PROVISION OF WATER SUPPLY BY PUBLIC-PRIVATE PARTNERSHIPS

Roger L Brown

1. Introduction

Safe water supply is a unique commodity. It is a basic need for survival of individuals and the community. It is a key part of good public health, together with sanitation. Both must be used effectively, through proper hygienic behaviour, to gain maximum benefits. Governments have traditionally taken responsibility for providing these public services directly but the private sector is being used more and more as implementer and operator, with government retaining the roles of facilitator and regulator (controller). Government always retains the ultimate responsibility for safe water supply, no matter what arrangement is used.

No one can survive without water. Some may have to travel far to obtain water, others may have to pay highly. Government’s objectives are to provide water that is safe and reasonably accessible. Various targets are set internationally and nationally in a drive towards better services that are available to more of the population. The main stumbling blocks are the capital funds required to provide the necessary infrastructure and the operating funds to run and maintain systems.

In many countries and religions, water is regarded as a naturally occurring free commodity, which is an entitlement of the community. Politicians promise cheap or free water as a vote catcher. As a result many water supply systems are under-funded. This leads to neglect of maintenance, poor operation (lack of chemicals for water treatment) and an inability to expand to meet increasing demand from more consumers. Therefore, many schemes, particularly in developing countries, are unable to provide the services that consumers want, which in turn makes consumers unwilling to pay for poor or even non-existent supplies, thereby reducing the already inadequate income to the operator even more. Those consumers who can afford it then take measures to improve their own supply. They install tanks to store water delivered intermittently and shallow hand pump wells if groundwater is high. These “coping costs” can be substantial, and poor consumers cannot pay them.

Public Private Partnerships (PPP) is the term used for a broad range of ways of the public and private sectors co-operating together to provide any service, including water supply. The key word is “partnership” as this infers some mutual sharing or distribution of risks and benefits. The main categories of PPP are:

- Those that improve service delivery by better operations, possibly at lower cost’
- Those in which the private sector provides significant funds for capital investment.

However, developing and running PPP is not simple. It needs a sound understanding of the water supply sector as well as the various models of PPP that have been used world wide. In addition, the partnership should be kept under regular review to see that expectations are

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being met, to agree changes that would improve the services further and to meet new challenges. Under a PPP, the public sector retains its basic responsibilities to consumers to ensure a good water supply. The private sector can help government to achieve this and can make things happen but will expect the PPP to be commercially viable, but perhaps only in the medium to long term.

Successful PPP in water supply requires both good practice in water supply and good practice in PPP. This report sets out the key issues that will affect PPP for provision of water supply. Most of the good practice is equally applicable to water supply schemes that are run entirely by government.

The water sector is being stimulated by international concerns of deficiencies and inadequacies (see section 2). Many new ideas are developing. Some are a reaction to methodologies that have been classed as “unsuccessful” in certain contexts. Others are based on small-scale operations with very large professional inputs that are not replicable. However, a careful review of these extremes does indicate how improvements can be made in the sector. These are discussed in section 2 to 5.

In addition the report pays particular attention to services to the poor. This is because they are often under-served and because of concerns that the private sector could take a narrow commercial view and neglect poor consumers. Although, the majority of urban and rural water supplies are run by the public sector coverage is still inadequate and most of the under- or unserved are low income families in slums and shanty towns. Generally the poor are disadvantaged irrespective of who operates the water supply system.

With the introduction of private operators and the fear of a “commercial” approach, considerable effort has been focussed on possible impacts on the poor and ways to protect them. However, the vast majority of piped water supply is operated directly by the public sector and the trend is to make these operations autonomous and “self supporting”, i.e. commercial. Therefore, the plight of the poor is equally of concern whether the water supply system is operated by the public sector on its own or jointly under a PPP. The impact on the poor and methods of alleviation are discussed in sections 6 and 7.

Historically, many piped water supply schemes were installed by the wealthy industrialists to safeguard their workforce and improve productivity. Subsequently governments have taken over responsibility for providing the basic service of water supply and have provided substantial subsidies. Recently, governments priorities have moved to other (more conspicuous) sectors and less funds are available for water supply. On the other hand, politicians are often reluctant to agree to higher tariffs for a basic need and consumers are not being asked to pay directly. The concept of PPP is in some cases to attract private funds but also to reduce costs by more efficient and flexible operation. The PPP options are discussed in section 8 with procedures in sections 9 and 10.

Some workers tend to take a “purist” view of the water supply model. However, the water supply sector has to fit into an imperfect world where taxation is heaviest on the rich, subsidies abound particularly to agriculture, to less economic areas and industries, many fare and tariff structures are distorted and cross-subsidy is the norm. Therefore, this report tries to look at the reality of the situation and at the tools that can be used to make improvements even at the risk of distortion of the concept of water as an economic, but as a social good as well.
No one is unaffected by water supply. Some take it for granted (unless it stops), whereas for others it is a daily battle.

2. Characteristics of the Water Supply Sector

The International Community recognises the importance of safe water supply in the alleviation of poverty. The United Nations Millennium Declaration resolved “by the year 2015….. to halve the proportion of people who are unable to reach or to afford safe drinking water” (clause 19). This statement of intent is interpreted locally:

- “Reach” is often set at a distance from dwellings, say less than 500m on the flat or 100m vertically.
- Afford” is often taken as a percentage of household income, say not more than 5% for water supply and sanitation.
- “Safe” is often taken as the World Health Organisation Guidelines, but these are not all health related and may not be significant in the local context.

The resolution does not include any target for quantity. Clearly, water that is not used for drinking does not need to meet these standards. Particularly in rural areas, people may tap a number of different water sources depending on what the water is to be used for and its availability, which may be seasonal.

There are many challenges in meeting these targets. However, the overriding objective is sustainability for which the three parameters of a water supply system in Box 2.1.must be in balance.

Levels of service should be chosen that:

- Will generate adequate income to provide and operate infrastructure.
- Can be provided by the infrastructure.
- Consumers are prepared to pay for and will be supported by others if loans, subsidies or grants are required.

<table>
<thead>
<tr>
<th>Box 2.1. Conditions for sustainability (Sustainability triangle)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Levels of service</strong></td>
</tr>
<tr>
<td>Quality</td>
</tr>
<tr>
<td>Quantity</td>
</tr>
<tr>
<td>Administration</td>
</tr>
<tr>
<td>Environment</td>
</tr>
<tr>
<td><strong>Sustainability</strong></td>
</tr>
<tr>
<td><strong>Income and funds</strong></td>
</tr>
<tr>
<td>Tariffs and charges</td>
</tr>
<tr>
<td>Loans</td>
</tr>
<tr>
<td>Subsidies, grants</td>
</tr>
<tr>
<td><strong>Infrastructure</strong></td>
</tr>
<tr>
<td>Construction</td>
</tr>
<tr>
<td>Operation and maintenance</td>
</tr>
</tbody>
</table>
Infrastructure and operational resources should be provided that:

- Will deliver the chosen level of service’
- Can generate enough income.
- Can be paid for by consumers and will be supported by others if loans, subsidies or grants are required.

Income levels should be achieved that:

- Will pay for provision and operation of infrastructure.
- Provide the chosen level of service.
- Can be paid by consumers and will be supported by others if loans, subsidies or grants are required.

The introduction of the private sector into water supply increases awareness of the “Sustainability Triangle”, which applies equally well to services run by the public sector. In fact, many of the problems of the public sector are directly related to under-funding caused by unrealistically low tariffs imposed by political pressure. This reduces incomes to below the level that is required to provide and operate the system leading to deterioration in service and consumers being unwilling to pay charges. In addition wealthier consumers will try to improve their own service by developing other sources or storage. They are then less willing to pay more for an improved public service.

When tariffs are raised, consumers review their use of water. In particular, large consumers may try to use less in their processes or to recycle water internally and may even decide to opt out of the public system altogether by establishing their own private borehole or other source. Even domestic consumers are likely to reduce their consumption if tariffs jump sharply (referred to as “price elasticity”). Consumers are prepared to pay more when the service improves.

Water supply schemes generally have high capital cost and low running costs. However, if much energy is required, the operating costs can also be high, e.g. desalination of sea water. Large infrastructure developments cannot be paid for out of income at the time costs are incurred. Some form of loan is essential to spread costs over a number of years. The cost of borrowing increases the operational costs. Therefore, in many developing countries governments will fund capital works for new water supply infrastructure. Donors have supported this approach with commercial loans, soft (low interest) loans and grants. However, there is mounting pressure from donors to increase the proportion of income to the water utility that comes directly from charges on consumers.

There are a number of PPP for water supply that has been shown to provide sound mechanisms for developing a partnership between the public and private sectors. These are discussed in detail in Chapter 8. In summary, there are well-tried mechanisms that use the skills of the private sector in operation, namely:

- Out sourcing or service contracts for particular services
- Management contracts to boost senior capability and introduce new concepts;
- Lease contracts to pass commercial and technical responsibility and risks to the private sector;
• Concession contracts to pass full commercial and technical responsibility and risks to the private sector and, in addition, the responsibility for obtaining capital funds.

Capital funds for infrastructure components (such as water treatment works or pumping stations and pipelines) can also be obtained under arrangements, such as:

• Build Own Operate and Transfer (BOOT), assets transfer to the public sector at the end of the operating period;
• Build Operate and Transfer (BOT) used for BOOT;
• Build Own Operate (BOO), assets remain with the private sector indefinitely.

These involve operation of the asset as part of the overall water supply system which is controlled by the public sector, so that the commercial risk taken by the private sector should be small.

The suite of PPP options allows flexibility in that greater responsibility for water supply can be passed to the private sector in stages, e.g. by moving from a management contract to a lease or concession.

3. Water Supply Sector

Water supply schemes can range from small single sources serving one or a few nearby houses to major distribution networks with many sources serving millions of people. Different approaches are required to establish and run these schemes. At the small end of the range are individual houses and at the large end are megacities. Table 3.1 sets out some of the factors that differ over the range. The lowest level of body that could be responsible for the water supply is given to show how far decentralisation could go. On the other hand all schemes could be controlled by central government, but the trend is towards more involvement of local bodies and the consumers.

In most developing countries central government has financed infrastructure. Funds from donors in hard currency are normally routed through government, which on-lends in local currency. Consumers will pay for water in the local currency and part of this income can be used to repay local loans. Often there are restrictions preventing free exchange of local currency but as Government has control of the national economy it also has an influence on differential inflation between local and hard currency. Therefore, government normally takes the risk that the exchange rate may deteriorate, so that the loan repayment in local currency does not cover the foreign loan repayments in hard currency.

In theory, local bodies could set tariffs for their areas that would earn enough income to cover costs. However, as water supply tariffs are often perceived as a political tool, central government may also have powers to approve or disapprove increases. These decisions are usually made on very general grounds, not on the actual income required to run the system. Normally a water utility will use the same tariff structure and levels over the whole of its area of supply rather than trying to charge parts of the area at different rates that reflect actual local costs. This means that some areas can be charged less than it costs to supply them (see section 5.4 on cross-subsidy). The larger the consumer base the easier it is to cross-subsidies poor
areas. In rural areas most of the consumers may be classified as poor on the basis of income and there may not be any large users, both of which preclude cross-subsidisation.

The strength and weaknesses of the each size of consumer groups is also given in Table 3.1. Often small schemes cannot attract the skilled staff to run them. In addition, they may need some skills from time to time only and not continuously. Larger schemes can attract and fully utilise good staff. Villages can be grouped together (aggregation) under a single body that is responsible for overall management and support to provide the necessary skills. Economies of scale in large systems help to keep costs lower. For instance, billing can be computerised and payment made easier.

