

# Financing water supply and sanitation under Agenda 21

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*This paper assesses the financing challenges which have to be met by developing countries if water resources are to be managed efficiently, if the quality of the aquatic environment is to be improved and if water related services are to be delivered in a responsive, efficient and equitable way. This paper takes the view that attaching 'price tags' to water supply and sanitation, as was tentatively done in Agenda 21, is a misguided approach and that what is needed is articulation of clear principles which should underpin the financing of water supply and sanitation investments. To illustrate the approach the paper focuses heavily on experiences from World Bank water supply, sanitation and urban development projects over the past 30 years. The challenge is to develop appropriate institutional and financial arrangements. The essence of such arrangements is that they ensure that societies mobilize appropriate levels of resources for providing water related environmental services and that these resources are used in the most efficient and effective way possible.*

## The state of the water supply and sanitation sector: services, impacts and environmental quality

### *The incomplete 'old' agenda*

Both the number and proportion of people in developing countries who have access to adequate water and sanitation facilities have increased dramatically. For instance, the number of urban people with access to adequate water supply increased by about 80% in the 1980s, and the number of urban people with adequate sanitation facilities increased by about 50%.

These achievements notwithstanding, very large numbers of people remain unserved – an estimated 1 billion do not have access to clean water, and 1.7 billion do not have access to sanitation. An estimated 2 million children die and billions become sick each year because of inadequate water and sanitation facilities.

Furthermore, those who are not served often pay high costs, especially the poor in urban areas. These people often rely on vendors who typically charge US\$2 to

US\$3 per m<sup>3</sup> of water, which is 10 or more times the price which the served pay for water from a tap at home.

### *The emerging 'new' agenda*

While the old agenda, focused on household services, still poses very large financial, technical and institutional challenges, a new, broader agenda which considers both the provision of services and environmental quality has emerged forcefully in recent years.

The quality of the aquatic environment is a global concern. The situation in cities in developing countries is especially acute. From 1981–90 the number of urban inhabitants without access to adequate sanitation increased by about 70 million. Even in middle income countries, little sewage (2% in Latin America, for instance) is treated. In general, water quality is far worse in developing countries than in industrialized countries. Furthermore, while environmental quality in industrialized countries improved over the 1980s, it did not improve in middle income countries and declined sharply in low income countries.

In considering this nexus of service and environmental issues, it is instructive to consider the sequence in which people demand water supply and sanitation services. Consider, for instance, a family which migrates

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into a shanty town. Their first environmental priority is to secure an adequate water supply at reasonable cost. This is followed shortly by the need to secure a private, convenient and sanitary place for defecation. Families show a high willingness to pay for these household or private services (in part because the alternatives are so unsatisfactory and so costly). It is natural and appropriate, therefore, that they put substantial pressure on local and national governments to provide such services. And it is, accordingly, natural and appropriate that the bulk of external assistance in the early stages of development goes to meeting the strong demand for these services. The very success in meeting these primary needs, however, gives rise to a second generation of demands, namely for removal of waste water from the household, then the neighbourhood, and then the city. Success in this important endeavour, too, gives rise to another problem, namely the protection of the environment from the degrading effects of large amounts of waste.

There are a number of implications emanating from this description. It means that the historic 'bias' in favour of water (at the expense of sanitation and sewerage) is probably correct. The historic experience of industrialized countries, and the contemporary experience of developing countries demonstrates clearly that it is only when the first challenge (service provision) has been substantially met that households and the societies aggregating them pay attention to the higher order challenges of environmental protection. And it is thus neither surprising, nor incorrect, that the portfolio of external assistance agencies has focused heavily on the provision of water supply. For example, of World Bank lending for water and sanitation over the past 30 years, only about 15% has been for sanitation and sewerage, with most of that spent on sewage collection and only a small fraction spent on treatment. The two following case studies (on the Orangi Pilot Project in Karachi) and (on the provision of sewerage services to the periphery of São Paulo, Brazil) demonstrate graphically how forcefully poor people demand environmental services, once the primary needs for water supply are fulfilled. (These examples also illustrate many other points which will be referred to later in this article.)

