand pumps and solar panels. Human and technical resource constraints including shortage of qualified staff, have affected all government departments including systematic collection of water resource data, water quality monitoring, regular maintenance programmes and water sector planning generally. Financial constraints combined with the size of the country and diversify in cultures and languages, provides limitations to implementing comprehensive community education and awareness programs, notwithstanding community awareness has increased substantially over the last decade.

4.9 Papua New Guinea (PNG)

Papua New Guinea – Key Country Facts

Capital – Port Moresby; Land area – 462,000 square kilometres over 74 islands; Population 1998 Census – 4.4 million persons; Languages – Tok Pisin, English, hundreds of local languages and dialects; Currency – Kina; Key economic sectors – agriculture, fisheries, forestry and mining

PNG is the largest of the PIC's, with a population of 5.1 million (2000 Census) and a land area of 462,000 square kilometres. Approximately 15% of the population live in some 20 designated urban centres ranging from Port Moresby with 252, 000 persons to the smallest Lorengau with 5,800 persons. The bulk of the population, approximately 4.5 million people, live in rural areas and villages, with water sourced from surface water in catchments as well as groundwater. Although PNG has an abundance of water, ranking as one of the highest rainfall areas in the world,¹⁷ some of the lowland and islands adjoining the mainland have experienced water shortage problems and prolonged dry periods pronounced by El Nino during the last decade.

The institutional setting for the water resources sector is characterised by national, provincial and local government involvement, namely;

- the Department of Environment and Conservation who regulate water resource discharge from groundwater, rivers, springs and lakes such as the issues of permits for extraction of groundwater and surface water resources;

¹⁷ Rainfall averages from 2000 mm to 6000 mm

- the state owned PNG Water Board who manages water supplies in 11 of the designated urban centres excluding Port Moresby;
- the state owned Port Moresby City Water Supply who manages and operates water and sewerage systems in Port Moresby;
- the Department of Health for water quality monitoring and promotion of water supply and sanitation in rural areas, and
- the rural Provincial and Local Governments who operate at the village and non urban water supply systems.

Like other PIC's, overall planning of the water sector including donor and project coordination is the responsibility of the national planning office, namely, the PNG Department of Planning.

The 20 designated urban areas are generally provided with good reticulated water supply systems sourced from ground or surface water and providing supply 24 hours a day. The rural villages source their water from springs, wells, river, streams and rainwater, with some villages having communal reticulated village systems. Fourteen out of the 20 provincial towns and 3 out of the 86 district towns are supplied with safe treated drinking water. As such, accessibility to safe drinking water in rural areas is low.

There has been a considerable amount of consultation on issues in the water sector in PNG since the early 1990's. The National Water Supply and Sanitation Committee was formed in 1991 and continues to be the main consultative forum for water policy comprising a range of government agencies, agencies and donors such as WHO and UNICEF, plus NGO's. At the provincial and local levels, Water Supply and Sanitation Committees have also been set up. Recent reviews include the recently completed ADB water sector study to identify water sector investment priorities while in 2002 JICA undertook a groundwater resource study for 8 district towns severely affected by drought during the 1997/1998 period. Draft environmental regulations were prepared in 2002 under the recently promulgated Environment Act of 2000. The government is keen to privatise urban water supply, with the government indicating its intention to privatise the PNG Water Board as the National Water Authority to achieve operational efficiencies. While there is no overarching water sector legislation, PNG has a range of dated water legislation including the Water resources Act, 1982; the Environmental Planning Act, 1978 and Environmental Contaminants Act, 1978.

Projects have included development of village water supply schemes, provision of solar and hand pumps, numerous institutional strengthening programs and the like. Human resources issues, combined with continued domestic civil unrest and disorder issues, plus the sheer size of PNG including hundreds of different regional and local dialects, all form major constraints to comprehensive water resource management. In 2003 PNG held a National Water Seminar to refocus its efforts on achieving sustainable water management. The multi-stakeholder meeting has resulted in the creation of a National Water Association, with multi-stakeholder multi-departmental government and non-government representation, and a clear strategy for the development of a national water policy. With the bulk of the PNG population dispersed in rural areas, mainly highlands, and depending on a subsistence economy for survival, the provision of safe water to 50% of the PNG population by 2010, as stated in the 2001-2010 National Health Plan, is key priority.

