

Chapter 1

A Contextual Background

1.0 Introduction

When viewed in its simplest form, this research study seeks to answer the question of whether or not *user pays* is, in the context of sustainable development, an achievable option for water service providers in developing countries such as those found in the Pacific Islands region. The study is predominantly based on a case study of the Solomon Islands Water Authority (SIWA). However, to place the study into perspective, the achievement of the goal of *user pays* is determined by the decisions of management concerning the utilisation and allocation of scarce resources. Given that the provision of these services has community or social impact, there is also a need for this study to address the issue of the accountability in those management decisions in achieving *user pays* funding outcomes.

Under the *user pays* approach the revenue decision is seen as being a central factor. The revenue decision is required to balance issues such as the capacity/willingness of the user to pay against the cost of water service infrastructure both in the provision of that infrastructure and the ongoing operations and maintenance of that infrastructure. The revenue decision is considered to embody all management's considerations and decisions in assessing how to raise the necessary financial resources to achieve the mission/goals as stated in the organisation's Corporate Plan. In the case of Water Authorities, the

Corporate Plan should include statements of management's intentions as to the level of service provision through strategy policy statements and service outcome expectations through statements of objectives contained in that Corporate Plan.

In order to answer the research question, examination of the issues confronting the water industry is required within a framework of accountability and funding, particularly as far as that framework relates to *user pays*. Accordingly, in this Chapter, Section 1.1 examines the accountability and funding environment in which Authorities such as SIWA operate. Section 1.2 highlights and discusses the water issues surrounding the provision of the infrastructure needed by Water Authorities to provide the stated services. Given the identification of the accountability and funding environment and the issues confronting Water Authorities in providing services, Section 1.3 examines the role of *user pays*. The scene having been set, Section 1.4 identifies the research question to be answered by this study. The study framework is explored and definitional issues are dealt with in Section 1.5 with a study outline and overview being provided in Section 1.6.

1.1 A Water Authority Accountability and Funding (Operating) Setting

In terms of this study there are three factors of sensitivity which combine to provide the accountability and funding environment. These factors are:

1. Health;
2. Environmental; and
3. Common/Public Good.

These factors are highlighted in submissions to the *Review of Reforms in the Water Industry, Vol. 5* (1988,Black:0 243) where it states:

There has been much talk of a “user pay” approach. We have severe reservations about this, particularly where large capital cost expenditure, such as the repair or extension of a dam wall, is involved. In any case there are social benefits, improvements to public health and a betterment of the quality of life that result from the “use” of water.

The factors of environment and health are further reinforced by the Asian Development Bank in their publication *Water Utilities Data Book: Asian and Pacific Region* (ADB, November 1993:vii) where they state:

The managerial-principles and methods selected to inform and assist practitioners and decision-makers are geared towards financial viability and sustainability, not as ends in themselves, but rather as means to ensure the attainment of long-term health and environmental goals.

Unfortunately, these health and environmental factors, in terms of water services, are still under stress in developing countries which make up the Pacific Islands, particularly the Melanesian group of islands of which the Solomon Islands is a member. This is identified by Connell and Lea (1993:134):

The situation concerning the provision of other urban services - and especially water supplies - is similar to that concerning housing. Despite the international priority given to the supply of adequate water and sanitation facilities, there is little evidence that these and other basic needs have any real priority in Melanesia, other than at times of service breakdown. There is evidence of limited investment in provision of services like water supplies, sewerage facilities, environmental management (street and stream cleaning and garbage disposal), ...

In developing countries such as the Melanesian countries the performance of such services is considered more critical than those of developed countries because of the

associated lower levels of health and health services. Low average household incomes, without any welfare safety net support compound the issue when the notion of *user pays* is added to the equation. This situation is not further compounded in Melanesian countries such as the Solomon Islands and Papua New Guinea (PNG) where a significant proportion of the population reside in rural areas where only minimal services are provided, if any. According to the 1986 Solomon Islands census approximately 80% of the population resided in rural areas.

This diversification of the population into smaller geographically separated communities has similar implications for SIWA as that experienced by Australian Country Water Authorities (*Review of Reforms in the Water Industry, Vol. 5, 1988:0 272*):

Large communities require large works, but usually have a better capacity to opt for those works. Small communities require relatively smaller works, but often the cost of those works fall unfairly on the end user, as the community resources are not equal to the task.

Honiara is the Capital and largest city in the Solomon Islands with a population in the vicinity of 47,000 currently. The lack of economies of scale is relevant to both Solomon Island urban and rural communities.

The environmental factors of Health, Environment and Common Good act to increase the political sensitivity of the funding of water services (*Review of Reforms in the Water Industry, Vol. 1, 1988:64*):

Action has been confined to policy decisions and discussion of options in a field which is highly politicised. While the raising of most government charges attracts some comment, water prices have been more seriously challenged than any other government service charges, including local government rates.

The accountability and funding environment in which water authorities operate is a sensitive one whether it is in Australia or the Solomon Islands. Water authorities, as cited above, are confronted with a number of issues relating to the cost of providing and maintaining the infrastructure needed for the delivery of services which have the potential of increased sensitivity in an already tense environment. This sensitivity can only increase in developing countries where consistent and quality water services may not be available. A recent survey of Asian and Pacific city water utilities (ADB,1993:4,5,13 & 14) identified that:

Only 21 of 38 water utilities surveyed have a 24-hour supply for all customers.

In 22 of the 38 cities people appear to take their drinking water direct from the tap. In the other 16 cities, they generally boil water taken from the tap before drinking. ... Bottled water is commonly used in only six cities ... , but there are bottled water enterprises in 21 of the 38 cities surveyed.

Provision of 24-hour water supply should be a matter of priority.

Provision of safe potable water at the tap should be an objective, and monitoring of this parameter an essential feature of any utility ...

Much more attention needs to be given to the maintenance aspects of O & M, especially in the annual budgeting of human and financial resources, and in this regard reduction of unaccounted for water must be seen as a major annual maintenance expense. ...

This again reinforces the awareness of the factors of health, environment and common good and the growing sensitivity of these factors.

The need for improved water services in the Solomon Islands is considered to be further highlighted through the provision of international development assistance to the Solomon

Islands Government (SIG) through SIWA by the Australian Government Aid Agency (AusAID) and the Japanese International Cooperation Agency (JICA). The AusAID development assistance (termed the SIWA Project) is a five year project concentrating on institutional and organisational strengthening. The JICA project is a project of approximately one year duration (completion of this project is scheduled for March 1998) and is designed to strengthen the Honiara water supply system.

A further compounding issue for developing countries is a rapidly growing population base and the pressures that places on maintaining living conditions and particularly health standards, let alone improving those conditions and standards of living (Thistlewaite & Davis, 1996:8):

At the individual country level in all countries save Fiji, the population will continue to grow rapidly (given the age structure), although the rate of increase could decline with increasing material affluence and the (unlikely) development of social service benefits such as old age pensions. However, the rate of increase will still be such that the current momentum of population growth will be reinforced with all its concomitant ills. The economies of Papua New Guinea, Solomon Islands and Vanuatu are likely to decline in terms of economic growth, per capita income, and national income ...

In a developing country such as the Solomon Islands this is particularly the case with high population growth rates (Honiara 6.9%, Solomon Islands average urban growth rate of 6.7% (Cole, 1993:102)). High population growth rates in conjunction with low household incomes and a low level of existing water services¹ compounds the issue of achieving sustainable services under the notion of *user pays*.

¹ Thistlethwaite and Davis (1996: 9), highlights this issue where it states:

The performance of any activity seeks to ensure optimal outcomes from the investment but investment performance is more critical when the notion of *user pays* is introduced to a rate base such as that which exists in the Solomon Islands. It is particularly critical when these services compete directly with the costs of food, clothing, accommodation and education for a portion of that limited household income which has already been reduced by income taxes. Unemployment becomes a significant factor where no safety net provisions are in place in such countries as the Solomon Islands (Thistlewaite & Davis, 1996:8,104). The constraints of these factors, particularly the factor of health, is confirmed in a statement by the General Manager of SIWA (Makini, 1995:14) which, in part, says:

Regardless of the problems confronting the management of urban water supply and wastewater services in the past, the efforts of SIWA and the SIWA Project are definite indications that the provision of these services will improve. What is required is for government to provide an environment that is conducive for SIWA to achieve its objectives which in effect are only secondary to the primary aim of providing basic health to the people in all urban areas of Solomon Islands.

There does exist a need to achieve improved results or outcomes in the provision of water services in developing countries, particularly the Solomon Islands. The SIG has legislatively imposed that need on SIWA under the constraints of achieving improved water services through the adoption of a user pays policy within five years. Simultaneously, the SIG imposed funding support constraints through decreasing the amount of government funds annually available to SIWA to reflect the gradual achievement of *user pays*. This does impose a need for performance improvement in the

All Melanesian countries will face severe industrial-urban problems in their main urban centres, with management of waste and pollution of air and water becoming critical.

supply of these services *albeit* in an imposed timeframe. The need to improve services and the associated issue of cost recovery are further recognised in relation to sewerage (Thistlewaite & Davis, 1996: 37):

Sewerage and waste disposal services are likely to come under increasing pressure, with population growth, changed consumption habits and increased tourism. Simply maintaining the existing levels of service will require additional funding, yet cost recovery in the past has been low.

Without considering the future environmental impact of under-developed wastewater systems and services, both in terms of health and environmental pollution, a need is considered to exist for the development of sound management and performance reporting policies, practices and procedures for water utilities in Pacific Island developing countries. Five significant international development assistance Agencies, European Union (EU), World Health Organisation (WHO), Asian Development Bank (ADB), JICA and AusAID through either statement and/or action confirm this. Whilst the appropriateness of conducting this study in a developing country context is considered to have been identified through, if nothing else, a means of determining how such countries can achieve basic water and wastewater services, the elements of *user pays* (funding) and the accountability of management in externally reported financial statements require further examination. In an examination of these two elements an appreciation of the particular issues confronting Water Authorities is required. Section 1.2 now discusses and examines those water issues.

1.2 Water Issues Associated with the Funding of Water Services Infrastructure

Over the past few decades there has been a noticeable increase in the problems experienced by public authorities in the balancing of maintaining levels of services and providing those services at a reasonable cost to the consumer. These problems have been, and are reflected in the popular press (Department of Accounting and Financial Management 1989:19-23) in Australia by way of comment on the extent of local government rate increases, telephone charge increases, power supply charges increase, etc (*Review of Reforms in the Water Industry, Vol. 1. 1988:64*). A government response to these problems has been to move toward commercialisation and corporatisation of the water, power and telecommunications sectors and the notion of *user pays*².

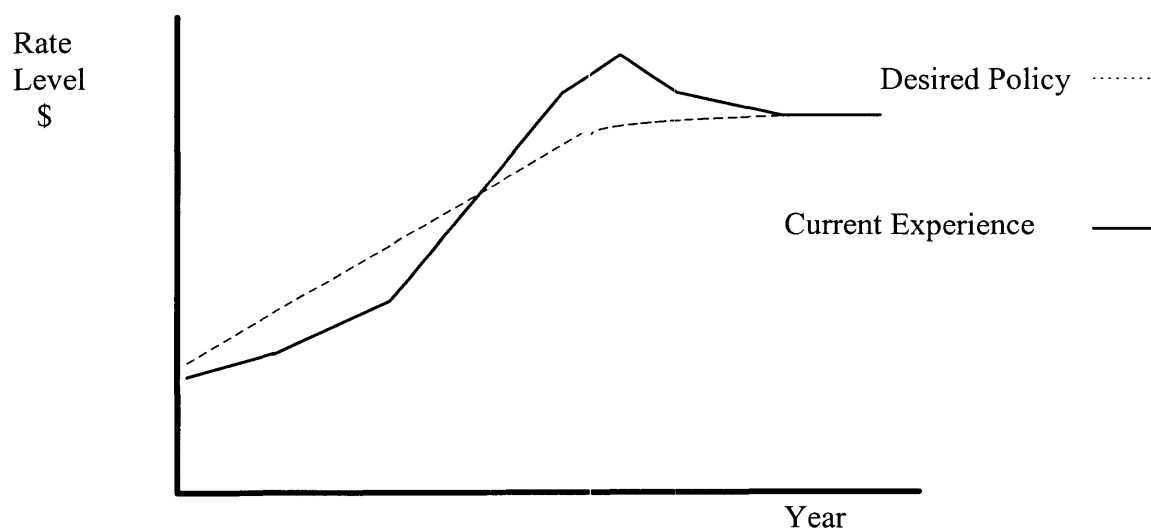
To obtain some insight into the problems confronting authorities in controlling charges levied on consumers one must have an appreciation of the nature of the investments made by authorities to provide a 'reasonable' standard of service. In terms of water, wastewater, telephone and power the works must be designed to meet current demands as well as those expected to occur sometime into the future. The works need to be designed in order to compensate for normal demand growth expectations as well as to consider any reasonably abnormal growth contingencies (e.g. those brought about by rapid tourism growth, increased trans migration, mineral resources discoveries, etc.) in the population base which they serve. By nature of the area and population base which they serve they

² The commercialisation, corporatisation and privatisation push has been recently highlighted through the 1996 electoral agenda of the current Australian governing party in reference to further sale of shares in Telecom.

require large capital investments. That investment, historically is *lumpy*³ (PWD 1984:5).