*How and when poor people demand sanitation services, and how to meet these demands: the case of the Orangi Pilot Project in Karachi, Pakistan*

In the early 1980s, Akhter Hameed Khan, a world renowned community organizer, began working in the slums of Karachi. He asked what problem he could help resolve. People in this area had a satisfactory supply of water but now faced 'streets that were filled with excreta and waste water, making movement difficult and creating enormous health hazards'. He asked what they

wanted, and how they intended to get it. What they wanted was 'a traditional sewerage system . . . it would be difficult to get them to finance anything else'. They requested Dr Khan to persuade the Karachi Development Authority (KDA) to provide it free as it did (they believed) to the richer areas of the city.

Dr Khan then spent months going with representatives from the community petitioning the KDA to provide the service. Once it was clear that this would never happen, Dr Khan worked with the community to find alternatives. He later described this first step as the most important thing he did in Orangi – liberating the people from the demobilizing myths of government promises. With a small amount of core external funding, the Orangi Pilot Project (OPP) was started. The task of the OPP was to reduce the costs so that these were affordable and to develop organizations that could provide and operate the systems. On the technical side, the achievements of the OPP architects and engineers were remarkable and innovative. Coupled with an elimination of corruption, and the provision of labour by community members, the costs (in-house sanitary latrine and house sewer on the plot, and underground sewers in the lanes and streets) are less than US\$100 per household.

The organizational achievements are equally impressive. The OPP staff has played a catalytic role: they explain the benefits of sanitation and the technical options to residents, conduct research and provide technical assistance. They never handled the community's money. The households' responsibilities include financing their share of the costs, participating in construction, and electing a 'lane manager' (who represents about 15 households). The lane committees, in turn, elect members of neighbourhood committees (around 600 houses) who manage the secondary sewers. The early successes achieved by the project created a 'snowball' effect, in part because of increases in the value of property where a sewerage system had been installed. As the power of the OPP related organizations increased, so they could put pressure on the municipality to provide municipal funds for the construction of secondary and primary sewers.

The Orangi Pilot Project has led to the provision of sewerage to over 600 000 poor people in Karachi and to attempts by at least one progressive municipal development authority in Pakistan to follow the OPP method. Even in Karachi, the mayor has now formally accepted the principle of 'internal' development by the residents and 'external' development (including the trunk sewers and treatment) by the municipality.

The experience of Orangi demonstrates graphically how peoples' demands move naturally from the provision of water to removal of waste from their houses, then their blocks and finally their neighbourhood and town (Hassan, 1986 and 1990).

*How and when poor people demand sanitation services, and how to meet these demands: the case of the favelas of São Paulo Brazil*

In the 1980s the city of São Paulo, Brazil, made extraordinary progress in providing all of its residents with water supply and sanitation services. In 1980 just 32% of *favelas* (low income, informal settlements) had a piped water supply, and less than 1% had a sewerage system. By 1990 the respective figures were 99% and 15%!

SABESP, the state water utility serving São Paulo, is a sophisticated technical water supply organization. Until the emergence of democracy in Brazil, SABESP had defined its role narrowly and technocratically. Specifically, it did not consider provision of services to the *favelas* to be its responsibility, since it was not able to do this according to its prescribed technical standards, and because the *favelas* were not 'legal'. Before the legitimization of political activity in Brazil in the early 1980s, SABESP successfully resisted pressures to provide services to the *favelas*. While SABESP was resisting this pressure, a small municipal agency (COBES) experimented with new technical and institutional ways of providing water and sanitation services to the poor. On the technical side this did not involve provision of 'second class' service, but of reducing the cost of providing in-house services by using plastic pipe and servicing of narrow roads where access was limited. On the institutional side it meant the community assuming significant responsibility for community relations, and for supervising the work of the contractors.

As the military regime withdrew and was replaced by democratic politics, the pressures on SABESP to serve the *favelas* increased. Pressure from the communities on SABESP was channelled through the municipal agencies, responsive officials, and politicians (including the mayor and governor). Since COBES had shown how it was, in fact, possible to serve the *favelas*, SABESP had no option but to respond.

In the context of the present discussion, the lessons from São Paulo are that:

- Once the poor have water services, then a strong demand for sanitation services emerges organically; and
- Where institutions are responsive and innovative, major gains can be made in the provision of these services at full cost to poor people (Watson, 1992).