4.10 Nauru

Nauru – Key Country Facts

Capital – Yaren; Land area – 22 square kilometres; Population 1998 Census – 11,000 persons; Languages – English, Nauruan; Currency – Australian \$; Key economic sectors – phosphate

Nauru is an isolated uplifted limestone island located just south of the equator. The total land area of Nauru is only 22 square kilometres or 2,200 hectares, and like many PICs, is surrounded by a fringing coral reef some 120 to 300 metres wide. A narrow coastal plain surrounds a raised coral limestone plateau of pinnacles and outcrops, the latter 70% and 30% of the island land area respectively. The limestone plateau has been the focus of extensive phosphate mining for the past 80 years which is to be finally phased out in the next 10 ten years.

The key players in the provision of water supply and resource management in Nauru are:

- the National Phosphate Commission for the establishment and operations of a desalination plant;
- the Nauru Works and Community Services for distribution of water supply to residents and business;
- the Department of Health for testing and monitoring water quality, and
- the Nauru Rehabilitation Corporation for data collection of wells and aquifers.

The national Department of Economic Development coordinates water sector activities including project proposals and liaison with donors and aid agencies.

The freshwater resources of Nauru are contained in Buanda lagoon, a landlocked, slightly brackish freshwater lake located in the southwest of the island on the plateau. Groundwater from the underlying lens is considered extensive, with the result it has been tapped by several hundred household wells to supplement the main source of potable water supply from desalination. A plant commissioned by the government from the National Phosphate Commission (NPC) provides desalinated water using waste heat generated from its power station. Water is delivered by truck to individual households and commercial storage tanks. When the plant is not in operation due to maintenance or breakdown, the island faces severe water shortages and an increased reliance on the groundwater sources for supply. The drought from 1998 to 2001 stretched the water resources on the island and highlighted the urgent need for a sustainable water supply system. The drought resulted in overuse of the lens and a decline in water quality, leading to rising health and environmental issues due to soakage from household sewage pits into the increasingly brackish and contaminated groundwater.

Nauru is facing major economic difficulties as its dependency on phosphate-processing winds back in the next decade. With increased diesel costs to maintain the NPC power plant, it is becoming increasingly difficult to meet daily water needs of potable drinking water for the island population. At the request of the Ministry of Health, a draft Water Plan was commenced in 2002 with the support of WHO. The draft plan identified a range of priority actions including feasibility studies on an underground gallery for rainwater storage from airport runway run-off, establishment of a secondary desalination plant, extraction from the fresh surface layer from the groundwater lens (if possible), installation of groundwater monitoring wells and clear delineation of the extent of underground resources so as not to risk over pumping. Most of the water resources information available is some 20 years old and needs urgent updating to indicate data on safe yields, water quality and other important monitoring and assessment data. Finalization of the Water Plan including continued public awareness on the fragility of the islands resources is a major water resource priority.

4.11 Niue

Niue – Key Country Facts

Capital – Alofi; Land area – 259 square kilometres; Population 2000 Census – 1,700 persons; Languages – English, Niuean; Currency – New Zealand \$; Key economic sectors – agriculture, tourism, off shore banking

Niue is a small island of 259 square kilometres in the southwest Pacific, being an elevated coral outcrop with fringing coral reef. It consists of two terraces with the upper terrace forming the bulk of the island. It is believed to be the largest coral atoll in the world, with 13 villages spread around the lower coastal terrace. The population (2000 Census) is approximately 1700 persons, notwithstanding the impact of the total devastation of the island at the time of writing this report from Cyclone Heta on 6th January, 2004, which is likely to see further residents leave for New Zealand to rebuild their lives.¹⁸

There is no surface runoff in Niue in the form of rivers, streams, and lakes. As such, water for residential and commercial consumption can only be sourced from the underground water lens supplemented by the collection of rainwater at the village or household level. It is estimated approximately 66% of Niue's annual rainfall evaporates. Approximately 85% of water that is pumped from the groundwater lens is used for domestic use, 10% for agricultural use and 5 % for commercial and industrial usage. All the 13 villages on the island have their own water system that consists of a submersible pump and a water reservoir except for the main village of Alofi, which has two reservoirs, and 4 submersible pumps. Water pumped from reservoirs to household storages is not treated, with households deciding themselves whether to treat or boil the water.