The impact of new works on rate levels has historically been depicted as follows:

Figure 1.1 The Impact of New Works on Pricing Policy



The long term nature of the investment can dictate that at the time of investment the consumer or revenue base is much less than that for which the works are designed to service. Thus, in the ensuing period, whilst the revenue base is growing and after assistance is provided, in some cases via subsidisation, the existing consumers are required to pay for the short fall in revenue to meet the works costs and the ongoing operations and maintenance costs. The resultant increase is usually reflected by a rate/tariff 'jump'. This situation was supported in a preface to a report (Eagle 1984:5) where it said:

Construction of essential water and sewerage works results in social and economic benefits for the community involved. The Department continuously

³ *Lumpy* is in particular reference to the impact on investment expenditure due to normally significant costs of water and sewerage capital works. The pricing decision must then cope with this *lumpy* expenditure.

updates its design and construction techniques to minimise the cost of these works and to ensure that the best possible facilities are provided.

The cost of schemes never the less have an impact, sometimes dramatic, on water supply and sewerage rates. After the benefit of subsidy, many country rate payers still experience large rate increases.

After stating that every effort is made to keep up to date with industry advances and to minimise the cost of provision of the services, the above confirms that even after the effect of subsidisation there is no guarantee rates will not increase.

Unfortunately there are other pressures (PWD 1984:5) placed on authorities apart from just the provision and maintenance of services:

1. increasing community demand for higher levels of service and a resistance to increases in charges,
2. requirements to minimise adverse environmental effects which can lead to costly works,
3. scarcity of loan funds, higher interest rates and shorter loan periods.

These pressures combine to increase the complexity of determining a price for the service necessary to maintain it and provide for the future. The problem is no better exemplified than in the rating decision that faces SIWA.

SIWA will not necessarily achieve the construction economies of scale that are possible by larger authorities (Samra 1987). Whilst the main urban centre of Honiara may provide the basis of some economies of scale in the provision of water and wastewater services the other Provincial urban areas are significantly smaller and distributed over a number of

Islands all having differing service supply and delivery problems. Problems include uneven population growth rates, varying topography through volcanic and/or the typical 'desert' island land bases, and turbidity of water due to high rainfall in parts. SIWA is susceptible to the effects of rapid unnatural increases on demands for services. Similar demand experiences were found in Country Water Authorities (CWA's) in Australia (Hunt & Staunton 1990). Demands for services which can, and do, add abnormal pressures to existing services and influence the pricing decision, are by nature a recurring problem whilst ever that authority exists. The severity of the pricing decision is reflected in the degree of change (or jump) in the rate charges.

Government in Australia has recognised the problems confronting the authorities, (PWD 1984, AFM 1986, Mercer & Morgan 1986, New South Wales Government 1987a, 1987b, and 1987c, Victorian State Government 1987, AFM 1989a and 1989b, Review of Reforms in the Water Industry Vol. 1-5 1983, Ng 1988, Staunton and Hunt 1989, Public Sector Accounting Standards Board ED50 1989, NSW Government 1989a and 1989b, Hunt & Staunton 1990, Australian Accounting Standard AAS 27 1995, Rowles 1992), in the provision of these services and the effects that the cost of provision of services has on its users. Subsidies have and are provided by grants and loan mechanisms (some low interest or soft loan facilities are available) to spread the burden of the cost to the wider community. SIWA presently receives limited subsidisation (in the terms of SIWA's annual operating costs and future works requirements) from the Solomon Islands Government (SIG) and Aid support via AusAID on a five year Project basis. Targeted aid is also supplied on a works specific basis by Japan through JICA (refer to p. 6). In

Australia, rate ceilings in most instances, apply in order to ensure that users are not irresponsibly or overly charged for the service(s) provided and to bring some responsibility to bear on the authority to better manage its affairs and resources. For SIWA that rate ceiling is presently limited to the rates charged for the Honiara water and wastewater services operating costs (SIWA Board June 1996). There is presently no consideration of future works costs. Concern by government is reflected generally by the number of studies commissioned in Australia and the Pacific Region which have identified many general, conceptual and specific matters⁴ (WHO 1990:1994a:1994b, Connell and Lea 1993, ADB 1993, Makini 1995).

In achieving a sustainable *user pays* revenue policy a number of issues identified in this section and supported by government and regional studies cited above need to be considered. These water issues are summarized thus:

1. Long term nature of the investments.
2. Cost of those investments.
3. The lumpy nature of the investments.
4. The associated financing decisions.
5. The recurrent costs associated with the investments.
6. Conflicting claims on resources.

Associated with the consideration of these issues are other variables. These variables include consideration of the capacity of the rate base to pay, demand/growth expectations,

⁴ Refer to page12 for details of Australian Studies.

future service provisioning requirements, the impact of capital works decisions on operations and maintenance and the subsequent environmental impacts of those decisions and others (Department of Accounting and Financial Management 1989a and 1989b). The provision of water and wastewater services by Water Authorities is what they are in business to do and therefore the primary focus of management's decision making and the allocation of resources to provide and maintain those services and facilities. The decisions associated with the provision of these services have long term consequences and therefore, to limit the risk involved in making such decisions long term planning is essential to ensure the accuracy of outcomes in terms of both accountability and funding.

The importance of planning and reporting has general support⁵ in the literature Kaufman writes (1991:56):

Planning intends to create a useful, productive future. It is based upon results that are both measurable and valuable. There are three useful varieties of results: (1) products, the building-block results that are collected to make up organizational results, (2) outputs, which can or will be delivered to society, and (3) outcomes, the consequences and payoffs for these results in and for society.

This need for planning also highlights the need for strong financial management, a strength lacking in Developing Countries (WHO, 1994a:vii):

Because of the experience of recent decades, it has become a truism that inadequate financial management in water supply and sanitation (WSS) systems invariably leads to service disruptions and environmental health deterioration.

⁵ Support is also provided by Meredith (1969: 4) where he stated:

The presence of risk and uncertainty implies a lack of knowledge of future economic conditions to be faced within the firm and by the firm within its market sphere. In their attempts to overcome risk and uncertainty we may anticipate that financial managers of Australian manufacturers would ensure that long-range plans are carefully prepared, with careful consideration being given to the selection of data for project analysis, and the use of investment analysis methods which may assist in the accept-reject decision under these economic conditions.

The WHO further reinforces this statement and confirms the issues confronting Water Authorities in general through the following comments (WHO, 1994a:3):

Sustainability is the most desirable characteristic of any water supply and sanitation (WSS) system. ...

... cost-containment should be an important objective of public utilities; it is of critical importance in developing countries, where too many people still do not have access to services. ...

... the two basic principles of sound financial management are resources-coverage and liquidity-maintenance. Resources-coverage means that at any given time all needs should be covered. Liquidity-maintenance means that at any given time all cash needs should be covered. ... in most developing countries, liquidity-maintenance is an essential condition for the attainment of permanent resources-coverage and sustainability.

Again the need for strong financial management is identified and through the issues of resources-coverage and liquidity-maintenance the issue of revenue/rating is highlighted.

In summary, the Australian experience with rating increases has proven to be a sensitive issue. In the past there has been some form of Government assistance via grants, soft loans, etc. to dampen rate increases but the decision to increase rates has still been a sensitive issue. The notion of *user pays* has the associated inference of the removal of government cross-subsidisation and assistance in the provision of these services. With the removal of Government assistance there is an increased potential to make the 'rate increase' decision more sensitive. To minimise the sensitivity of the rating decision a more planned approach that enhances performance outcomes is required. Through planning and performance enhancement a potential exists to minimise future rate increases. Given the added resourcing pressures and the lower infrastructure

development base of developing countries, planning and performance improvement have a higher potential focus.

The potential political sensitivity of the *user pays* issue in respect of the provision of a community service dictates a need to plan and actively pursue and report performance improvements in the supply of services. Logically, the external reporting of such achievements combined with community education programs has the potential to reduce the political sensitivity through having a better informed client base. Additionally, improved external reporting of performance has the potential to improve accountability.

Another consideration in respect of external accountability of industries whose outcomes have social consequences such as the water industry is where, if the push to commercialisation leads to corporatisation, which in turn leads to privatisation. This could especially be the case when the rating decision becomes extremely politically sensitive and survival of the organisation is at stake. In such a case management could take the short-term decision to run down assets for the sake of maintaining profitability and the selling price of the entity. A requirement to report about future performance expectations of an organisation has the potential to minimise the negative societal implications of water and wastewater systems when they are ineffectively and inefficiently managed. That is, managed to achieve a short-term profit/return outcome in lieu of reasonable and sustainable service delivery outcomes in the long-term.

Given the additional resource, socio-economic and environmental constraints experienced in developing countries, the issues of planning and reporting are of increased importance. This is especially the case under the condition of 'sustained' service provision. The achievement of any level of accountability requires decision useful management information and external reporting. Under these circumstances it is considered that a need exists to determine whether or not a revenue model can be developed which provides for, if not a sustainable *user pays* rating decision model, a mechanism which will assist in determining what is required in terms of funding outcomes for a sustainable delivery of water and wastewater services. The identification of the gap between achievable financial resources (funding) and those financial resources required for the provision of sustainable services does provide the facility for analysing the costs (and benefits) of not having reasonable service levels and hence a means of decision accountability. Section 1.3 examines the funding options available to Water Authorities and the role of *user pays* within those options.

1.3 The Role of the User Pays Option

There are three basic funding options available to Water Authorities (discounting loan funds):

1. User pays
2. Government
3. A user pays/government hybrid.

The user pays option is an option whereby the users of the service pay for the services provided on the basis of a tariff that takes into consideration the current and recurrent costs of providing those services as well as a predetermined costing of future service and supply requirements. The user pays option should not be confused with the “pay for use” option which fundamentally only requires payment, on the basis of volume of services consumed, of the current cost of supply of those services. The “pay for use” option normally does not consider any future service provisioning costs. The user pays option requires that the community that consumes those services pays for those services and the future sustainability of those services. The adoption of the user pays option is designed to make the Authority more visible in terms of performance and value for money. This heightened visibility is also designed to assist the Authority in being more efficient and effective in its basis of operation (Audit Commission, UK, 1984:1) especially in light of the adverse publicity faced by water authorities referred to in Sections 1.1 and 1.2.

The government funding option basically results in government fully subsidising the supply of services through the use of consolidated revenue funds. A user pays/government option is currently in operation throughout Australia and the Solomon Islands. This option requires the water authority to levy rates and charges for the recurrent cost of services with some residual funding for future capital works. The government supplements these funds through appropriation (subvention in Solomon Island terms) and/or soft loans funded out of consolidated revenue. This funding option allows for the cross subsidisation of the supply of water services across the government taxation base. Such an approach is specifically beneficial to small and or ageing

communities where there exists a relatively small taxation base in comparison to the cost of supply of services. The issue of urban and metropolitan telephone subscribers subsidising country and remote telephone subscribers might be used as an analogous case. The hybrid approach does have general support (*Review of Reforms in the Water Industry, Vol. 5. 1988:0 243*):

There is valid argument against full cost recovery where the benefits of the service accrue to a wide range of individuals, only some of whom can be directly charged. In these circumstances it is not a matter of charging less than the cost of provision but rather there is a justification for using general taxation revenue to pay for the costs incurred on behalf of those unable to be charged.

Whilst currently SIWA does operate on a form of user pays/government hybrid funding arrangement it has been decreed by government that it will have to achieve self sufficiency through user pays funding arrangements by the year 2001. This requires that SIWA will be responsible for deriving its own funding/revenue. Given the water issues identified in Section 1.2, SIWA will be responsible for devising a means to ensure that revenues are achieved in such a way so as to minimise the adverse effects of these issues. This will require forward planning to provide information that will allow revenue modelling to predict the capacity and thus minimise any volatility associated with lumpy investments and associated rate jumps. In doing so it will predict the funds necessary to sustain the provision of services. The sensitivity surrounding that volatility is intimated in the following statement (*Review of Reforms in the Water Industry, Vol. 5. 1988:0 245*):

Concern is expressed about the simplistic application of user pays principles. The point is made that there are other factors involved than a simple correlation between costs incurred by governments and charges levied.

These concerns are further expanded (*Review of Reforms in the Water Industry, Vol. 5. 1988:0 251-0 252*):

5.1 Throughout this submission serious doubt has been placed on the application of user pays principles, ... there are societal benefits, improvements to public health and a betterment of the quality of life that result from the 'use' of water. ...

5.4 Local Government also believes that there (sic) people have a basic right to water which for landholders has been enshrined as riparian rights. In many instances, towns developed because of their access to water and those "rights" pre dated any regulatory procedures. It was thought inequitable that it was now proposed to charge for access to a resource to which communities had had access for over a century. ...

5.8 That having been said, support can be argued for at least a limited application of the principle. Paying a charge for the water supplied encourages conservation and hence lower charges later on when augmentation and/or replacement of capital works can be delayed.

5.9 Although user pays, in principle, applies in the electricity and gas industries, this has been distorted in the electricity industry by the imposition of price controls (for political reasons) and the application of subsidies to country councils and to individual consumers who are seen to be economically disadvantaged.

5.10 It should be noted that even in these sectors, there is not a full user pays application - the Government intervenes to keep charges to politically acceptable levels; the full cost of infrastructure and debt servicing is met by loan funds, subsidies, and investment earnings, for instance.

These concerns, especially as they relate to land ownership (see 5.4 above) and customary land ownership in the Solomon Islands, are currently being experienced by SIWA. These concerns relate directly to the accountability environmental factors of health, environment and common good as identified in Section 1.1. Given the water issues identified in Section 1.2 the adoption of user pays requires the addressing of a number of complex issues even in a developed country such as Australia. When the adoption of user pays is placed in a developing country the complexity is increased due to the lower

comparative resource base of developing countries to developed countries and the associated lower capacity of the consumer base to pay. It is within this setting that the research question is developed in Section 1.4.