### **Costs of services and how they are currently financed**

#### *The cost of providing services*

As shown in Table 1, costs of different levels of service vary considerably. Of particular note are: (1) the modest

increases in costs for urban water supplies when the level of service is improved from a public standpipe to a household connection; (2) the order of magnitude difference between simple on-site urban sanitation systems and conventional sewerage with treatment; and (3) the high absolute costs of conventional sewerage.

#### *How are costs changing?*

Real costs of water supply and sanitation services are changing due to a number of factors. First are demographic factors. As the population of developing countries becomes more urbanized, per capita costs rise. This is partly because a number of the low-cost, on-site urban sanitation technologies become infeasible in dense urban settlements, and partly because the aspirations of urban people – as demonstrated in the Orangi case – aim for a high level of service. Second are resource factors. Twenty-two countries today have renewable water resources of less than 1,000 m<sup>3</sup> per capita, a level commonly taken to indicate severe water scarcity, and an additional 18 countries have less than 2000 m<sup>3</sup> per capita. Elsewhere water scarcity is less of a problem at the national level, but is nevertheless severe in certain regions, at certain times of the year and during periods of drought. The effects of these 'natural' factors are seriously exacerbated by the widespread mismanagement of water resources, with scarcity induced by the provision of large quantities of water at no or low cost for low-value agricultural uses. Costs are also affected by the fact that cities have logically first sought water where it is easiest and cheapest to obtain. Finally, as cities grow, so the 'pollution shadows' around the cities often engulf existing water intakes, necessitating expensive relocation of intakes. In Shanghai, for instance, water intakes were moved more than 40 km upstream at a cost of about US\$300 million. The compound effect of these factors is a large increase in the costs of capturing and transporting water of adequate quality to cities and towns throughout the world.

#### *The efficiency with which financial resources are used*

A recent comprehensive review of 40 years of World Bank experience in water and sanitation (World Bank, 1992b) demonstrates compellingly that costs are much higher than they need to be, because of the low efficiency with which available resources have been used by water supply agencies in developing countries. The review, which examined more than 120 sector projects over 23 years, concludes that in only four countries – Singapore, Republic of Korea, Tunisia and Botswana – have public water and sewerage utilities reached acceptable levels of performance.

**Table 1** Typical investment costs for different levels of service

Service	Rural Low	Urban Intermediate	High
Water supply	Approx US\$10 <sup>a</sup>	Approx US\$10 <sup>b</sup>	Approx US\$200 <sup>c</sup>
Sanitation	Approx US\$10 <sup>d</sup>	Approx US\$25 <sup>e</sup>	Approx US\$350 <sup>f</sup>

<sup>a</sup> Handpump or standpost. <sup>b</sup> Public standpost. <sup>c</sup> Piped water, house connection. <sup>d</sup> Pour-flush or ventilated improved pit latrine. <sup>e</sup> Pour-flush or ventilated pit latrine. <sup>f</sup> Piped sewerage with treatment.

A few examples illustrate how serious the situation is:

- In Accra, Ghana, only 130 connections were made to a sewerage system designed to serve 2000 connections.
- In Caracas and Mexico City an estimated 30% of connections are not registered.
- Unaccounted for water, which is 8% in Singapore, is 58% in Manila and around 40% in most Latin American cities. For Latin America as a whole, such water losses cost between US\$1.0 and \$1.5 billion in revenue forgone every year.
- The number of employees per 1000 water connections is between two and three in Western Europe, around four in a well-run developing country utility (Santiago in Chile), but between 10 and 20 in most Latin American utilities.

Financial performance is equally poor. A recent review of Bank projects found that borrowers often broke their financial performance covenants. A corollary is that the shortfalls have to be met by large injections of public money. In Brazil from the mid-1970s to mid-1980s, about US\$1 billion a year of public cash was invested in the water sector. The annual federal subsidies for water and sewerage services to Mexico City amount to over US\$1 billion a year or 0.6% of GDP.

