

# Theme 6

# Finance

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## **THEME 6 : FINANCING**

# **TOWARDS SUSTAINABLE WATER MANAGEMENT IN THE PACIFIC**

**July 2002**

# Theme 6 : Financing

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# 1. INTRODUCTION

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## 1.1 Introduction

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The problems with delivering satisfactory water supply and appropriate sanitation services in Pacific Island urban areas are primarily institutional and financial rather than technical. They reflect inappropriate policies, undue government interference, and the lack of appropriate incentives for consumers to reduce demand to sustainable levels, and inadequate cost recovery mechanisms, all of which undermine the ability to operate and maintain water supply and waste water systems properly. Budgetary support for water and sanitation operations – a major contributor to government budgetary deficits in a number of Pacific countries – is unsustainable.

The financing needs of the water sector are huge, water projects tend to be indivisible and capital intensive, and many countries in the Pacific have backlogs in developing water infrastructure. All governments need a strategy for financing and cost recovery in the water and wastewater sector.

External aid is limited in relation to requirements. Private finance is available but is costly and is most relevant to larger urban centres where ability to pay is higher. In some cases joint public – private investment is an alternative option. There is a growing body of international experience in creating the virtuous circle usually involving improved cost recovery and more attention to investment appraisal. There is a need for demand management to limit consumption and cost recovery policies and tariffs to ensure that users meet costs of services in line with accepted levels of affordability.

This report comments on cost recovery mechanisms, in particular tariffs and their ability in selected Pacific and Island countries to meet objectives that should be set for tariffs. A review of economic costs and financial tariffs in the selected countries is summarized and the main problems with respect to cost recovery identified. Actions that are being taken to improve the situation are discussed.

Finally reference is made to the Global Water Partnership Tool Box as a resource for assisting with developing clear financial policies and cost recovery mechanisms, and then to the Bonn Conference where a number of similar issues as those facing the Pacific were enunciated in a set of recommendations for action. These could also form a set of recommended actions for the Pacific.

## 1.2 Report Outline

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This paper is set out under the following section headings

Section	Section Headings and Contents
1	Introduction
2	Financing Issues and Constraints – Outline of Appropriate Cost Recovery Policies and Tariff Objectives
3	Tariffs and Cost Recovery in the Selected Countries and Case Studies
4	Financing and Institutional Arrangements
5	Completed and Proposed Actions

## **2. FINANCING ISSUES AND CONSTRAINTS**

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### **2.1 Introduction**

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This section sets out the issues that should be taken into account when developing financial and cost recovery policies for the sustainability of the urban water supply sector, in particular the need to consider economic, financial, social and administrative objectives when developing tariff policies and tariff structures. The lack of proper adherence to such objectives, political influence, and weak institutional structures present the major constraints to the long term financial sustainability of the sector.

### **2.2 Tariff Setting Objectives**

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Cost recovery mechanisms, especially tariffs, are the structure through which costs of water supply and wastewater costs, as well as the associated financial, environmental and social costs are recovered from users. Those cost recovery mechanisms which are most likely to be successful in providing for long term sustainability are those that have been designed on the basis of their ability to meet specific objectives that determine or significantly affect long term sustainability.

Thus, the development of tariffs as cost recovery mechanisms for water and wastewater systems in the Pacific need to be designed on the basis of specific economic, financial, social, and administrative objectives. In formulating tariff methodologies and recommendations, it is generally recognized that water and wastewater tariffs should meet four key objectives, namely:

(i) Economic Efficiency. In order to ensure that charges for water and wastewater are related to economic costs, thus achieving economic and environmental efficiency of resource allocation in the water and wastewater sector. This also includes the application of demand management techniques to achieve conservation and the polluter pays principle when charging for wastewater;

(ii) Financial Sustainability. In order to ensure that the water and/or wastewater entity has sufficient revenue to cover all its operating costs (including depreciation), any debt servicing requirements, taxation, and ideally a proportion of future capital expenditure;

(iii) Social Acceptability. In order to ensure that the poorer members of the community have access to water and wastewater services at a price, which they can afford. That is that tariffs are affordable and in line with consumers willingness to pay.

For domestic customers this means that tariffs (both water and wastewater) are affordable in terms of household incomes.

(iv) Administratively Understandable. Tariff structures need to be capable of implementation in terms of metering, billing and revenue collection and also readily comprehensible and understandable to customers.

These objectives are discussed in more detail below.

### **2.3 Economic Efficiency and Economic Pricing Principles**

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#### **2.3.1 Calculation of Economic Costs**

It is not unusual for the above objectives to conflict and final tariff design is typically a compromise between them. The usual starting point however is to derive the tariff structure and

level which would best meet the economic objectives. This involves determination of the economic cost of providing water and wastewater services. Generally this is the economic cost of the next major investment in water supply and distribution, and/or wastewater collection and treatment facilities.

### **Long Run Marginal Cost (LRMC)**

Therefore tariffs should reflect the Long Run Marginal Cost (LRMC) of water and wastewater services. The estimation of the LRMC for water and sewerage projects is difficult to measure because of the large and long-term additions to capacity which are typical in the sector. Therefore the Average Incremental Cost (AIC) concept is used as an approximation of the LRMC for the purposes of project evaluation and tariff formulation.

Where the analysis is in economic prices and the discount rate is the Social Opportunity Cost of Capital (SOCC) then it is referred to as the Average Incremental Economic Cost (AIEC). On the other hand calculation using financial prices is referred to as the Average Incremental Financial Cost (AIFC) and is the price (average tariff) that needs to be charged on all units to achieve full cost recovery over the life of the project in financial prices. The appropriate discount rate would be the Financial Opportunity Cost of Capital (FOCC) with the long term government domestic borrowing rate/bond rate (adjusted for inflation) a proxy. Often the weighted average cost of capital (WACC) which represents the costs of financing to the water entity is used as an alternative to the FOCC.

### **Average Incremental Costs, AIEC and AIFC**

The Average Incremental Economic Cost (AIEC) and Average Incremental Financial Cost (AIFC) of water supply and sewerage provide measures of the costs of producing, treating and distributing water and the collection, treatment and disposal of wastewater under the project. It is used to determine the economic and financial tariffs required to achieve full cost recovery and to identify the level necessary to achieve recovery of O&M costs. (This needs to be the minimum objective in any tariff charges.)

The AIC is the ratio of the total discounted capital and operating and maintenance costs incurred by a measurable addition in capacity divided by the total estimated (discounted) water production in cubic meter (cum).

The AIC strictly speaking is a measure of the additional investment to service the increase in consumption of existing customers. However it is normally calculated to include rehabilitation of existing systems, system reinforcement (the LRMC investment) and system expansion.

Thus, the AIC estimate can be calculated from the costs and water production of a discrete capital investment program. However, there are considerable practical difficulties in estimating such items as the total additional consumption attributable to the investment program as well as an expansion program's true capital costs. Capital expenditure for the water supply project falls into three areas:

- ?? rehabilitation (to existing intakes, water treatment plants, transmission and distribution assets). This may be thought of as deferred maintenance and are those costs necessary to bring the asset up to the operating level commensurate with its age;
- ?? reinforcement (to enlarge intakes, water treatment plants and distribution facilities to meet existing consumers suppressed and/or incremental demand). In the marginal costs concept this is the true marginal impact of an existing customer increasing demand; and
- ?? expansion to meet requirements of additional consumers (this may also involve expenditure on intakes, water treatment plants and distribution assets. The latter are not, however, engendered by incremental demand).

In the context of identifying costs which are determined by incremental demand, we are primarily concerned with reinforcement and system improvement expenditures which serve to increase the capacity of the transmission networks. Unfortunately, it is typically difficult to isolate these expenditures from those on replacement projects (rehabilitation) intended merely to maintain the existing asset base and levels of capacity, and from extension works to provide supplies to new areas or groups of consumers. Accordingly for purposes of calculating the AIC all incremental costs and water production have been included in the analysis.

In the case of water it is important that the future price is understood so that water demand on the margin can be priced accordingly to discourage waste and encourage conservation with pricing used as a demand management tool. However in the case of sewerage pricing on the margin, the objective is not to discourage use, rather the objective is to encourage use and maximise the level of cost recovery.

Allowances for fixed O&M expenditures is based on a percentage of the capital costs (0.5% for civil and 5.0% for E&M per annum) associated with water production, treatment and distribution and waste water disposal - transmission , treatment and final disposal (outfall )

To the capital (capacity) and fixed O&M cost it is necessary to add the variable operating costs related to each unit of sales. In the present context these generally refer to any chemicals/consumables used, electricity for pumping and any variable O & M costs associated with electrical and pumping equipment. (Incremental overhead costs should also be included such as billing and collection where additions to capacity may lead to such increases as a result of substantial increases in customer numbers.)

### **AIC Comparison with Financial Tariffs**

A comparison of AIEC with the existing financial tariff provides a measure of the extent to which the economic costs of the sub-project are recovered in the tariff and therefore, gives an estimate of the economic subsidy. Tariff levels necessary for full cost recovery may not be realistic because of affordability and willingness to pay considerations.

The AIFC is similar to the AIEC except that capital and operating and maintenance costs are expressed in financial prices. The AIFC provides the level of tariff required to cover the full capital and operating and maintenance costs of the water supply and wastewater services measured in financial terms and provides a measure of the financial subsidy when compared with the existing financial tariff.

### **2.3.2 Importance of Economic Pricing Signals.**

The importance of the above analysis is that it identifies the cost of the next (future) water supply project. This is the price that should be charged for all cum of sales to recover costs over the period of the project. Thus high end water consumption should be charged at this level in any present tariff structure. Tariffs that are lower than this result in subsidies to urban water users to the expense of other sectors of society. Pricing at lower levels also results in wastage or excessive consumption that brings forward the requirement for further more expensive investment.

## **2.4 Financial Sustainability and Financial Objectives**

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In considering the financial requirements for tariffs it is important that the tariff structures incorporate economic price signals as far as possible, as this provides the correct signal to wastewater producers. Financial objectives relate to the satisfactory financial performance and long term sustainability of the water and wastewater entities. Accordingly, water and wastewater tariffs should be set at an overall level to meet:

*Direct Operating Costs*

(i) Cash operating and maintenance costs;

*Other Indirect Operating Costs*

(i) Depreciation

(ii) Interest

(iii) Government taxes and duties

*Cash Flow Requirements*

(i) Government dividend payments and retained profit policies such as approved rate of return criteria;

(ii) Principle repayments on loans;

(iii) Proportion of future capital expenditure;

(iv) Maintain an acceptable cash balance in any year to meet working capital requirements,

*Balance Sheet Structure*

(i) Acceptable balance sheet structure (debt equity ratio);

(ii) An adequate rate of return (net profit) on capital (expressed as revalued net fixed assets in operation

(iii) Acceptable level of accounts receivable

Accounts receivable of not more than 40 to 60 days of sales would ensure that cash flows do not suffer because of slow payment or non-payment of wastewater bills (the maintenance of this should be supported by well publicised and enforced water disconnection policies).

Adequate operation and maintenance costs (O&M) is defined as that level of repairs and maintenance that maintains the plant and equipment in proper working order commensurate with its age. That is as the life of the asset is used, then it is necessary for O&M expenditure to increase to maintain it in proper working order. Adequate O&M is often expressed as a percentage of capital cost and is in the order of 1-2% per annum for civil works and buildings and up to 5% per annum for electrical and mechanical equipment.

### **2.4.1 Specific Financial Objectives or Covenants**

Water supply and wastewater entities often have a debt service ratio covenant in any loan, and often a self financing ratio covenant. As a minimum there is often a Debt Service Ratio (DSR) of 1.1 to 1.3 times cash available for debt service, and a self-financing ratio (SFR) target of 15 to 25 % of capital expenditure.

The SFR is important given the increasing requirements of utilities to meet a share of future capital expenditure out of tariffs to meet some of the cost of new expansion and/or improve the level of service. The self financing ratio target is often expressed as a three year moving average of capital expenditure.

The above financial objectives may be encapsulated in some return on capital objective, preferably on a revalued asset basis. The adequacy of such returns to various parties including the private sector will be examined during the project.