<table>
<thead>
<tr>
<th>Water Supply for:</th>
<th>Organisation at lowest level</th>
<th>Main Provider of Assets</th>
<th>Fix charges (Cross-subsidy to poor)</th>
<th>Strengths</th>
<th>Weaknesses</th>
<th>Private operating partner</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single house</td>
<td>Householder</td>
<td>Householder</td>
<td>Householder (no)</td>
<td>Consumer choice of service</td>
<td>Needs cheap local source, Consumer funds, low cost</td>
<td>Plumber</td>
</tr>
<tr>
<td>Few houses</td>
<td>Source committee CBO</td>
<td>Source committee or govt</td>
<td>Local (no)</td>
<td>Community choice of service</td>
<td>Requires adequate local source, Consumers share high costs</td>
<td>Plumber</td>
</tr>
<tr>
<td>Village</td>
<td>Village committee/ CBO</td>
<td>Govt.</td>
<td>Local (possible)</td>
<td>Village choice of service</td>
<td>Must have good local source, Difficult staffing</td>
<td>Local company, CBO</td>
</tr>
<tr>
<td>Aggregation of villages</td>
<td>Village committee/ CBO</td>
<td>Govt.</td>
<td>Local (possible)</td>
<td>Village some choice of service Economies of scale</td>
<td>Must have good local sources, Easier staffing</td>
<td>Local company, CBO</td>
</tr>
<tr>
<td>Multi village/town</td>
<td>Project</td>
<td>Govt.</td>
<td>Govt (possible)</td>
<td>Economies of scale Use distant source</td>
<td>Restricts local choice, Difficult staffing</td>
<td>National company</td>
</tr>
<tr>
<td>Small town</td>
<td>Local govt.</td>
<td>Local/central govt.</td>
<td>Local (possible)</td>
<td>Town choice but must have local source</td>
<td>Costs and tariffs vary between towns, Staff not attracted</td>
<td>National company</td>
</tr>
<tr>
<td>Large town</td>
<td>Municipality</td>
<td>Municipality, govt.</td>
<td>Municipality (yes)</td>
<td>Economies of scale Spread costs Attract good staff</td>
<td>Uniform service, Large operator</td>
<td>National or international company</td>
</tr>
<tr>
<td>Megacity</td>
<td>City council</td>
<td>City/govt</td>
<td>City (yes)</td>
<td>Economies of scale Spread costs Attract best staff</td>
<td>Uniform service, Large operator</td>
<td>International company</td>
</tr>
</tbody>
</table>

Table 3.1 Characteristics of water supply to sizes of groups of consumers

Table 3.1 also gives an indication of possible private sector partners for PPP. Very small systems can have an arrangement with local plumbers or blacksmiths to keep them running. Local and national companies might be partners in larger settlements. International companies will be interested only in large systems or groups of systems where their overheads can be spread and they can use their particular skills. It must be emphasised that all plans for PPP that are trying to attract the private sector must be commercially viable and profitable compared with the risks. This may require some capital and operating subsidies, at least initially, until tariffs can be raised.

The availability of water sources is a major factor in planning a scheme. Groundwater is usually good quality and is locally available. However, groundwater in some areas has naturally high amounts of arsenic or fluoride, both of which can cause health problems in the long term. In these areas the best option may be large schemes using surface water.
Table 3.2 sets out the range of the main ways in which consumers can obtain water for different levels of service. An indication is given of the main uses for each type of supply. Where other less safe sources are available, water used solely for food and drinking can come from expensive sources. However, where other sources are not available consumers may have to use expensive sources for all purposes. This can be a very severe burden on the poor. To reduce the cost burden, free non-potable water could be provided by wells or boreholes or by not charging for standposts. Some kiosks are subsidised by paying the attendant’s wages or allowing him part of the income from water sales. An indication has been given of the initial costs to consumers. Where water is collected, the householder’s cost includes for buying vessels to carry water and possibly for some larger storage vessels in the house.

<table>
<thead>
<tr>
<th>Supply</th>
<th>Main Use</th>
<th>Initial costs to consumers</th>
<th>Pay Process</th>
<th>Level of charges</th>
<th>Coping costs</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Piped water</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>House connection</td>
<td>All</td>
<td>High, pipe</td>
<td><em>Monthly</em></td>
<td>Low</td>
<td>High</td>
<td>Preferred system but waste water must be disposed of.</td>
</tr>
<tr>
<td>Yard tap</td>
<td>All</td>
<td>High, pipe</td>
<td><em>Monthly</em></td>
<td>Low</td>
<td>Moderate</td>
<td>Can upgrade to full plumbing</td>
</tr>
<tr>
<td>Standposts</td>
<td>Food</td>
<td>Low, Containers</td>
<td>Cash, if charge high</td>
<td>Low</td>
<td>Low, Storage in house</td>
<td></td>
</tr>
<tr>
<td>Water kiosks</td>
<td>Food</td>
<td>Low, Containers</td>
<td>Cash</td>
<td>High</td>
<td>Low, Storage in house</td>
<td>Oftentimes restricted opening hours, charges can be high to pay wages.</td>
</tr>
<tr>
<td>Neighbour</td>
<td>Food</td>
<td>Low, Containers</td>
<td>Cash</td>
<td>Low</td>
<td>Low, Storage in house</td>
<td>Depends on local community</td>
</tr>
<tr>
<td><strong>Non-piped water</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vendors</td>
<td>Food</td>
<td>Low, Containers</td>
<td>Cash</td>
<td>Expensive</td>
<td>None</td>
<td>Unreliable, can be unsafe</td>
</tr>
<tr>
<td>Communal open well</td>
<td>All</td>
<td>Low, Containers</td>
<td>Free</td>
<td>Low</td>
<td>None</td>
<td>Can be unsafe for food</td>
</tr>
<tr>
<td>Tube well, borehole</td>
<td>All</td>
<td>Low, Containers</td>
<td>Low</td>
<td>Standby electricity</td>
<td>Can have local distribution</td>
<td></td>
</tr>
<tr>
<td>House well, borehole</td>
<td>All</td>
<td>High</td>
<td>Free</td>
<td>Very low</td>
<td>None</td>
<td>GW can be contaminated, seasonal availability</td>
</tr>
<tr>
<td>Local river or canal</td>
<td>Washin</td>
<td>Low</td>
<td>Free</td>
<td>None</td>
<td>None</td>
<td>Can be very contaminated, seasonal availability</td>
</tr>
<tr>
<td>Rain harvesting water</td>
<td>Washin</td>
<td>High, pipes and storage tank</td>
<td>Free</td>
<td>Low</td>
<td>None</td>
<td>Depends on adequate, frequent rain.</td>
</tr>
<tr>
<td>Bottled water</td>
<td>Drink, Food</td>
<td>None</td>
<td>Cash</td>
<td>Very expensive</td>
<td>None</td>
<td>Not affordable by most, bottle to be disposed of.</td>
</tr>
</tbody>
</table>

Table 3.2. Levels of service

Payment methods are shown in Table 3.2. Consumers with connections will pay monthly, those buying water in vessels will pay cash and other sources are free. An indication of levels of charges is given. Vendors supply poor consumers who are distant from other sources. As the charges made by vendors are high, consumption is severely limited by financial constraints, which can create a health hazard to the whole community.

Where a piped supply is intermittent and low pressure, wealthier consumers may make their own provisions to improve the level of service within their houses. These are referred to as “coping” activities and costs. Underground tanks are constructed in the garden or under the house with a pump to raise water to a roof tank from which the house can be supplied by gravity. Storage, pumps etc, within properties are paid for by the house owner. If the groundwater is high, shallow boreholes can be sunk and fitted with a hand pump. However, these coping activities can be a health hazard if waste water is disposed of by septic tanks, which can cause pollution of the groundwater.

Most consumers would like a piped water supply system plus a house connection to serve a number of water using appliances such as sinks, showers and toilets. The next best
supply is a yard tap providing a single delivery point from which water can be carried to the point of use. However, even with a house connection, consumers may still choose to use tradition sources for certain purposes. Consumption from a piped water system may be only part of the total water used by a household.

An assessment of the water that will be sold at the price needed to cover costs should include consideration of the availability of alternative sources that might be used as well as the piped service. This is most important in rural areas where traditional sources will probably remain useable even if piped water is installed. The piped water supply is not a monopoly and the water utility has to bear in mind that consumers have a choice of sources. The level of service from the piped supply has to be better than others, e.g. more easily available, better quality, more reliable, and not so expensive that the volume sold will be small.

Alternative sources such as shallow boreholes and rivers may also be accessible in urban areas. Both are often contaminated, by sewage from septic tanks in the former and pollution from sewage and solid waste in the latter. Nonetheless, in urban areas piped water is more likely to be a monopoly than in rural areas. In theory, a monopoly could tempt operators to charge excessive prices, so some control mechanism (regulation, see section 8) is essential to safeguard consumers. If the public sector is running the service, tariffs are normally kept low by political pressure and in many cases are too low to properly fund the operations. If the private sector is supplying piped water, control is normally provided by an independent regulatory body. It has responsibility for ensuring that tariff levels are consistent with costs that are incurred in running a sustainable service with a reasonable profit margin. Unless the operation is profitable, banks may not be prepared to offer finance to cover cash flow deficits and further investment. There is a strong argument to apply the same level of regulation to the public sector as to the private sector especially where the public sector is being made autonomous. Whether operated by the public or private sector, it is not in the long term interest of consumers for a water supply operator to:

- Under invest in routine and preventive maintenance because the service will deteriorate with time.
- Be virtually bankrupted because of low tariffs, as the service will be seriously interrupted and will require time and even higher tariffs to restart it, possibly with another operator.

4. Sustainability

The basic concept of sustainability has been explained in Box 2.1. It is essential to have a balanced sustainability triangle for any water supply scheme to continue to provide the desired levels of service. This section covers some of the aspects that can contribute to sustainability and some that are most likely to contribute to deteriorating services.

4.1 Factors contributing to sustainability

These include:

a) **Consumer support.** This is essential to keep water supply systems operating. These include such factors as:

- Regular payment in full against bills. Bills should be monthly in developing countries. A discount for early payment is more effective than a penalty for late payment. Experience in Kathmandu is that most consumers pay
in time to claim a modest rebate. Consumers should be able to pay bills easily, near where they live, at convenient times. Low value coupons for water payments, which are purchased when money is available, can be a way of spreading payment especially for poor consumers who have difficulty in saving.

- Encouraging consumers to report deteriorating services by responding quickly and efficiently to complaints.
- Explaining the operational process and reasons for tariff increases.
- Good public relations and transparency

b) Adequate funds and income. Water supply schemes are high capital cost and relatively low running costs. However, cash flow is critical to any business and if consumers are charged on the basis of measured consumption it is inevitable that billing and payment will follow on after expenditures have been made on supplying water. This is not the case if charges are based on indirect measures of consumption such as property size or value (see section 5.3.2), when bills can be sent out ahead of costs being incurred. Operators must be credit worthy if they are to be able to fund their working capital by borrowing.

c) Appropriate development strategy and designs. The public sector and private sector have different priorities in the design and operation of water supply schemes (see Box 4.1). A development strategy that would be acceptable to the public sector using government and donor funds for capital works would not necessarily be the most effective for the private sector, especially if the private sector is to provide finance.

d) Sound construction. This will minimise later difficulties and costs. The private sector will ensure that construction standards will achieve the design life, especially for underground infrastructure where poor construction can lead to high leakage from pipes. The operators can also check that operations will be efficient.

e) Operational skills. These are generally enhanced by the private sector which will introduce equipment which may reduce staff levels but will train staff to run them. This will increase staff skills and lead to higher wages so that the private sector has fewer staff but with higher wages, including performance bonuses.

f) Regular and preventative maintenance. This will prolong the life of both fixed and moveable assets. In many public water supply systems, maintenance is neglected because of lack of funds. The impact of lack of maintenance is noticed only after a number of years during which systems will continue to run but less and less efficiently. This progressive deterioration in performance then requires a major rehabilitation project to restore the facility. The overall cost is higher than prolonging the asset life through proper maintenance.
4.2 Factors that contribute to deterioration

These include:

a) **High physical losses.** A very significant proportion of water put into distribution systems is “lost” before it reaches consumers by leaks from underground assets (pipes, valves, connections etc). The majority of losses are leaks from pipes caused by one of more factors such as:
   - Poor initial construction especially jointing;
   - Fracture of pipes due to poor bedding and increased vibration from heavier traffic;
   - Internal and external corrosion due to poor protection;
   - Faulty jointing of house connections to pipes in the road.