Responsibility for water supply and water resource management rests:

- the Water Unit in the Ministry of Public Works; and
- the Public Health Unit of the Health Department for water quality testing.

In terms of water supply, major recurrent problems identified have been leakages from distribution pipes and reservoirs and overflows resulting from manual operation of pumps. Water and subsequent electricity conservation has not been a high priority. AusAID funded an institutional strengthening program in the Water Unit in 1987 and included a successful leak detection program. A draft Master Plan for waste, water and sanitation was prepared in 1998 with external funding but has not been finalized due to financial and human resource constraints. There has been no recent detailed surveys or assessment of the underground water resource since 1980. A Water Resource Act was passed by the government in 1996 but has not been able to be implemented because it requires drafting of detailed regulations. There is community concerns over 'catchment' rights and fears of demands for compensation by government from residents if the new Water Resource Act is enforced.¹⁹

A study carried out by SOPAC on coastal water quality in 2003, originally initiated due to fish poisoning outbreaks and fish deaths, confirmed high nitrate and phosphate concentrations. This is believed to be caused by inadequate wastewater treatment primarily from septic tanks draining into the groundwater regime. This survey highlights the vulnerability of the islands water resources to any land surface activities, and the close link between land and catchment activities and coastal zone impacts.

With the planned increase in economic development of the island including a fish cannery (with associated fish waste effluent disposal), cash cropping of vanilla and growth of the tourist industry, an IWRM approach needs to be developed for the island to ensure the adequate

¹⁸ There is already approximately 18,000 Niueans live in New Zealand.

¹⁹ Source: Niue Country Briefing Paper, Sigatoka Consultations for Kyoto, 2002

protection of the groundwater from over-abstraction and contamination. The immediate priority challenge for Niue however is to establish the water supply system following the devastating cyclone of 06 January 2004. In the longer term there is an urgent need for water resources assessment and a community education and awareness program to operationalize and mainstream the Water Resources Act of 1996. Stronger partnerships between villages, residents and government are priorities to sustain and portent the water resource.

4.12 Conclusion

The concepts within IWRM have been well understood in the Pacific for a considerable time, and to some extent have been practised traditionally at the community level. The formalisation of IWRM into the government planning and resources management mechanisms however has been slow to take off. Evidence from most countries increasingly demonstrates recognition of the need for improved cross-sectoral planning on water resources issues and implementation of at least formal structures and informal cross-departmental initiatives to address this issue.

PICs have particular constraints that they will have to overcome in order to implement IWRM, including the issues of poorly resourced government administrations and strong traditional land and water ownership rights. Awareness raising, education and community participation are considered essential to overcoming these constraints so as to modify 'traditional' norms and values where appropriate. As reflected in the country assessments, legislation and foreign rules alone will not work in the Pacific.

Table 4: Summary of Key IWRM – Water Sector Attributes in Selected SOPCA PIC's.

Key IWRM and Water Sector Attributes	Fiji Islands	Cook Islands	FSM	Kiribati	Samoa	Tonga	Vanuatu	PNG	Nauru	Niue
1. Existence or preparation of National Plans – Policies for the Water Sector	Draft – In progress	No	No	In progress	In progress	Yes	Yes	Yes	In progress	No
2. Existence of National Water Committee	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	No
3. Comprehensive Water legislation	No	No	No	No	No	In progress	In progress	No	No	Yes
4. Existence of National Planning Processes/Plans for Development	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
5. Preparation of Water Master Plans at the local and regional levels	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
6. Local catchment initiatives/projects in place with communities	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No
7. Comprehensive and effective institutional arrangements and framework	No	No	No	Yes	Yes	Yes	Yes	No	No	No
8. Human and technical resource capacity	Limited	Limited	Limited	Limited	Limited	Limited	Limited	Limited	Limited	Limited
9. Political will and commitment	Average	Average	Average	Average	Strong	Average	Average	Average	Average	Average