Multilateral agencies such as the Asian Development Bank and World Bank specify cost recovery objectives in their loan agreements, in particular to ensure tariffs are at levels to meet debt service payments but more importantly to ensure long term sustainability. In the case of the water and wastewater companies there is generally a covenanted:

?? cost recovery ratio (CCR), 1.0, and

?? debt service ratio (DSR), 1.3

The CCR requires that the WWC generate total revenues, equal or greater than the sum of:

- (i) its total operating expenses, including depreciation ; and
- (ii) the amount by which debt service requirements exceed the provision for depreciation;

The DSR requires that tariffs be set so that cash flows after meeting operating expenses are at least 1.3 times estimated debt service costs.

#### **2.4.2 Importance of Financial Objectives.**

In terms of tariff structures it is normal to ensure that the overall average financial tariff in any year is adequate to meet all the financial objectives. The main implication for tariff structuring is therefore to ensure that the average revenue per cum to meet financial objectives is achieved within the tariff structure, but at the same time ensuring that tariffs are affordable to average income and low income households.

It is necessary for the government to define clear financial objectives and cost recovery policies for the urban water sector and then allow tariffs to be set to meet these objectives. Loan covenants assist by reinforcing the need to adhere to agreed financial objectives.

Financial projections should be prepared to identify funding requirements of any proposed investment plan and to identify the revenues required from tariffs ( over operating costs) both to meet a share of project capital expenditure (SFR) and to meet loan repayments (DSR) to repay loans to cover capital expenditure and future any capital expenditure for rehabilitation and replacement (SFR) required to ensure long term sustainability.

A financial plan and preparation of financial projections over at least a five year period are a necessary requirement to assessing the ability of tariffs to meet cost recovery objectives of the sector or the water and/or wastewater entity.

## **2.5 The Social Objective - Affordability and Willingness to Pay**

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### **2.5.1 Introduction**

In considering the affordability of water and wastewater services it is necessary to consider this in the context of affordable tariffs not exceeding some 5 percent of household income for water supply and waste water disposal in a developing country context. The primary social objective for tariff formulation should be to ensure that all members of the community are able to afford access to clean water supply and to waste water disposal services without placing an undue burden on their expenditure.

The poorer members of the community are likely to be particularly vulnerable to high levels of water tariffs and wastewater disposal charges, which would discourage their use and result in the continuation of the use of unsatisfactory alternatives in terms of the potential health and environmental risks to the population at large. Thus tariff structures need to be designed with acceptable levels of household affordability in mind. This is discussed in the section below.

However, as discussed below tariffs that approach 5% of household income should only be introduced when services improve and potable water is provided on a 24 hour basis at good pressure as discussed in Section 2.5.3.

### **2.5.2 Ability to Pay**

Two basic measures are commonly adopted to highlight the households' ability to pay for water and wastewater services:

- ?? an average measure of the cost of water and waste water disposal as a proportion of average household incomes; and

?? a basic needs measure of the cost of supplying the minimum water and waste water disposal requirements of households, particularly those of the low-income households.

Both the above measures involve the application of criteria to determine the appropriate proportion of household incomes that should be used for purchasing safe water supplies and meeting the cost of wastewater disposal. Such criteria cannot be derived scientifically, but can be adopted as broad 'guideline' figures, which take into account the existing income and expenditure patterns of the water and wastewater consumers concerned.

A figure of up to 5 percent may normally be used as a guideline of the amount of household income that should be spent on a minimum demand for water supply and wastewater services necessary to meet the daily requirements of a household in developing country context. Social perceptions as to the 'appropriate' proportion of income to be devoted to water supply in the future are likely to be influenced by past experience. In the case of the Pacific, while there is wide acceptance to paying for water, there is less experience of being required to pay for full cost of water supply and very limited experience in paying for wastewater collection and treatment.

In general, most socio-economic surveys examine the affordability or ability to pay of both 'average' and 'poor' households to pay for water to meet both their likely minimum demand and lifeline demand in terms of litres/capita/day (lpcd) using the following criteria:

?? that, for likely minimum demand requirements of average consumers of around 120 - 180lpcd would be appropriate to pay 3-5 per cent of household incomes for good quality piped water supply and sanitation services in the urban areas.

?? that for lifeline demand requirements of poor urban households of say 60 - 90 lpcd, a guideline figure of 4-6 percent would be appropriate for water supply and wastewater charges that would be sufficient to meet their basic water and sanitation requirements.

In the case of Maldives and Kiribati these levels are likely to be of the order of 40 lpcd and 20 lpcd (or less) respectively for an average and low income household.

### **2.5.3 Willingness to Pay**

Although households may have the ability to pay, willingness to pay is usually related to the quality of service and also on an understanding of the benefits of water supply and sanitation services. The alternate argument is that households in developing countries should at least pay 4-5% of their household incomes for a good water supply and wastewater disposal service. That is, they should pay up to the accepted levels of ability to pay. The reasoning behind this is that consumers receive a service that is not only convenient but also results in health related benefits. Water supply and waste water systems are often very expensive both in terms of capital costs and operating costs.

Accordingly, in order to free up government budgets for expenditure on other social services, such as education and health, where it is difficult to define the service and link this directly to cost recovery, user charges are recommended for water supply and wastewater services. However, it is accepted that households should only pay up to 4-5% of their monthly income for good pressure, clean, 24 hour potable water supply and associated waste water disposal services.

### **2.5.4 Very Poor Households**

For very poor households other mechanisms outside the tariff structure need to be considered as to how to make water and wastewater charges affordable. In some cases this may take the form of public taps as in Male, while in Male all households were connected to the sewerage system free of charge. However, in many countries the provision of public taps has fallen out of favour as a means to provide minimum services to the poor.

An alternative is to provide rebates on water and wastewater bills. The question then arises whether rebates or discounts on the water tariff are more the responsibility of the government and should be provided as some form of welfare payment system which is not the responsibility of the water supply company who should be required to operate in a commercial manner.

### **2.5.5 Importance Of Social Objectives and Developing Affordable Tariffs.**

As noted above the primary social objective for tariff formulation should be to ensure that all members of the community are able to afford access to clean water supply and to waste water disposal services without placing an undue burden on their expenditure.

The poorer members of the community are likely to be particularly vulnerable to high levels of water tariffs and wastewater disposal charges, which would discourage their use and result in the continuation of the use of unsatisfactory alternatives in terms of the potential health and environmental risks to the population at large. Thus tariff structures need to be designed with acceptable levels of household affordability in mind.

Access to water and waste water services for all household is key to government objectives and is a major platform in addressing poverty alleviation issues. However, in meeting these objectives it is important that governments keep in mind the economic and financial objectives necessary for long term sustainability. It is generally possible to meet all these objectives with developing tariff structures that allow basic needs to be met through provision of a lifeline block in the tariff structure.

## **2.6 Administrative Objective - Billing and Income Collection**

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Any recommendations on tariff structure must be capable of implementation in terms of metering, billing and revenue collection. Also it is important that the tariffs are readily comprehensible and understandable to customers. It has been shown that increasing the complexity of tariff structures reduces customer understanding and also that there is a close correlation between customer understanding and willingness to pay. Also where wastewater charges exist these need to be billed in conjunction with wastewater to avoid duplication of billing and collection and to make enforcement of payment of wastewater tariffs easier.

Where the collection efficiency of a billing system falls below 90% then the integrity of the billing and collection system falls into question. That is, users begin to realize that there is no penalty for non-payment so that they do not pay. Other users observe this and in turn decide not to pay.

There is a need for clearly understood and enforced disconnection policies so that water and wastewater bills are paid in a timely fashion.

### **2.6.1 Importance of Billing and Collection Procedures.**

Unless revenues from tariffs can be collected from users then there is not much possibility of the financial and cost recovery objectives of the sector being met. Likewise economic signals that are supposed to be conveyed through the tariff structure will be ignored leading to excessive and wasteful consumption.

## **2.7 Ideal Tariff Structures.**

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### **2.7.1 Water Tariffs**

This section discusses some of the key features that should be contained in any tariff structure.

Ideally a water tariff structure should include:

?? A minimum charge to ensure a minimum level of revenue from all customers,

- ?? Some form of fixed monthly charge to reflect meter reading, billing and collection costs as well as the meter replacement cost,
- ?? Progressive sales charges to act as a demand management/conservation incentive with higher levels of consumption set at the economic cost or higher levels. The domestic tariff may have three or four progressive bands,
- ?? Provision of a life line block for low income consumers. As a general guide the lifeline block should cover O&M costs, and
- ?? Separate tariff categories to domestic for other classes of consumers, to limit the concessional life line block to domestic customers and to allow pricing to more readily reflect ability to pay of other customer categories.

Metering is a prerequisite of any good cost recovery and demand management system.

While fixed and minimum charges are suggested these can also be regarded as regressive as where low income households attempt to limit their consumption, the effective cost per cum of water consumed as a result of these charges increases.

Generally some form of progressive tariff structure is desirable for domestic households as this allows provision of a lifeline block of consumption to meet the basic water requirements of low income households at a price they can afford. This meets the social objective.

The main deficiency of progressive tariff structures is that there are often too many bands and the bands are too wide. This results in all or most domestic consumption in the lowest band, leading to poor financial revenue generation and low cost recovery and very minimal demand management leading to excessive or wasteful consumption.

Ideally a tariff structure should have not more than a total of 3 or 4 tariff bands. Each band should not exceed 10 cum of consumption. After say 20 cum of consumption tariffs should be set at or above the AIFC and this charge should be the same for all classes of consumption at this level. That is, the only concessions that should be made is to provide a lifeline block to meet basic needs of low income households in the first block of 10 cum and then to meet average households requirements in the next 10 cum block.

In the case of non-domestic consumption there is no need to have a progressive tariff but charges should be in line with the AIFC to encourage economic efficiency.

### **2.7.2 Wastewater tariffs**

Wastewater tariffs are generally flat rates for different customer classes, with the prime objective of recovering costs of collection and wastewater treatment. It may however be necessary to have a lower "lifeline block rate" to coincide with the water tariff structure life line block to ensure that overall tariffs are affordable.

Treatment and disposal costs are related to wastewater strength as well as to flow (volume) and thus the level of pollution loading is a factor that should also be reflected in the tariff. All dischargers, including households, should pay pollution charges based on the estimated or measured levels of polluting substances contained in their effluent, in accordance with the "polluter pays principle". This is based on the premise that all households, businesses and industries contribute to the pollution of surface waters and should share in meeting the costs of management, control and abatement. Charges to each group and/or each customer should reflect their pollutant loading. This is entirely consistent with marginal cost principles where each wastewater customer meets the cost of treatment based on the pollutants and the concentration in their effluent.

This is likely to be only of relevance in larger urban centers where there is a wastewater collection and treatment system in place. In these circumstances any industries discharge should be assessed and charged accordingly.

## 2.8 Cost Recovery Strategies/Objectives for Different Service Levels.

Given that ability to pay and level of service are important issues in determining the appropriate level of cost recovery possible, there should be a hierarchy of cost recovery levels from major urban centers through to rural water supply projects with urban centers and smaller rural towns situated somewhere in the middle. This is summarised in Table 1 below.

In terms of cost recovery through user charges, small town communities cannot be asked to pay more than what would be regarded as an affordable tariff. The level of affordability or ability to pay is dependent on the level of service, both in terms of quality of supply, hours of supply (that is 3-6 hours up to 24 hours per day) and whether it is a piped house connection, community tap, or public tap.

In rural projects it is reasonable that households pay between 1-3% of their household income for water supply and sanitation services. On the other hand it is regarded as reasonable that urban communities pay up to 4-5% of their household income for piped (private tap) supply which is 24 hour, good pressure, potable water accompanied by waste water services. It again would seem reasonable that small towns may fall somewhere between rural water supply schemes and large urban schemes where a good pressure 24 hour water supply service is available.