Losses range from about 10 to over 50 percent of total supply. Leakage reduction measures detect and repair leaks early, thereby “saving” the water that would
have been lost had the leak continued. Lengths of pipes that persistently develop leaks should be replaced.

b) **Inadequate billing of charges.** This means that income is lost. Customer bases should be complete and up to date, which can be difficult in areas that do not have an address system, such as shanty towns. Domestic meters generally under read because they do not respond to low flows; especially the cheaper models which are the least accurate. Meters can be tampered with, especially if installed within properties. However, those outside properties can be damaged. Illegal connections and by pass pipes to meters are a direct loss of revenue. Billing is easiest with a simple billing system.

c) **Deterioration of services.** Consumers are less willing to pay bills, especially if follow up on outstanding bills is weak and spasmodic and penalties are added for late payment.

In many areas the raw water resources available for water supply are limited. In others, new sources may be more distant and therefore more expensive. Conflict can develop between water for irrigation and urban use, but the latter will pay more for water.

### 4.3. Impact of tariff increases

Many water charges in developing countries are below the level to give enough income to run the system in the long term. The trend is to set tariffs that cover at least operating costs and, preferably, some part of capital costs.

Piped water is used for many purposes, some of which are essential for life but others are not. All consumers will pay highly for the volume of water that they consider is a top priority such as for drinking and cooking, they will pay less for uses that are not critical but still contribute to well-being such as washing. Wealthier consumers will pay proportionately even less for luxury uses such as watering lawns, cleaning cars, filling swimming pools. Therefore, if the consumer demand is fully satisfied at a certain tariff level, i.e. some consumers are buying water for non-essential uses, any tariff increase could lead to a reduction in usage as some of these consumers decide to cut back on using water for some purposes. Industry will look at means of reducing consumption from the mains and may introduce recycling of waste water from some processes that it can treat and then use for other processes with less stringent requirements. In an extreme case large consumers will choose to install their own private water supply system, usually with a borehole taking groundwater from below their property. Demand is “elastic” as it depends on costs.

However, in many developing countries the consumer demand is not satisfied. Consumers may well accept increases in charges and maintain their consumption. In fact consumption may increase if the supply is improved at the same time.

Therefore, the price that consumers consider to be reasonable for piped water supply depends on many factors including:

- Historic rates of charging to which consumers have become “calibrated”. In many countries these rates have been highly subsidised in the past for public health, humanitarian, religious or political reasons.
- Level of service and coping costs incurred by consumers to improve the service within their houses. In an intermittent system, once a householder has installed
tanks, pipes and pumps in order to supply water to his house all day, the owner will be less willing to pay more for a 24 hour supply in the street. However, a consumer without his own facilities will be prepared to pay more.

- Rate at which tariffs have risen in real terms (excluding inflation). A gradual rate will allow consumers to become used to new levels. Small but frequent increases are more acceptable than infrequent but large rises.

- Expenditure on water supply (and coping costs) relative to family income. Donor guidelines suggest that families in developing countries should budget on paying five percent of income on water supply and waste water disposal. However, poor families will often pay more and wealthy consumers will pay much less as a proportion of income.

4.4. Intermittent water services

In many developing countries, water supply systems are not able to perform because of faulty construction, inadequate maintenance, insufficient capacity, under-investment and alienated consumers. The result is an intermittent system that supplies water at low pressure for a few hours per day. Consumption is limited or rationed by the amount of water that is actually put into the system and how this is distributed.

In many ways operating an intermittent system is much more demanding on a day to day basis, than running a 24 hour supply. Many of the sound management and operational techniques developed for good systems just cannot be used. Limited supplies have to be switched between areas once or twice per day, so that all get some water.

Water delivery pipes are laid underground for many reasons. Often pipes are surrounded by groundwater that has been contaminated by sewage leaking from sewers or septic tanks or infiltration from the surface. In a 24 hour supply system a positive pressure is maintained in the pipes which causes leakage of water out of any holes but prevents ingress of contaminated water. However, in an intermittent system the pressure in the pipes often falls to zero or negative so that groundwater can infiltrate, which makes the supply potentially unsafe for drinking.

4.5. Upgrading supply

Many of the challenges in developing countries are to upgrade and expand water supply services to provide better services (improved safety) and more complete coverage (see section 2). This can be a huge task, especially if consumers are accustomed to supplies of a few hours every so often at very low pressures. Their fittings will not withstand higher pressures without leaking. Similarly, the distribution network will probably leak at a very high rate.

The task of upgrading poor systems is huge and expensive. Governments may be tempted to hand the whole problem over to the private sector. However, this is not realistic as government still has full responsibility to provide water as a public service. In addition, a piped water supply in urban areas is often a monopoly so some public control of tariffs is essential. Finally, private sector operators are not prepared to take the full risks themselves, especially in providing large investments with a return only in the long term.

5. Cost Recovery and Sources of Funds

5.1 Cost recovery
The process of cost recovery is crucial to the implementation and sustainability of water supply schemes. All types of water supply schemes are capital intensive. Operating costs are normally not high unless energy is required for pumping. In the range of types of schemes, some have low running costs but in others running costs are high:

1. Lower running cost schemes:
   - Deep/shallow wells with hand pumps
   - Protected springs
   - Protected dug wells
   - Protected rainwater catchment systems

2. Higher running cost schemes:
   - Piped water supply systems with adequate treatment, especially where pumping is necessary;
   - Desalination of sea or brackish water.

In the case of piped water supply, the preferred strategy is to recover the cost of providing infrastructure through some form of usage charge. Consumers pay periodically e.g. monthly or annually. The water supplier arranges all finance for new infrastructure and passes on these costs as necessary (some finance may be grants). In large water supply operations, where a new scheme is part of a substantial functioning system or systems, the cost of new infrastructure can be absorbed by charging all existing consumers a relatively small amount. This applies to a supplier running a single large system or one running a number of systems where all consumers are charged on the same scale irrespective of which system they are in. In addition, the supplier will probably take out loans to spread new infrastructure costs over a number of years.

A new pipe water scheme to provide a higher level of service to the whole of a community is costly. Income is not generated until consumers are connected. The full capacity of the scheme may not be utilised for a number of years. If the full costs were to be charged to the water utility at the time that expenditures were made a huge deficit in cash flow would result. To mitigate this situation some or all of the capital cost of schemes is often borne by government.

In rural and small schemes, the community is sometimes required to contribute in some way to construction. Their contribution can be in labour, which reduces the capital cost, or in cash which reduces the deficit to government. However, the consumers have either to have saved this cash contribution or they have to borrow from a bank or other source in order to pay. Any borrowing increases costs to the consumers especially where commercial loans are short term and high interest. Poor consumers may just not be able to raise loans, but might provide labour. Wealthier consumers may prefer to pay the cash contribution.

Any lump sum charge for connection will be more difficult for poor consumers to pay than more wealthy consumers and may prevent the poor from joining a new or existing system. Therefore, in order to encourage consumers to connect (and use the infrastructure) the supplier can spread lump sum charges by collecting in instalments through water bills.

The disparity between initial capital costs and running costs is even more pronounced for lower running cost schemes. However, labour contributions to construction costs could be
higher. The costs of operating and maintaining a dug well or spring are negligible. A hand pump can break and need repair. Filters on rainwater catchments need cleaning from time to time. In addition, any arrangement for charging for usage has a significant cost for billing and charging.

Some systems for charging consumers may actually reduce the availability of water and the convenience of a new system. In some countries, an operator is put in charge of each water delivery facility, such as water kiosks. The operator levies an agreed charge for each bucketful or container of water supplied, which provides their income, covers routine maintenance and pays for the bulk supply to the facility. The water sources have to be sufficiently far apart for there to be enough consumers for each kiosk to generate adequate income to the operator. In Africa, kiosks can be one kilometre apart to generate enough consumers for each. The kiosk will operate during certain fixed times only, depending on availability of bulk water and reasonable working time of the operator. These constraints are counter to the policy to provide an easily accessible source of water within a short distance.

Alternatively the community can accept responsibility for operating and maintaining the scheme. A one-off charge may be levied from the consumers when a repair or replacement is necessary or a small charge could be levied each month in order to build up a fund that could be used as full or part payment if there is a breakdown in the future.

5.2. Subsidies

Often government provides a water supply service which incurs costs for investment and operation and maintenance. To be sustainable these costs must be covered by direct income through charging consumers or by subsidy from government or both. Although any subsidy may appear to come from “government”, it is in fact provided from taxes paid by the population in one form or other. Therefore, the population already pays directly or indirectly for the full cost of water supply.

Forms of subsidy that are in common usage include:

- **Capital costs.** These cover new works. Often government will cover the full cost of construction through a grant to the water utility or, more usually, by implementing the construction of the works itself and then handing them over to the operator. In the past donors have supported this approach with loans but are now requiring that some or all of these costs be passed on to the consumers.

- **Operational support.** The cost recovery strategy is often changed by government, possible in order to obtain loans from donors. Typically the new target could be to recover the full cost of operation and maintenance plus some part of capital costs direct from consumers. However, for public health and other reasons government may be reluctant to sanction large enough increases in tariffs immediately. Nonetheless if the operator is to remain financially sound its total income must cover total costs on a year by year basis. Therefore, the deficit can be covered by an operational subsidy, which should be accepted as being temporary and would be phased out as tariffs are increased gradually in real terms. A time bound operating subsidy will sometimes be provided by donors.

- **Major maintenance and rehabilitation costs.** These can also be covered by grants or better-than-commercial loans from government, again with the support of donors. At the start of most large concession contracts a substantial sum has been
provided by donors to rehabilitate the system up to a reasonable level where efficiency savings can then be achieved by the private sector.

- **Relief of dues to government.** These can take the form of tax relief to the private sector for a number of years (tax holiday), waiver of import duties on equipment and exemption of tariffs from Value Added Tax (VAT). Any means of keeping tariffs low will increase water sales where there is adequate capacity to supply.

### 5.3. Tariff structure and levels

Current policies are to move towards full cost recovery from consumers through direct charges. This infers reduction of subsidies to the sector and setting up a functional tariff structure at adequate levels. However, no tariff system can reflect the true cost to each consumer so an averaging system is used based on a balance of income and costs over supply areas or at local government or national levels. This means that there is always some form of inequity between categories of consumers and individuals in the same category.

In many countries, industry and commerce are charged a higher rate per cubic metre for water than domestic consumers. The reasoning is that the former are profit organisations and can pass on this cost to those who buy their services (i.e. directly or indirectly to the population at large). The cost of a piped water supply system within a dense urban area is usually less than the equivalent for rural areas because a shorter length of pipe is needed per consumer. Consumers that use less water are more expensive to supply per cubic metre than those that use more as each consumer has the same pipework, head office and billing and collecting costs.