1.4 The Research Question

In Section 1.0 it was stated that ... *in its simplest form, this research study seeks to answer the question of whether or not user pays is, in the context of sustainable development, an achievable option for water service providers in developing countries such as the Pacific Islands.* The ensuing discussion highlighted a number of environmental factors and the associated elements of accountability, funding, planning and reporting. It also highlighted issues confronting the water industry generally as they relate to decisions faced in the providing and maintaining of the services provided by that industry. It is a sensitive environment within which water authorities operate which complicates the adoption of the user pays option. There is a no less complex environment for the adoption of user pays in a developing country. The question whilst it may be stated simply is not necessarily simple to answer.

The research question to be answered in this study is stated as follows:

Does the adoption of user pays as a tariff setting policy provide a funding basis for the sustainable development and delivery of water services in a developing country urban environment?

The essence of answering this question lies in assessing the viability of *user pays* specifically as it relates to the adoption of this option by SIWA, a water authority providing water services to urban areas in a developing country. The general framework for this study and specific definitional issues are dealt with in Section 1.5.

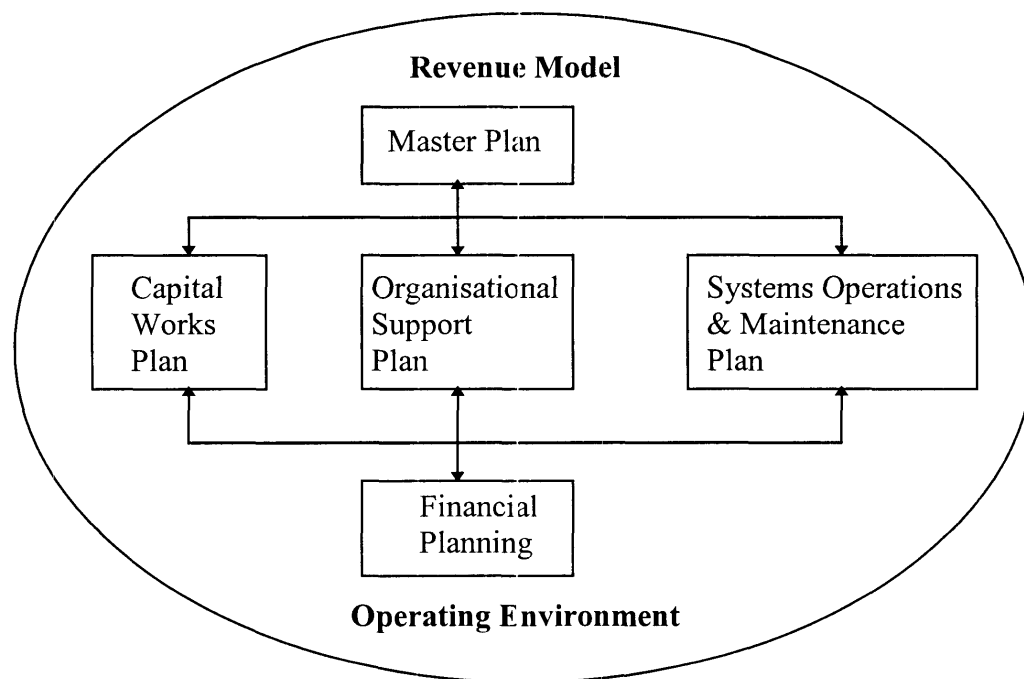
1.5 The Study Framework and Some Definitional Issues

The research question defined in Section 1.4 revolves around the testing of a funding option (*user pays*) and the provision of water services to urban areas in a developing country context. SIWA has been identified as a water authority which delivers water services to the urban areas of a developing country, the Solomon Islands (Section's 1.0 and 1.1). Additionally, Section 1.1 identifies three predominant operating environmental factors (health, environment and common good) confronting water authorities like SIWA. These factors provide the background to the accountability and funding environment within which SIWA operates.

Water authorities are required to make investments which have long lives. Due to the size and length of life of these investments, a number of issues arise which impact on the funding of these decisions (Section 1.2). These decisions require to be planned due to both the timeframe and the requirement to ensure future service delivery capacity is maintained. The life of these investments can cover two or more generations and therefore when the investment is made it must consider the growth expectations it will encounter throughout its useful life. If there is to be a sustainable delivery of service

outcomes from these assets then the authority is accountable not only for the investment decision but also the operation, maintenance and support of that decision. The funding of these decisions therefore must consider not only capital works planning but also operations and maintenance planning and organisational support planning. An overview of such a planning framework is provided in Figure 1.2.

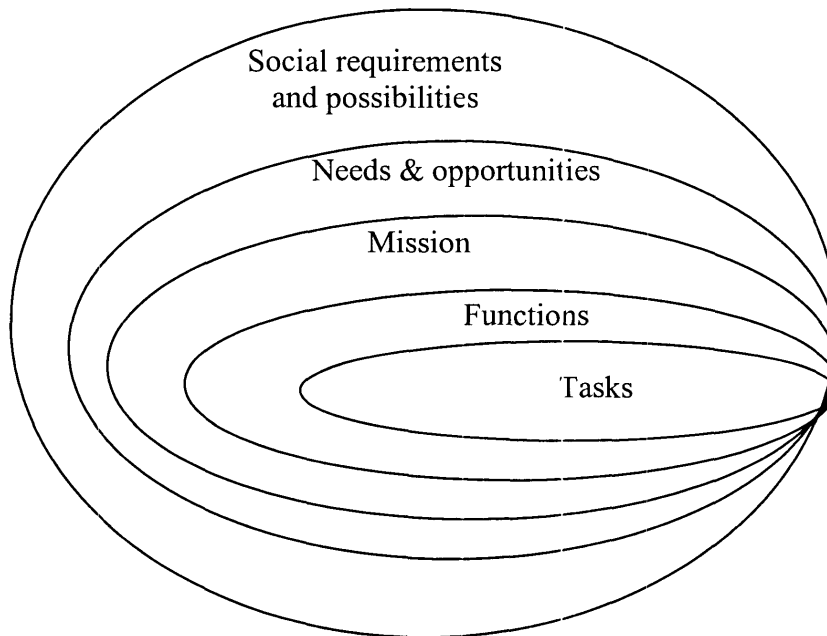
Figure 1.2 A Planning Framework For Water Authorities



This planning framework dictates a future focus which in terms of this study is called the Master Plan⁶. A possible development basis for the Master Plan is the Corporate Plan suggested by Kaufman (1991:157). His construction of such a plan is depicted in Figure 1.3.

⁶ In the context of this study the Master Plan is defined as being a physical map of the entire organisation and its water systems at some predetermined future point in time.

Figure 1.3 The Corporate Plan Relational Development Environment



Source: Kaufman (1991:157)

Kaufman provides a Corporate Plan development setting which considers the environmental factors (*Social requirements and possibilities*), the entity's future service needs gap (*Needs & opportunities*), the future focus of the entity (*Mission*) and the basis upon which the entity will strive to achieve sustainable outcomes (*Functions & Tasks*).

Whilst accountability and funding are key elements to this study of the viability of *user pays*, unless each element is not underpinned by planning and reporting then neither management's desired outcomes nor the environmental factors will be properly considered. Under these circumstances a study framework will be examined within the bounds of accountability, funding, planning and reporting. A framework that considers

operational environmental factors of health, environment and common good. In view of this framework the following definitions of terms are provided:

accountability	<i>means the responsibility to provide information to enable users to make informed judgements about performance, financial position, financing and investing, and compliance of the reporting entity; (SAC 2:5)</i>
common good	<i>means the extent to which organizational purposes are identical to social purposes is the extent to which an organization is likely to be successful. Because organizations are means to social ends, and because they are judged by the extent to which they contribute to the common good, the rational approach for planning should be society-as-client mode (Kaufman, 1991:45-49).</i>
corporate plan	<i>means a stated plan focussed on the identified corporate mission which embodies the corporate wide goals, objectives, strategies and activities/functions required to achieve that mission on a sustainable basis.</i>
capital works plan	<i>means a plan that provides a physical and financial plan for the physical implementation of capital investments initiatives identified as being consistent with achieving the corporate mission in terms of the corporate plan.</i>
economy	<i>means the extent to which resources of a given quality were acquired at the lowest acquisition cost; (AAS 29:8)</i>
efficiency	<i>means the extent to which the entity maximised outputs produced from a given set of inputs or minimised the input cost of producing a given level and quality of outputs; (AAS 29:9)</i>
effectiveness	<i>means the extent to which the entity achieved the objectives established for its operations, activities and/or programs, whether those objectives were expressed in terms of outputs or outcomes; (AAS 29:8)</i>
funding	<i>means monies sourced by an entity, particularly monies sourced by means of tariffs for services.</i>
master plan	<i>means a physical map of the entire organisation and its water systems at some predetermined future point in time.</i>

This plan encompasses all of the physical aspects of the corporate plan.

materiality	<p><i>means, in relation to information, that information which if omitted, misstated or not disclosed has the potential to adversely affect decisions about the allocation of scarce resources made by users of the financial report or the discharge of accountability by the management or governing body of the entity. (AAS 5:5.1)</i></p> <p>(a) <i>an amount which is equal to or greater than 10 per cent of the appropriate base amount may be presumed to be material unless there is evidence or convincing argument to the contrary; and</i></p> <p>(b) <i>an amount which is equal to or less than 5 per cent of the appropriate base amount may be presumed not to be material unless there is evidence, or convincing argument to the contrary. (AAS 5:4.1.6)</i></p>
operations and maintenance plan	<p><i>means a plan that details the operations and maintenance activities which are responsive to capital works planning and consistent with the organisational needs as defined in the corporate plan.</i></p>
planning	<p><i>means all aspects of an entities planning as it relates to past, present and future identified needs and the resourcing implications associated with those needs and the organisations capacity to fulfil those needs.</i></p>
organisational support plan	<p><i>means a corporate services and human resources plan to support the capital works plan, operations and maintenance plan and the revenue plan in a manner consistent with implementing the corporate plan.</i></p>
performance	<p><i>means the proficiency of a reporting entity in acquiring resources economically and using those resources efficiently and effectively in achieving specified objectives; (SAC 2:5)</i></p>
relevance	<p><i>means that quality of financial information which exists when that information influences decisions by users about the allocation of scarce resources by:</i></p>

- (a) *helping them form predictions about the outcomes of past, present or future events; and/or*
- (b) *confirming or correcting their past evaluations;*

and which enables users to assess the rendering of accountability by preparers; (SAC3:5)

reporting *means the reporting of financial and non-financial outcomes of the entity for both management and external accountability purposes.*

user pays *means that the user pays for the current operation and maintenance and support of water services and contributes to the future sustainability of the provision services by way of a tariff levied per kilolitre of service consumed.*

Given that the studies aims and objectives and environmental setting have been identified and the general concepts of a study framework has been identified, the study outline is now provided in Section 1.6.

1.6 Study Outline

Chapter 1 has identified the context of the study (Section 1.0), the operating environment in which the study is set (Section 1.1) and the fundamental water issues the study needs to consider (Section 1.2). Section 1.3 examined the role of the *user pays* option in the context of three primary funding options, the other two being a hybrid user pays/government option or a total government funding option. The research question was identified in Section 1.4 and a general framework for the testing of the research question

was explored in Section 1.5. It has been identified that the rating decision for water is a sensitive one. With the added complexity of *user pays* the sensitivity surrounding water has increased with concerns having been raised over the equity and sustainability of this approach (Section 1.3). Given the concerns surrounding the adoption of the *user pays* option within Australia, the application of this option in a developing country (having more limited resources than that of a developed country such as Australia), increases interest in the question of the sustainability of this option. In the ensuing Chapters the study will be developed.

Chapter 2 will examine the general study framework identified in Section 1.1 in detail. More specifically, it will examine the key elements of accountability and funding and the underpinning elements of planning and reporting and their relationship to the operating environment (Section 1.1) and the water issues (Section 1.2) in providing a framework that will provide for validity in testing the research question (Section 1.3).

Chapter 3 examines those water issues as they relate to SIWA and through the framework developed in Chapter 2, how consideration of those issues would be reflected in any funding decision. Given that the funding decision to be tested in this study is one of the viability of *user pays*, a revenue model will be developed in this Chapter which is consistent with the framework developed in Chapter 2. Chapter 4 provides for the identification of the research methodology to be adopted in answering the research question and the identification and detailing of the data to be tested under revenue model

simulation conditions. Chapter 5 examines the outcomes of the revenue model simulation and their implications for the viability of *user pays* as a funding option for the provision of sustainable water services in a developing country context. The study conclusions, limitations and implications for future research are provided in Chapter 6.

Chapter 2

SIWA and the Study Framework

2.0 Introduction

In Chapter 1 the research issue which forms the basis of this study was identified as being the need to examine the viability of the adoption of *user pays* as a means for the funding of the provision of urban water services in a developing country. In order to place this study in a developing country context SIWA has been selected as the basis of a case study. The selection is apt as it is a water authority which has the charter to supply water services to all Solomon Island urban areas. The Solomon Islands is of course a developing country.

In this Chapter a background profile of SIWA is provided in Section 2.1. Section 2.2 examines SIWA's current service delivery capacity. Next, the two identified fundamental issues of Accountability (Section 2.3) and Funding (Section 2.4) are analysed as they are, as regards this study, key components of the SIWA charter. Section 2.5 examines the sub-issues of planning and reporting in the SIWA context with a summary of this Chapter provided in Section 2.6.

2.1 The SIWA Background

The Solomon Islands is physically the second largest of the four independent Melanesian states of Papua New Guinea, Vanuatu, Fiji and the Solomon Islands with a total land area of 27,550 sq. km. The Solomon Islands has a population currently estimated at 393,360 with an estimate of 71,280 (18.1%) living in urban areas and 322,080 (81.9%) living in rural areas (Cole 1993:103). *Per Capita* Gross National Product (GNP) is estimated as being US\$430 (Thistlethwaite and Davis, 1996:20).