Table 5: Summary Country Analysis via a vis Steps in the IWRM Plan Process

Steps	Fiji Islands	Cook Islands	FSM	Kiribati	Samoa
1. Raise awareness about IWRM and build political will to support the process	Awareness and political will increased over the last decade. Domestic unrest.	Awareness and political will increased over the last decade.	Awareness and political will increased over the decade	Awareness and political will increased over the decade	Awareness and political will increased over the decade
2. Ensure a framework for broad stakeholder participation	National Committee now established.	Framework and national initiatives to be strengthened under IWRM process. No National Committee.	Framework and national initiatives to be strengthened under IWRM process. No National Committee	Needs developing – in process of formation.	National Committee now established
3. Overview of on going activities that the IWRM plan can build on	Many recent studies and processes to build on. Actual on-going process to build on for IWRM. Good information nationally and regionally	Many recent studies and processes to build on (information, recommendation). Good information nationally and regionally.	Many recent studies and processes to build on (information, recommendation). Good information nationally and regionally.	Many studies including current activities provide a strong platform on which to build. Good information nationally and regionally.	Many studies including current activities provide a strong platform on which to build. Good information nationally and regionally.
4. Identify and prioritise WRM issues and challenges	Identified in many studies, although not formally under IWRM concept.	Identified in many studies, although not formally under IWRM concept.	Identified in many studies, although not formally under IWRM concept.	Identified in many studies, although not formally under IWRM concept.	Identified in many studies, although not formally under IWRM concept.
5. Identify WRM functions	Not formally identified in national studies.	Not formally identified in national studies.	Not formally identified in national studies.	Not formally identified in national studies.	Not formally identified in national studies.
6. Identify management potential and constraints	Constraints have been identified, potentials need to be identified and built upon. Many community opportunities.	Constraints have been identified, potential need to be identified and built upon. Many community opportunities.	Constraints have been identified, potentials need to be identified and built upon. Many opportunities in different States.	Constraints have been identified (2003-2004), potentials need to be identified and built upon. Many community opportunities.	Constraints have been identified (2003-2004), potentials need to be identified and built upon. Many community opportunities.
7 Prepare strategies and plans for IWRM framework	Good foundation processes and material to build on for IWRM framework.	Processes and outputs need to be articulated with communities and Government.	Can be done – with no framework, maybe more difficult	Can be done building on existing ADB initiatives for water sector.	Can be done building on existing EU initiatives for water sector.
8. Ensure adoption at the highest political level	Can be achieved via national and line planning agencies. Ministerial briefings.	Can be achieved via national and line planning agencies. Ministerial briefings.	Can be achieved but myriad of tiers of government over a number of States	Can be achieved via national and line planning agencies. Ministerial briefings.	Good track record. Can be achieved via national and line planning agencies. Ministerial briefings.
9. Initiate capacity building	Can benefit from national and regional initiatives.	Can benefit from national and regional initiatives.	Can benefit from national and regional initiatives.	Can benefit from national and regional initiatives.	Can benefit from national and regional initiatives.
10. Prepare portfolio implementation projects & financing strategy of plan	Would follow logically from in country consultations on expanding IWRM as formal concept.	Would follow logically from in country consultations on expanding IWRM as formal concept.	Would follow logically from in country consultations on expanding IWRM as formal concept.	Would follow logically from in country consultations on expanding IWRM as formal concept.	Would follow logically from in country consultations on expanding IWRM as formal concept.
Conclusion/recommendation	Likely to be successful. Potential for impact is great given many communities live within clear physical catchments.	Need strong support for sustained success, but potential given similar projects.	Need strong support for sustained success. but potential given similar projects.	Strong underlying traditional socio-cultural value and norms. Need strong support for sustained success, but potential.	Good past performance where Government commits to need perceived to relevant to support community needs.

Table 5 (continued): Summary Country Analysis via a vis Steps in the IWRM Plan Process.