#### 5.3.1 Charges based on measured consumption

There is concern that poor consumers may not be able to pay the full cost of water supply (whether this be just for operation and maintenance or also includes capital costs). One solution that has been applied in many places is to increase the unit charge for water as consumption increases. A block structure is used with the lowest block of up to 6 to 20 m$^3$/month being provided at less than cost. One or more higher blocks are charged at or above cost, to achieve the necessary income. In particular the highest block may be set at a rate that is intended to discourage excessive usage. However, this approach has a number of disadvantages:

- Consumption has to be measured. Consumers’ meters must be read each month at the same time to establish how much water has been taken in each block. Metering is expensive and subject to serious error especially when supply is intermittent because air passes forwards and backwards through the meter as the water supply starts and finishes. Meters tend to under record low water flows and often fail.

- The initial (lifeline) block is charged to all consumers, whether they are poor or not, so all consumers receive some water at less than cost. In some places the tariff structure is a charge rate per cubic metre increasing with consumption, with all the water being taken in the month being charged at the unit rate for that consumption. This means that monthly bills are very sensitive to the measured monthly consumption, which puts considerable importance on accurate meters and regular recording.

- Often a number of poor families share one connection. Their total consumption exceeds the lifeline block so that they also buy water at higher rates. In fact most of the water they buy may be charged at more than cost.
• Wealthy consumers who use piped water for luxury purposes are least likely to be constrained by the cost of supply, so may continue to use excessive amounts even during seasonal shortages.
• Operating costs are only partly related to water supplied as many costs such as those for infrastructure, staff and overheads are fixed or difficult to change. Sometimes a fixed charge is made as well as a variable charge based on consumption which models costs more accurately.

5.3.2. Charges based on indirect measures of consumption

Although charging by measured consumption is widely used there are well tried practical alternatives that have certain advantages especially if supply is intermittent. These are based on indirect measures of consumption and an indication of ability to pay and include:

• Charges based on size of property, large properties pay proportionately more than small properties. The area of properties can be measured once only and can be checked easily. Large properties are likely to have more water using facilities and appliances.
• Charges based on size of house connections. The rate of flow is controlled partly by the diameter of the connection from the main pipe in the road. Large consumers can choose a larger diameter connection pipe which can deliver more water under equivalent conditions.
• Charges based on location, with better areas being charged at a higher rate per unit of property size. This reflects the likelihood of more water using appliances in wealthy areas and being able to pay.
• Charges based on an assessment of the value of the property, which can include both size and location. Size can be measured easily and checked from time to time. Property value is only practical where it is ascertained for other purposes, such as local taxation, which case a part of the house charge may be allocated to water.

The advantages of these indirect systems are:

• Poor consumers can be identified indirectly by the size, location or construction of their dwellings without more complex tests to establish their poverty level. A targeted low tariff can be charged on an area or house basis.
• Saving in costs for installing, repairing and replacing meters, and for meter reading and billing each month. This saving can be passed on to consumers.
• Errors in meter measurements are avoided. These can be very high for intermittent supplies because meter measure air not water.
• The base on which tariffs are charged is known in advance and will not change during the year. Bills and payment can be in advance of costs.
• Income is secure even if droughts reduce the volume of water that can be supplied.

The disadvantage of these indirect charging systems are:

• As the same water charge is made irrespective of consumption there is a perceived risk that usage and wastage may be excessive but in fact is limited by
flooding or overloading septic tanks. In many intermittent systems there is just not enough water to waste.

- Total consumer usage cannot be determined by summing total measured water sales. However, in most metered systems a high proportion of meters are faulty or broken, especially in intermittent systems where any readings can be very misleading.

The method of charging should be related to the practicalities of each situation. In poor areas a flat rate may be more effective than measurement because the cost of metering can exceed the cost of supply, i.e. more than double the monthly charge.

### 5.4. Cross-subsidy

For the reasons discussed above, some element of cross-subsidy is inevitable, i.e. some consumers will pay more than the “real” cost whilst others will pay less.

The smaller the water supply system the less likely that cross-subsidy will be possible, particularly in rural areas without industry or commerce and with few large consumers. Establishing a specific tariff level for each community may well lead to significant differences in charges between communities, because of the different costs of installing, operating and maintaining each water supply system. For instance, communities living on hills can be faced with high pumping costs, whereas those in valleys might be able to distribute water by gravity. Those using surface water sources may be faced with significant water treatment costs that are not necessary for groundwater. Inevitably, anomalies will occur.

There are some strong arguments both for and against cross-subsidy to ensure that all consumers have adequate safe water. In favour are:

- Public health has an impact on the whole community. Adequate safe water is a major contributor to health. In epidemics of cholera or typhoid the whole country may suffer economically as well as personal losses.
- Charges can cover a large area, thereby evening out local high and low cost anomalies.
- The rich universally pay more than the poor through taxation schemes based on income, consumption and life style whereas the poor benefit more from social services funded out of this general taxation.
- Commercial and industrial consumers require a healthy workforce and are prepared to support safe water supply to their workers and their customers. However, they must also minimise their costs so may develop their own water supply system if charges are excessive.
- Consumers have a choice of paying more or less for water but those who are most able to pay are not penalised.

Against cross-subsidy are:

- Unnecessarily high charges to some consumers compared with the cost of their particular service.
- If all consumers are required to pay close to actual costs it might discourage settlements in remote or inaccessible areas that are difficult and expensive to serve. Consumers might settle in areas where water charges are less. However, most
developing countries face severe migration from rural to urban areas and governments try to keep people in even remote communities.

- Higher charges to larger consumers do not reflect actual costs as the unit cost of supply falls as more water is sold, costs are spread and infrastructure is used more fully.

6. Pro-Poor Mechanisms

6.1 Benefits of good water supply

The international community has established a priority and targets for poverty alleviation. It has recognised that adequate safe water nearby is a major contributor to this aim by improvement in health and time saving of all consumers but with more impact on the poor, which in turn will:

- Increase use of water to improve overall well-being.
- Reduce illness and suffering.
- Reduce expenditure on medicines, which can be ill-afforded by the poor.
- Increase output of workers by reducing illness which can cause underperformance or absence from work. The poor are unlikely to be paid if they do not attend at their work place.
- Reduce absence from education institutes.
- Save time spent in collecting water.
- Create capacity for employment opportunities in the time saved in collecting water.

6.2. Pro-poor approach

Recognizing the special needs and vulnerability of the poor has been termed “pro-poor”. However, this concept may restrict the scope of projects and institutional arrangements that could help alleviate poverty if emphasis is placed on the poor on their own.

Although pro-poor strategies are aimed at helping the less well off members of the community there can be resentment in being classified as “poor”. This suggests some inadequacy and causes “loss of face” within the community. As an example, in some areas of Manila, water was provided through officially appointed standpost operators who either sold water to consumers at the standpost or filled consumers’ containers which the operators then delivered to houses using small trailers. This latter service was slightly more expensive but was very visible and clearly established that those having water delivered had risen above the lowest level in the community. Water being delivered was a small but significant status symbol.

The other risk in the use of the term pro-poor is that it can be interpreted as focussed entirely on the poor. As piped water supply is relatively expensive to install and operate any scheme which is serving the poor only is almost certainly not affordable and must have a substantial subsidy. If the scheme is part of a larger system then cross- subsidy is also a real option.

The poor can benefit directly in the ways listed above. They can also benefit indirectly if the operator can earn more which could be used to provide services to the poor special favourable conditions. For instance, the creation of large consumers paying more than the cost
of water can lead to greater capacity for cross-subsidy to the poor. Consumer groups can reduce construction costs by undertaking some construction activities using local labour to effectively reduce overall costs and save money that could be used to help the poor.

The pro-poor methods that can assist the poor directly include:

- **Subsidised tariff levels.** (see section 5.3.1) This can be achieved through a lifeline block of water supplied each month at less than cost. This is a crude and rather wasteful approach towards all consumers.
- **Targeted subsidy.** This is aimed at poor consumers through existing social safety net provisions. Those who qualify would receive money or coupons from government with which to pay their charges to the operator. This is an efficient form of subsidy but does require a sound process for identifying poor consumers to be in place and to be administered fairly.
- **Lower service levels.** These are provided only to poor areas but at lower cost. These include standposts with free water, or if a charge is made the provision of some other convenient sources for non-potable purposes. Communal taps can be fitted with busbars holding a number of domestic meters, one for each local household. The occupier can then attach his own flexible hose pipe to take water to his house. This system is appropriate in shanty towns with narrow pathways, especially those which are likely to be redeveloped later.
- **Regular and frequent billing.** These should be coupled with easy payment so that consumers are not faced with large bills for which they need time to accumulate money to pay.
- **Special connection charges.** These may be low and/or spread over a number of years, as discussed below.

### 6.3. Connection charges payment

Experience world wide is that low income families have difficulty saving to meet substantial cash payments. However, they can manage to pay a smaller amount each month on a regular basis, even though the total sum paid may eventually exceed the original lump sum. The inability to manage money with numerous day to day demands is the main problem, not affordability. This leads to an exploration of means of making payment easier for consumers without disadvantaging the operator significantly. The basic concept should be to spread payment for house connections in an affordable and manageable way. This could be achieved by:

- The consumer borrows from a money lender. Often rates are exploitative and duration of loans is no more than a few months or up to a year so the cost to consumers is very high.
- The operator spreads any connection charge over a number of years. Although the operator is in effect giving a loan he is also immediately generating additional income to himself by selling water to a new consumer. Therefore, the operator can afford to charge little or no interest. The operator has the additional safeguard that if the consumer can afford to repay connection charges in instalments, he is also likely to pay monthly bills.
- Donors can specifically channel part of the funds for a water supply project to ensuring that poor consumers do connect to a new system. These funds could be a grant but existing consumers might consider this to be an unfair benefit as they
have already paid for their own connection. Usually, donor grants are used where a project is specifically targeting the very poor but this creates a financial risk for the operator because these consumers may not pay regularly.

- NGOs provide the initial funds for connection and charge consumers by instalments. In some places NGOs have also assisted with improvements to water using facilities within properties in order to make best use of the easier access to water. The cost of these internal facilities is also covered by loans.

7. Anti-Poor Factors

This section reinforces the importance of taking an overall view of water supply and evaluating what aspects could have an adverse impact on the poor but not on other consumers.

Poverty alleviation requires that job opportunities are created where skilled and unskilled work can be obtained. Many industries require reliable and good quality water for their processes. An industrial organisation looking for sites for a new factory will consider many factors amongst which will be the availability of labour (reservoir of appropriate workforce) but also the water supply. The prime decision factor for water is likely to be reliability of water supply as any lengthy disruption could stop the process. Short interruptions or daily fluctuations can be covered by local storage in the factory. Quality is a serious consideration but many processes require better than potable standard so the factory may establish its own treatment plant. The cost of water is critical. The new factory may not be competitive if water charges are excessive.

The interest of the local poor is not served by charging industry much higher than the cost of supply if this means that the factory is located somewhere else and their job opportunities are lost. In addition, the operator will loose a potential good consumer. In extreme cases a new factory may opt for establishing its own water supply which creates jobs for the community but not income to the water supply operator. Charging high tariffs to industry may discourage new factories that would be of most benefit to the poor because of jobs for them. Other consumers who do not want work in a new factory may well oppose industrial development for environmental reasons.

The importance of adequate income to run the water supply system has been emphasised (section 2 with the sustainability triangle). The ability of non-poor consumers to install coping facilities that improve their water supply has also been explained. The problem is that the poor cannot afford to install storage tanks etc and are very reliant on taking water when it is available. Sometimes this may be only in the middle of the night when upstream users are not taking water. Therefore, if a water supply system is unreliable and/or intermittent the poor are hit hardest. The logical extension of the argument is that the poor should be given a better service than richer consumers because the poor are least able to afford special measures to collect and store water.