SIWA was established in 1992 with the enactment of its enabling legislation, the *Solomon Islands Water Authority Act 1992* (Appendix 1). Operationally SIWA commenced in February 1994 when the then Water Unit of the Ministry of Transport Works and Utilities was disbanded and assets transferred to SIWA. SIWA's mission (SIWA's *Corporate Plan*, 1996 Appendix 2) is:

... to provide safe, sustainable and reliable water and wastewater services to Solomon Islands urban areas.

(where:

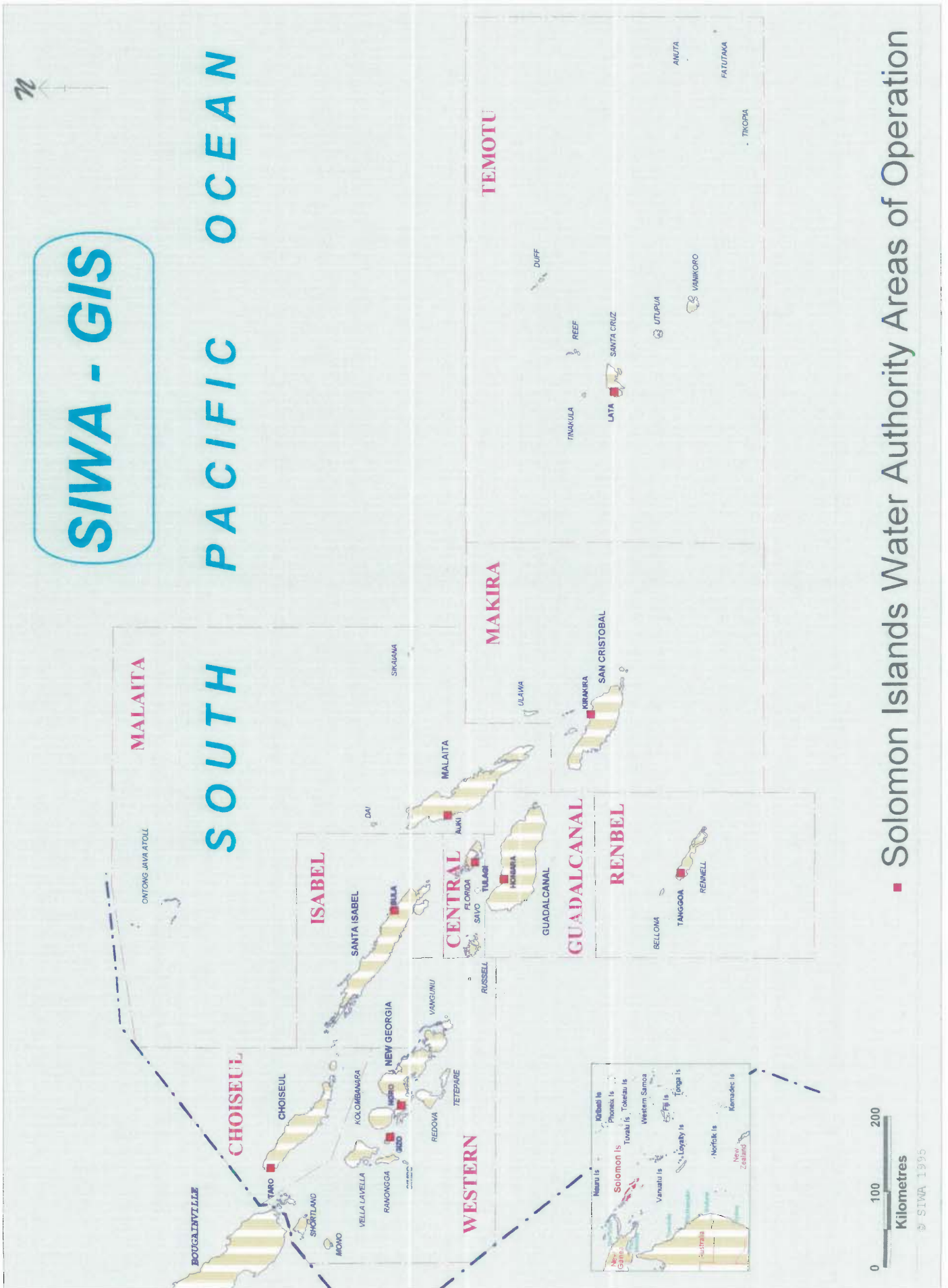
safe means that it meets SIWA Standards, based on World Health Organisation standards;

sustainable means that it will be ongoing to meet the needs of customers, current and future; and

reliable means that it will be available on customer demand.)

A constraint has been applied to the achievement of the SIWA mission by the Solomon Islands Government (SIG) which requires SIWA to be self funding through the adoption of *user pays*, by the year 2001.

SIWA is responsible for the supply of water services to the urban areas of the Solomon Islands. SIWA has a 20 year planning horizon which identifies ten urban centres, Honiara, Gizo, Auki, Noro, Buala, Tulagi, KiraKira, Lata, Taro and Munda (see map p. 33). Currently SIWA only supplies water services to four Solomon Island urban centres



SIWA - GIS

SOUTH PACIFIC OCEAN

- Solomon Islands Water Authority Areas of Operation

(Honiara, Auki, Noro and Tulagi). It is anticipated that all ten urban centres will be serviced by SIWA by the end of the 20 year planning timeframe (1996 - 2016).

As the aim of this study is to assess the viability of the adoption of *user pays* as a means of funding the supply of urban water services on a sustainable basis in a developing country, SIWA meets all the basic criteria for selection as a case study. It is a water authority operating in a developing country with a government imposed requirement to achieve self funding through the adoption of *user pays*. It is the achieving of self sufficiency through the adoption of *user pays* which has yet to be tested in the case of SIWA. The funding issues associated with *user pays* in terms of SIWA are discussed in more detail in Section 2.4.

The Objects and Functions of SIWA are clearly stated in the *Solomon Islands Water Authority Act 1992* and are detailed as follows:

4. (1) *The objects of the Authority shall be -*
 - (a) *to ensure that water resources allocated for urban water supply are properly managed, distributed, allocated and used in ways which are consistent with proper water management practices;*
 - (b) *to provide water related services to meet the needs for users in a commercial manner consistent with the overall policies of the Government.*
- (2) *In exercising its functions, the Authority may have regard to such matters as it considers would be appropriate for the attainment of its objects including, but without limiting the generality of the foregoing -*
 - (a) *promotion of efficient use of urban water resources;*
 - (b) *the necessity for integrated catchment management and planning of land use and the use of urban water resources;*
 - (c) *public interest and community needs;*
 - (d) *conservation of urban water resources;*
 - (e) *pollution control and prevention; and*
 - (f) *efficient use of human, material and financial resources.*

7. *The functions of the Authority shall be -*
- (a) *to control, regulate, develop, manage, conserve and utilise urban water resources in the best interests, of Solomon Islands;*
 - (b) *to formulate national policies relating to the control and use of urban water resources;*
 - (c) *to ensure that the water supplied for consumption meets the prescribed water quality standards;*
 - (d) *to provide, construct, operate, manage, and maintain, buildings, works, systems and services for impounding, conserving and supplying water for domestic, industrial, commercial and other purposes;*
 - (e) *to provide, construct, operate, manage and maintain buildings, works, systems and services for the conveyance, treatment and disposal of sewage, disposal of trade and industrial waste and other connected purposes; and*
 - (f) *any other like function.*

The above *objects*⁷ and *functions* of SIWA reinforce the requirement for accountability by SIWA in general in the reference to public interest and community needs in 4(2)(c) and environmental pollution in 4(2)(e) above. In particular Section 4 also highlights the need for efficient and effective use of resources in managing water services on a commercial basis consistent with Government policy (see 4(1)(a) & (b) and 4(2)(a) & (f) above.

Section 7 reinforces the notion of accountability as it applies to SIWA. For instance the wording there implicitly suggests the need for performance indicators of effectiveness and efficiency. It may be argued that 7(c) explicitly covers such indicators. The issue of SIWA's accountability is analysed in more detail in Section 2.3. These legislative requirements are reflected in SIWA's Corporate Mission Statement cited earlier in this section.

⁷ The use of the word *objects* as opposed to the word *objectives* reflects the British influence, particularly as it relates to the drafting of legislation.

Given this legislative control framework and SIWA's physical operating environment, SIWA's current operating status and delivery capacity in terms of the water and wastewater services it is required to deliver are now examined.

2.2 SIWA's Current Operating Status and Service Delivery Capacity

The operating status and current service delivery capacity of SIWA is best detailed in Makini, the inaugural and current SIWA General Manager, (1995:1-2);

The general condition of all urban water supply and wastewater systems in Solomon Islands are at various stages of disrepair and neglect. Most systems are old, undersized or obsolete. Their growth have been on an ad hoc manner and were mostly development-driven. All infrastructures are due for a complete overhaul, requiring huge capital outlays of magnitudes that are not presently affordable either by SIWA or the government.

Although funds were disbursed in the past to improve a number of provisional systems, the absence of a capable organisation with the capacity to operate and maintain them has been a problem. Furthermore, the responsible authorities then, have serious management, technical, engineering and institutional shortcomings as well.

Lack of consultation between various development sectors resulted in the inability of the water supply and wastewater systems to keep up with actual or anticipated future demand trends for the services. Each sector is pushing its own priorities without regard for the capability of the wastewater and water supply systems to cope. A more comprehensive, integrated approach to development planning is required to address this area.

The lack of recognition by the policy-makers of the part played by the water supply and sanitation sectors in improving the health of the people is a grave concern. It is unfortunate that this important link is not readily understood otherwise, appropriate attention can be accorded to this sector which would in the first instance and in the long run, benefit the other sectors immensely.

The existing link between SIWA and the health authorities is on quality testing level only. The results of the tests are usually not available until a week later

which is late for any appropriate action to be taken quickly. While there are occurrences of waterborne and sanitation related diseases, SIWA is normally alerted to the situation either after the fact or through a third party usually the media. Although +ve E-Coli tests have been consistently recorded by the Malaria Research Laboratory (MRL), it has yet to be established whether these have any direct relationship with recorded diarrhoeal cases for example. This would imply other causes for these cases or the tests may be flawed. The latter being denied by MRL. The need to establish a more workable link between SIWA and the Ministry of Health and Medical Services (MHMS) is very important.

With the establishment of SIWA and the assistance provided through the AusAID-funded SIWA Project, these issues are and will be addressed. Emphasis however is placed on strengthening the institution and training personnel. Both aspects should guarantee the long term sustainability of SIWA in providing the services it is expected to provide through adequately trained personnel and more effective work procedures under an effective institutional framework. The much needed improvements to the physical infrastructure will be pursued with funding from other sources which in the light of government's new policy will be in the form of concessionary loans.

SIWA enjoys a certain degree of autonomy, being established under an Act of Parliament. This independence however does not mean total isolation from the government bureaucracy as attachments with the government still exist through MTWU. Political influence is inherent in the running of the organisation through the members of the Board of Directors whose appointments are dependent on the party in power.

Regardless of the problems confronting the management of urban water supply and wastewater services in the past, the efforts of SIWA and the SIWA Project are definite indications that the provision of these services will improve. What is required is for the government to provide an environment that is conducive for SIWA to achieve its objectives which in effect are only secondary to the primary aim of providing basic health to the people in all urban areas of Solomon Islands.

The above highlights various management issues:

- (i) The poor condition of most infrastructure assets.
- (ii) The lack of consultation among various development sections of the SIG.
- (iii) The important link between water and health.
- (iv) The time lag between quality testing and SIWA corrective action.

- (v) The need for support from Aid bodies in terms institutional support and infrastructure funding.
- (vi) The role of the Board of Directors; and
- (vii) The role of corporate planning.

The implications of these issues for the framework are shown in Figure 2.1. There the issues are listed in the first column, then the primary elements of accountability and funding are used with the sub-elements of planning and reporting. Then the particular cell is identified to show the implications of each particular issue. It is argued that Issues (i) and (iv) have implications for accountability at the planning level; Issue (ii) for funding at the planning level; Issue (iii) for accountability at the reporting level; Issue (v) for funding at both the planning and reporting level; and Issues (vi) and (vii) at all levels.

Figure 2.1 Selected Management Issues and the Framework

Management Issues	Accountability		Funding	
	Planning	Reporting	Planning	Reporting
i	X			
ii			X	
iii		X		
iv	X			
v			X	X
vi	X	X	X	X
vii	X	X	X	X

The fragility of the water supply systems has recently been reinforced with drying up of the primary Honiara water source (White River) in November 1995 and the breakdown of the Noro water supply system in May 1996 due to system leakage. Further, the above analysis of SIWA's current position highlights the water issues raised in Sections 1.1 and

1.2 with regard to health, environment, common good, economic infrastructure (Section 1.1), long term investment, cost of investment, recurrent costs, lumpy investments, financing decisions and conflicting claims on resources (Section 1.2). A comparison of the water issues with the management issues (pages 8-9) is provided in Figure 2.2.

Figure 2.2 SIWA's Management Issues in Relation to Water Issues

Management Issues	Water Issues					
	Long Term Investments	Cost of Investment	Lumpy Investments	Financing Decisions	Recurrent Costs	Conflicting Claims on Resources
i		X		X	X	X
ii	X					X
iii						X
iv					X	X
v	X	X	X	X		
vi	X	X	X	X	X	X
vii	X	X	X	X	X	X

With the exception of Issue (iii) all other issues have multiple relationships with other Water Issues. Makini (1995:4) further highlights the significance of these issues in respect of SIWA in his assessment of the status of Solomon Islands water and wastewater systems where he states:

Unless there is a major system failure, the population in Honiara has access to water on a 24 hour basis although the quality is suspect and the boiling of drinking water is always recommended. Of those who have access to reticulated water, about 30% are connected to one of a number of wastewater systems which dispose of the raw effluent direct to sea. ...