Steps	Tonga	Vanuatu	Papua New Guinea	Nauru	Niue
1. Raise awareness about IWRM and build political will to support the process	Awareness and political will increased over the last decade.	Awareness and political will increased over the last decade.	Awareness and political will increased over the decade. Domestic unrest.	Awareness and political will increased over the last decade	Awareness and political will increased over the last decade
2. Ensure a framework for broad stakeholder participation	National Committee now established.	National Committee established. Framework and national initiatives to be strengthened under IWRM process.	National Committee established. Framework and national initiatives to be strengthened under IWRM process.	Needs revisiting and developing – in process of formation.	National Committee and framework to be established.
3. Overview of on going activities that the IWRM plan can build on	Many recent studies and processes to build on. Actual on-going process to build on for IWRM. Good information nationally and regionally	Many recent studies and processes to build on (information, recommendation). Good information nationally and regionally.	Many recent studies and processes to build on (information, recommendation). Good information nationally and regionally.	Many studies including current activities are outdated. Some information nationally and regionally to be updated.	Many studies including current activities are outdated. Some information nationally and regionally to be updated.
4. Identify and prioritise WRM issues and challenges	Identified in many studies, although not formally under IWRM concept.	Identified in many studies, although not formally under IWRM concept.	Identified in many studies, although not formally under IWRM concept.	Identified in studies, although not formally under IWRM concept.	Identified in many studies, although not formally under IWRM concept.
5. Identify WRM functions	Not formally identified in national studies.	Not formally identified in national studies.	Not formally identified in national studies.	Not formally identified in national studies.	Not formally identified in national studies.
6. Identify management potential and constraints	Constraints have been identified, potentials need to be identified and built upon. Many community opportunities.	Constraints have been identified, potential need to be identified and built upon. Many urban and rural opportunities.	Constraints have been identified, potentials need to be identified and built upon. Many tiers of Government.	Constraints have been identified (2002), potentials need to be identified and built upon.	Constraints have been identified (2002). Major tasks remain following 2004 cyclone.
7 Prepare strategies and plans for IWRM framework	Good foundation processes and material to build on for IWRM framework.	Processes and outputs need to be articulated with communities and Government.	Processes and outputs need to be articulated with communities and Government.	Can be done building on existing local and agency initiatives for water sector.	Can be done building on existing regional initiatives for water sector.
8. Ensure adoption at the highest political level	Can be achieved via national and line planning agencies. Ministerial briefings.	Can be achieved via national and line planning agencies. Ministerial briefings.	Can be achieved but myriad of tiers of government at local, provincial and district levels.	Can be achieved via national and line planning agencies. Ministerial briefings.	Can be achieved via national and line planning agencies. Ministerial briefings.
9. Initiate capacity building	Can benefit from national and regional initiatives.	Can benefit from national and regional initiatives.	Can benefit from national and regional initiatives.	Can benefit from national and regional initiatives.	Can benefit from national and regional initiatives.
10 prepare portfolio implementation projects & financing strategy of plan	Would follow logically from in country consultations on expanding IWRM as formal concept.	Would follow logically from in country consultations on expanding IWRM as formal concept.	Would follow logically from in country consultations on expanding IWRM as formal concept.	Would follow logically from in country consultations on expanding IWRM as formal concept.	Would follow logically from in country consultations on expanding IWRM as formal concept.
Conclusion/recommendation	Potential for impact is great given community and government support to related projects.	Need strong support for sustained success given size and diversify and country, but potential.	Need strong support for sustained success given size and diversify and country, but potential.	Need strong support for sustained success given internal economic issues, but potential given urgency of water issues.	Need strong support for sustained success given size and impact of recent cyclone. Strong potential.

Section 5: Directions for IWRM in Pacific Island Countries

5.1 The Need for IWRM in Pacific Island Countries

The purpose of this review has been to highlight the application of IWRM principles and approaches used to date in the PICs. The country assessments in Section 4 have highlighted the extent to which IWRM is recognised in each country as being a priority issue. The overriding trend is that IWRM as a 'formal' management approach differs considerably across the region, given the varying geographical, political and socio cultural and economic settings. All PICs are at varying stages of the development process and as such, their needs and demands vary including the application or otherwise of IWRM.