**Table 1 : Hierarchy of Possible Cost Recovery Levels or Items to be included in the Water Tariff**

Cost category	Rural Projects	Small Towns	Large Towns	Main Urban Centres
Contributions to capital cost	10 – 30% capital	10 – 20% capital	HH connection	HH Connection
Water charges as % HH Income (1)	1-3%	3– 5%	3-5%	4-6%
<b>Set tariff levels to cover:</b>				
O&M costs	Yes	Yes	Yes	Yes
Interest costs	No	Possibly	Yes	Yes
Capital repayment	No	Say 15%	Say 15/ 50%	Say 50% plus
System expansion	No	Yes	Yes	Yes
Capital replacement	Preferably	Yes	Yes	Yes
Major Repair	No	No, Possibly from savings	Yes	Yes

Note: (1) For large urban centers the general convention is that households should be willing to pay up to 4-6% of their household income for 24 hour supply of potable water with adequate pressure. For rural water supply projects recovery of O&M costs has been estimated to represent 1-3% of HH income.

To a certain extent the level of affordability should be related to the level of service provided. If small towns receive a 24 hour service with all the above qualities then they should pay 4-5% of household income. Where the service is say six hours or less per day then there could be an argument that they should not be paying more than say 3 – 4% of household income. In an economic sense they are required to provide their own storage if they want supply outside the hours of supply provided.. The transfer of this storage cost to the users could be recognised in the form of lower tariffs.

In terms of cost recovery in large urban centres it could be argued that consumers should bear a higher proportion of capital cost recovery, where this is possible within acceptable levels of affordability.

## 2.9 Connection Costs and Charges

Connection charges are a means of the utility seeking capital contributions from new water service customers. The contributions required, however, should not be so high as to deter

potential customers from joining the system. Often, this is clearly in the undertaking's financial interests (if it has unused capacity) and generally in the community interest (to promote public health). In these cases, connection costs may be reduced to encourage connection. However, the general trend is towards connection charges related to the actual costs of the connection.

While this follows strict user pay principles, it is important to ensure that these costs are affordable to new customers and do not represent a barrier to connection and hence a barrier to access to a clean and safe water supply, especially for poorer households. As a minimum the utility should offer payment over 24 or 36 months to ensure connection costs are affordable to poorer households.

## 3. TARIFFS AND COST RECOVERY IN SELECTED COUNTRIES

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### 3.1 Introduction

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The current tariffs and cost recovery policies of five Pacific Island countries and the Maldives are reviewed with the purpose of trying to draw some lessons on what appears to achieve the desired objectives, and to identify issues and constraints and discuss actions completed to date and proposed. This section concentrates on an examination of current tariff policies, economic costs and financial objectives in the five countries.

The countries in question are Fiji, Kiribati, Samoa, Vanuatu and the Maldives. These countries are all subject to case studies and it is not proposed to present detailed information on their operations in this paper. However, they represent a range of institutional and financing options. Information is available on the economic costs of supply for Fiji, Kiribati, Samoa and Maldives.<sup>1</sup> Vanuatu represents a private sector concession arrangement, Maldives a joint venture company between the private sector and government, while Samoa and Kiribati represent a government board and authority respectively, and Fiji a government department.

Samoa and Kiribati's water and sanitation facilities have been financed largely by grant aid, while the Fiji government has financed the bulk of the past sector's investment from its own budget. In the case of Maldives the funding of the water and sanitation facilities in Male was provided from grant aid, a low interest loan and foreign private sector investment. In Vanuatu sector expansion and rehabilitation has been met by the private sector concessionaire for the past eight years.

### 3.2 Fiji and Suva – Nausori Case Study

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#### 3.2.1 Fiji : Suva – Nausori Economic Costs

It is not intended to present all the material set out in the Case Study, but rather to summarise the main results. The Suva Nausori project estimated the economic costs in both financial prices and economic prices for the Overall Masterplan 2003 to 2022 for both water supply and sewerage and for the proposed project over 2003 to 2007. This provides an opportunity to assess the costs over different time periods and increasing investment requirements.

Firstly it is important to note that the estimate in economic prices (AIEC) are higher because of the higher discount rate (SOCC of 12%) and also because it incorporates all costs met by various parties while the AIFC (financial prices) represents those costs that must be met by WSD and uses the WACC (of 2.1%) as the discount rate. In addition the longer term masterplan costs are higher for water supply as projects are developed in a least cost framework so that the cheapest sources etc are developed first.

In the case of the sewerage component the long term cost is lower as excess capacity constructed in the initial project is fully utilised. In fact for pricing purposes for the short term project the Feasibility Report (and Case Study) argue that for pricing purposes the correct short term AIFC estimate that should be used for tariffs would be the short term water costs and the overall masterplan sewerage costs, that is F cents 110.4 per cum rather than the estimate of F cents 140.6 in Table 2 overleaf.

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<sup>1</sup> Economic Costs have been extracted from past feasibility studies. They have not been updated to 2002 prices, but nevertheless are representative of future costs and provide a comparison with existing financial tariffs in each country.

Where existing tariffs are less than the AIFC and AIEC, then the difference represents the financial and economic subsidy to water users respectively. That is the amount by which water users are subsidised by other sectors of the economy.

**Table 2 : Summary Calculation AIFC and AIEC for Water Supply and Sewerage (F cents / cum)**

Total Master Plan, 2003 - 2022	Water		Sewerage		Water and Sewerage	
	AIFC	AIEC	AIFC	AIEC	AIFC	AIEC
F cents / cum						
Capital	44.6	94.4	43.5	120.4	88.1	214.8
O&M	23.4	19.8	22.7	24.8	43.2	47.5
Total	68.0	114.2	66.2	145.2	134.2	259.4
Proposed Project, 2003 - 2007	Water		Sewerage		Water and Sewerage	
	AIFC	AIEC	AIFC	AIEC	AIFC	AIEC
F cents /cum						
Capital	29.9	87.2	59.2	161.9	89.1	249.1
O&M	14.3	14.9	37.1	36.2	51.4	51.1
Total	44.2	101.2	96.4	198.0	140.6	299.2

The AIFC is used for tariff development purposes as these are the costs ( and the financing charges that need to be met by WSD. In line with economic principles the objective should be to set tariffs at a level that average tariffs approximate the AIFC and all tariffs for upper band levels of consumption should be at or above the AIFC.

### 3.2.2 Derivation of Affordable Tariffs.

The analysis of the AIFC (capital and operating costs) can be used to identify and develop affordable tariff structures to achieve first, full cost recovery and second, to meet operating and maintenance costs of the water and sewerage schemes in the project area. The assessment is carried out for the low and median income households to assess the level of monthly income required. The results are summarised in the table below for the proposed project 2003 to 2007.

**Table 3 : Summary Alternative Cost Recovery Levels and Affordability for Households in Suva-Nausori Area, based on Short Term Plan (2003-2007)**

Income	F\$\$ / month cum/mth. Lpcpd	Average Income 1083 31.35 190	Low Income 388 14.85 90		
Sub project	F cents/cum	F\$/HH/mth.	Affordability	F\$/HH/mth.	Affordability
<b>Water Supply</b>					
Full Cost Recovery	44.21	13.86	1.3%	6.57	1.7%
O&M only	14.32	4.49	0.4%	2.13	0.5%
<b>Sewerage (1)</b>					
Full Cost Recovery	66.19	20.75	1.9%	9.83	2.5%
O&M only	22.66	7.10	0.7%	3.37	0.9%
<b>Water &amp; Sewerage</b>					
Full Cost Recovery	110.41	34.61	3.2%	16.40	4.2%
O&M only	36.98	11.59	1.1%	5.49	1.4%
Water Full Cost, Sewerage O&M only	66.87	20.96	1.9%	9.93	2.6%
<b>Current WSD Tariffs (2)</b>					
Water		8.90	0.8%	2.27	0.6%
Sewerage		6.27	0.6%	2.97	0.8%
Total		15.17	1.4%	5.24	1.3%

Note (1) : As noted in text the AIFC used in the Overall Masterplan cost

(2) : See current WSD tariff below.

In the case of a median income household, 3.2% of household income is required to achieve full cost recovery of both water and sewerage services. This suggests that it is possible to

structure tariffs to achieve full cost recovery for both water supply and sewerage for an average household within acceptable affordability limits. The recovery of O&M costs would amount to only 1.1% of average household income. This may be compared with combined water and sewerage bill at the current tariff of F\$15.17, which equates to 1.4% of household income. This leads to the conclusion that for an average household the water and wastewater bills would simply meet future system O&M costs with no effective contribution to capital cost recovery.

It is evident that a low income household would be able to meet a full cost recovery tariff for water and sewerage amounting to 4.2% of household income, which would be within the acceptable levels of household affordability. However, this would probably exceed willingness to pay where most households have access to the existing water supply system, which many consider adequate, while many households use septic tanks and therefore do not have to meet a monthly sewerage charge. The average bill for a low income household at the current tariff for water and wastewater would be F\$5.24 or 1.3% of household income. Where a low income household only had a water connection then the estimated bill of F\$2.27, would represent 0.6% of household income. At these levels household's would only contribute to O&M costs.

On the other hand, the recovery of O & M component of the AIFC by low income households would amount to only 1.4% of monthly household income. For a low income household, this may be compared with a combined sewerage and water bill of \$5.24 per month, equivalent to 1.3% of household income. However, as noted above, most low income households are likely to be only connected to the water supply, and therefore paying a monthly bill of F\$2.97, which is equivalent to 0.6% of household income. However, if present levels of collection efficiency of 60% is factored in, then present revenues are not able to meet O&M costs.

### **3.2.3 Implications for Tariff Design**

A progressive tariff structure, with a life line block, lower than the full AIFC cost, would allow low income households to meet their basic water and wastewater requirements at a price they could afford, while tariffs in higher bands could allow full cost recovery to be achieved at affordable tariffs for an average income household.

The above discussion leads to the conclusion that the project is affordable with tariffs able to be set to achieve full cost recovery within acceptable limits of household expenditure both for average income households and for low income households.

Accordingly as supply improves WSD should be able to increase charges to the levels proposed above. This would remove the burden from the Government of having to subsidise water and sewerage services in the Suva–Nausori area. It is generally accepted that households are prepared to pay such tariffs where they receive a good 24 hour supply of good pressure potable water and associated wastewater services.

A progressive tariff structure, with a life line block, would allow low income households to meet their basic water requirements at a price they could afford, while tariffs in higher bands to average income households could allow full cost recovery to be achieved at affordable tariffs for average income household. The ability of the existing tariff to satisfy cost recovery objectives is discussed below.

### **3.2.4 Present WSD Water and Sewerage Tariffs**

The tariff is uniform for the whole country. Although water meters are only read every three months, WSD has begun to charge customers monthly. This has led to much confusion. The socioeconomic surveys for the Suva Nausori project of both domestic and commercial customers have indicated a clear preference for meters to be read monthly and for monthly billing.

All customers are metered, but where meters are not working, customers consumption is estimated on the lowest of the last three readings.

The table below sets out the current WSD charges effective from January 200. While the WSD tariff is for the country as a whole, the comments below relate to how this tariff would achieve cost recovery objectives in terms of the Suva-Nausori water supply and sewerage system and the proposed project.

**Table 4 : WSD Current Water Tariff Structure**

Category	Consumption Bands Cum/3 months	Consumption Bands Cum/ month	Tariff F\$ / cum	Tariff US\$ / cum (2)
<b>Water</b>				
(i) Domestic	1 - 50	1 - 17	0.153	0.072
	51 - 00	18 - 33	0.439	0.207
	Over 100	Over 33	0.838	0.396
(ii) Commercial	All units	All units	0.529	0.250
<b>Sewerage</b>				
(i) Domestic	All units	All units	0.200	0.095
(ii) Commercial	All units	All units	0.200 (1)	0.095
<b>Average Tariffs</b>				
	<b>Water</b>	<b>Sewerage</b>	<b>Average</b>	
	F\$ / cum	F\$ / cum	F\$ / cum	
Domestic	0.284	0.200	0.484	0.229
Commercial	0.529	0.226	0.755	0.357
Average	0.353	0.210	0.563	0.266

Note (1) : Sewerage tariff assessed for all major industries and is based on tariff of F\$ 0.200 per cum and average F\$ 0.226 per cum

Note (2) : 1US\$ = 2.116 F\$ or 1F\$ = 0.4726 US\$

### 3.2.5 Subsidy Implications Financial Tariffs and AIFC Costs

Subsidy implications of AIFC tariffs compared with present water and sewerage tariffs is set out in the table below. Firstly as shown above, there is a cross subsidy between the average financial domestic tariff and the commercial financial tariff when compared with the overall average financial water tariff of F\$ 0.09 per cum. Further when the average domestic tariff is compared with the AIFC tariff then there is a financial subsidy of F\$ 0.16 per cum. The Commercial tariff on the other hand exceeds the AIFC, but nevertheless there is an overall average financial subsidy of F\$ 0.09 per cum. In the case of sewerage tariffs the overall financial subsidy is F\$ 0.45 when compared with the AIFC costs and when water and sewerage is combined then the financial subsidy increases to F\$0.54 per cum.