Availability of water in the provincial urban centres on a 24 hour basis can not always be guaranteed. Rain water tanks supplement the piped system although their quality is unknown and their usefulness is limited to the wet season only.

Wastewater services existed in the two provincial urban centres of Auki and Gizo. The latter's system is operating (inefficiently) but covers only a very small part of the township while Auki's system has been inoperable for sometime.

All the water supply systems are in badly deteriorated condition and are performing poorly The causes for these poor performances are due to:

- *Systems losses*
- *Inadequate source capacities*
- *Inadequate system capacities*
- *Absence of treatment facilities*
- *Lack of security of supply*
- *Ageing assets*
- *Inadequate level of staffing*

Wastewater systems - wherever they occur - are overloaded and there are no facilities to treat the effluent which is discharged directly into the sea.

The status of the current systems as explained above, highlights the need for significant expenditures on infrastructure assets in respect of systems maintenance and operation and systems upgrading. This reinforces the role of the sub-elements of planning and reporting met earlier in Figure 2.1. Given the adoption of *user pays* by SIWA, these expenditures have a significant potential to cause material rate/tariff increases. If no planning for these future costs has been undertaken and is therefore not reflected in current rate/tariff levels there exists a high potential for a need to significantly increase those rates. Such an increase will lead to what has previously been identified as a *lumpy* rate history directly reflecting a lumpy investment pattern. From the notion of *user pays*, denial of access to government funding support can also be inferred.

In terms of planning achievements SIWA has developed a Corporate Plan which details SIWA's mission and the objectives, strategies and activities defined as being necessary to achieve that mission. SIWA's financial management and planning focuses around a five year engineering plan and this is supported by an annual operating and capital works

budget. This planning has been concentrated on improving the existing water and wastewater supply systems (Makini, 1995:4):

To guarantee an efficient provision of these services, the general requirement is the total replacement of all systems. However, due to monetary constraints, the initial thrust is to increase the quantity of supply to the existing systems with quality considerations next in importance.

With a focus on the existing systems no detailed assessment has been made of future needs and the capacity limitations of these systems in meeting future demands. This highlights the need for some form of a systems master plan so as to provide a focus for future capital works planning

A review of SIWA's operations and records does reveal that most of the 1994-1995 initiatives detailed in the Corporate Plan have been achieved. However, to date SIWA has not published an annual report. Draft 1994 financial statements have been drawn up from a trial balance provided by the Auditor's, Coopers & Lybrand. A review of the existing Financial Management Information System (FMIS) reveals that whilst billing, purchasing, billing revenue and payroll systems exist and are operational they are not fully linked to the general ledger. This has direct implications for financial reporting, budgeting and planning. Consequently, this does limit the quality of the database required for the development of a pricing model for SIWA in terms of financial data and capital works data which takes into account systems growth expectations and hence systems connections expectations and subsequent revenue expectations.

Improved accountability within SIWA is required at a minimum to provide an assessment of whether or not financial and planning controls are working. Extending the level of accountability is required to assess the efficiency and effectiveness of inputs, processes, outputs and outcomes.

2.3 Accountability

Internal and external accountability are issues for SIWA if it is to operate at the levels of efficiency and effectiveness which optimise its capacity to achieve a viable self funding basis through the adoption of *user pays* imposed by the SIG and to meet its external reporting requirements to that Government. This is more the case given the low infrastructure operating base of SIWA and the increasing demand pressures placed on SIWA both through the requirement to supply services to more of the urban centres than it currently does and through the high natural population growth rate of the Solomon Islands of 2.88% (Cole, 1993:95). This is found in Honiara in particular which has an estimated growth rate of 6.9% (Cole, 1993:102).

In respect of SIWA the issue of accountability is legislatively imposed (Section 2.1) and operationally needed (Section 2.2) if it is to meet the government requirements for demonstrating efficiency and effectiveness of operation. This need for accountability is also reinforced in the literature.

The WHO handbook (1994a) stresses accountability at different levels in various sections. At the broadest level, the discussion of a number of objectives (or “desirable states”- see pages 3-4) implicitly covers accountability in terms of performance in the areas of environmental issues and health considerations. At a narrower level, the Chapter “Financial Records and Reports” (pages 67-75) explicitly covers accountability issues. There one finds (page 67)

Reporting systems should be designed and implemented, and an accounting system adopted. The reports will be used to monitor project implementation and to assess the efficiency of the uses of resources. ...

The objective of an accounting and reporting system is to provide information to managers, owners and financial institutions to: (1) enable decisions to be made; (2) indicate the level of efficiency of the use of resources; and (3) determine to what extent the needs of the community are being met. ...

The accounting system for the project should represent a compromise between effective financial control and simple project administration. ...

Note especially the references to decision making, user needs, efficiency and effectiveness. An AIDAB paper (1994) also includes implicit arguments as to accountability in the broad sense. The role of economic infrastructure is stressed (pages 6, 8 and 11) with its implications for performance in the areas of health and the environment.

Connell and Lea (1993) explicitly use the terms effectiveness and efficiency in their monograph (see pages 140, 151 and 152). They also use the phrase accountability on page 153. Finally, in ADB (1993:13-14) one finds:

Water Accountability

The utility must provide the means to meter accurately all water production and all water consumption and to sustain this situation through periodic replacement

(ideally every five years) of all water meters (thus is a prerequisite for reduction of unaccounted for water) ...

Efficiency

Reduction of unaccounted for water to levels of at least 20% in the smaller cities and at least 30% in the larger cities should be targeted. The improvement of collection efficiency should start with the utility addressing its own shortcomings. ...

Utility Accountability

An annual report designed for the public view should be prepared by all water utilities. Utilities should employ full-time social scientists to survey consumers so that their needs are adequately addressed. ...

The above, especially the last statement, directly relate to the accountability of water authorities attempting to deliver sustainable services.

The scope of this study does not allow for the development of performance indicators to measure efficiency and effectiveness for **all** of SIWA's operational and capital investment activities. This study focuses on the funding element in determining the viability of implementing *user pays* as the primary means of achieving the funds required to resource the sustainable delivery of water and wastewater services. In terms of answering any questions about the viability of *user pays* as a funding mechanism it is essential that accountability measures of efficiency and effectiveness are developed to validate any conclusions reached in this study. However, it is beyond the scope of this study (time and word limit constraints) to develop such performance indicators. Possible indicators are suggested in Chapter 6 for further research.

Whilst accountability is a significant issue in terms of SIWA and the assessment of the outcomes of this study, the issue of funding is an equally significant issue. That significance is self stated through the notion of *user pays*. *User pays* is in principle a basis for determining the source of revenue, from which the services provided are funded. In the context of this study the users of water and wastewater will be those who will have to pay for the cost of those services provided currently and in the future. The issue of funding in terms of SIWA is discussed next.

2.4 Funding Investments

The WHO handbook (1994a:19) states:

- *There are four sources of funds for the agency:*
 1. *user charges or water or sanitation taxes:*
 2. *grants from external and local funding institutions:*
 3. *loans: and*
 4. *funds made available by the government from taxation.*

SIWA currently derives funding from all of the above sources. Of particular interest to this study is tariff revenues (that is 1 above) as they relate to *user pays*. As mentioned in Section 1.3, loan funds are not a consideration under the notion of *user pays*.

Current tariff pricing policies within SIWA for water and wastewater services are based on the partial recovery of operating costs and a contribution to future works based on the

annual depreciation expense of current systems assets. The decision for partial recovery is in recognition of the current cross-subsidisation by government through annual subvention (appropriation) of consolidated revenue funds for application by SIWA in new capital investment decisions. This is consistent with the position found by de Haan (1992). There it was argued that, in general, revenues tend to be so low that even the operation and maintenance of those systems could not be carried out in an effective and efficient manner without funds from other sources.

However, as described earlier the government requires that SIWA be self funding within five years. The self funding argument is supported by a conclusion reached in ADB (1993:13):

Financial resources derived from tariff revenues should be sufficient to cover O&M [Operations and Maintenance] costs and debt servicing and to provide a contribution to capital investment financing.

The basis for pricing, as yet, does not consider the capacity nor the willingness of the consumer base to pay, nor does it consider the future costs of service provision. Thus the cost will only by coincidence equate to that based on historic cost of the current systems assets. A recent board decision (June, 1996 refer to Appendix 3) in respect of uniform tariffs for all of the Solomon Islands does, in part, address the issue of considering future service provision costs.

At present there exists no formal planning within SIWA which attempts to forecast either tariff levels or the timing of tariff increases to achieve a *user pays* tariff level. However

the Corporate Plan (1996) does include the requirement for such planning and implementation of *user pays* incorporating such notions as *true costs of services* as follows:

Strategies **4.1** ***Implement a “true cost” charging policy***

Activities 4.1.1 *Define “true cost”*

Includes: - *Systems maintenance and operation costs*

- *Contribution to future works*

- *Technical and Corporate Support*

4.1.2 *Define “user pays” principle - system x system Vs. national system*

4.1.3 *Develop a revenue projection model which includes:*

- *Master plan* - *future demands*

- *future needs*

- *future works*

- *future maintenance*

- *future fixed overheads*

- *future revenue*

streams

While the literature (WHO handbook, 1994a) debates whether economic costs should be included along with financial costs, this study is concerned only with financial costs.

Section 4.1.3 of the SIWA Corporate Plan (1996) cited above also identifies as being necessary the inclusion of a revenue model via which the water issues identified in Section 1.2 of this study are considered. Issues relating to the long term nature and lumpiness of investments, recurrent costs, and future demand requirements are taken up through consideration of such things as future demand, works and recurrent costs planning considerations being incorporated in the revenue modelling process. The role of this study is to develop and test such a revenue model.

Whilst there is a lack of information pertinent to the development of a tariff pricing policy that considers managements' needs within SIWA there is considerable accessibility to data within the Solomon Islands through close associations with other areas of government. However, a further limiting factor is the lack of current census data with the last census conducted in the Solomon Islands in 1986. This has particular implications for the forecasting of future demand growth and average household disposable income levels.

In the above it has been argued that the issues of accountability and funding are key elements in order to assess the viability of *user pays* to provide a basis for sustainable delivery of water and wastewater services. Two sub-elements concern planning and reporting. Planning includes the development of a functional revenue model which can identify and test variables necessary to the adoption of a *user pays* tariff policy. A reporting framework is required to provide management with information to monitor and evaluate set plans and to provide externally useable efficiency and effectiveness

assessments (or external accountability) of the consequences of the implementation of a *user pays* tariff policy. The next section examines those planning and reporting considerations as they apply to SIWA.

2.5 Planning and Reporting

The importance of planning is well stressed in the water industry literature. The following criticism is found in WHO (1994b:vii):

Unfortunately, there is ample evidence to show that this has not always been the case, mainly because resources have largely been utilized for the planning, design and construction of facilities while operation, maintenance and project evaluation have been often neglected.

From this it can be inferred that planning is an essential function in the provision of water and wastewater services. However, it also highlights the lack of integration of the functions of operation, maintenance and evaluation in the planning stage. This has resulted in problems such as works construction being undertaken without consideration of the operation and maintenance of those works after commissioning.

Section 2.2 identified the forward planning undertaken by SIWA and the primary reliance on a five year capital maintenance plan supported by an annual operating budget. Further, it was identified that to date only draft 1994 annual financial statements had been prepared. In Section 2.2 it has been argued that the elements of planning which considered the issues concerning the water industry identified in Section 1.2 have been included by SIWA in its Corporate Planning processes (1991:Section 4.1). Section 1.2

identified a number of issues which predominantly arise out of the long life of the systems assets used to provide water services. Because such assets have up to a 100 year lifespan (Public Works Department, NSW:1984) the investments are long term, costly and lumpy. Financing the investment decision requires careful consideration and must consider the recurrent costs associated with operating such long lived assets. Additionally, the financing decision must consider service delivery requirements in prioritising conflicting claims for resources. The relationship between these water issues and the identified study framework by elements and sub-elements is shown in Figure 2.2.

Figure 2.3 Water Issues and the Framework

Water Issue	Accountability		Funding	
	Planning	Reporting	Planning	Reporting
1. Long Term Investment	x	x	x	x
2. Cost of Investment	x	x	x	
3. Lumpy Investments	x	x	x	x
4. Financing Decision	x	x	x	x
5. Recurrent Costs	x	x	x	
6. Conflicting Claims on Resources	x	x	x	

Figure 2.2 identifies a direct link between water issues and both of the key elements of accountability and funding. This direct link also exists between the water issues and the sub-elements of planning and reporting, as they relate to the key elements, with the exception of water issues 2, 5 and 6 where there is no directly identifiable link at the funding/reporting level. These water issues have been identified as not having a direct link at this sub-element level as these water issues directly concern costs (expenditure)

and therefore are accountability/reporting relationships as opposed to funding (revenue)/reporting relationships.

However, all of these water issues and key and sub-element framework components do have implications for revenue modelling as it relates to the issue of *user pays* in this study. This interrelationship is reinforced through the integrated approach of the accountability/funding framework adopted in this study designed to overcome the gap between planning/construction activities and the operations and maintenance (recurrent) activities identified above (WHO,1994b:vii).

In terms of this study there is a need to progress SIWA's planning and reporting in general, and revenue model development in particular, in order to assess viability of *user pays* to provide a basis for the sustainable provision of water sources. The progress relates directly to SIWA and may indirectly relate to developing countries in general or to interested developed countries. Any planning and reporting mechanisms developed must address both technical and political policies if they relate to the provision of water services by a water authority. The technical issues are those that relate to engineering, accounting and economic considerations in providing those services and the political are those dictated by government and the consumer base to which such authorities are responsible for the supply of these services.