What is clear from the country assessments, however, is that there is a strong **need** for the consistent application of IWRM in PICs. The overarching priority facing PIC communities is that of improving and maintaining a reasonable level of basic human health. A safe, sustainable, adequate, reliable and affordable supply of potable water is a basic necessity for healthy lives and healthy communities. To achieve this, it is essential that water resources are protected against contamination and over-extraction, water supply systems are operated and maintained effectively and that freshwater use is conservative.

The country assessments reinforce the compelling evidence in PICs that there is an inadequate protection of water resources and supply. The major issue of water pollution in PICs and linkages with waterborne diseases has been a dominant development theme over the last decade. As many islands are small, environmental concerns about downstream effects of catchment degradation due to forest clearing, urbanisation and resource extraction have risen. High levels of turbidity and suspended sediment caused by excessive clearing in upper catchments, and faecal pollution from human settlements, particularly in urban, town and village areas, are major issues facing the (i) integrity of the resource and (ii) supply of freshwater. Sedimentation and contamination in rivers and coastal waters from upper catchments also adversely impact on mangroves, coral reefs and coastal fisheries. Other primary sources of pollution for surface water and groundwater resources identified in country assessments include animals (mainly cattle and pigs); industrial and mining waste discharges; hydrocarbon leaks particularly near power stations, and agricultural chemicals.

There have been many responses to the problems of providing adequate and safe water supplies. Most past activities within the water sector in PICs have been based on institutional approaches rather than community-based, participatory approaches. There is now a much greater awareness on the part of proponents of water projects involved in catchment and IWRM management that a necessary condition of project design to assist sustainability is;

- active participation of communities including fostering of partnerships with key stakeholders;
- a holistic approach to dealing with the issues as water sector issues are crosscutting affecting social, economic and political aspects of life, that is, IWRM, and
- building of capacity rather than just an emphasis on technical solution.

5.2 Regional support programme for national IWRM implementation

Based on the country assessments and knowledge of other SOPAC member countries not dealt with in detail in Section 4, SOPAC member countries have been scored based on the A, B, C ranking used by GWP.²⁰ Group A Countries are those that are considered likely to meet the international target of developing IWRM national plans by 2005 with little assistance, Group B

²⁰ Source: 'WSSD Target of National IWRM', Draft GWP report, December, 2003.

Countries those that are considered to need some major support to meet the target and Group C Countries those that are considered to need substantial support to meet the target (see Table 6).

Table 6: Selected Pacific Island Countries IWRM Status by Category.

Country	Category	Justification
American Samoa	B	Strong utility and EPA capacity, US regulatory approaches suggests IWRM can be quickly introduced and sustained
Cook Islands	C	No national water policy or strategy but possible IWRM on Rarotonga, with its existing Island Water Catchment Management Committee
Federated States of Micronesia	C	Four separately governed states, with their own water utility and EPA, suggesting State and not national IWRM plans would be the appropriate scale
Fiji Islands	B	National Water Policy in development. National water committee semi-formalised and supported by Cabinet decision. Catchment projects in place
French Polynesia	A	EU regulations apply to French Territory, and therefore has to meet EU deadlines and criteria
Guam	B	No information available, but assumed similar US related capacity and regulations as American Samoa
Kiribati	B	National water management review to be completed mid 2004, with likely recommendations for integrated planning and institutional reform. Restricted human and technical resources
Marshall Islands	B	Water and sanitation master plan, well defined utility and EPA responsibilities, but restricted human and technical resources
Nauru	C	Draft national water plan completed 2001, but little coordinated approach or agreed institutional responsibilities
New Caledonia	A	EU regulations apply to French Territory, and therefore has to meet EU deadlines and criteria
Niue	C	Small population prevents IWRM implementation. National water committee being considered in 2003. Badly affected by Cyclone Heta, January, 2004.
Palau	C	No information available, but known lack of land use planning on Babeldaob suggests little existing progress to date on IWRM at any scale
Papua New Guinea	B	National Water Association set up in 2003, with inter-ministry approval to develop a national water policy. Some civil unrest.
Samoa	B	Existing National Water Resources Policy, recent multi-stakeholder consultations and secured donor support for improved water management. Good political support for community endorsed projects.
Solomon Islands	C	Fragmented and degraded water sector, civil unrest weakened government resources and immediate priorities on supply system operation
Tonga	B	Water management plans and bills exist, integrated into National Development Plan and an active Water Resources Committee. Good community support.
Tuvalu	C	Water and sanitation master plan exists and recent national review. IWRM not a priority for a country reliant upon rainwater harvesting only
Vanuatu	C	Water resources management bill and informal national water committee exist but no institutional sanitation responsibility or national water policy