**Table 5 : Analysis of WSD Tariff and Subsidy Implications with AIFC Estimates**

	Water	Sewerage	Overall
Average Tariffs	F\$ / cum	F\$ / cum	F\$ / cum
Domestic	0.284	0.200	0.484
Commercial	0.529	0.226	0.755
Average	0.353	0.210	0.563
<b>AIFC</b>	0.421	0.662	1.104
<b>(i) Subsidy element (AIFC compare with average tariff)</b>			
Domestic	0.158	0.462	0.620
Commercial	(0.087)	0.436	0.349
Average	0.090	0.451	0.541
<b>(ii) Subsidy element with low collection efficiency</b>			
Domestic	0.272	0.562	0.834
Commercial	(0.003)	0.459	0.425

Average	0.186	0.501	0.687
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If the collection efficiency is taken into account then the financial subsidy would increase. The above analysis assumes that the revenue received from the tariff is 100% collections. Assuming a collection efficiency of 65% for Suva Nausori for water supply and wastewater collections then the effective subsidy increases as shown in the table below as the revenue from the existing tariff base declines. Thus the financial subsidy comparing the current tariff with the AIFC will average F\$0.69 per cum.

### 3.2.6 Comment on Existing Tariff Structure.

The existing tariff structure does not provide households with the correct economic signals and thus has a limited demand management effect. Sewerage tariffs do not cover proper O&M costs.

The existing tariff structure does not meet the financial sustainability test as it does not generate sufficient revenues to meet O&M costs let alone any contribution to capital expenditure. The sector is reliant on the GoF to meet the balance of O&M costs and all capital expenditure for rehabilitation and expansion. This problem however, is made worse by the current billing and collection arrangements.

The existing tariff is able to meet standard affordability criteria for low income and average income households. However, because of the poor financial performance of the sector the water supply and sanitation services are failing to meet the populations social requirements for adequate safe supplies of drinking water.

The tariff structure with three monthly meter reading and monthly billing based on estimates is confusing for customers and requires frequent adjustments and rebates. Consequently the meter reading and billing arrangements fail the test of being readily understandable to customers.

Further the current institutional structure with billing undertaken by the Water Rates Office and funds then transferred to the consolidated fund means that WSD is not directly responsible for collecting revenues to meet its own budget requirements which are met by the GoF out of the consolidated fund,

In fact the integrity of the whole billing system is declining with the collection efficiency steadily falling and now averaging 56% for the whole of Fiji. The Water Rates Office simply lacks the manpower and vehicles to rectify this problem which does not appear to be a high priority of government.

### 3.2.7 Declining Collection Efficiency

In 1998 Water Sales for WSD were estimated at F\$19.4 million and collections at F\$12.1 million. This represents a collection efficiency of 64%. Over the next three years while billings increased to F\$23.1 million for 2001, collections were only F\$13.2 million which includes arrears from previous years. Consequently at best the collection efficiency is now some 56% and accumulated arrears of outstanding bills is F\$18.2 million. Collection Efficiency is higher in the Suva Nausori area but probably would not exceed 65%.

## 3.3 Kiribati Public Health and Sanitation Project and PUB.

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### 3.3.1 Economic Costs of Combined Water and Sewerage Projects.

The feasibility study calculated the AIFC and AIEC of alternative development options, with the least cost development option resulting in the following project costs.

Adding the AIFC estimates for water supply and sewerage services results in a cost of A\$ 6.38 per cum (including reservoir payments). O&M costs represent A\$1.65 per cum which includes an allowance for reservoir payments of A\$ 0.64 per cum. In practice therefore the existing tariff

at A\$1.33 per cum (or A\$10 per month) would not cover fixed and variable O&M costs of water supply where these included the reservoir payments. Reservoir payments for

**Table 6 : Summary of AIFC for Water and Sewerage, A cents per cum**

	Capital	Operating	Total
Water Supply	355.0	140.43	495.4
Sewerage	119.1	24.2	143.3
Total	474.1	164.6	638.7

Note: (1) Assumes NRW of 25%, real discount rate of 10% and project life of 40 years.

Also, present collection levels are 47%, meaning that for every A\$1.00 billed in 1995 only A\$ 0.47 is collected which means that funds collected only cover around half of the estimated future cost of proper O&M. It is probably true to say that the existing system has deteriorated because of similar lack of funds to meet proper O&M and provide for replacement of items such as pumps etc on a timely basis. Hence the need for the present rehabilitation project.

### 3.3.2 Other Water Supply Options

#### Rainwater Tanks

Rainwater tanks could provide a further 500-1000 cum per day, depending upon the size of tank and the extent of the programme and the level of investment. A 10cum tank with a 100 square meter catchment area could provide 0.38 cum per day, with the investment of A\$99 per 100 m of catchment area, providing the equivalent of 750 ten cubic meter storage tanks and associated catchment areas providing 300 cum per day. The feasibility studies showed that this is the next least cost project on a cost per cum basis at A\$1.64 per cum (AIEC) after the "Rehabilitation project" At A\$ 1.61 per cum. However this is included with the expansion projects above to arrive at the least cost expansion plan to meet future requirements. The AIFC for rainwater tanks is A\$1.99 per cum as shown below.

**Table 7 : Summary AIFC and AIEC for Rain Water Tanks. (A cents per cum.)**

	AIFC	AIEC
Capital Cost	183.6	151.6
O&M Costs	15.5	12.8
Total	199.1	166.4

Note: (1) Assumes real discount rate of 10% and project life of 40 years.

#### Desalination Water Production Option

A detailed review of desalination plants as an alternative water source was undertaken, with reverse osmosis technology thought the most appropriate for comparison. Given the state of the existing transmission line and distribution network, it is still necessary to embark on the rehabilitation project to upgrade the network to a suitable level to allow proper functioning of the system.

Thus the desalination option requires as a minimum, the proposed expenditure of A\$3.6 million estimated for rehabilitation of the pipeline plus a further A\$1 million (Base cost A\$0.815) for a 1000 CMD per day plant (to match the catchment, plus Abatao and Tabiteuea Infiltration Galleries). This results in a cost (AIEC) of A\$6.23 per cum over the forecast period.

The Rehabilitation Project with North Tarawa Expansion or the Desalination Plant option would meet South Tarawa's needs to 2010. However the analysis demonstrates that the options would cost an average of A\$2.62 per cum and A\$6.23 per cum respectively. Thus the Desalination plant option is over twice as expensive as the development option proposed. It

should also be noted that the Desalination Plant option is a highly technical option and although inexpensive in capital terms it has high operating costs requiring 9kWh of electricity to produce one cubic meter of water.

The estimated costs associated with a standalone desalination plant result in an economic cost of A\$5.34 per cum or at least two times the cost of the preferred rehabilitation and expansion option. However the distribution of water from the desalination plant would still require the rehabilitation of the pipeline and network. Alternatively water would need to be delivered by truck and stored in water tanks. Therefore this does not present a viable option where vehicle costs and household storage would need to be included when compared with rehabilitating existing distribution system.

The costs of the desalination plant options with and without the required rehabilitation of the distribution system needed to distribute the water produced is summarized in the table below.

**Table 8 : Summary of AIEC and AIFC of Desalination Options (A cents per cum)**

	With Rehabilitation of Distribution		Standalone (1)	
	AIEC	AIFC	AIEC	AIFC
Capital	100.5	108.8	49.6	51.8
O&M Fixed	25.3	27.4	15.0	15.7
O&M Variable	498.0	498.0	469.0	469.0
Total	623.7	634.2	533.6	536.5

Note (1) Standalone option would require water to be tinkered to each household and then stored by each household.

(2) Assumes real discount rate of 10% and project life of 40 years.

### 3.3.3 PUB Billing Procedures and Collection Efficiency

The system of billing in 1995 was based on meter readings that were used by PUB to update the manual and computerised systems. During the month staff would refer to the manual system to inform customers of their outstanding accounts. The computer system software is batch based and debtors accounts only updated once a month, at month end.

There were frequent differences on the balance of customer accounts between the manual and computerised systems. Customers did not believe the account balances when they have to pay and the meters are not readily visible for the customer to check his usage. It is reported that customers, disenchanted with the whole water situation of rationing and lack of supply, started disconnecting their meters. It is also reported that even the police started disconnecting their police houses and then the Public Utilities Board reduced their meter reading activities. This does not appear to have been a policy decision of the Board or the Ministry but rather a consensus agreement between the staff. For 1995 this situation led to only 47% of the money billed been collected.

### 3.3.4 Comment on Existing Tariff Structure.

The existing tariff structure does not provide households with the correct economic signals and thus has a limited demand management effect. Sewerage tariffs were discontinued in 1995.

The existing tariff structure fails the financial sustainability test as it does not generate sufficient revenues to meet O&M costs let alone provide any contribution to capital expenditure. The sector is reliant on the government funding to meet the balance of O&M costs and all capital expenditure for rehabilitation and expansion. The government failed to meet these costs resulting in the deterioration of the water and sewerage systems thus requiring.

The existing tariff is able to meet standard affordability criteria for low income and average income households. However, because of the poor financial performance of the sector the water supply and sanitation services are failing to meet the populations social requirements for adequate safe supplies of drinking water and sanitation services. The Feasibility Study

concluded that an average income household could pay A\$ 25 per month at a 5% level of household income.

Billing and collection systems require attention as integrity of the whole billing system is declining with the collection efficiency in 1995 at 47%.

### 3.3.5 Tariff Study 2002, and Water Demand Management Proposals

Tariff proposals for the implementation of the current project are currently been evaluated so that the above comments will need revision in light of these findings. In addition A primary objective of the SAPHE Project and PUB water supply operations is to provide an equitable supply of water to all customers preferably through individual house connections. The very limited water resources in Kiribati make this objective very difficult. A promising option to help overcome this problem is to have a constant flow system with flow restricting devices on each connection. This system supplies each household with a constant flow of water that is fed slowly into a small tank located on a concrete block stand adjacent to the house. The system is designed to provide about 250 litres per day to each household.

Three pilot areas were established to test the effectiveness and customer acceptance of constant flow arrangements to individual houses. Based on the results of the pilot works, it is likely that the constant flow system be extended to serve all other areas in South Tarawa incorporating the modifications that have evolved from the pilot study. All non-domestic customers would still be metered.

## 3.4 Apia Urban Services and Samoa Water Authority.

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### 3.4.1 Economic Costs of Supply

#### Apia Sewerage Project

The Apia Integrated Urban Development Project provided an estimate of the economic costs of a reticulated sewerage project for the main Apia central business district and associated residential areas. These costs are summarised below and show that the economic costs in financial prices would be equivalent to S\$3.90 per cum of waste water disposal. However, this project was for the Apia central area and is not representative of the costs of wastewater services for Apia as a whole.

**Table 9 : Economic Cost of Apia Sewerage Project (S\$ percum)**

	<b>AIEC</b>	<b>AIFC</b>
Capital/Capacity	2.99	3.26
O & M	0.64	0.64
Total	3.63	3.90

#### Estimate of Economic Cost of Apia Water Supply

The EC, "Water Authority, Organisation and Tariff Study" February 1994 calculated a weighted average system cost per cum for Apia. This was adjusted to 1997 prices to provide an estimate of the future economic costs of water supply for Apia of S\$1.99 per cum with estimated O&M costs for Apia of S\$0.37 per cum and outside Apia for NW Upolu and Savaii of S\$ 0.50 reflecting the very high pumping costs associated with the deep tubewell pumps of the Upolu and Savaii water supply project.