The poor are also most disadvantaged if the service deteriorates. Sustainability of services is more important to them than other consumers who would take measures to cope with worse supply. Sustainability cannot be achieved without adequate income so crude charging mechanisms that purport to help the poor through a life line block may actually have the converse effect. This is because even those who can afford to pay the cost of water are charged less for the initial block. The low initial block causes a loss of potential income to the operator that could be used to improve sustainability. In addition many poor families may use
the same metered supply so would actually consume sufficient to take them into higher
charging blocks.

The operator (whether public or private) will be under some commercial pressure to
maximise income. If the water supply is less than the total system demand (possibly
seasonally) it means that some consumers would like to take more water, and pay for it. Where
a lifeline block is charged at less than cost and higher consumption is charged at more than
cost, the operator could have a choice of who to supply on a day by day basis. The limited
water available could be delivered to large consumers at a higher charge than cost (and
probably be paid) or to poor or low consumers at a charge less than cost (with possibly an
additional risk that they may not be able to pay regularly). Clearly for public health reasons the
limited supply should be spread between consumers (some for all). Therefore, excessive
emphasise on profitability on a day to day basis within an organisation may actually mean that
poorer consumers tend to suffer most, especially during shortages.

As explained in section 6 poor consumers find money management difficult. They can
pay frequently in small amounts but find it difficult to save in advance for future bills. Water
supply operators aim to minimise their billing and collection costs and often issues bills
sporadically following infrequent and irregular meter readings (which also makes a rising
block tariff less effective). Any inefficient and irregular billing impacts most on poor
consumers, who may even like to pay weekly rather than monthly. Frequent billing is simplest
if charges are based on non-measured assessments of use (see section 5.3.2.). In fact consumers
can be given their charges for the whole year at the start of the year and can pay in small
amounts frequently as and when they have funds. Richer consumers may even choose to pay
the full year in advance.

The poor are least able to make complaints about faulty service or to report
deterioration in service. However, it is in the operator’s interest to develop the confidence of
all consumers, so that they understand supply problems and the importance of paying bills. A
quick and effective response to reports shows that the operator is trying to provide a good
service. The general experience is that when operation is handed over to the private sector the
number of complaints and reports increases initially. This is because he actually responds to
them, which the public sector did not, so that consumers lost interest in reporting leakage from
pipes etc and also in paying for a service which was not responding to their actions.

As explained in section 6 a water supply scheme that is just focussed on supplying poor
consumers and charging them the full cost is likely to be much more expensive than supplying
the poor from a large scheme with sharing of costs between consumers.

8. Public Private Partnerships (PPP)

8.1. Partnership concept

The term “Public Private Partnership” (PPP) has developed as short hand for forms of
agreement or partnership between the government (Public Sector) and other organisation that
are not government (Private Sector) to carry out a project or provide a service. Civil society
has a direct role as a beneficiary, expressing the price the community would pay for an
acceptable level of service, and an indirect role in shaping policy for water supply. In small
PPP the community and Community Based Organisation (CBO) can be the private partner.
The most important feature of the concept is the “Partnership”. It infers:

- joint commitment
- sharing of risks
- mutual benefits
- partnership agreement

To be successful, both the public and private sectors need to compromise in order to develop workable forms of PPP. Both require safeguards on the performance of the other, especially to accommodate changed circumstances. A sympathetic approach to PPP improves the chances of sustainability, but one essential element is clearly that the funds available to the PPP cover full costs. Unless this is achieved the partnership project will not be sustainable (see section 2). Funds can come from direct payment by consumers for a service or through a fee paid by the public sector to the Private Operator (PO) for providing the service or a combination of both.

**8.2 Main stakeholders**

The main stakeholders in PPP for water supply, together with the benefits offered to them through PPP, are as follows:

a) Government (primarily municipalities): access to additional private funds over and above public money, and/or improvements in operating standards and efficiency.

b) Consumers: better services at prices that can be afforded.

c) Community based organisations (CBO): improvement in services and safeguard of the poor. Implementers and operators of local development projects

d) Private companies: use of their resources and skills to provide services through partnership. Establish reputation.

e) Financiers (banks): creation of sound investments, compatible with risks.

f) Employees (trade unions): improved job opportunities and terms of employment, but PPP to safeguard jobs or compensate for retrenchment or early retirement.

The likelihood of achieving these objectives depends directly on progressive development of PPP through careful planning, skilled formulation, successful implementation and smooth operation, flexibility and adjustment. All stakeholders should contribute at all stages.

Some stakeholders may have real concerns that they will be worse off following PPP. For instance, trade unions are often worried that some of their members may lose jobs through the introduction of more efficient operating practices and outsourcing some activities. Appropriate strategies, including compensation, should be included in the PPP. On the other hand, ex employees may have better job opportunities working in the private sector providing a service to the PPP. For instance, in Chile, the meter readers formed small companies to bid for and carry out meter reading. Accuracy and performance improved.

Many countries have traditionally administered and run water supply through a large public sector. The private sector is often small but usually is developing rapidly. Public sector staffing levels and employment terms are established. Jobs are secure with progression until retirement with a pension. The private sector is less secure but rewards are generally higher for greater output, particularly if the employee has, or develops, special skills (see Box 4). Casual
employment on a temporary basis or for a daily wage is common in both the public and private sectors.

Implementation through PPP creates more flexible job opportunities particularly through labour intensive construction projects. Traditionally, certain groups in the community have undertaken particular tasks, especially those that are most arduous, least pleasant and often poorly rewarded. PPP can be effective in those sectors by not only creating jobs but also in developing jobs that need higher skills, that are paid better.

**8.3 Common PPP models**

Models for PPP have been developed and used extensively worldwide, particularly for piped water supply. Their broad characteristics are described in this section. The selection of the most appropriate model is critical to successful PPP. Table 8.1 sets out some key characteristics of common PPP models. The duration of small simple PPP can be shorter than for larger PPP, especially where reforms are required.

Common terms for operational arrangements of PPP for public services that have already been provided by the public sector are:

a) **Contracting out, operating or service contracts**: services to be provided by the private sector, usually without investment as many private entities already have the capacity to provide the service or the municipality can provide or lease out its own equipment. It allows competition for short PPP of 1 to 7 years. Longer durations are better where the investment from the private operator (PO) is higher and where continuity is valuable. Suitable for small PO or user/community groups.

b) **Management contract**: the private sector to guide and assist the management of an existing public water utility for which fixed and, sometimes, incentive fees would be paid by the public sector. Public sector also pays for all operating, maintenance and expansion costs over a short to medium PPP period of 3 to 7 years. The private sector does not have day to day control over operations and staff.

c) **Lease**: the private sector to take over day to day operation (and costs) of an existing public organisation or facility and to assume technical and commercial risks but the public sector pays for all infrastructure costs except routine maintenance over a medium PPP period of 8 to 15 years. The private sector may pay for replacement of short life assets.

d) **Concession**: as a lease but the PO pays for all operation and infrastructure costs including rehabilitation and expansion, as agreed with the public sector, over a long term PPP period of 20 to 30 years. Sometimes the private sector receives a single payment at the start as a “sweetener” to contribute to rehabilitation that is now required because of lack of maintenance in the past.

The duration of the PPP reflects the level of responsibility, the time required to raise standards and the time required to recover the costs of establishment and of any other investments. If a service contract requires the private sector to make a significant investment to increase its capability, the contract period should be chosen to allow this investment to be recovered over a longer period at lower annual cost.
Often a PPP can progress from a simple form to a longer and more complex PPP as experience is gained, e.g. a management contract can be converted into a lease or concession contract with the same or different PO.

Common terms for providing infrastructure components through PPP (such as water or waste water treatment plants) for public services are:

a) **Design and Build contract**: private sector designs and builds infrastructure, funded by others, to meet specified performance standards, including short term operation to demonstrate that targets are met, payment to PO by lump sum, usually including interim payments triggered by achieving specified milestones. Contractors are responsible for designing and constructing a facility, usually to meet a specified performance.

b) **Build Operate and Transfer (BOT)**: as a) but with long term operation before transfer of operation to the public sector, payment to PO for construction and by operating fee. In this note BOT is used where the project is funded by the public sector, but the term is often used for private funding as well.

c) **Build Own Operate and Transfer (BOOT)**: as b) but construction using private funds and long term operation for 20 or 30 years, public sector payment to the PO of a regular fee to cover investment and running costs. The PO takes the commercial risk that the agreed fee for providing and operating the infrastructure is too low or that the public sector does not pay. The public sector usually takes the commercial risk that it cannot sell the full output of the infrastructure. Some means are necessary to deal with actual conditions that differ to a large extent from what was expected. The public sector can contribute some capital cost as a grant (to attract bids) or an equity share (to share in later profits). It should be noted that the term BOT is often used to include private finance, i.e. BOOT.

d) **Build Own Operate (BOO)**: as c) but no transfer to the public sector so the infrastructure remains with the PO indefinitely.

Both concession and BOOT arrangements are **investment PPP** as the private sector provides funds for infrastructure development but in the former the private sector also has responsibility for operating the existing infrastructure as well as that which it has funded. In the case of a water supply system the concession would usually cover all technical aspects from raw water sources to the consumers, plus billing and revenue collection from consumers. The PO pays for all rehabilitation and expansion costs (which may increase income to the PO if more water is sold). In a BOT and BOOT the public sector takes the output from the infrastructure provided and then delivers it to the consumer. Therefore, the public sector is responsible for billing and revenue collection from consumers. The public sector pays the PO the agreed fees. The same terms can be used where the public sector makes a contribution to the funding.

Experience shows that PPP will have fewer problems if one operator is responsible from source to consumer including billing and operation, i.e. a vertical operation. Splitting horizontally so that one PPP relies on the performance of one or more others causes interfaces where misunderstandings, inefficiencies and disputes can develop. For instance the supplier of bulk water may not meet the needs of the distributor of water or the distributor may not need all the water that the bulk supplier can provide and on which he has based his price.
Even if the private sector has responsibility for operation, the public sector retains ownership of the existing infrastructure and takes over any new infrastructure provided by the private sector on completion of all arrangements, except for BOO.

Community based projects are a special category of PPP, for which these common models can also be used. Depending on the PPP, the community can provide some cash and can contribute to construction through providing labour or other resources free of charge. It then takes over operation of completed projects through users’ committees. The community is the primary beneficiary and it is in their interest to operate and maintain the project. For simple projects this arrangement is sustainable but if the infrastructure is costly and can break down, such as a pumped well or borehole for water supply, the community may not be able to afford to buy replacement components. Either the municipality accepts responsibility for replacement of certain components or the community should build up a repair fund through higher charges. These community based PPP do not have a time limit and are equivalent to a long lease, probably with no rent fee.

The allocation of key responsibilities under the main PPP models is shown in table 8.2. Operational models have been divided into projects that are suitable for community based PPP and larger ones for private operators.