However from the above discussion, it is apparent that the key elements, accountability and funding, and the sub-elements of planning and reporting must be considered in the

revenue modelling. The revenue model provides the mechanism by which various **funding** outcomes can be determined. In the operation of the revenue model all the **planning** considerations need to be incorporated if the revenue model is to reflect managements' future expectations about the organisational needs. The revenue model, through consideration of these identified management needs provides a mechanism for the production of quantifiable outcomes in terms of managements' expectations about the present and future performance of the organisation. Those performance assessments are in a **reporting** form and therefore should contribute to management **accountability** requirements.

2.6 Summary

In this Chapter SIWA was examined to show it was an organisation that may be used as a case study for the research issue identified in Chapter 1. That research issue was identified as the need to examine the viability of the adoption of *user pays* as means for funding the sustainable provision of urban water services in a developing country context. Section 2.1 confirmed that SIWA met the definition of an urban water services provider in a developing country. Section 2.2 examined SIWA's current operating status and delivery capacity in order to provide the background starting point to the case study. Sections 2.3 (Accountability), 2.4 (Funding), and 2.5 (Planning and Reporting) examined the fundamental and supporting issues identified in Chapter 1 as setting the scope of this study in addressing the *user pays* viability issue.

In Section 2.5 it has been argued that the revenue model provides a mechanism for integrating consideration of the fundamental elements of **accountability** and **funding** and the sub-issues of **planning** and **reporting** as they relate to assessing the viability of *user pays* as funding basis for the sustainable provision of water services in a developing country context.

Whilst the revenue model has been identified as a possible mechanism for integrating the fundamental and sub-elements identified in Chapter 2, a framework is required to integrate issues to be considered when developing such a revenue model. Such a framework would need to ensure that the revenue model considered all of the variables that may be required to satisfy the key elements and sub-elements of accountability, funding, planning and reporting respectively. Further, the validity of any underlying assumptions would require testing. Such a theoretical modelling framework is developed in Chapter 3 and testing carried out in Chapters 4 and 5.

Chapter 3

Development of a Revenue Model

3.0 Introduction

In Chapter 2 the water issues identified in Chapter 1 were analysed in terms of developing a framework that would provide an integrated approach that would allow for the testing of the issue of this study. That issue was identified in Chapter 1 as being the viability of *user pays* in providing a means for the provision of sustainable water services to urban areas in a developing country context.

Chapter 2 identified the key elements of such an integrated framework as being accountability and funding. Underlying these two key elements were the sub-elements of planning and reporting. In this Chapter that framework is used to analyse the role of revenue modelling in a *user pays* funding situation as it relates to SIWA. The analysis assesses the relevancy of a revenue model in terms of the framework elements of accountability (planning and reporting) and funding (planning and reporting).

Section 3.1 further analyses the accountability element in order to show the major role of the Corporate Plan in revenue model development in respect of SIWA. Section 3.2 further analyses the funding element in order to develop a revenue model which is fully integrated with the other key parts of the planning sub-element covered in the Corporate Plan of SIWA. In Section 3.3, a revenue model is developed which is in principle

consistent with the framework based on the sub-elements of planning and reporting and their direct link with the key elements of accountability and funding.

Sections 3.1, 3.2 and 3.3 provide the mechanisms for the development of a revenue model within the framework developed in Chapter 2. Section 3.4 identifies and examines the variables that such an integrated revenue model would need to consider. In Section 3.5 a detailed revenue model is developed which can be tested by data to be collected as described in Chapter 4.

3.1 Revenue Modelling in an Accountability Framework

During the late 1980's and the early 1990's there has been much emphasis placed on the development of organisational Corporate Plans as strategic planning instruments which considered all areas of the organisation (Staunton, Hagan and Cooper:1989, Kaufman:1991, Kaplin and Norton:1992, Kaplin and Norton:1993). The Corporate Plan details the organisation goals, objectives and strategies decided as being necessary to carry out the Corporate Mission as defined by the organisation's management. The Corporate Plan provides for an accountability mechanism which considers all levels from the vision to the applications necessary to achieve those organisational outcomes in an integrated way.

A meaningful corporate plan must contain a statement of management initiatives which is consistent with providing an accountability mechanism to allow for decision useful

assessment of outcomes in all areas of accountability of the organisation. Section 1.1 identified as primary areas of accountability in the water industry, the areas of Health, Environmental and Public/Common Good (as defined in Section 1.5). Under these circumstances, for the Corporate Plan to be an accountability instrument in terms of SIWA it would be required that SIWA's Corporate Plan addresses all of the legislative functions and objects applying to SIWA and in doing so, incorporate a means for formally assessing the primary areas of accountability (health, environment and common good).

Given that, in principle, the Corporate Plan does provide a suitable accountability mechanism it is now important to assess the SIWA Corporate Plan in terms of meeting both its legislative and water industry accountability objectives. Then, in the first instance, the Corporate Plan must be assessed as to whether or not the Mission Statement and Objectives included in SIWA's Corporate Plan (Appendix 2) are consistent with its legislative objects and functions. Figure 3.1 provides an analysis of the SIWA Corporate Plan in respect of its Compliance with the objects and functions detailed in the *Solomon Islands Water Authority Act 1992* (Appendix 1 and Section 2.2).

Figure 3.1 A Comparative Analysis of SIWA's Legislative Objects and Functions with the SIWA Corporate Plan

Legislative Objects and Functions (Section 2.2)	Corporate Plan Stated Mission and Objectives (Appendix 2)
S. 4 (1) (a) Re methods of supply of water (b) Re overall SIG policies (2) (a) Promotion of efficient use (b) Re integrated catchment issues (c) Re public interest issues (d) Re conservatism (e) Re pollution (f) Re use of other resources	Mission Objectives 1 - 10 Mission Objectives 1 - 10 Mission Objective 7 Objective 2 Mission Objectives 1 - 10 Objectives 2 and 7 Mission Objective 3 Mission Objectives 1 - 10
S. 7 (a) Re urban water services (b) Re national policies (c) Re water quality standards (d) Re infrastructure for water (e) Re infrastructure for wastewater (f) Re other related functions	Mission Objectives 1 - 10 Mission Objectives 3, 9 and 10 Mission Objectives 2 and 3 Mission Objectives 1 and 2 Mission Objectives 1 and 2 Mission Objectives 1 and 2

Figure 3.1 indicates that there is a high degree of correlation between the legislative objects and functions of SIWA and the mission and objectives as detailed in the Corporate Plan. This claim is made given that the Mission Statement complies at all levels and at least one objective has been identified at each level. To this end, SIWA's

mission and objectives are consistent with its legislative charter and therefore what SIWA was set up to achieve by Government.

Secondly, SIWA's Corporate Plan needs to be assessed in terms of whether or not it provides the mechanism for assessing the primary areas of water industry accountability of health, environment and common good. Figure 3.2 provides the basis for analysis of compliance of SIWA's Corporate Plan in providing for accountability in these areas.

Figure 3.2 A Comparative Analysis of SIWA's Corporate Plan and Selected Areas of Primary Water Industry Accountability

Corporate Plan Stated Mission and Objectives (Appendix 2)	Selected Primary Areas of Accountability		
	Health	Environment	Common Good
Mission	X	X	X
Engineering			
Objective 1	X		X
2	X		X
3		X	X
Financial			
Objective 4			X
5			X
Personnel			
Objective 6	X	X	X
Organisational			
Objective 7	X	X	X
8	X	X	X
9	X	X	X
10	X	X	X

For the corporate plan to provide an integrated mechanism for accountability it would require that the Mission Statement incorporates consideration of all the primary areas of accountability. SIWA's Mission Statement is considered to achieve this through the incorporation of the notions of "safe", "sustainable" and "reliable" as stated outcomes in the Mission Statement. Whilst the Mission Statement does address the identified areas of accountability, the objectives which bring the Mission Statement to life must also address each are of identified accountability.

SIWA's statement of objectives is considered to meet this through every objective relating to at least one area of accountability. In fact it could be argued that SIWA's Corporate Plan is a truly integrated accountability instrument in that five (5) of the objectives consider all three areas of identified primary accountability whilst three objectives consider two areas of primary accountability. This integrated relationship has also been demonstrated in Figure 3.1 where, in a number of instances, a number of objectives have legislative relevance.

From the above analysis it is considered that the SIWA Corporate Plan does provide an integrated mechanism for accountability in terms of SIWA's legislative charter and the identified primary water industry accountability issues. However, whilst the SIWA Corporate Plan provides a mechanism for the framework key element of accountability in terms of the accountability issues of health, environment and common good, it is

necessary to obtain similar assurances at the accountability sub-element levels of planning and reporting.

In terms of planning, whilst it is necessary to assess SIWA's Corporate Plan as an accountability/planning mechanism it is also an objective of this Section to assess whether the SIWA Corporate Plan provides a revenue model development environment/framework which addresses the *User pays* issue. In order to make such an assessment an analysis of the SIWA Corporate Plan is required to see if it considers all of the water issues identified in Section 1.2 and analysed in terms of the framework in Figure 2.2. Figure 3.3 provides such an assessment.

Figure 3.3 Water Issues and SIWA's Corporate Planning

<p style="text-align: center;">Water Issue (Section 1.2)</p>	<p style="text-align: center;">Corporate Plan Stated Missions and Objectives (Appendix 2)</p>
1. Long Term Investment	Mission Objectives 1, 2, 5, 6, 7, 8, 9 and 10
2. Cost of Investment	Objectives 1, 5 and 7
3. Lumpy Investments	Objective 1
4. Financing Decision	Objectives 5 and 7
5. Recurrent Costs	Objectives 1 and 2
6. Conflicting Claims on Resources	Objectives 1, 2, 3 and 7

SIWA's Corporate Plan addresses all of the water issues through the mission statement and objectives included in the Corporate Plan but more directly through the strategies and activities underlying those objectives (refer to Appendix 2). The Corporate Plan is therefore considered to be consistent with framework key element requirements for accountability and the accountability sub-element of planning which is fundamental to addressing the water issues as detailed above in Figure 3.3. The SIWA Corporate Plan objectives, strategies and activities identify all the elements required to accomplish integrated planning including capital investment (works), operations and maintenance and organisational support planning. Under these circumstances, the SIWA Corporate Plan is considered an appropriate mechanism for applying the framework as it relates to the key element of accountability and accountability sub-element planning.

However, the key element of accountability has a further identified sub-element of reporting. Whilst a revenue model developed utilising the Corporate Plan mechanism may meet the requirements of the other elements that have been defined at the upper level as being accountability, that accountability cannot be confirmed if it cannot be reported. In terms of the Corporate Plan it is then necessary to establish whether it does provide a reporting mechanism that not only services managements' needs but also external reporting requirements. To this end, recent Australian initiatives may assist

In Australia Commonwealth Government initiatives of the Commonwealth Authorities and Companies (CAC) Bill and the associated Finance Ministers Orders have developed a Report of Operations which is a component of annual reporting. The structural reporting framework adopted by the Report of Operations is the entity's Corporate Plan. In terms of Australian reporting and auditing requirements this approach has been tested by the Australian Securities Commission (ASC) in their 1993/94 Annual Report (refer to Appendix 4 for analysis).

Given that the SIWA Corporate Plan is an integrated planning instrument in the entity, then in terms of this study it can be taken as given that the SIWA Corporate Plan provides the mechanism to produce a Report of Operations, thus addressing the sub-element of reporting as it relates to accountability.

As the Corporate Plan does provide a mechanism for treatment of the framework key element of accountability then it is an appropriate mechanism for the development of the required revenue model.

It is now required to examine the SIWA Corporate Plan in terms of the framework key element of funding to show the appropriateness of the SIWA Corporate Plan as a revenue model building mechanism. This is done in Section 3.2.

3.2 Revenue Modelling in a Funding Framework

Given that the Corporate Plan provides a revenue model mechanism which meets the accountability requirements, the other key element of funding is of interest especially as it relates to revenue model development. Revenue modelling is directly related to funding and any assessment of *user pays* viability.

In general, as was pointed out in Section 2.4, funding as it relates to SIWA can be achieved from a number of sources. Those sources include revenue in terms of rates/tariffs, loan funds, government subvention, Aid donors internal investment activities and miscellaneous incomes. The last two are considered to be immaterial as they are only incidental to the core business of the supply of water services. They would be in conflict with Corporate Planning initiatives should they become a material source of funds.

The issue being examined in this study is that of the viability of *user pays* as means of providing the funds necessary to provide for the sustainable delivery of water services to urban areas in a developing country context. More specifically, this study examines the achievability by SIWA, through the adoption of *user pays*, of the sustainable provision of water and wastewater services to Solomon Island urban areas. With the introduction of *user pays*, access to SIG subvention and external Aid funds may be eliminated from the funding issue. With the previous discounting of other investment and miscellaneous

incomes, funding considerations in respect of SIWA's adoption of *user pays* resolve to service rate/tariff revenue and loan funds. In SIWA's case the adoption of *user pays* is not optional given a government directive to do so by the year 2001.