### Combined Economic Costs of Water and Sewerage

While the water supply and sewerage costs could be combined to give an overall economic cost of S\$ 5.89 per cum, the proposed Apia sewerage project only covers a limited area outside the downtown business area, so is not really representative of economic costs of water and sanitation services for Apia as a whole, where septic tanks will continue to be the main means of managing domestic wastewater disposal.

#### 3.4.2 Present SWA Tariff Structure

The progressive tariff structure is based on a logarithmic formula. The tariff follows what is commonly referred to as a “slab” tariff where all consumption is charged at the same highest tariff in which any consumption falls. The tariff essentially has 25 steps representing consumption bands increasing from 1 cu m to 25 cu m per day or 30 cu m to 750 cu m per month as set out below.

Where customers are not metered they are required to pay a charge equivalent to WS\$12.0 per month. This is payable quarterly.

Tariff structures of this nature existed for example in Thailand (Provincial Water Authority), prior to 1993. However they have generally gone out of favour, because of the very high marginal cost of consuming one cum in the next highest bracket that results in all consumption charged at the highest rate. For example, the first 30 cu m cost S\$0.12 per cum, or S\$3.60 for the month. However 31 cu m would cost S\$9.30, so that the marginal cost of the additional cum is S\$5.70. The “average” marginal cost of 30 cum in the second bracket is S\$0.48 compared with WS\$0.12 for the first 30 cu.m.

On the otherhand, this could be argued is a strong incentive from a demand management perspective to not waste water as the penalty is severe where customers consumption is all charged at the highest rate. Nevertheless, the bands are quite wide, with most households unlikely to consume in excess of 60 cu m, or certainly 90 cu m per month. However, as noted above the penalty is very severe for consuming one cum in the next bracket above the band in which consumption was incurred.

**Table 10 : SWA Tariff Structure**

Consumption	Consumption	Average Charge All Units		Marginal Rate next cum	
		S\$ per cum	US\$ per cum	S\$ per cum	US\$ per cum
Cum Per day	Cum Per month				
1	1 - 30	0.12	0.04	0.12	0.04
2	31 - 60	0.30	0.09	0.48	0.15
3	61 - 90	0.48	0.15	0.84	0.25
4	91 - 120	0.60	0.18	0.96	0.29
5	121 - 150	0.70	0.21	1.10	0.33
..	..	..	..	..	..
25	721 - 750	1.40	0.33	1.88	0.57

In the case of low income households provided they keep consumption below 30 cu m per month - for a household of 8.3 persons consuming 120 lcd, then affordability would not exceed 0.5% of household income. Similarly for an average income household consuming some 250 lpcpd or 60 cum per month the cost would be S\$ 18 per month or 1.6% of Household income. Affordability analysis suggests that where households paid 5% for water services would amount to S\$28 per month for a low income household and S\$ 56 per month for a median income household.

Unmetered consumption levels are of the order of 350 – 400 lpcd or 130 to 140 cum per month putting Samoa near the top in the world when it comes to water consumption levels. While metering is expected to reduce this level of consumption, consumption will still be excessive by international standards, unless tariffs are increased to exert a greater demand management effect on consumption.

### **3.4.3 Accounts Receivable and Collection Efficiency**

In 1995 WSWA accounts receivable were in excess of 120 days, with many accounts uncollectable. Accounts receivable transferred from PWD in 1995 amounted to WS\$1.383 million and included water bills outstanding from as far back as 1988. Such accounts are uncollectible and it was recommended that these should be written off. Accounts receivable in 2002 for SWA are now 192 days suggesting that collection efficiency and/or arrears are still a problem with SWA but nevertheless progress is being made in collecting arrears with average collections now about 80% of billings. Collections include current months billings and collection of arrears.

## **3.5 Maldives and Joint Venture, MWSC**

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### **3.5.1 Background.**

The Male Water Action Plan prepared in 1994 with the assistance of Danida recommended that an international operator be invited to form a Joint Venture (J-V) with the Government of the Maldives (GoM) to rehabilitate, expand and operate the Male Water Supply and Sewerage Company (MWSC) over a period of 20 years. The J-V Agreement for the establishment and operations of MWSC dated 30 March 1995 sets out the ongoing basis on which tariffs should be set. In particular that tariffs should be set so “that an Internal rate of Return of at least 15% over the Concession period is maintained”.

The JV was awarded to a Danish firm with MWSC provided with an IFU loan of about US\$4.0 million at a 4.5% interest rate to be repaid by 2001. Danida also provided GoM with a grant to assist with the rehabilitation of the system. The Foreign J-V partner purchased a 15% equity share.

The foreign J-V partner provided a general manager and advisors for the first four years of development and operation. These advisors were charged as costs to operations. MWSC is now managed by Maldivian personnel who were trained over the initial period of operations.

The definition of the calculation of the IRR was not set out in the JV, but during a Danida Tariff and J-V Review carried out in 1998 and 1999 the definition was clarified at a Board meeting in October 1998. It was agreed that the 15% IRR should be calculated on shareholders equity. For the purposes of the tariff review and calculation of the 15% IRR, this was defined as annual investment and operating cost flows less debt funding and resultant debt servicing costs and repayment.

The J-V also provided for dividends to be paid out to GoM and the J -V operator. The J-V agreement implied that once the company is profitable they could pay out a dividend of 90% until a reserve fund of 10% of share capital was built up, after which a dividend equivalent to 100% of the profit could be paid out.

### **3.5.2 MWSC Tariff**

The J-V agreement set out a “Base Tariff” and tariff structure which resulted in an average tariff of MRf 76.8 per cum. At the time of the Review the Base Tariff was re-estimated based on the proposed 15% IRR definition at MRf 75.8 per cum or US\$6.47 per cum. The Male Water Action Plan and J-V agreement recommended the following tariff structure. This included a lifeline block of 10 lpcpd per person for an average household of 9 persons. Other tariffs were calculated to arrive at the average tariff estimated to achieve the 15% FIRR.

**Table 11 : MWSC Tariff ( Water and Sewerage Charges ) MRf per cum**

Customer Class	Lpcpd per HH	Cum per month	MRf per Cum	US\$ per cum
Domestic	0 – 90 (2)	0 – 2.70	25.32	2.16
	91 – 270	2.71 – 8.10	75.95	6.48
	> 270	>8.10	101.26	8.64
Standposts (3)	Flat rate		75.95	6.48
Institutional	Flat rate		75.95	6.48
Commercial	Flat rate		101.26	8.64

Note: (1) Current tariff includes a fixed monthly charge of MRF30 (US\$2.55) per month.

(2) Assumes 10 lpcpd and a household size of nine

(3) Standpost charges met by Government of Maldives.

(4) 1 US\$ = 11.7 MRf.

### 3.5.3 Male - Economic Costs and Comparison with the MWSC Tariff.

At the time of the Danida review the economic costs of the system was estimated as shown below. The overall cost is US\$6.52 per cum. There is a high variable cost related to the high energy cost of generating fresh water from salt water in the desalination process. MWSC have their own generators and generate their own electricity. However, pump stations used electricity purchased from STELCO.

**Table 12 : Calculation AIFC for Male**

Breakdown of Cost (Discount rate - 15% )	AIFC		
	US\$/cum	MRf/cum	%
Capital	4.18	49.16	64.1%
Fixed O&M/Overhead	0.62	7.34	9.6%
Variable O&M	1.72	20.24	26.4%
Total	6.52	76.75	100.0%

The above calculation of the AIFC when compared with the average tariff shows the level of financial subsidy.

**Table 13 : Identification of Financial Subsidies in MWSC Tariff**

	Average Tariffs	Subsidy to AIFC	
	MRf/cum	MRf/cum	%
AIFC	76.8		
Overall Average	75.8	1.0	1.3
Domestic Average	59.6	17.2	22.3

There is a very modest subsidy when the average tariff is compared with the AIFC. There is a cross subsidy between domestic customers and the overall average tariff of MRf 16.2 per cum and MRf 17.2 per cum when compared with the AIFC. However, higher domestic customers pay the same tariff as commercial customers for consumption exceeding the average. (It should be borne in mind that the 15% FIRR discount rate exceeds that normally applied to financial analysis and calculation of AIFC).

### 3.5.4 Comment on Existing Tariff Structure.

The existing tariff structure provides households with the correct economic signals and thus has a demand management effect. The tariff structure includes a true lifeline block that provides households with a concessional block of consumption. This is balanced by higher charges for higher consumption above the AIFC average for consumption in excess of 8.1 cum per month. Other classes of customers pay a flat rate charge. The tariff includes a fixed monthly charge that is in line with the costs of maintaining a connection, plus monthly meter reading and billing functions.

Thus the structure satisfies economic and financial objectives and at the same time is affordable as evidenced by consumers willingness to pay. The tariff is understandable and customers pay their bills promptly with well publicised disconnection policies clearly understood by consumers. Accounts receivable are some 30 days of sales or one billing cycle.

### 3.5.5 Summary of MWSC Performance

Despite the high tariffs there has been a steady increase in consumption since 1996 with consumption increasing on average at around 20% per annum for the past five years. Sale of water through stand posts has steadily declined. (The GoM meet this cost and pay MWSC at the average tariff of MRf 75.95 per cum.). The following notable events have been achieved over the past seven years.

- ?? The IFU loan (\$4.0 million) has been repaid ahead of schedule.
- ?? The MWSC has been paying dividends to the shareholders since 1999.
- ?? MWSC has been handed over to Maldivian management who continue to operate the system at the same level of service with steadily increasing financial performance despite increases in diesel fuel costs over last few years.
- ?? Adequate funds (capital and / or dividends) are available for expansion and replacement of Reverse Osmosis plants and network expansion. Wastewater treatment could also be financed from these sources.
- ?? The level of collection efficiency is about 99%. Clear disconnection policies are enforced.
- ?? Consumption has increased from 0.5 cum per household per month in 1996, to 3.8 cum in 1998 to 6.5 cum in 2002. This results from increased consumption and a switch from public taps owing to greater acceptance of the convenience of private taps.
- ?? Tariffs are affordable to low income and average income households. Households make use of rainwater and this is preferred for drinking water. Monthly bills represent about 1.2% for a low income household consuming 1.8 cum per month and 3.0% for an average income household consuming 6.5 cum per month.

## 3.6 Vanuatu and Concessionaire, UNELCO

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### 3.6.1 Background

UNELCO Vanuatu Ltd. (a subsidiary of the French Group Lyonnaise Des Eaux-Dumez) manages and operates Port Vila's water supply under a concession contract (for 40 years) to the Government (previously operated by the PWD) from February 1994. UNELCO has pledged that; "water supplied shall at all times have the qualities required by the standards of force in Vanuatu and, as far as possible, to the standards set by WHO". UNELCO within the limits of its contract; will manage and operate the water supply services in Port Vila (water production and distribution); finance and construct the works including renewals, upgrading and extensions of the network in conformity with this contract.

Sectors outside the area of the contract can eventually be included into the area of contract after the installation of individual meters for each water connection, and subject to the network conforming to standards set by UNELCO. The limits of the concession can be extended by agreement between the Government and UNELCO, to rural sectors outside the Port Vila municipal boundary, but must be supplied from the Port Vila network. To date two addendums have been signed in order to access the villages of Erakor and Ifira and the second to Blacksands.

The amount of investment to be made over the 40-year concession period is estimated at VUV800 million (US\$6 million). The Government will allow UNELCO, to use free of charge, the

land occupied or to be occupied by the facilities and equipment, in particular the pumping station, reservoirs and right-of-ways for pipe installation. UNELCO finances all improvements, upgrading and extensions to the distribution network in accordance with work program agreed by both parties. There is a fixed investment rate at VUV40 million for the first 5 years of the contract and VUV20 million thereafter.

The contract with the government is to supply the water service at a fixed contract price. The existing tariff structure has a fixed price for the first 50 cum. House connections are equipped with KENT water meters and the most recent figures show 4,600 connected meters in the greater Port Vila area. Those that are not connected to UNELCO in the greater Port Vila area obtain water from surface and groundwater sources and are either serviced by individual water systems (for example wells and/or pumps that service 1-2 households) or by private individuals.