<table>
<thead>
<tr>
<th>Model</th>
<th>Fixed Assets Owner</th>
<th>Fixed Asset O&amp;M</th>
<th>Moveable Asset Provision</th>
<th>Moveable Asset O&amp;M</th>
<th>Funding for fixed assets</th>
<th>Commercial risk of PPP</th>
<th>Duration years</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operational PPP, Small:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Suitable for community based PPP</td>
</tr>
<tr>
<td>Contract out/Service contract</td>
<td>Public</td>
<td>Public</td>
<td>Public</td>
<td>Private</td>
<td>Public</td>
<td>Public</td>
<td>1 to 2</td>
<td>Indefinite duration for community based</td>
</tr>
<tr>
<td>Contract out/Service contract</td>
<td>Public</td>
<td>Public</td>
<td>Private</td>
<td>Private</td>
<td>Public</td>
<td>Public</td>
<td>3 to 5</td>
<td>Indefinite duration for community based</td>
</tr>
<tr>
<td>Management Contract</td>
<td>Public</td>
<td>Public</td>
<td>Public</td>
<td>Public</td>
<td>Public or shared</td>
<td>Public</td>
<td>1 to 5</td>
<td>Manage public workers, Shared risk if performance fee</td>
</tr>
<tr>
<td>Lease</td>
<td>Public</td>
<td>Private</td>
<td>Private</td>
<td>Private</td>
<td>Public or shared</td>
<td>Public</td>
<td>5 to 10</td>
<td>PO collects and keeps revenue or pays lease fee.</td>
</tr>
<tr>
<td>Lease</td>
<td>Public</td>
<td>Private</td>
<td>Private</td>
<td>Private</td>
<td>Public or shared</td>
<td>Public</td>
<td>5 to 10</td>
<td>Income to PO depends on PPP revenue.</td>
</tr>
<tr>
<td><strong>Operational PPP, Large:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Suitable for private operator PPP</td>
</tr>
<tr>
<td>Contract out/Service contract</td>
<td>Public</td>
<td>Public</td>
<td>Private</td>
<td>Private</td>
<td>Public</td>
<td>Public</td>
<td>5 to 7</td>
<td>Duration depends on equipment provided</td>
</tr>
<tr>
<td>Management contract</td>
<td>Public</td>
<td>Public</td>
<td>Private</td>
<td>Private</td>
<td>Public</td>
<td>Public</td>
<td>3 to 7</td>
<td>Can have financial incentive to meet targets</td>
</tr>
<tr>
<td>Lease</td>
<td>Public</td>
<td>Private</td>
<td>Private</td>
<td>Private</td>
<td>Public</td>
<td>Public</td>
<td>8 to 15</td>
<td>PO collects and keeps revenue or pays lease fee.</td>
</tr>
<tr>
<td>Lease</td>
<td>Public</td>
<td>Private</td>
<td>Private</td>
<td>Private</td>
<td>Public</td>
<td>Shared</td>
<td>8 to 15</td>
<td>Income to PO depends on PPP revenue.</td>
</tr>
<tr>
<td><strong>Investment PPP:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Funding may be shared</td>
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<tr>
<td>Concession</td>
<td>Existing-</td>
<td>Private</td>
<td>Private</td>
<td>Private</td>
<td>Private</td>
<td>Private</td>
<td>10 to 15</td>
<td>Small</td>
</tr>
<tr>
<td></td>
<td>Public-</td>
<td>Private</td>
<td>Private</td>
<td>Private</td>
<td>Public</td>
<td>Private</td>
<td>20 to 30</td>
<td>Large Infrastructure</td>
</tr>
<tr>
<td></td>
<td>New- Private</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Could be operational PPP</td>
</tr>
<tr>
<td>BOT</td>
<td>Public</td>
<td>Private</td>
<td>Private</td>
<td>Private</td>
<td>Public or Shared</td>
<td>Public</td>
<td>20 to 30</td>
<td>Large infrastructure Public sector risk for low use</td>
</tr>
<tr>
<td>BOOT</td>
<td>Private then</td>
<td>Private</td>
<td>Private</td>
<td>Private</td>
<td>Private or Public</td>
<td>Public</td>
<td>20 to 30</td>
<td>Large infrastructure Public sector risk for low use</td>
</tr>
<tr>
<td>BOO</td>
<td>Private</td>
<td>Private</td>
<td>Private</td>
<td>Private</td>
<td>Private</td>
<td>Indefinite</td>
<td></td>
<td>Public sector buys service or output</td>
</tr>
</tbody>
</table>
Table 8.2. Allocation of key responsibilities under the main PPP models

8.4 Safeguards

PPP arrangements should contain certain safeguards for the public and private sectors and civil society.

The public sector usually expects the **private sector to contribute** in one or all of the following ways:

- Provide agreed services
- Make agreed investments
- Meet agreed standards/targets
- Not exploit any monopoly situation

The private sector expects the **public sector to contribute** in one or all of the following ways:

- Create an enabling environment suitable for PPP
- Pay agreed fees promptly in full
- Implement tariff increases as agreed
- Prevent unexpected competition from others during operation (exclusivity)

**Civil society expects the PPP to:**

- Provide appropriate levels of services
- Be affordable to the community either through direct charges or indirectly through general taxation

The consumer will ultimately pay for services but they can either pay to the private sector directly or to the public sector which then pays the private sector. If consumers pay the private sector directly the PO has the burden of billing, collection and taking measures against those who do not pay. However, the PO collects from a large number of consumers, most of who will pay. If the public sector pays the fee for services, the PO is dependent on one sole source and any default or delay could be critical. Good consumer relations are more likely to be established where the PO has direct contact with consumers through billing and collection.

Piped water supply, can be a natural monopoly i.e. it is not realistic for any other organisation to go to the expense of constructing a second parallel set of infrastructure. If no alternative sources are available tariffs might be raised significantly before consumers reduce their use of piped water. However, in some urban areas consumers may also be able to obtain water from, some or all, nearby water courses, dug wells, shallow boreholes, water vendors (tankers) and bottled water, which they can use for different purposes depending on the quality of the water. Therefore, if alternative sources are available consumers will rely more on them if the charges for piped water are high or are increased. Consumers may change their behaviour patterns significantly over time.
Flexibility in arrangements and adjustment to meet new conditions is more important with longer PPP. Normally, it is in the interest of both the public and private sectors to try to continue with an existing PPP arrangement or to adjust it. Cancellation can be very disruptive to consumers.

8.5 Private sector partners

The possible private sector partners in a PPP for water supply include:

- Users groups or committees (CBO)
- Not-for-profit organisations, such as NGOs as facilitators
- Profit organisations and business

An NGO can be most effective as a facilitator to help establish PPP projects that could be run by the community, including training. The role of the NGO is completed when the local community can take over long-term responsibility for the PPP. The NGO should then move on to a new PPP project.

At this stage the number of potential PPP partners should be identified, either from one or more of CBO, NGO and private companies. Expressions of interest can be requested through local adverts or personal contact.

8.6 Selection of private partners

The process of selecting the best private partner depends on the PPP project and the local capacity and interest to participate.

If three or more companies are interested to become PPP partners, some form of selection process could be used, e.g. bidding process. The company providing the best offer would be selected. This has the merit of some competition and possibly a low price.

Competitive bidding on price is normal practice for construction contracts where the type of work can be stated, together with expected quantities, and a number of companies will bid. The selection process is also “transparent” as the basis and reasons (usually lowest price) for selecting the preferred bidder are clear.

International experience of bidding procedures on operational PPP contracts based on price is very mixed. The bidders may bid an unrealistically low price in order to secure the project but during operation the PO will take every opportunity to try to negotiate an increase in this price, to a more realistic and profitable level.

Many PPP include activities that are not easily quantified. Also the PO may have its own well-tried methods and skills that the public sector wants to use. Therefore, other selection processes may be more appropriate to encourage full use of these attributes through partnerships. These include negotiation and competitive negotiation.

An alternative to a competitive selection process based on price only is to encourage innovation by stating project objectives that the bidders are to meet. The bidder then makes his proposal. The bid process is in two parts, namely the proposed methodology and related price. These could be discussed with all bidders to clarify any uncertainties. The preferred bidder would be the one offering best “value for money”. This is a “competitive negotiation”.
If there are only one or two potential bidders the time and cost of bidding is not warranted compared with the potential benefit of a competition in terms of lower prices.

In many developing countries with a limited private sector, it is likely that no more than one company would show interest in any specific PPP project.

Therefore, the selection process that is most likely to lead to an effective PPP is negotiation with one interested PO.

The approach of government to partnerships could affect the implementation of PPP locally in the long term. Government organisations that earn a reputation for constructive participation in PPP will attract more private sector support. Whereas those that try to obtain short-term financial advantage in PPP may find little local support in the future.

Hard bargaining through competitive bidding and protracted negotiations may not be the most sustainable selection process for a PPP as it may make working as a “partnership” more difficult. The degree of partnership is related to the flexibility allowed for in the contract.

9. Private Sector Support

9.1 Common Misconceptions

The public sector and the community sometimes have preconceived views of the private sector, some of which are very pessimistic whereas others are over optimistic. Common misconceptions are:

- **Private sector operators and suppliers have large funds at their immediate disposal.** In fact funding by the private sector for water supply is by borrowing from commercial banks, which will apply stringent conditions and charge interest rates that reflect perceived financial risks. This means that the public sector may be able to obtain funds more cheaply than the private sector, especially with soft loans from donors.

- **The private sector will seek excessive profits which will raise charges.** Most serious private entrepreneurs in water supply wish to stay in this sector and to develop their businesses over time. It is expensive to establish the necessary resources and skills which must be recovered over a number of projects. A good reputation is the best attribute for obtaining more work.

- **The private sector will not serve the poor.** Many public sector water operators do not serve the poor for many reasons. Where people have no legal rights to land occupancy (usually poor), a concern is that providing an “official” water supply would give some legitimacy to “illegal” housing. A private sector operator does not have this constraint. As the public sector becomes more commercial, the most viable means of serving the poor is a factor for any operator, public or private.

- **The private sector will take all risks.** The private sector is generally more aware of risks than the public sector. It will try to reduce or eliminate risks but will accept responsibility for risks under its direct control (but may charge as appropriate). However, it will not accept risks that are under the control of others, including government. Therefore, PPP usually also identifies risks that the public sector must take so that the partnership is balanced.
• **The private sector has unlimited resources and interest.** Only a limited number of international private sector firms can undertake operation of large water supply systems. Therefore, any proposed new large PPP will be competing with similar PPP opportunities in other countries in order to attract competitive bidders. Similarly in developing countries there are limited national firms that could undertake smaller PPP, so a new PPP must compete within its country.

#### 9.2 Building on PPP experience

The confidence in partnerships between the public and private sectors will only develop with good experience. However, successful projects have much less publicity than those that are not successful. Sound public relations will help in creating confidence in PPP and greater support from all stakeholders.

The public sector can, and has, worked with the private sector in many fields. Common public services that use PPP include:

- Telecommunication, through licensing of services. The mobile telephone sector is growing extremely fast with innovations created by the intense competition. Consumers prefer mobile phones to inefficient or non-existent line services because of convenience and status. Equipment is developing rapidly so that models become obsolete within a short period. Alternative means of communication are available including mail, fax, e mail and personal contact.
- Energy, through private suppliers and/or distributors. Energy is not a total monopoly because a range of types are available. Cooking stoves can be run with electricity, piped gas, canned gas, paraffin, coal and wood so that consumers can choose from a wide range of fuels depending on availability, price and convenience. Electricity is the most convenient form of lighting but has to be supplemented by candles during power cuts.
- Transport, through franchises. Consumers have a choice of travelling by some or all of air, train, coach, bus, tram, underground railway, taxi, private car, trishaw, bicycle or walking. Each has particular advantages and role but all are competing with one or more other forms of transport.
- Potable water supply is most convenient by piped connections. This can be a monopoly in most urban areas but there are also alternatives that can be available for non-potable use. Bottled water is too expensive to be an affordable alternative for most consumers. This is a basic need contributing to public health.
- Sanitation including collection and disposal. In dense urban areas the only effective infrastructure are sewers and waste water treatment, but alternatives such as septic tanks and latrines are functional elsewhere.

All these sectors have significant alternative ways providing of meeting demand adequately. The exception is piped water supply for which there is no affordable alternative to piped water for the best level of service. Others may or may not be satisfactory in quality but are less convenient and suitable for certain uses only. Water supply is the least competitive sector.