5.3 Suggested directions and approach

At the Pacific regional level, the principles of IWRM are consistent with the Pacific Regional Action Plan for Sustainable Water Management as presented at the 3rd World Water Forum in Kyoto, Japan, 2003, namely:

- Theme 1: Water Resource Management
- Theme 2: Island Vulnerability
- Theme 3: Awareness
- Theme 4: Technology
- Theme 5: Institutional Arrangements
- Theme 6: Finance

In this context, a regional framework as coordinated by SOPAC now exists to allow individual PICs to come to grips with the range of water sector issues that preoccupy them on one hand, whilst identifying the means by which to address them, such as IWRM, on the other. The advantage of the Pacific Regional Action Plan endorsed by the Pacific Heads of State is that it provides a sense of direction and priority actions for individual PICs to deal with their numerous water sector and development issues including IWRM.

Against this background any GWP support to the region should take a regionally strategic approach to addressing IWRM. Importantly, it should act as a demonstration programme for the region as a whole. Rather than select the countries that are deemed to have achieved the furthest level of IWRM implementation to date, and therefore are most likely to meet the 2005 target date for developing national IWRM plans, it would be of more benefit to the region if GWP were to select countries for support that between them provide demonstrations of the range of island state conditions found in the Pacific. Such a programme would then attempt to select countries for support based upon some of the following alternative criteria, for example:

- differing water resource types, for example, surface water and groundwater resources management;
- differing administrative and legislative codes, e.g. British and American;
- differing levels of IWRM development, eg a country with a formalised integrated approach and one with less IWRM awareness; and
- differing scales or levels of IWRM implementation, eg national, municipal, catchment and communal demonstrations.

In adopting such a target group of countries for any support programme, it would be hoped that lessons learnt in one country would find relevance and application in a minimum of one other country in the region, and that each country in the region would find parts of the programme of relevance to their own hydrological, geographical, institutional and legal environment. What the country assessments indicate is that the scale at which IWRM might be applied varies enormously from large surface water catchments in PNG, Solomon and Fiji Islands, to 100 metre wide freshwater lens on atoll islands in Kiribati, Marshall and the Cook Islands. Nationally, IWRM might have to consider a single island state such as Nauru, Niue or Guam, or be applicable and achievable in countries with more than 300 inhabitable islands.

In terms of a possible Pacific IWRM programme structure and the activities that it could encompass, these are suggested as:

- **Regionally** – at the regional level, the priority actions could focus on enhancing public awareness of IWRM advantage and disadvantages, exchanging views and experiences on IWRM in the Pacific to date, developing the political and governance commitment and importantly, building capacity. The GPW *'IWRM Toolbox'* could be modified to suit the Pacific circumstances so as to assist stakeholders to work there way systematically and holistically through the priority water sector issues.

- **Nationally** – at the country level, the initial emphasis could be on building partnerships at the local, regional and national level as a means to ensure IWRM is accepted as a genuine program to be pursued. Embedding of partnerships and the priority setting process of developing an IWRM Action Plan will allow individual projects to be set over a range of priorities. The scale of intervention could be national, local and regional level and address priorities relating to the enabling environment, institutions and management instruments. Pilot catchment projects could be carried out if funds allow, or identified for other partners including donors and agencies.

In summary, consistent implementation of IWRM principles and practices would be of great benefit for PIC's. As outlined in this report and as reinforced by the selected country assessments, the need is well justified. If IWRM support is provided for the Pacific Region (SOPAC and its PIC members), a carefully targeted GWP supported programme needs to be developed for the Pacific which will demonstrate good practice in addressing the full range of IWRM constraints encountered throughout the 18 PICs that are SOPAC's member states. This will necessitate development of (i) regional and (ii) national applications, the latter based on careful country selection based on the work carried out in this status report.