### 3.6.2 UNELCO Tariff

The tariff was agreed in 1994 plus an adjustment clause to maintain its value as part of the Concession Agreement. The adjustment clause has led to only modest increases in tariffs over the past 8 years. There is only one tariff for all customers with four tariff bands. The median customers level of consumption is 62 cum per quarter. The true level of average domestic consumption is likely to be less. For example eliminating all consumers over 300 cum per quarter results in the median falling to 58 cum per quarter.

Some interesting observations can be drawn from the consumption data provided. The bottom 25% of consumers consume an average of 17.0 cum per quarter. Those that qualify for the 265 Vatu fixed charge represent 19% of customers and have an average consumption of 13.4 cum per quarter. This information suggests that there are quite a large per cent of the customers that are limiting their consumption of piped water to less than 10 cum per month that would equate to lifeline block in "the supposedly ideal" tariff structure

**Table 14 : UNELCO Tariff – Volumetric Charge all customers**

Consumption Bands Cum per 3 months	Consumption Bands Cum per month	Tariff Vatu per cum	Tariff US\$ per cum (2)
1 - 50	1 - 17	43.28	0.32
51 - 100	18 - 33	56.26	0.42
101 - 200	34 - 66	60.59	0.45
Over 201	Over 67	64.92	0.49

Note (1) : 1 US\$ = 133.4 Vatu

**Table 15 : UNELCO Tariff – Quarterly Fixed Charge all customers**

Meter Size	Vatu per Quarter	US\$ per Quarter
15 mm	530	4.0
20 mm	860	6.4
25 mm	2150	61.1
30 mm	5400	40.5
40 mm	7560	56.7
Above	10810	81.0

Note : Subscribers whose quarterly water consumption is less than 25cum are charged Vatu 265 (US\$2.0).

### 3.6.3 Comment on Tariff Structure

No information is available to assess the economic costs of supply but it is assumed that this would be equivalent to the average monthly revenue (volume and fixed charges) as out of this amount the utility has to meet operating costs, capital expenditure and concessionaire's profit. With fixed charges this would be of the order of US\$ 0.50 cents per cum.

The tariff structure provides the appropriate signals for demand management to ensure economic use and at the same time generates income to meet UNELCO's financial objectives.

There is some financial subsidy between average consumption and the estimated economic costs but like Maldives this would not be great.

The tariff has a progressive tariff structure, but like Fiji the bands are too wide, especially at the low end. Consumption at lower levels is probably limited by price and that it would be better to have a lifeline block covering 10 cum per month for domestic customers. Non-Domestic customers should have a separate tariff so that they would not benefit from this concession.

Tariffs appear affordable to average income households at around 3 to 4%% of household incomes but are likely to be in the range of 4-5% of household income for low income households.

Billing and collections are enforced, so that like MWSC Male, revenue is around 99% to 100% of billings.

### **3.6.4 Improvement in Service Standards**

Prior to the signing of a concession with UNELCO Vanuatu Ltd. in 1994 the Public Works Department (PWD) was responsible for the provision of urban water supply. A water section within the department was responsible for the operation and maintenance of the water supply in Port Vila. Generally the water system in Port Vila was in good condition but required better maintenance. In densely populated settlements, the water supply was often interrupted and there were no guarantees of a 24 hour supply.

In general, the urban water supply system was a financial drain to the national government in terms of the financial losses generated, especially 1989 to 1994. There was some improvement in the financial condition in 1992 to 1993 attributable to the increase in rates from 1992 from the previous flat rate of VUV40 per cubic metre of water consumption to VUV52 per cubic metre. The Vanuatu National Audit Office estimated outstanding water bills for Port Vila alone prior to its transfer to UNELCO at VUV160 million or two years of sales. The concession has enabled the government to avoid the high capital costs required in rehabilitating and expanding the system which it would have incurred had it continued on with operating and maintaining system performance.

Since the signing of the concession, UNELCO has improved the operating conditions of the water supply network and hence the level of return with strict control of billings, water losses have been reduced and therefore so have consumption levels. UNELCO provides an uninterrupted 24-hour service to all of its customers and any leaks or other problems are repaired within a short period (1-2 days).

## **3.7 Summary of Tariffs and Cost Recovery Objectives**

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The key elements of the above discussion are summarized in Table 16 overleaf. Tariffs are reviewed in terms of the objectives outlined above, namely economic, financial, social, and administrative. This is discussed below.

### **3.7.1 Economic Efficiency**

In the case of Samoa, Fiji and Kiribati existing tariffs do not provide the correct pricing signals to consumers with high economic and financial subsidies implied when economic costs are compared with existing financial tariffs. In the case of Fiji it would be possible to establish affordable tariffs that would achieve full cost recovery of the economic tariff. However, the provision of a life line block would be necessary to ensure affordability to low income households. Improved tariff structures and billing and collection procedures would also likely result in lower water consumption. In the case of Kiribati it is evident that it would be difficult to set tariffs at full cost recovery but it would be possible to set tariffs to meet proper O&M costs and a proportion of capital costs.

Samoa still has one of the highest levels of per capita consumption in the world at 350 to 400 lpcd. The present tariff structure and tariff levels do not exert any demand management effect on consumption.

In the case of Maldives, despite higher economic costs than Kiribati, higher household incomes means that households pay charges that are close to full economic costs. Maldives has a true lifeline block to meet basic needs of low income households. Higher levels of domestic consumption, institutional and domestic consumers pay the economic price or in excess of this, resulting in a weighted average close to the economic costs. The situation is similar in Vanuatu, however, like Fiji it could be argued that tariff bands are too wide thus limiting demand management objective. In the case of Vanuatu it would be fairer to introduce a lifeline block equivalent to 10 cum per month to ensure affordability by low income households.

In Male and Vanuatu the tariff structures provide customers with the appropriate signals that additional consumption is more expensive resulting in strong demand management and reduction in wastage. Both Maldives and Vanuatu have fixed monthly charges that ensure a greater level of revenue from customers, which is independent of water consumption, and reflects the high level of fixed costs that most utilities face.

### **3.7.2 Financial Sustainability and Financial Objectives**

In considering the financial requirements for tariffs it is important that the economic structure be maintained as far as possible as this provides the correct signal to wastewater producers. Financial objectives relate to the satisfactory financial performance and long term sustainability of the water and wastewater entities. Accordingly, water and wastewater tariffs should be set at an overall level to meet proper operating costs, any debt service, and a proportion of future capital expenditure especially in terms of replacement, rehabilitation and modest expansion within existing design parameters.

Present tariffs for Samoa, Fiji and Kiribati clearly do not meet the above financial criteria as they are not able to generate revenues to meet operating costs. At the present time both Vanuatu and Maldives achieve full cost recovery targets through tariffs. When this is coupled with better operational performance as evidenced by low water losses, it means that full cost recovery and sector financial self sufficiency can be achieved at lower overall costs.

Therefore where water supply and wastewater projects are financed with commercial monies then there would be a requirement for such tariffs. The problems arises where grant aid results in no financial requirements to set such financial tariffs. As a result revenues are generally inadequate to even meet proper O&M as preventative maintenance is also ignored in the desire to set tariffs as low as possible to satisfy political rather than sound commercial objectives.

In pursuing political agendas in the form of low tariffs it is the urban poor that end up being disadvantaged as their service is likely to deteriorate first in the periurban areas. Alternatively lack of funds means that the distribution system system cannot be connected to bring water to periurban areas where the poor are more likely to reside. Water sources are also likely to be inadequate to supply services to such areas.

### **3.7.3 The Social Objective - Affordability and Willingness to Pay**

In considering the affordability of wastewater services it is necessary to consider this in the context of affordable tariffs not exceeding some 5 percent of household income for water supply and waste water disposal in a developing country context. The primary social objective for tariff formulation should be to ensure that all members of the community are able to afford access to clean water supply and to waste water disposal services without placing an undue burden on their expenditure.

Only Male provides a genuine lifeline block for low income consumers. Kiribati has a flat rate charge of A\$10.00 per month, while Fiji and Vila both allow an initial block of 50 cum for three months or 17 cum per month at the lowest tariff rate. For a lifeline block this is excessive and in both countries much of the consumption is in this band, or in Fiji the first two bands. In Samoa and Fiji existing tariffs result in a monthly water and sewerage bill equivalent to 1.6% and 1.4% of monthly household income respectively, which is below accepted levels of affordability at 4-5%. In Male existing tariffs result in a monthly bill of US\$5.1 or approximately 3.0% of household income while in Vanuatu an average "domestic customer" would pay US\$ 8.3 equivalent to around 2 to 3% of household income.

#### **3.7.4 Administratively Understandable plus Billing and Collection of Tariffs.**

Any recommendations on tariff structure must be capable of implementation in terms of metering, billing and revenue collection. Also it is important that the tariffs are readily comprehensible and understandable to customers. It has been shown that increasing the complexity of tariff structures reduces customer understanding and also that there is a close correlation between customer understanding and willingness to pay. Also where wastewater charges exist these need to be billed in conjunction with wastewater to avoid duplication of billing and collection and to make enforcement of payment of wastewater tariffs easier.

In the case of Fiji the system of three monthly meter reading and monthly billing on estimates has lead to considerable confusion and dissatisfaction. In Kiribati there was almost a complete breakdown in the billing system in 1996 with both computer and manual systems often showing conflicting data. In Samoa customers presumably have got used to the logarithmic basis of the tariff, with many customers paying on a flat rate basis anyway, In Male and Vila there does not appear to be any customer confusion over existing billing practices.

Where the collection efficiency of a billing system falls below 90% then the integrity of the billing and collection system falls into question. That is users begin to realize that there is no penalty for non-payment so that they do not pay. Other users observe this and in turn decide not to pay. This has become a factor both in Fiji and in Kiribati, on the other hand Samoa is making efforts to improve collection efficiency and recover arrears. Institutional strengthening in Kiribati and Fiji should also see an improvement in this situation.

**Table 16 : Estimates of Economic Costs of Water Supply and Average Tariffs ( US cents per cum)**

Country	Fiji	Kiribati	Samoa	Maldives	Vanuatu
Urban Centre	Suva (1)	Sth Tarawa (2)	Apia (3)	Male (4)	Vila (5)
Institutional Structure/ Arrangement	Government Department	Government Board	Government Authority	J-V Company	Private Sector Concession
Water Source	Surface water	Groundwater	Surface Water	Desalination	Surface/ground water
Main Sources of Past Financing	Government	Bilateral grants	Bilateral grants	Bilateral grants and loans	Concessionaire funding
	<b>US cents/cum</b>	<b>US cents/cum</b>	<b>US cents/cum</b>	<b>US cents/cum</b>	<b>US cents/cum</b>
Full Cost Recovery – Economic Cost	51.9	357.6	60 (6)	644.0	50.0
Ave Domestic Tariff	22.7	75.0	9.0 / 6.0 (7)	506.0	40.0
Ave HH Consumption cum/month	31.3	7.5	60.0 / 138 (8)	6.5	20.7
Collection Efficiency	56%	47%	80%	99%	99%
Effective Average Domestic Tariff	12.7	39.5	7.2 / 4.8 (8)	506.0	40.0
O&M Covered by Collected Tariff	50%	50%	50%	100%	100%
Capital Contribution from the Collected Tariff Revenues	Nil	Nil	Nil	Capital and/or dividends to shareholders	Capital invesment plus return to concessionaire
Accounts Receivable No. days of sales	288	400	192	30	30
Measure of Operational Efficiency – Water losses	50%	50%	45%	7.5%	23.0%
Affordability Present Tariff - % Ave. HH Income	1.4%	2.0%	1.6%	3.3%	2 to 3%%

- Sources :
- 1.) Suva Nausori Masterplan, 1999 and ADB Fact Finding Missions, 2000 to 2002
  - 2.) Kiribati Sanitation and Public Health Project, ADB, 1996 and recent comment
  - 3.) Apia Urban Development Project, ADB Fact Finding Mission, 1997 and recent SWA comment
  - 4.) MWSC Tariff Review, Danida 1999, and recent MWSC comment
  - 5.) UNELCO and consultants estimates.
  - 6.) US cents 60 is for water supply only, a US cents170 per cum includes sewerage project down town and Central Apia area,
  - 7.)US cents 9.0 for metered consumption, and US cents 6.0 for unmetered assuming charge of WS\$ 12 per month
  - 8.) Consumption : metered is estimated at 60 cum per month and unmetered 138 cum per month

## 4. FINANCING AND INSTITUTIONAL ARRANGEMENTS

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### 4.1 Sources of Funding in the Urban Water Sector.