Water and sanitation have the strongest impact on people other than the direct consumer. They both affect public health of the whole community and sanitation has a big impact on the environment.
However, the involvement of the private sector in public services is mainly a political decision based on ideology and public acceptance which is spurred on by financial necessity to improve efficiency or to obtain private funding.

PPP in water supply is easiest to introduce into countries that already have PPP in other sectors. Many of the legal, management and administrative issues will have been resolved and the public will be used to the concept. This means that introducing the first water supply and sanitation PPP will have to cover a broad range of issues, with more time required to work with stakeholders.

9.3 Private sector organisations

Various types of private sector partners are available, which may be categorised as:

- **International companies.** There are a number of international companies that have operated water supply systems in countries other than their own. They are mainly from France and England. A number of large concession contracts were established in the 1990s. Some of these are being adjusted to meet current conditions that differ from those in the original contracts. However, this should be a normal process which illustrates the partnership approach rather than a strict contractual concept. New companies from other countries are emerging.

- **National companies.** Where the public sector has had exclusive responsibility for water supply there will be no national private companies with direct experience. However, expertise can be bought through a consortium with an international company or by recruiting qualified experts. In the case of the Manila concessions the bidding joint venture companies had to be led by a Philippine firm with majority share holding. Inevitably this firm was not a water supply operator so this expertise was supplied by international companies. This approach countered concern that a public service was being handed over to foreigners.

- **Commercial organisations.** These can supply services or goods and are used extensively by both the public and private sectors for outsourcing activities or as part of a joint venture group.

- **Non-government organisations (NGO).** These are particularly orientated towards issues related to poorer communities. Their most effective contribution is by establishing local community organisation through development of the community and training. The intention is create conditions that are sustainable by the efforts of the community only, so the NGO should have a temporary role as a facilitator before moving on to the next challenge.

In a large PPP the private sector will normally establish a special purpose company to undertake the project.

9.4 Safeguards in PPP

Both the public and private sector partners will require some protection against the unreasonable behaviour of the other party. This is normally in the form of a legal contract, probably supported by extensive information of what is to be achieved and how. The form of local contracts should be consistent with local legal convention. The contract is only important when disputes arise. Conventional contracts tend to be adversarial, leading to an expensive and
long drawn out process to achieve settlement. This can be particularly damaging in such an important sector as water supply where any deterioration in service during a dispute could adversely affect public health.

The objective in a PPP should be to devise an agreement which is flexible and less adversarial and recognises the reality that conditions will change over time and adjustments will be necessary. Some form of memorandum of agreement could be appropriate.

In whatever form the agreement is made, certain safeguards should be covered including:

**Exclusivity.** The private sector will make a commercial decision to embark on a PPP, which will include an evaluation of the cost and investment compared with the returns. In PPP for water supply the private sector may look for an exclusivity clause that prevents another organisation or the public sector itself competing unfairly. This is unlikely for a piped water supply because no competitor would install a parallel piped system. However, it could apply to consumers supplied by tanker or water kiosks.

**Periodic review of tariffs.** Costs of operation will rise through inflation. It is logical that tariffs should also rise. Annual adjustment of tariffs to allow for inflation should be standard, especially if local costs are rising rapidly. However, a robust consumer price index is necessary that, at least approximately, reflects the balance of items making up operating costs. Where operation includes a large energy or fuel component this item can be treated separately and the full additional cost added under a “cost pass through” clause.

**Economic regulation.** An economic regulator is a safeguard to both the public and private sectors. Their task is to review the proposed business plan and tariff requirements of the operator and to agree how the sector should develop. A large investment programme may increase costs whereas efficiency savings will reduce costs.

9.5 Economic Regulation

Economic regulation is probably the most critical factor in establishing a sustainable PPP. Most of the problems that have developed have been related to difficulties and disputes over regulation of on-going PPP in order to adjust to changing conditions.

One serious factor is the independence that a regulator can have within an environment of suspicion and possibly very high profile exposure. The regulatory body is appointed by government. There is no alternative to this, but their independent position can be strengthened by making it very difficult to remove them before their appointments expire, say every five years.

The regulator has to be aware of the constraints under which government is operating and the need to keep prices down. Sometimes government may set new standards to be met on, say, drinking water quality, but the regulator will have to agree the rate at which progress is made towards meeting these standards. Rapid increase in infrastructure to meet these standards would trigger tariff increases which could impact on consumption and profitability and would adversely affect the PPP.

Nonetheless, there is often suspicion that the regulator is favouring government policy at the expense of the private operator. The political pressure on the regulator can be severe.
The normal procedure is for the regulator to be funded by a small levy added to the tariffs, usually about one percent from collections or a fixed amount. The regulator is therefore paid for directly by the consumers. The money is paid by the PO if he collects payments. One criticism of the percentage basis is that the regulator’s income would increase if he agrees to higher tariffs.

The job of regulator is specialist, with a sound knowledge of the economic and legal aspects of regulation and of the water sector. The regulator should be detached from details of operation. In some cases the regulator has been staffed from the previous public sector organisation but this has not been very successful because the regulator reverts to dealing with day to day operational issues. The PO has to be allowed to operate in the way it wants to without outside interference.

9.6 Risks Identification and Handling

Risk is the chance of something happening that will have an adverse impact on objectives. It can be assessed for any event or occurrence in terms of its consequences (severity or hazard) and its likelihood (probability) of occurring: Risk is equal to the Hazard multiplied by the Probability

Measures can be taken to reduce the risk of a severe event by making it less probable. For example, the risk of running out of fuel in a car can be reduced by:

1. Fitting a fuel gauge (design risk);
2. Adding fuel before the gauge shows empty because the gauge may not be completely accurate (technology risk);
3. Refilling when there is an opportunity, as fuel might not be available later (operation risk);
4. Carrying a full container of petrol as a reserve (reduces or eliminates risk depending on size of the container).

Exactly the same reasoning could be applied to an aeroplane but, as the consequence of running out of fuel is much higher, greater precautions are taken to have adequate fuel or emergency strategies. However, carrying unnecessary excess fuel increases operation costs and reduces profit so considerable effort is put into carrying the safe quantity of fuel. Passengers do not perceive a risk of running out of fuel, although they may perceive other risks in flying.

All PPP involve risks to stakeholders. To be effective and sustainable stakeholders must accept some risks. However, by careful planning and consultation, risks can be reduced to levels that are low enough not to threaten the PPP and can be handled within the partnership arrangement.

The stages or aspects for addressing risks that can help in structuring a successful PPP are given in Box 9.1. These stages may be merged or overlap especially in small short term PPP. Risk handling can be crucial in large long term PPP.
This section covers the main types of risks that will be encountered in PPP and suggests means to solve or avoid them. The identification, presentation and discussion of risks is an important part of the creation of a balanced PPP. In addition, it leads to a much clearer understanding of the tensions that might develop in a PPP and can point to ways in which to reduce the overall risk of failure.

The main types of risks are:

**Political risks:** Government and the public sector should clearly state their policy (which could change) on key issues, such as:

- Level of support for the use of the private sector to provide water services. In many countries the development of PPP has been slow, which may reflect some political reluctance.
- Acceptance that any “social” aspects should be separated from commercial considerations. Tariffs for water supply are often kept low to protect the poor, but by using a very crude subsidy system, which has left water supply organisations short of funds (see section 5.3.1).
- Support for independent regulation and/or review of PPP to safeguard consumers and a Private Operator (PO) especially in monopolies where government fixes tariffs. Government often wishes to retain the right to set tariffs but these may be influenced by short-term political considerations, which can be perceived as a risk by the private sector. The PO is likely to seek a higher income to cover this risk.
- Ability of the public sector to take or share commercial risks of PPP. A BOOT project provides infrastructure with an agreed fixed capacity, but this may not be fully utilised initially. The public sector usually pays for the full capacity even if it cannot sell this amount to consumers e.g. a water treatment works delivering into a distribution system run by the public service. The risk can be reduced by construction in stages or more complex charging mechanisms that reflect the costs of providing the infrastructure (flat rate) and that of running it (quantity based).

The political risk includes the consequences and likelihood of changes in government withdrawing support to a PPP. Support by all major parties reduces this risk.

**Implementation risks:** In many countries a number of PPP have been planned and even signed but have not been implemented for various reasons.

- Have all stakeholders agreed to the PPP? Objectors can delay or even stop PPP going ahead. From the creation stage, PPP should be discussed with all stakeholders, but especially those who consider that they may be disadvantaged.
- Is the land available to the PPP? Ownership of land is not always clear. Construction can be delayed if access to a site is denied, which can delay implementation
and postpone the date that income can be earned. Land ownership should be established early in the development planning.

- Does the PPP structure encourage or discourage early implementation and completion of construction? The PO will be encouraged to complete construction quickly if he then increases his earning capacity and profit. Where a PPP is staged to spread the construction cost, each phase should be profitable and also increase the overall profit. If some phases are not profitable, the government can contribute a grant to reduce the financial burden on the PO.

- Is the implementation programme sufficiently defined to monitor progress? The programme should include milestones for starting activities and completion, plus any intermediate targets that can be clearly defined. Payment of fees could be related to achieving milestones.

- Are obligations and actions clearly identified, including a timetable for external review and approval? Approving agencies should agree time limits in which they will respond to applications (that are properly presented).

**Construction risks:** Where infrastructure is to be developed as part of the PPP some construction will be necessary.

- Can costs exceed the estimate? Under most construction contracts the contractor (private sector) takes the risk for cost overrun if related to aspects under his control, such as inefficient working. However, costs can also increase because of changes in design, delays in approval/agreement by the public sector, changes in law, new taxes, etc. Competitive bidding increases the risk of under estimating construction costs.

- Can completion be late? Normally the contractor takes this risk as he has the responsibility for controlling the construction process. However, he could be denied access to land held by the public sector or been given misleading information on existing infrastructure. Over optimistic programming increases this risk.

- Is construction to required standards? Normally this risk is reduced by independent site supervision on large construction and routine inspections by public sector.

- Does infrastructure meet performance criteria? Often final testing has to be undertaken at less than the extreme operating conditions on which the design has been based. Sound design reduces this risk.

**Operating risks:** These are particularly important for pure operating contracts.

- Are operating costs more or less than expected? Normally the private sector takes the risk of higher operating costs unless the increases are due to causes outside its control, such as new or increased taxes. Competitive bidding increases this risk.

- Are operating costs likely to change during the PPP? For long term PPP regular periodic review and adjustment of charges will improve sustainability. Independent regulation or review reduces the risk that charges may be influenced by political pressure.

- Could others also provide the services under the PPP and thereby reduce sales? This is more likely where the cost of starting up a PPP arrangement is low, e.g. no significant initial capital investment. Some exclusivity of service or area may be necessary for the initial PPP arrangement in order to protect the PO, at least for a specified time. The risk of an alternative PO is reduced if the public sector licenses or authorises PPP.
**Revenue risks:** The risk that the private sector will not receive sufficient revenue to be commercial.