Another World Bank study (1992b) of projects launched between 1966 and 1989 showed that actual outcomes fell short of expectations for reducing unaccounted for water in 89% of projects, in sales volume in 84% and containment of operation and maintenance costs in 74% of cases. In short, the vast majority of water supply agencies in developing countries are high cost, low quality producers of services.

## How formal services are financed

### Levels of public financing

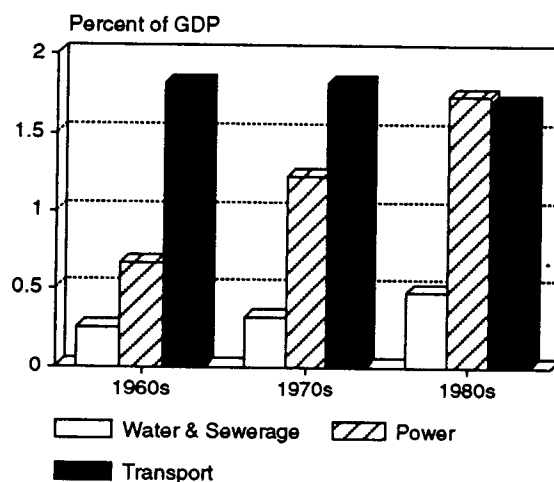
Recent assessments by the World Bank (World Bank, 1990, 1992a, 1992b; Garn, 1990) provide a clear overview of public financing for the water and sanitation sector in developing countries over the past three decades. As shown in Figure 1, the proportion of gross domestic product (GDP) invested in water supply and

sanitation rose from about 0.25% in the 1960s to about 0.45% in the 1980s. Furthermore, although it was widely believed that the allocation to the sector fell during the difficult years of the late 1980s, a World Bank analysis of information from Public Investment Reviews in 29 countries showed that while public investment had, indeed, declined in this period (from 10.9% of GDP in 1985 to 8.7% of GDP in 1988), over the same period, investment in water and sanitation held virtually constant at about 0.4% of GDP.

### Sources of financing for formal services

As will be discussed in more detail, sector performance and sustainability depend not only on the level of financing, but on the sources of such financing. Experience shows unequivocally that services are efficient and accountable to the degree that users are closely involved in providing financing for the services. Or, stated another way, deficiencies in financing arrangements are a major source of the poor performance of the sector.

A World Bank analysis (Garn, 1990) has assessed in detail the sources of financing for water and sanitation projects assisted by the World Bank. Internal cash generation in efficient, financially sustainable utilities is

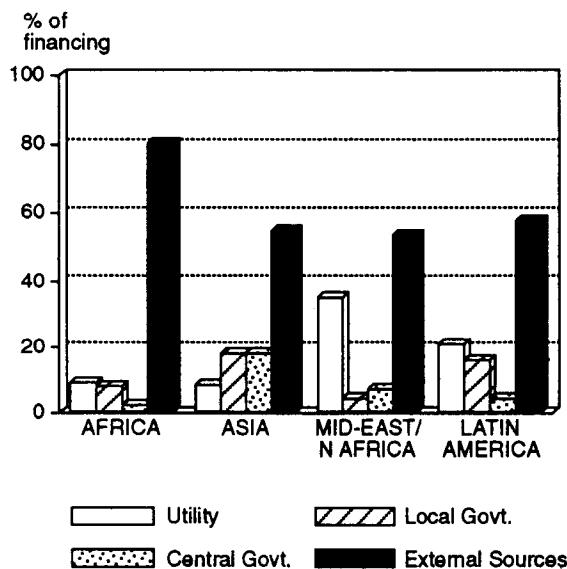


**Figure 1** Public investment in infrastructure in developing countries over three decades

high – 67% in a World Bank assisted water and sewerage project in Valparaiso, Chile, for example. As shown in Figure 2, there are wide regional differences in the relationship between financing and users. Africa has the farthest way to go, with utilities and local government providing only 17% of investment financing. In the other three regions the proportion of financing mobilized by utilities themselves and from local government is higher. In Asia the supply institutions themselves generate relatively little financing, with domestic financing from central and local government in about equal shares. In the Middle East and North Africa utilities themselves generate most of the domestic financing in World Bank assisted projects, whereas in Latin America the contributions of the utility and local government are similar. Unsatisfactory as these figures are, it appears that things are getting worse: internal cash generation financed 34% of costs in World Bank financed projects in 1988, 22% in 1989, 18% in 1990 and just 10% in 1991.