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The main sources of financing that have traditionally been accessed to finance investment in the urban water sector in the Pacific are as follows.

#### 4.1.1 Domestic Sources

- ?? Government funds ( Include Trust Fund Sources.)
- ?? Local loans ( Include Provident Funds.)
- ?? Customer contributions such as connection costs
- ?? Private Sector Sources – both loans and equity contributions
- ?? Customer revenues - from tariffs to meet O&M and finance share of future capital expenditure.

#### 4.1.2 International Sources

- ?? Multilateral Bank Loans (World Bank, ADB, EIB etc)
- ?? Bilateral Loans/Export Credits (JIBEC, KfW, IFU )
- ?? Bilateral Grants (Include Compact Payments)
- ?? BOT, Private Sector Management Contracts, Private Sector Concession Agreements
- ?? Mixed Capital Public-Private Partnerships.

#### 4.1.3 Funding Sources Utilised by Each Country

The above sources are briefly discussed in relation to the five countries reviewed above.

##### Fiji

Fiji in the past has met most of the cost of financing the development of the sector out of its own government budgetary sources. It is only recently that it has sought external financing. JIBEC have provided a loan for Nadi - Lautoka expansion with GoF meeting any rehabilitation costs. For the rehabilitation and expansion of the Suva – Nausori system the GoF is seeking finance from the ADB. This loan will be at commercial rates based on LIBOR (at about 6%). The GoF will need to provide counterpart funding.

##### Samoa

Samoa has been the recipient of grants to fund water supply, most recently from the EU to finance the rural water supply schemes for Upolo and Savaii. Previous grant funding established the water sources and treatment facilities for the Apia water supply system. The ADB has proposed financing of the Apia Central Sewerage Project. This would be from ADF Sources at concessional interest rates (1%). The Government of Samoa will need to provide counterpart funding.

##### Kiribati.

The original water supply and sanitation systems on South Tarawa were developed with the assistance of Australian Aid. The current rehabilitation and expansion is being financed by an ADF Loan from ADB at concessional interest rates (1%). The Government of Kiribati will need to provide counterpart funding.

## **Maldives.**

The Male water and sewerage system was financed by the J-V between the Government and a foreign joint venture partner. The JV was awarded to a Danish firm with MWSC provided with an IFU (Danish Export Development) loan of about US\$4.0 million at a 4.5% interest rate to be repaid by 2001. Danida also provided GoM with a grant to assist with the rehabilitation of the system. The Foreign J-V partner purchased a 15% equity share in MWSC.

## **Vanuatu**

The Concession agreed from 1994 required investment to be made over the 40-year concession period of VUV800 million (US\$6 million) by the concessionaire. The Government will allow UNELCO, to use free of charge, the land occupied or to be occupied by the facilities and equipment, in particular the pumping station, reservoirs and right-of-ways for pipe installation. UNELCO finances all improvements, upgrading and extensions to the distribution network in accordance with work program agreed by both parties. There is a fixed investment rate at VUV40 million for the first 5 years of the contract and VUV20 million thereafter.

### **4.1.4 Mixed Capital Public Private Partnerships**

Sustainable Project Management (SPM) is a not-for-profit international business development organisation, which was established in early 1995 to implement some of the outcomes of the 1992 Earth Summit. The objective is to create locally owned public-private partnerships that operate commercially viable businesses to provide improved waste, water and energy services to developing communities. SPM uses a sustainable development tool known as the Mixed-Capital Public Private Partnership (MC-PPP) to create and sustain these businesses.

SPM has been working in the Pacific region since January 2000 with the support of New Zealand's Official Development Assistance programme and in collaboration with the South Pacific Regional Environment Programme (SPREP) and the South Pacific Geoscience Commission (SOPAC).

Currently, an integrated municipal solid waste facility is being developed in cooperation with the Government of Samoa as the public partner, and both local and New Zealand based private sector interests. SPM is also directing the development of a waste-to-energy business using an oxidation pond sewage/wastewater treatment system coupled with a fish-farm operation. This system is being designed for Pohnpei, the capital of the Federated States of Micronesia with the Government as the main public partner, and a number of local and international private sector companies providing the appropriate technology.

In brief, this model can be successful in developing sustainable solutions to infrastructure problems that will also result in economic and environmental benefits for developing communities. It seeks from the outset to engage the public sector – both official and civil society – and the private sector in the overall design and implementation of a project. There is an important element of shared risk and shared reward that is a strong linkage between the two parties.

When this is connected with both sides committing investment and equity to the partnership, the resulting joint venture creates a sustainable solution that works. The business is established using innovative financing mechanisms (hence the reference to 'mixed-capital') that obviate the need for the public sector to take on more national debt to finance the solution to an infrastructure problem. The business is structured to be commercially viable so it is profitable, provides local employment, and the service it delivers supports greater efficiencies in the local economy overall.

The Case Study develops the discussion further on the use of such innovative financing and management mechanisms.

## **4.2 Financial Projections and Future Investment Requirements.**

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### **4.2.1 Development of Financial Plans for Urban Water Sector**

Financial plans and financial projections have been prepared for the urban water sector in Samoa, Kiribati, Fiji and Maldives in order to identify sector funding requirements, sources of financing and the necessary levels of tariffs needed to meet sector operating and maintenance costs, any loan repayments, and to provide funds for some future capital investment.

These analyses were then used to define broad financial objectives for the sector, and cost recovery targets to be achieved through tariffs. This in turn lead to recommendation of financial objectives in the form of covenants that should be adopted to ensure that tariffs are maintained at the appropriate levels to achieve the proposed objectives. The analyses also took into consideration that tariffs had to be affordable to both average and low income households.

### **4.2.2 MWSC Financial Projections and Tariff Review, 1999**

In the case of Maldives the financial objectives were defined by the J-V Agreement and required a 15% rate of return on equity invested. This objective requires tariffs that would meet all operating and maintenance costs, plus recover past capital expenditure and meet future replacement capital expenditure and earn a 15% rate of return on equity investment. While tariffs have never been set to achieve the 15% IRR the return at around 14% has been regarded as acceptable by all shareholders.

### **4.2.3 Kiribati Tariff Review, July 2002**

As noted above the financial projections and tariff review that was undertaken in 1996 as part of the Loan PPTA are currently been updated to provide recommendations to the Government on future cost recovery objectives, tariff policies, tariff structures and tariff levels. For domestic customers where there will be no metering these will need to be simply a flat rtae monthly tariff.

### **4.2.4 Samoa IUDP, 1997**

Financial projections for SWA were prepared in 1996 as part of the Integrated Urban Development Project. These were subsequently updated in 1997 as part of a ADB Fact Finding Mission. The objective of the projections at that time was to identify the capacity of SWA to service debt for the proposed Apia Central sewerage project, and to examine tariff levels necessary to achieve progress in meeting SWA self sufficiency at least in terms of operating costs. Water tariffs prevailing at that time have not been increased and SWA still requires Treasury support to meet O&M costs. However, ongoing institutional strengthening with the assistance of AusAid is improving accounting ssysytems and moving SWA towards greater finncial self sufficiency.

### **4.2.5 Fiji Suva Nausori Project, February 2002.**

Financial projections for the Public Works Department, Water and Sewerage Section (WSS) were prepared to identify the ongoing Government of Fiji (GoF) funding for the sector under alternative cost recovery policies and tariff levels. In recent years the Government has met all capital costs through either direct grants or through external loans repaid by Ministry of Finance.

The basis of the investment program was the Masterplans developed for various systems throughout Fiji. These also provide the basis for PWDs annual applications for funding within the Fiji Budget.

The financial model developed was used to identify the implications of alternative cost recovery options.

### **Existing PWD Tariffs with no improvements in Billing Procedures**

Assuming no change in billing and collections and no tariff increases the analysis forecasted that the GoF would need to provide F\$471 million over the next ten years or an amount equivalent to F\$47 million per annum to meet the balance of O&M costs, debt servicing, and proposed capital expenditure.

### **Existing Tariffs but improvements in Billing Procedures**

Improvement in billing and collection of revenues means that all consumers would be paying for the water they use under the present tariff. Ensuring customers pay the present tariff for the services they receive saves the GoF F\$101 million over ten years or F\$10 million per year. Nevertheless support to the sector at F\$370 million is required and is still likely to place strains on government finances.

### **Tariffs Increased in Line with System Improvements**

Domestic water and sewerage tariff increases are proposed in 2006 and 2008 to coincide with completion of the Nadi – Lautoka and Suva – Nausori projects. Tariff increases maybe of the order of 30 to 40% in each year. It is expected that households will be willing to pay higher tariffs for the improved services that are likely to arise. An average income household in Suva – Nausori would spend up to 3% of household income on water and sewerage charges in 2006 compared with 1.4% in 2002 while a low income household would spend up to 3.5% of household income on water and sewerage charges in 2006. Such increases should be limited to the main systems with lower increases recommended for the smaller systems.

Under this option GoF support to water and sanitation sector falls to F\$177 million compared with F\$370 under existing tariffs but with improvements in billing and collections and F\$471 million where there is no change to existing billing and collection procedures.

Thus the preparation of financial projections and the model can be used as a tool to assist the GoF to identify the impact of various cost recovery options and tariffs for various investment options.

## **4.3 Institutional Arrangements and Financing in the Water Sector**

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Institutional improvements alone are unlikely to be sufficient to improve water services. Rather, clear goals, policies and actions need to be agreed upon that serve the interests of the community at large. Effective oversight arrangements should be established with meaningful representation by consumers and other stakeholders, such as landowners.

Even so, commercialization and corporatisation may be appropriate first steps, to establishing the independence of operations required for consumer-oriented water services. At the same time private sector management in Port Vila and through Joint -Venture arrangements in Male are proving to be practical ways of improving and maintaining the quality of water services.

The above table, Table 16, suggests that lower financial and operational performance is associated with operations of government departments (Fiji) and government boards and authorities (Kiribati and Samoa) while in Maldives and Vanuatu the performance of a J -V company and a concessionaire are superior in terms of collection efficiency of bill collection and in terms of operational efficiency when observing the level of non revenue water ( including both technical and non-technical losses).

Despite the reorganization initiatives of recent years, the water and sewerage sector in Fiji remains fragmented. PWD, whose management structure is regionally based, carries out all technical functions. Operational activities are headed by a Deputy Secretary (Operations), with each region responsible for public buildings and roads, as well as for water supply and sewerage. Planning and design is carried out under a Deputy Secretary (Planning and Design),

quite separately from operations. Water and wastewater charges are collected through the Water Rates Office, and all revenues are paid into the Government consolidated fund.

In fact it is the lack of clear financial and cost recovery objectives for the sector that result in this situation in Fiji coupled with fragmented sector management, while in Kiribati although the PUB as a statutory board had clear financial objectives these were not consistently applied, and the PUB did not have the management independence of other organisations such as the Kiribati Oil Company. In Samoa the SWA is dependent on Treasury to meet the balance of operating costs and lacks financial autonomy.

On the other hand in Maldives the J-V company had a clear financial objective to set tariffs to achieve a 15% rate of return on equity investment, while in Vanuatu the concession agreement provides for an acceptable rate of return to the concessionaire who in turn established a base tariff by agreement with the government and an automatic tariff adjustment procedure based on an agreed formula. Over the 40 year concession period investment of US\$ 6 million is required by the concessionaire. In the Maldives the government has an 85% shareholding in the J-V company so are the major beneficiary of the dividend distribution. The current situation in Fiji is similar to the situation in Vanuatu existing prior to the concession arrangement in 1993 when water losses were 50%, operating costs exceeded revenues, with debtors equivalent to two years sales.