- Could there be fewer customers or lower demand? Predictions are made in the feasibility study on the amount of the service or product that people want. In BOOT contracts the public sector takes the risk of demand being less than supply when the fee is based on full potential output (take-or-pay). However, the PO takes the risk if payment is by actual output. Risks can be shared by a composite charge (see political risks).
- Are customers prepared to pay the commercial price? An evaluation of how much consumers or the public sector, if they take the output, will pay should be made at the feasibility stage of the PPP. Gradually increasing charges by a number of small increments reduces their impact compared with a single rise and reduces the risk of consumers not paying.
- Could customers refuse to pay? The public sector may be reluctant to withdraw a public service for non-payment but it has the power of legislating for penalties and imposing them. Publishing lists of non-payers can reduce this risk.
- Can public sector default on payment if it is the sole purchaser? Some form of guarantee could be a safeguard. On large projects funded by donors they may promise some support. This risk can be reduced by increasing the number of sources of revenue. The PO may lose one source of income but not others. The extreme case is where the PO receives payment directly from consumers. It is most unlikely that all consumers will decide not to pay which is a much lower income risk than if the total PO fee is paid from one single source.
- Do published inflation indices reflect increases in operating costs? Except for short PPP, adjustments to charges/prices should be made regularly for local and/or national inflation. Independent regulation with regular reviews reduces this risk.
- Can public sector increase charges for critical cost components? Government can increase charges for services such as water, electricity and materials. Except for short PPP, the PO should be compensated for increased costs for critical components that form a high proportion of total operating costs. The risk can be reduced by a “cost pass through” mechanism for increases in certain specified costs, in which the PO is compensated for the full increase in his costs. Charges or fees are adjusted accordingly. Possible factors are the introduction of a new tax, or sharp increase in electricity or fuel costs.

**Financial risks:** Funds will be raised by the private sector for any PPP that includes building infrastructure or where large working capital is required.

- Will changes in exchange rate affect PPP? Normally at operational level all income is in local currency. Government may provide funds that originated from donors in hard currency but would carry the risk of higher costs because of a drop in value of the local currency. This risk is not likely to affect PPP funded in local currency.
- Can interest rates vary? This will depend on the finance package and whether loans are at fixed or variable interest rates. Fixed interest rates reduce this risk.
- Do loan periods match the length of PPP? Commercial loans are repaid out of income from the PPP therefore the loan period cannot be longer than its duration. Normally BOOT projects are longer than commercial loans in order to spread the charge for capital. During a BOOT the initial loans may be refinanced to spread loan repayment.

**Force Majeure risks:** Events may occur that are outside the control of stakeholders in PPP.
• Is there a flood or erosion risk? Low lying areas can be affected by severe extreme hydrological conditions. Protection works could be included within PPP but would increase costs. Locating on higher ground would reduce the risk.

• Is the PPP vulnerable to earthquakes? In seismic regions, infrastructure should be designed to withstand reasonable earthquakes. Costs include those for reconstruction but also loss of income and possible claims for compensation.

• Is the PPP at risk from riot or general strike? Could it be a target? Could it be protected? These risks reduce in a stable political environment.

**Environment risks:**

• Does operation affect the environment? PPP should comply with current environmental legislation. Mal-operation can lead to penalties. Planning should cover compliance with environmental standards to avoid the risk of penalties and other costs later.

• Is there any pre-existing and continuing environmental liability? A thorough check during the planning stage reduces this risk.

Often PPP arrangements can cover the impact of risks by taking out insurance. However, the insurance industry in many countries is not geared to carry these risks. Therefore, the PPP itself has to act as its own insurer. Following an unexpected event, the PPP agreement should be reviewed and amended as necessary so that it can still meet the original objectives or revised ones.

10. **Enabling Environment**

The term “enabling environment” is used to encompass all the factors that could impact on the setting up, implementing and operating of a PPP in water supply. This section addresses some of the factors that help to create conditions that are more likely to make PPP work effectively.

10.1 **Legislation**

PPP requires a proper legal basis that is consistent with the local legal system, which can vary significantly between countries. However, certain basic aspects should be covered:

• Often operation of a public service such as water supply is placed legally within the public sector under a general or specific Act that grant rights to one or more organisations to provide and charge for water supply. Amendments are required to allow the private sector to take over all or some of these roles.

• The public sector will have certain rights and powers to run the water supply system which may be included in an Act or in supporting Rules and Regulations and Bye Laws. These could include the power to disconnect for non-payment or may prohibit disconnection. The powers enjoyed by the public sector should also be granted to the private sector.

• Transfer of public sector staff to the private sector including any compensation for loss of rights or benefits, such as pensions that are normally better in the public sector than in the private sector in developing countries.

• In urban water supply the potential monopoly and threat of excessive charges is countered by some form of regulation. Where water supply has been handled
exclusively by the public sector it will probably be necessary to pass a new Act establishing a regulatory body. This usually has three or five members of the board who make the ultimate joint decisions (majority). The legislation should cover such items as number and skills of the members of the regulatory body, duration that these regulators serve, responsibilities, basis for remuneration, and outline of the process of regulation.

- The source of funding of the regulatory body. This is usually a small charge as a percentage of income from water sales or a fixed levy.

10.2 Water abstraction rights

A PPP will normally include some measures of level of service, such as quantity of water delivered. The operator needs some assurance that the necessary amount of raw water is either available or can be made available to him so that he can meet his obligations. Any water utility (public or private) should have defined water abstraction rights.

Many countries have some form of water resources management system for both surface water and groundwater. Others are moving towards improved management, usually on the basis of river basins. Many areas have water shortages either constantly or seasonally or periodically. The allocation of quantities to raw water users on a monthly or daily basis is crucial to survival during severe shortages.

Most countries have some form of basic water sharing process or priorities between types of users. Normally water for domestic living purposes has top priority over other users such as irrigation and industry. However, in actual severe shortages all users are likely to be required to reduce their consumption. Lack of irrigation water at crucial periods of growth could reduce crop yields and consequently the income to farmers. Under these conditions adequate irrigation water may become the top priority at the expense of some reduction in water supply. Lower supplies could reduce income to the PO if water is paid for by volume, so some form of compensation may be appropriate. The basis of water sharing should be included in PPP agreements.

Standards of raw water should also be specified so that water treatment plants can be designed to deal with the expected contaminants. If these standards are exceeded the PO may ask for relief on standards of water that it provides.

The licensing of water rights is normally with the organisation responsible for the proper use of water resources and the environment. A small fee may be charged to cover administrative costs.

Where water is scarce there are moves to charge for each cubic metre taken by users in an attempt to encourage conservation. However, this cost has to be passed on to consumers, which may cause resistance. In some areas, water rights are traded for a price. For instance, a farmer can sell a raw water right to urban consumers. He will then have less water to irrigate with which will reduce the land under production and his income. The price for the water right should compensate for lost income.

10.3 Political support
Political parties may have overall strategies that are for or against the private sector taking over any service that has been provided up to now by the public sector. Left wing parties are particularly in favour of public ownership.

Many people are initially concerned that PPP for water supply would entail handing over full operational responsibility of a basic need to the private sector. For this reason, the planning of PPP should include measures that clearly show that this is not the case, with identifiable safeguards.

The most important factor is that the role of the public sector changes from being a provider and operator to being a facilitator and regulator. The full responsibility should remain with the public sector, with the private sector providing the means by which improvements can be made.

Most political parties in developing countries claim improved water supply to be one of their main aims. However, many of the ways for achieving this in the past have been closed because of pressure on limited public sector finances from other sectors. Those aspects of PPP that appeal to the major parties or lobbies in a country should be identified and incorporated in planning. All should feel that the PPP will enhance conditions in some way.

Strong opposition to PPP may not stop a project going ahead but will almost certainly cause the private sector to evaluate the risk of a change in government and cancellation of the PPP, with or without compensation. The price of joining PPP will be higher to cover this risk, or financial exposure will be minimised.

Successful PPP in other sectors with effective regulation is a strong contributor to political confidence in, and acceptance of, PPP in water supply.

10.4 Labour and staff support

PPP may be seen by labour and their representatives as an unknown step and therefore something to be concerned about in general. On specific projects, support will not be forthcoming until many details have been settled satisfactorily.

However, the private sector can offer many advantages to those that respond to retraining and who develop new skills. Opposition from labour and Trade Unions will reduce with good experience. This means that the way staff issues are handled is critical to that PPP but could also have an impact of other PPP.

In some PPP contracts, jobs have been safeguarded for a period of a year or two after the private sector takes over. This has limited benefit except to allow the PO to assess the quality of staff over more time, but at a cost that has to be passed on to consumers. Inevitably the end of the period of safeguard will be reached and the same issues will have to be faced then.

Where large numbers of staff are to be transferred or there are many PPP, the government should develop a policy, with the participation of labour representatives, to agree on strategies for retrenchment and levels of compensation. Prior to large PPP concessions it is normal for government to reduce the staff in the operating organisation so as to lower the
uncertainty of the overall cost of compensation for job losses which would be borne by the private sector later.

Smooth transfer of operations is essential as any interruption in water supply could have serious consequences for public health. The transition should be made at a specific moment but can be over a period.

Even with a considerable effort to placate labour there may be objections on large PPP from certain factions. These should be handled by government.

10.5. Consumer support

Consumer support can be developed by close contact and interaction with their representatives. Their concerns may be addressed in the structure of a PPP. However, the different type of consumers may have different priorities. Some may need reliability, others may need quality and others may want low prices. Some compromises will be necessary.

Information on proposals for a large PPP should be spread by newspapers, radio, television and meetings. Experience on other successful PPP should be used and publicised to show similarities with any specific PPP.

General experience is that consumers are prepared to pay for a good water supply at the levels of rates that would be commercial. Large lump sums to be connected should be spread over time for poorer consumers.

10.6 Other factors

Other factors that can contribute to the success of a PPP include:

- Good knowledge of existing infrastructure that might be part of the PPP. Most claims for compensation after PPP have been in operation for a year or so are related to misleading basic information on assets. This particularly applies to buried pipelines, which are difficult to inspect and may be damaged locally. Even the number and location of pipes is often faulty as records were not made or have been lost.
- Adequate tariff levels before the PPP so that the impact of any tariff rises is not so severe. In many cases, tariffs have been raised before PPP as part of the preparation process. In fact, in most concessions the unit price has fallen because of PPP. In part this may be because government takes over responsibility for repayment of outstanding debts that were previously covered in the tariffs. Subsidies in public sector tariffs should be reviewed so that tariffs are similar to PPP tariffs.
- A flexible approach (with adjustment mechanisms) that is necessary to meet changed conditions.
- Experience of other PPP in the water sector and other sectors should be analysed to identify those aspects that could be beneficial in PPP strategy or for specific cases. A data base of experience would help knowledge and experience to be disseminated, but no two cases will be identical.

11. Conclusions and Recommendations
There is a range of PPP models that have been used successfully in the water supply sector. International and local experience should be used to the full to plan and document PPP.

Broad conclusions and recommendations are:

- Establishment of an “enabling environment” is a major force in successful PPP. The most critical elements will depend on local conditions.
- Involving the private sector does not reduce the responsibility of government to provide the basic service of water supply.
- Planning should recognise the special needs of the poor, who are usually those least well-served in public sector operation. They may need to be addressed specifically within PPP to improve their services to a level that promotes public health.
- The choice of the most appropriate model depends on the particular project: especially whether the prime objective is to attract private funds and/or to improve operation in part or as a whole.
- Risks should be identified, minimised, allocated to the party that can handle them and those that remain should be shared. All stakeholder should take some risks.
- Learn from experience elsewhere but recognise that many factors will differ (political will, wealth, location and reliability of water sources, condition of existing infrastructure).
- Share experiences (good and bad), possibly through a national or regional resource for collecting and publicising details of PPP projects.
- Study PPP in other sectors. In particular, electricity and gas but all sectors could contribute some useful ideas.
- The basic approach to planning, design and construction in PPP will differ significantly from that for a public sector project.
- Review performance of regulatory bodies in other sectors.
- Establish an independent regulatory body to review and agree tariff charges that will ensure adequate funds to run the water supply system.
- Start PPP projects where they are most likely to succeed (strong local support, simple schemes etc). Simple operation and maintenance contracts for water treatment works and a common way of introducing the private sector competitively.
- Learn from any pilot projects in the water sector and other sectors. Pilots must be designed so that they try conditions and solutions that would be available in the prototype.
- Progress scope and types of PPP as experience and confidence are gained.