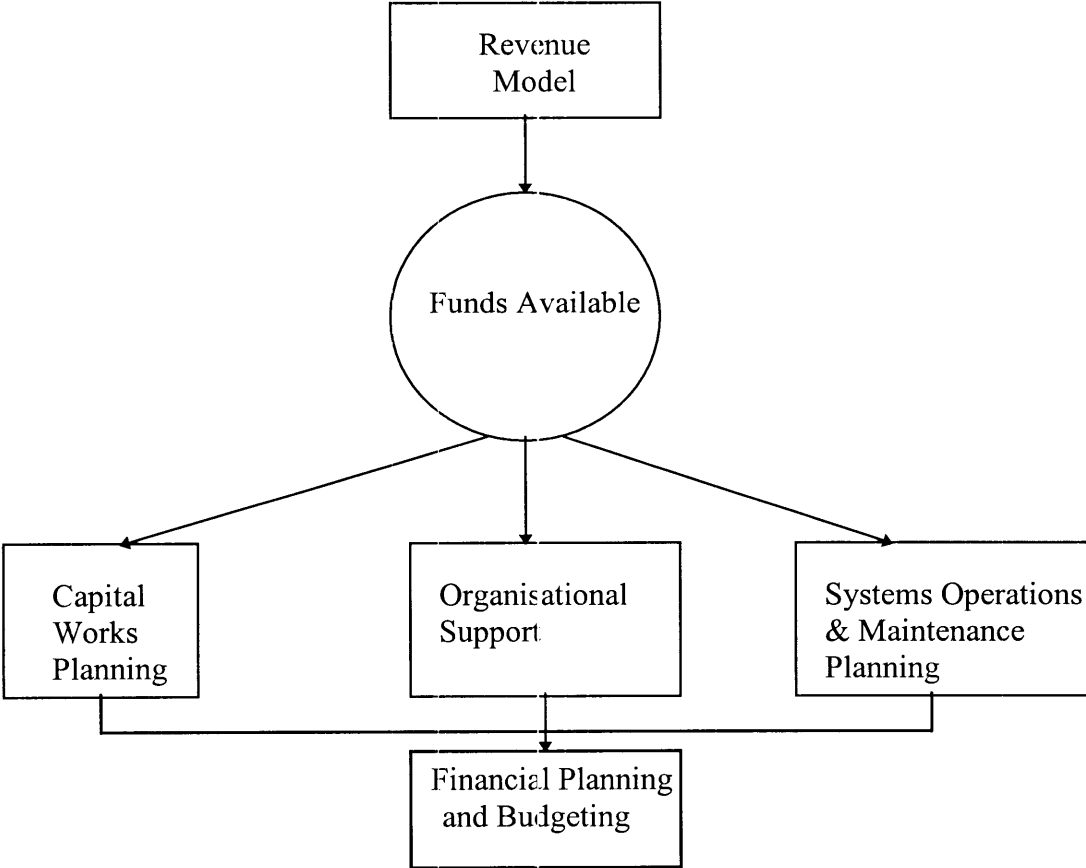
However, ideally funds sourced through loans are inconsistent with the notion of *user pays* (refer to definition Section 1.5). The notion of *user pays* incorporates considerations of operating and maintenance and organisational support (recurrent) costs as well as the future capital investment needs required to fund the capital works identified as being necessary to maintain the existing systems and expand those systems to meet future demand needs. As identified in Section 3.1 (see especially Figure 3.3), the SIWA Corporate Plan considers the planning needs for Capital Investment (Works), Operations and Maintenance and Organisational Support that are required to be considered if a revenue model is to assess the viability of *user pays* as a funding option.

In respect of revenue modelling and the framework key element of funding the SIWA Corporate Plan does provide an appropriate mechanism for the development of a revenue model. The funding sub-elements of planning and reporting are also considered to be addressed via the Corporate Planning mechanism. The key planning requirements in terms of both of the key elements of accountability and funding are those of Capital, Operating and Maintenance and Organisational Support planning. The Corporate Plan

addresses all of these planning requirements and in doing so also reinforces the integrated framework approach taken by this study.

Funding, in the context of this study, is only those funds from tariff setting. The level of funding sought to assess the viability of *user pays* as means of providing the funds necessary for the sustainable delivery of water services by SIWA is obtained directly through the application of the revenue model. In adopting the Corporate Planning framework for the development of a revenue model then it is argued that the interaction of the revenue model with the key planning functions would provide a funding reporting mechanism. To achieve this interaction the relationship detailed in Figure 3.4 would need to be adopted.

Figure 3.4 The Interactive Relationship Between a Revenue Model and the Key Planning Elements of the Corporate Plan



The focus of Figure 3.4 is from the revenue model perspective. However, any meaningful revenue model must consider the planning needs and the data which constitutes those plans. The objective of the revenue model in the adoption of the notion of *user pays* is to determine the tariff level required for the organisation to achieve the desired level of funding necessary to put those plans into effect in achieving sustainable service delivery outcomes for which it is accountable. Figure 3.5 provides the picture of the inter-relationships found in SIWA.

Figure 3.5 The Revenue Model/Corporate Planning Key Element Relationship Completed

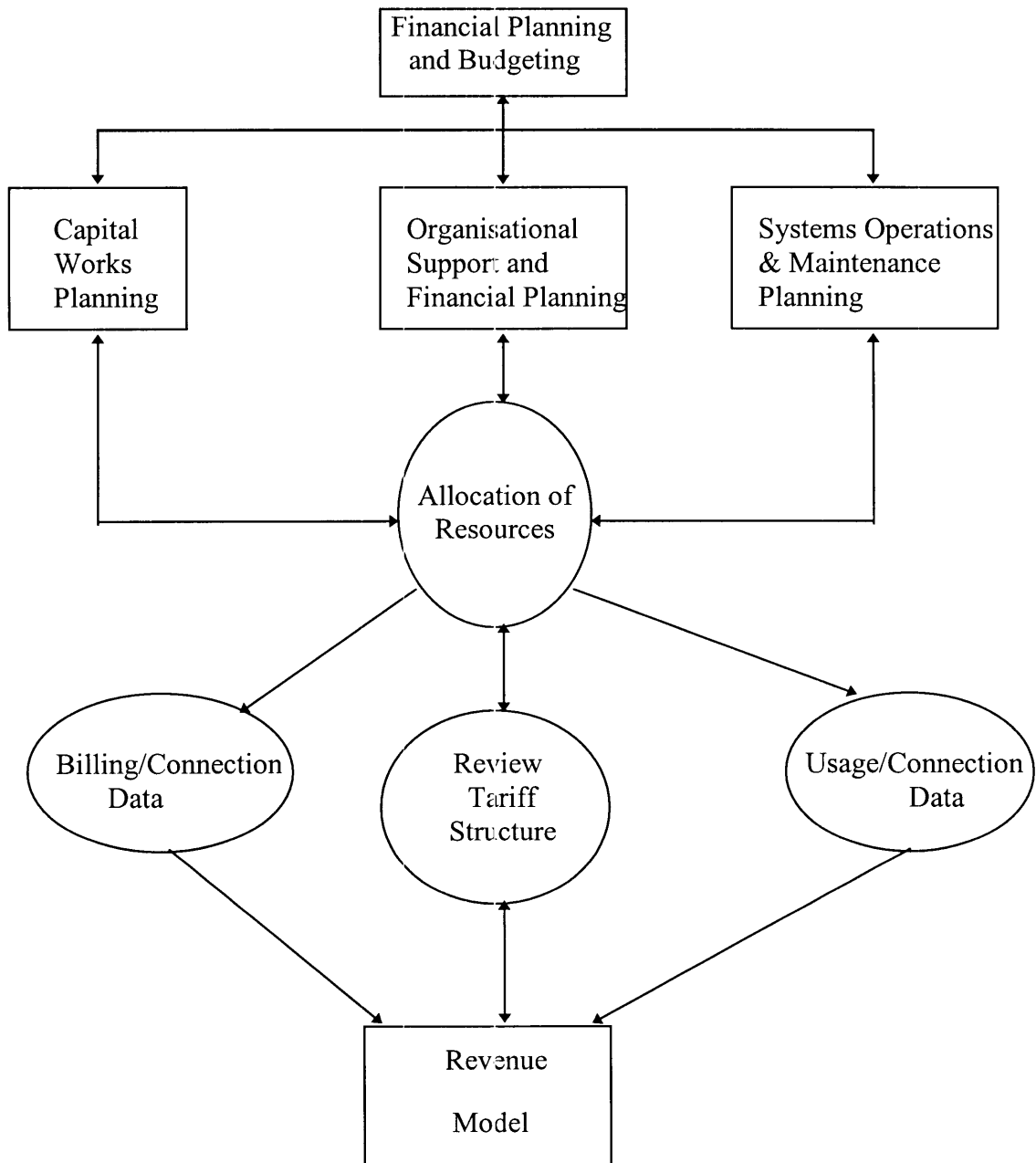


Figure 3.5 demonstrates that if a revenue model is to be meaningful in terms of providing decision useful funding data it must interact with the key planning elements contained in the Corporate Plan. The role of the revenue model is to provide a mechanism for identifying the tariff level needed to fund any given level of implementation of the plans of the entity.

Options to the level of implementation of the key planning elements by SIWA do not exist in terms of this study. The aim of this study is to assess the viability of *users pays* as funding mechanism through which SIWA provides sustainable water services to Solomon Island urban areas. There are prescribed levels of outcomes in respect to both quality and quantity of services which SIWA is responsible for delivering detailed in the SIWA Mission Statement. Given that the revenue model directly interacts with the key planning elements defined as necessary in achieving that Mission Statement then revenue model performance will be reported in terms of the level achievement of those plans. **That is, funding allocation decisions relating to achievement of those plans will solely be provided by the application of revenue model decisions and therefore provides the mechanism for achieving the framework funding sub-element of reporting.**

This analysis completes the development of an integrated framework. The Corporate Plan provides a mechanism for satisfying all of the elements of the framework, the key

elements of accountability and funding and the sub-elements of planning and reporting. Additionally, the Corporate Plan also provides a mechanism for the development of an interactive revenue model in an integrated planning and reporting environment. A summary of these findings is provided in Section 3.3.

3.3 Revenue Modelling in an Integrated Accountability and Funding Framework

In Section 3.1 the requirements for developing a revenue model in an accountability framework were examined. It was identified that the Corporate Plan provided a setting for the development of such a revenue model whilst also providing a mechanism for assessing planned and reported accountability. In respect of developing a revenue model the key elements of an integrated Corporate Plan which were of primary consideration were those of Capital, Operations and Maintenance and Organisational Support planning. The SIWA Corporate Plan was confirmed as being such an integrated Corporate Plan (refer to Figures 3.1, 3.2 and 3.3)

Section 3.2 examined the SIWA Corporate Plan as mechanism for assessing the framework key element of funding and the implications of those findings on revenue model development when adopting the notion of *user pays*. Six funding sources were identified, being Revenue (derived through rating/tariff setting), Loan funds, Government

Subvention, External Aid donors, Internal Investment and miscellaneous other income. Internal Investment and Miscellaneous income was discounted on materiality grounds and core business considerations whilst loans, subvention and Aid funds were considered to be inconsistent with the notion of *user pays* as defined in this study.

The funding focus of this study is singularly on revenue and the implications of *user pays* in determining funding outcomes. In developing a revenue model that would provide means by which funding outcomes could be examined the Corporate Plan was also found to be an appropriate mechanism particularly as it relates to the integrated consideration of the three primary planning elements of Capital, Operations and Maintenance and Organisational Support. This integrated relationship is reinforced in Figure 3.6.

Figure 3.6 Integration of Corporate Master Planning Through the Revenue Model

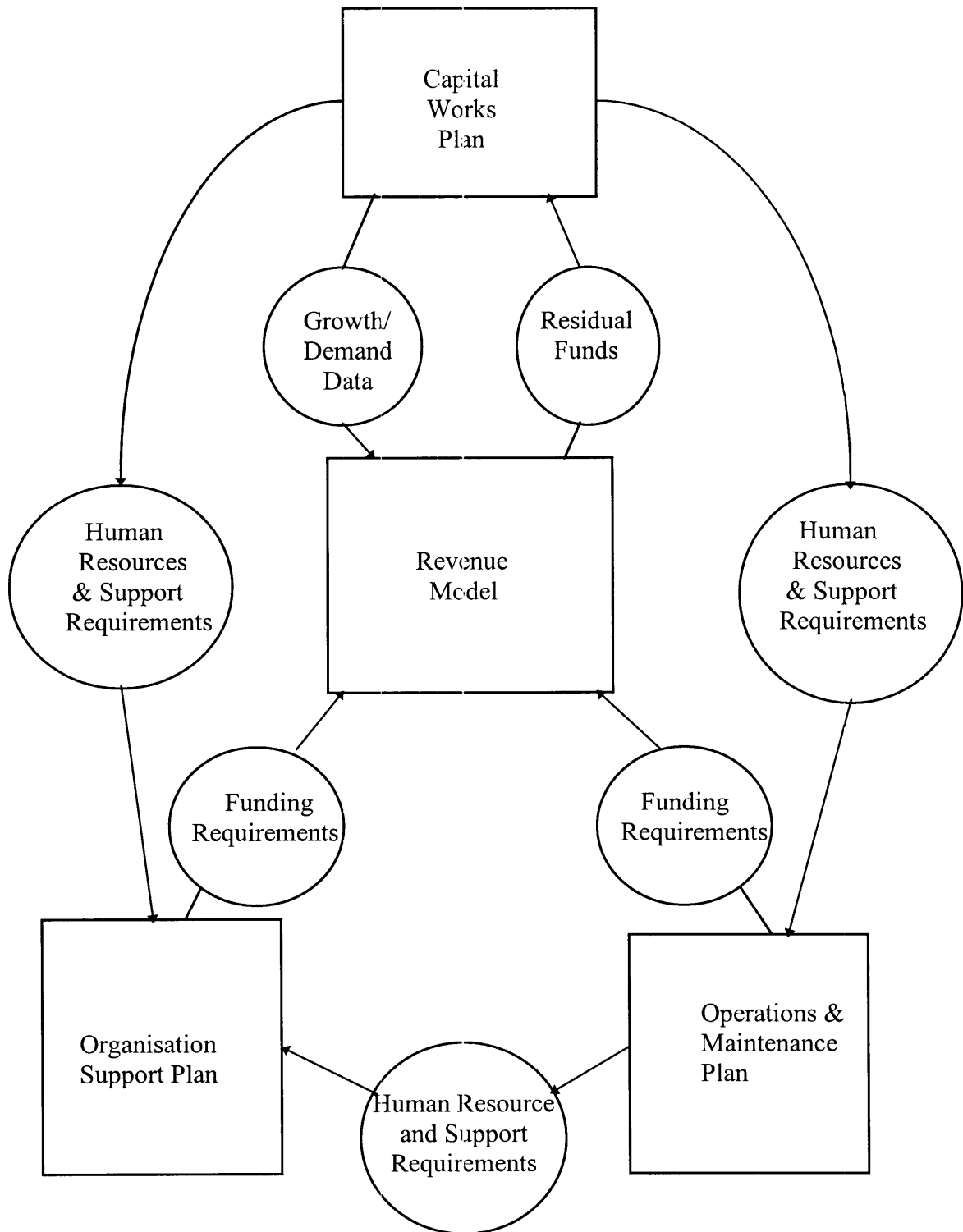


Figure 3.6 highlights the integrated interrelationship of the three planning elements which constitute the organisational Master Plan, Capital Works, Operations and Maintenance and Organisational Support achieved through the revenue model. The Capital Works plan is considered to be the key plan but it is the most susceptible plan in terms of funding. The Capital Works Plan considers all growth and demand pressures placed on the organisation in determining the physical infrastructure required supply current and future service requirements. These are the same growth and demand pressure considerations which must be taken up by the revenue model.