The Government of Fiji will have difficulty sustaining the level of investment required in the sector estimated at US\$220 million over the next 10 years or \$22 million per annum to meet the balance of O&M costs and capital costs. Improvements in collection procedures and modest tariff increases (to about 3% levels of household income) would provide 64% of this financing requirement and thus ease the burden on the GoF. Some sector reorganisation will be necessary to achieve these goals.

For other Pacific Island countries the provision of bilateral grants for urban water supply and sanitation such as in Samoa and Kiribati without corresponding clear financial objectives for the sector and proper cost recovery policies for the sector have simply allowed the respective governments to continue with a policy of low tariffs, resulting in excessive water use and wastage, and poor cost recovery, thus resulting in continued reliance on government funding not only to meet capital costs but also to meet sector operating costs and where available bilateral grants to meet capital costs of new projects and or rehabilitation of existing systems.

The Maldives and Vanuatu demonstrate examples where efficient operations and maintenance, clear financial objectives and cost recovery policies, have eliminated the need for direct government support of the sector at tariff levels that are regarded as affordable and domestic customers are willing to pay.

#### **4.4 Regulation of Urban Water Sector.**

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While the Pacific Island countries and Maldives do not have water laws that set rules for private participation and assign responsibilities for setting tariffs and service quality standards this has not been seen as a major impediment to participation. There is only a limited regulatory framework and no functioning regulatory entity separate from the utility and from the Ministry or municipal government responsible for economic regulation for public or private water service will be examined.

In the Maldives there is a Maldives Water and Sewerage Authority charged with the regulation of the sector but this is not really independent of the GoM. At the same time GoM is the majority shareholder in MWSC so that there is limited independence of the MWSC and for the MWSA to regulate the sector. Nevertheless to date the GoM has not done anything that would jeopardise the financial position of the minority J-V shareholder.

In the case of Vanuatu the Concession Agreement sets out the obligations of the concessionaire in terms of water quality, levels of service and tariff adjustment procedures. While the PUB in Kiribati and the SWA in Samoa may be said to be independent boards/authorities they have no real financial independence from their governments when it comes to setting tariffs. In Fiji as noted the water sector operations are part of a government ministry (MWTERTS).

These are matters that may need to be addressed in the future if more private sector involvement is to be encouraged in the Pacific Islands in the urban water sector.

## 5. ACTIONS COMPLETED AND FUTURE ACTIONS

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### 5.1 Future Institutional and Policy Reform Initiatives.

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While a number of countries have experienced poor operational performance in the water sector, weak cost recovery with lack of clear financial policies and poor tariffs and billing and collection procedures recent initiatives at institutional strengthening and policy reform should see improvement in performance.

#### 5.1.1 Samoa and Kiribati Institutional Strengthening Initiatives

In Samoa AusAid is assisting with the institutional strengthening of SWSA, increasing metering and improving billing and collection procedures. (This is the subject of a separate Case Study). The ADB loan project in Kiribati South Tarawa is rehabilitating and expanding the present water and sanitation systems, while institutional strengthening should lead to improved sector management and performance, clear financial objectives, improved cost recovery and greater sector self reliance.

#### 5.1.2 Fiji Institutional and Sector Reform

Similarly in Fiji the government is committed to improved sector performance and to sector reorganisation which is part of the ongoing discussions with the ADB in respect of financing of the Suva Nausori rehabilitation and expansion project.

The Government's current policy on public enterprise reform is contained in the Economic and Fiscal Update Supplement to the 2002 Budget Address, published in November 2001. In the case of water and sewerage services, the policy is for these services to remain in Government ownership, and to be re-organized according to the following underlying key principles:

- ?? clarity of objectives;
- ?? management autonomy and authority;
- ?? strict accountability for performance; and
- ?? an increasingly competitive environment.

The development of a Fiji Water Board (FWB) is one of the options been reviewed by the GoF. Features of FWB's structure include the integration of all water and sewerage functions under a Chief Executive Officer, and the creation of the four major divisions of Operations, Planning and Design, Corporate Services, and Finance. This structure is close to that of a commercial entity and would lead to a more coordinated management and performance of the sector.

One way to address the skills shortages that presently exist would be to contract system operations to a private company, while keeping ownership of assets with the Government. Another would be to contract out key functions such as water loss reduction, billing and collections. The aim should be to achieve efficiency improvements as quickly as possible, and thereby to ease the burden of funding even routine operations on the Government. If this can be achieved, then the available Government funding can be directed toward rural areas where it is most needed.

### 5.2 Benchmarking

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The strategy for improving both operating and financial performance should also focus on improving the productivity of the cost base rather than only on increasing tariffs and on implementing an improved maintenance regime, which should also be audited.

Cost control and improved efficiency of operations are key components. This requires the performance and delivery of water and sanitation services be monitored and benchmarked against recognized standards of good practice (and good value) in other similar small town urban environments.

The purpose of benchmarking is to search for and identify best practice (which may be within or without the same sector) with the objective of implementing appropriate best practice and improving performance. The ADB Regional Technical Assistance (RETA 5883-REG) assisted water supply and electric power utilities in developing countries of the Pacific to develop appropriate operational, institutional and financial performance evaluation criteria and benchmarks.

While the initial data collection and comparison of performance in 2001 yielded some strange results that made the data difficult to use, the development of this tool in coming years will be of immense value to water utilities both to monitor their own annual performance but also to compare their performance with other utilities in the region.

### **5.3 International Networking Sources for Pricing and Financing Issues.**

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Reference is made to the Global Water Partnership Tool Box as a resource for assisting with developing clear financial policies and cost recovery mechanisms. The lessons learned that are discussed in the Tool Box with respect to cost recovery mechanisms are also very relevant to the Pacific. Finally the Bonn Conference a number of similar issues as those facing the Pacific were enunciated in a set of recommendations for action. These could also form a set of recommended actions for the Pacific.

#### **5.3.1 Global Water Partnership Tool Box**

The Toolbox designed by the Global Water Partnership (GWP) supports the development of Integrated Water Resources Management (IWRM) world – wide. The tool box holds a set of economic tools. These involve the use of prices and other market – based measures to provide incentives to consumers and to all water users to use water carefully, efficiently, and safely. They work best in combination with other supporting measures.

Water pricing is an increasingly common tool applied to recover costs, to give the right incentives to users, and to protect the environment. Pollution charges work in an analogous way, providing a means to recover costs of treating wastewater before it is returned to the environment and penalties/disincentives for discharging polluted wastewater.

Targeted subsidies can work similarly to encourage good practice or to promote equity objectives and thus ensure public health benefits are realised to the benefit of the community as a whole. Where water users have rights enshrined in law or custom, and these rights cannot easily be revoked or amended, the redistribution of water can be effected by setting up markets in which rights can be traded, and holders can be compensated through the market.

The concept of water as an economic good distinguishes clearly between the value of water , assisting allocation processes and pricing, being part of the cost recovery issue. The economic value of water is highlighted within IWRM through a greater stress on demand management rather than supply - side actions, a recognition (and estimation, where possible) of the economic value of water in different uses, acceptance of the notion of the opportunity cost (value to other alternative users/uses) and attention to cost recovery, though with concern for affordability and ensuring access for the poor.

### **Cost Recovery and Charging Policies. ( IWRN Tool : A 3.4)**

The “economic” costs that water undertakings need to recover include those involved in the capture, storage, transmission, treatment, and distribution of fresh water, and the collection, treatment and disposal of wastewater. In the Pacific attention to economic costs, appropriate pricing signals for both water and wastewater and often neglected.

There is often concern that cost recovery charging for formal water services will impact unfairly on the poorest, but it is often the case that the poorest actually pay the highest price of water, whether by purchasing from water vendors or because of the distance and time involved in water collection or through ill health from inadequate potable water provision.

Formal charging structures (tariffs) can often lead to lower overall charges for low income groups. Clearly formal tariff structures need to ensure affordability to the poor, but formal charging structures cannot normally accommodate the poorest and other forms of government intervention are required to ensure that their access to basic water and wastewater services are met.

### **Lessons Learned.**

The Toolbox sets out several preconditions for a successful cost recovery policy :

- ?? Public acceptance of the need for cost recovery. A public information campaign maybe needed if consumers are used to regarding water as a gift of nature.
- ?? Strong political backing, and the avoidance of extravagant and unaffordable promises before elections
- ?? Provision for poor ( by targeted subsidies or free quotas). Direct support maybe more effective, since subsidies often benefit the rich more.
- ?? Financial transparency and regular and automatic price adjustments based on agreed criteria
- ?? Firm and clear public regulation of tariffs set by private sector and public utilities
- ?? Private companies find it easier to levy and raise charges than their public counterparts
- ?? Increases and higher tariffs are easier to implement when there is an associated improvement in services
- ?? Tariffs must be understandable and tariff billing and collection procedures must be enforced
- ?? Charges are only one instrument of demand management and work best in conjunction with other measures, such as cost control, leakage control, more efficient implements, recycling, reuse etc.

### **5.4 The Bonn Recommendations for Action, December 2001.**

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The International Conference on Freshwater, Bonn, December 2001 put forward a number of recommendations for action including the need to mobilise financial resources that also have particular relevance to the Pacific. Some of the more relevant to pricing, finance and regulation are summarised below.

#### **Encourage more efficient service provision.**

All service providers should be subject to effective regulation, benchmarking and monitoring. They should be efficient, accountable, and protected from inappropriate pressures. There should be clear separation between the roles and responsibilities of the regulators and service providers.

Regulation is a national level function which should be strengthened through international networking and the application of consistent principles, standards and methods.

The Bonn Keys also emphasised the importance of stronger, better performing governance arrangements. “Effective regulatory arrangements that are transparent and can be monitored are the way to effective, responsive financially sustainable services”.

#### **Ensure significant increases in all types of funding.**

All sources for funding, including public sector funding, revenue from water tariffs and charges, external assistance and private investment, must be strengthened to bridge the gap between current levels of service and required levels of expenditure.

#### **Improve economic efficiency to sustain operations and investment.**

Water service providers should aim for financial sustainability through receiving sufficient income from users to finance operations, maintenance and capital costs. Balancing this aim, however, cost recovery, objectives should not be a barrier to poor peoples access to water and sanitation services, tariff systems that allow social targeting should be established. Options include transparent subsidy arrangements from public funds and cross-subsidy from other customers.

Efforts to recover costs should focus on those consumers who consume most water. The authorities that set tariffs should be willing to charge the full costs to users that can afford to pay.

Subsidies to any water – related activity should be reduced and finally eliminated if they are leading to inefficient use of water or causing negative effects for the environment.

#### **Make water attractive for private sector investment.**

In view of high capital demand for water infrastructure there is a need to augment public or government funding by mobilising private sector funding for water and wastewater provision. These may take the form of public-private partnerships and not necessarily private ownership.

Investors seek confidence that their legal and financial interests are protected for the full contract duration, and that they can recover (and repatriate) their investment over time. This implies appropriate regulatory arrangements, transparent contracting procedures, reliable cost recovery mechanisms, and public acceptance of such arrangements.

#### **Make water institutions more effective.**

Many existing water institutions need to change their focus and their method of addressing challenges, by reorienting their role and structure appropriately.

### **5.5 General Future Actions**

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While there are a number of funding sources available to Pacific Island countries to finance urban water and sanitation services there will be a greater need in the future to develop clear financial objectives and cost recovery policies for the sector to ensure long term sustainability. This may include laws and regulations to allow greater private sector involvement.

The operations in the Maldives and Vanuatu demonstrate that where clear commercial objectives are in place in combination with proper attention to maintenance, with the reduction in water losses, and good billing and collection procedures, that reliable water services can be delivered at affordable tariffs. At the same time future government capital investment in the sector is minimised.

Tariffs can be designed that will allow cost recovery and financial objectives to be met and at the same time are affordable to low income households so that they can have access to water and waste water services at prices they can afford.

These are matters that need close and continuing attention in all countries if long term sustainability of the sector is to be assured. As noted above, there are aids such as the Global Water Partnership and other support structures to assist in developing financial and cost recovery strategies for the sector.