However, the provision of operations and maintenance is most critical because, if this is not achieved, the current and future infrastructure may not be operable and therefore not provide the services it has been designed to deliver (WHO 1994b). Additionally, the provision of Organisational Support is equally important because this determines the availability of human resources and support functions such as stores and supplies, procurement, customer support, revenue collection and management, etc. Without the support of these services neither the Capital Works nor the Operations and Maintenance can be carried out efficiently and effectively.

Capital Works Planning is very important because it does provide the base data in respect of service delivery output requirements and future capital investment requirements which are directly required by the revenue model in applying what is *user pays*. However, both

Operations and Maintenance and Organisational Support requirements must also be funded in the first instance. After meeting the costs of Operations and Maintenance and Organisational Support any residual funds can be applied to Capital Works. Whilst this highlights the significance of the revenue model in providing a decision information tool in assessing what level of Capital Works may be conducted under conditions of limited resources, this study will not directly address this issue.

The scope of this study is to assess the viability of adopting a *user pays* pricing policy in achieving the sustainable delivery of water services in a developing country. Under these conditions the Capital Works budget must define the cost of works required to provide, in SIWA's terms, ... *safe, sustainable and reliable water and wastewater services to Solomon Islands urban areas*. Once those Capital Works have been identified the Operations and Maintenance and Support cost must reflect the achievement of the Capital Works and the ongoing support to the provision of those services for which they are designed. Implications for accountability in the areas of health, environment and common good will only become an issue if *user pays* does not provide an appropriate funding mechanism and these issues will be dealt with in Chapter 5 should they arise.

The revenue model relationships and focus have now been defined. It is now appropriate to identify the variables which the revenue model must consider if it is to provide a

funding decision tool. Section 3.4 now examines the impact of these findings on the determination of the revenue model variables.

3.4 Determining and Defining The Revenue Model Variables

In the previous Sections (3.1, 3.2 and 3.3) the primary considerations of the revenue model were identified as being the three Corporate Planning elements of Capital, Operations and Maintenance and Organisational Support planning. In Section 3.3 the Capital Works Plan was identified as the most important plan for the revenue model to focus upon given that the aim of the study is the assessment of the viability of *user pays* in providing the level of funding necessary to provide sustainable water services in a developing country. In order to test this notion of *user pays* the required Capital Works plan must be funded and implemented to the level necessary for SIWA to meet its mission statement. To be sustainable the Operations and Maintenance and Organisational Support plans identified as being necessary to implement these and maintain Capital Works will also need to be funded.

It is the objective of this Section to identify the relevant variables required to be taken up by the revenue model and to define those variables. Upon achievement of this objective the revenue model will be stated in Section 3.5.

The Capital Works Plan has been identified as the key plan. This is because the Capital Works must consider all the future pressures and demands to be met given the present status of capital infrastructure. In order to develop such a Capital Works/Investment Plan the future service delivery requirements need to be identified. From a planning perspective this will require an audit of current service supply systems (infrastructure and infrastructure support) to be conducted to assess the operating status and demand and supply capacity. Resulting from such an audit is the starting point for capital works and the base operations and maintenance and organisation support plans. Once the planning foundations have been constructed then consideration needs to be taken of such factors as demand and supply growth and associated quality control requirements to be built into all facets of planning to address the accountability issues of health, environment and common good.

In terms of revenue modelling, to determine and project the amount of funds a particular tariff might raise, it is necessary to forecast consumption demand in terms of demand and population and non-domestic growth increases. These are the very consideration of the Capital Works Plan. Given that the Capital Works Plan predetermines, in part, the Operations and Maintenance and Organisational Support Plans the key variables required to be considered by the revenue model are the same as some of those considered by the Capital Works Plan. Indirectly via the other two plans other variables considered by the Capital Works Plan will be taken up by the revenue model.

The dependent variable in the structure of a revenue model is the amount of revenue or funds achieved given certain assumptions as to service consumption, consumption growth and the tariff to be charged for a particular type of service whether it be water or wastewater services. In this study, the dependant variable revenue will be represented by 'R'.

In determining revenue (R), consumption of service per connection needs to be identified and then the tariff per unit of consumption applied. Given that the revenue model is designed to consider both future costs of capital investment and future increases in demand the amount of required revenue is dependent on three primary independent variables - service connection numbers, service usage per connection and the tariff to be applied. Consideration will also need to be given to the residual variables relating to fees and charges incurred by consumers and developers which relate to connection, disconnection and reconnection of services and the headwork's⁹ and amplification charges arising from industrial and urban developments/investments.

⁹ Headworks are charges levied on developers when residential or non-residential land developments are undertaken. The developer is required to meet the costs of all water service infrastructure associated with the development as well as making a contribution to future works. The contribution to future works recognises the additional pressures being placed on the existing system and the implications for bringing new works forward as well as avoiding arguments concerning existing users cross-subsidising new users and associated intergenerational asset arguments. In terms of SIWA, headworks charges are designed to be cost neutral and therefore may have little impact on revenue modelling outcomes.

Service connection growth will come from two sources, domestic and non-domestic. Given that there are two primary services provided by way of water and wastewater there exists the possibility of the existence of four consumption variables identified as follows:

Cd_w = Number of domestic water service connections.

Cn_w = Number of non-domestic water service connections.

Cd_{ww} = Number of domestic wastewater connections.

Cn_{ww} = Number of non-domestic wastewater connections.

Usage of water and wastewater services could similarly be represented by four variables given that non-domestic consumers include industry and can be defined as follows:

Ud_w = Domestic water usage per connection.

Un_w = Non-domestic water usage per connection.

Ud_{ww} = Domestic wastewater usage per connection.

Un_{ww} = Non-domestic wastewater usage per connection.

Metering of wastewater usage is not achievable in all circumstances due to the varying types of wastewater treatment services available (septic tanks to full scale tertiary treatment works) and resources to fund such operations. This is the case in the Solomon Islands where SIWA applies a wastewater usage rate of 50% of water usage. Under these circumstances wastewater usage variables are further defined as follows:

$$U_{d_{ww}} = (U_{d_w} \times 0.5), \text{ and}$$

$$U_{n_{ww}} = (U_{n_w} \times 0.5)$$

Both connection and usage growths can be derived utilising demographic data based *ex post* information about household occupancy rates and service usage respectively. The issue of tariff setting however must consider the future cost of capital investment in terms of domestic and non-domestic consumption of those services with the objective of setting a tariff level which is not subject to large increases from time to time as has been associated with the lumpy investment experience of water authorities in the past. In a developing country, due to low socio-economic conditions, there has also been a recognised need to identify a “lifeline” tariff level (WHO 1994a:62 and ADB 1993:9). The lifeline tariff mechanism only applies to domestic consumers and provides for a predetermined amount of litres consumed at a discounted rate. SIWA adopts WHO standards and applies a lifeline tariff structure to domestic consumption. Currently that is set at SI\$0.65 per kilolitre of service consumed up to 35 kilolitres per month. This is set above the WHO standard of 20 kL/month. Currently SIWA charges SI\$1.30 for every kilolitre consumed by non-domestic customers and for every additional kilolitre consumed over 35 kL by domestic consumers. Under these conditions there are only two identified tariff structures, one for domestic and the other for non-domestic. Other than this differentiation no differences exist between the tariff for water or wastewater. The difference between water and wastewater charging is accounted for in the differing Usage calculation between water and wastewater services. The tariff variables are defined as follows:

T_d = Domestic tariff,

Where

$$T_d = [(U_{d_w} \leq 35kl \times T_l) + (U_{d_w} \times T)]$$

and

T_l = Lifeline tariff; and

T = General domestic and non-domestic tariff.

Depending upon the extent of future capital investment required to be undertake the tariff 'T' could impact on the willingness of customers to pay and therefore customer demand. Consideration of this issue will be taken up in Chapter 5 where the impact on the accountability areas of health, environment and common good will also be considered.

There are residual variables that also need to be considered and they concern income derived from connection, disconnection, reconnection fees and associated charges for both water and wastewater. Income from this source will be considered collectively as Fees (F) for the purposes of this study due to considerations of materiality in respect of revenue and is represented as follows:

F_w = Domestic and non-domestic water connection, disconnection, reconnection fees and charges.

F_{ww} = Domestic and non-domestic wastewater connection, disconnection, reconnection fees and charges.

At present, within SIWA, there exists no differentiation between domestic and non-domestic fees and charges of this nature. However, a headwork's charge is applied to both domestic and non-domestic developments and these are represented as follows:

H = Headwork's and amplification charges for water and wastewater.

Headwork's (H) charges are designed to cost/revenue neutral. In the Solomon Islands headworks charges are primarily levied on works outside of the gazetted government boundaries for urban areas and are therefore not considered in this study.

The identified study variables are summarised as follows:

R = Revenue

Cd_w = Number of domestic water service connections.

Cn_w = Number of non-domestic water service connections.

Cd_{ww} = Number of domestic wastewater connections.

Cn_{ww} = Number of non-domestic wastewater connections.

Ud_w = Domestic water usage per connection.

Un_w = Non-domestic water usage per connection.

Ud_{ww} = ($Ud_w \times 0.5$), and

Un_{ww} = ($Un_w \times 0.5$)

Td_w = Domestic tariff.

Tl = Lifeline tariff.

T = General domestic and non-domestic tariff.

Tn_w = T , where Tn_w is the non-domestic tariff.

F_w = Domestic and non-domestic water connection, disconnection,
reconnection fees and charges.

F_{ww} = Domestic and non-domestic wastewater connection, disconnection,
reconnection fees and charges.

The functional relationship of these variables is identified in Section 3.5

3.5 An Operational Revenue Model

Section 3.4 identified the variables required to be considered in the development of an operational revenue model based upon the relationships identified in Section 3.3. In this Section those variables will be ordered to form an operational revenue model which will be stated in this Section.

The variables identified include the dependent variable revenue (R) whose value is dependent upon consumption, connection growth, tariff levels, associated fees and charges and headwork's charges. These being the independent variables which interact to determine R. These variables are now expressed in terms of R as follows:

$$R = \int [(C d_w \times U_w \times T d_w) + (C c_w \times U_w \times T n_w)] + F_w + [(C d_{ww} \times U_{ww} \times T d_{ww}) + (C c_{ww} \times U_{ww} \times T n_{ww}) + F_{ww}]$$

In broad terms the source of data for the various classifications of independent variables is summarised in Figure 3.7.

Figure 3.7 Independent Variable Planning Data Source

Classification of Independent Variable	Symbol	Planning Data Source
Connection	$Cn_w, Cc_w, Cd_{ww}, Cc_{ww}$	Capital Works
Usage	U_w, U_{ww}	Capital Works
Tariff	$Td_w, Tn_w, Td_{ww}, Tn_{ww}$	Capital Works Operations and Maintenance Organisational Support
Fees	F_w, F_{ww}	Capital Works Operations and Maintenance Organisational Support
Headwork's	H	Capital Works Operations and Maintenance Organisational Support

This highlights the Capital Works Planning area as a data source, particularly as it relates to revenue modelling. However, where the data type is financial, such as tariff, fees and charges, all planning instruments must be considered. This highlights the need for integrated planning and revenue modelling stressed earlier as being the approach taken in this study through framework development to revenue modelling.

3.6 Summary

In this Chapter a revenue model has been developed which is consistent with the framework and reconfirms the need for and adoption of an integrated approach taken at all levels of the study. Section 3.1 examined revenue modelling and the issue of accountability with Section 3.2 addressing revenue modelling and the issue of funding. These issues represent the integration of the framework key and sub-elements as they apply to revenue modelling and Corporate Planning. The Corporate Planning revenue model development mechanism was found appropriate in terms of the framework (Section 3.3).

Section 3.4 identified the variables which needed to be considered by the revenue model and the model was stated in terms of these variables in Section 3.5. A revenue model has now been clearly stated that is designed to provide an integrated basis of assessment of the viability of *user pays* as a funding approach in providing for a sustainable delivery of water service in a developing country. Chapter 4 will restate the research question to be answered and clearly identify the methodology that will be undertaken in answering that question. As this is a case study based on SIWA, data requirements and data collection needs as they relate to revenue modelling in the SIWA context will be identified and conducted. The outcome of the data identification and collection processes will be to

provide a basis upon which revenue model simulations can be conducted and analysed in Chapter 5 in order to answer the research question identified in Chapter 4.