*Relationship between costs and pricing*

The relationship between the cost of providing services and the prices that are charged for these services has major implications for the technical and financial performance of supply organizations, and for the relationship of such organizations to the users it serves. Urban consumers in most industrialized countries pay all of the recurrent costs (for operations, maintenance and debt service) for both water and sewerage services. They also pay most of the capital costs of water supply and a large – typically more than half – and rising portion of the capital costs of sewerage.



**Figure 2** Sources of financing in World Bank assisted water and sanitation projects

In developing countries, however, consumers pay far lower proportions of these costs. A recent review of World Bank financed projects (Garn, 1987) shows that the effective price charged for water is only about 35% of the average cost of supplying it. As might be expected from the discussion on sources of financing, the gap between costs and prices was greatest in Africa and Asia, where the reliability and sustainability of services is the weakest.

*Who benefits from public subsidies?*

The justification for high levels of public financing for water and sanitation services in developing countries usually offered is the low ability of poor people to pay for services. In practice, however, it is the rich, not the poor, who virtually always benefit disproportionately from subsidized water and sanitation services.

As described earlier, the unserved people, particularly those in urban areas, pay much higher prices for water than the served. And it is the poor who are the unserved. A detailed assessment was conducted of who benefits from public subsidies of water supply and sanitation services in several Latin American countries (Petrie, 1989). The results are striking: although subsidies are justified as ‘being necessary because poor people cannot afford to pay’, they end up heavily favouring the rich, with the inequity directly related to the degree of rationing of the service. In the countries studied, inequity was greater in the lower income than in middle income countries, and greater for sewerage than for water supply.

The cycle is clear. Where services are heavily subsidized, service expansion is relatively slow, both because available resources are used inefficiently (because the supply organizations are not directly accountable to their customers) and because of constraints on public financing. The consequence is that ‘the lucky ones’ get subsidized services while ‘the unlucky ones’ who are not served pay an exorbitant human, social and financial price to get services. The data from Latin America provide confirmation of the universal rule, namely that ‘luck’ is not a random outcome, but is the prerogative of the privileged. These data also show that inequities are greatest where services are most heavily rationed (namely in the poorest countries and for sewerage).

*Non-formal services and their financing*

The preceding discussion, mirroring most discussions on the provision and financing of water supply and sanitation services, focuses exclusively on what is done by formal institutions, with the emphasis on formal public financing. In recent years it has become clear that there is, especially where formal institutions perform least adequately, a very large ‘underground’ industry

meeting those needs which the formal institutions do not meet.

Consider the following examples. In Jakarta, Indonesia, only 14% of the 8 million people living in the city receive piped water directly. About 32% purchase water from street vendors, and the remaining 54% rely on private wells. In Jakarta, furthermore, there are over 800 000 septic tanks, installed by local contractors, fully financed by households themselves and maintained by a vibrant and competitive service industry. In cities throughout the developing world, the reliability of the formal water supply service is unsatisfactory, and so households build in-house storage tanks, install booster pumps (which can draw contaminated groundwater into the water distribution system) and sink wells. In Tegucigalpa, Honduras, the sum of such investments is so large that it would be enough to double the number of deep wells providing water to the city. The size of this 'hidden' water economy often dwarfs the size of the visible water economy. In Onitsha, Nigeria, for instance, revenues collected by water vendors are about 10 times the revenues collected by the formal water utility!

And in rural areas, too, the 'hidden' water economy is often huge. In Pakistan, for instance, over 3 million families have wells fitted with pumps, many of which are motorized. These are paid for in full by the families, and all equipment provided and serviced by a vibrant local private sector industry.

The degree of distortion involved in ignoring the informal provision and financing of services varies greatly by level of development (as is obvious from the examples discussed). For prosperous urban areas, formal services are the norm; for low income countries the formal services may be totally dwarfed by the informal, especially in rural areas but even in some cities. What is critical is the realization that this 'hidden' water and sanitation economy is extremely important in terms of both coverage and service. The non-formal sector offers many opportunities for providing services in an accountable, flexible way. When this is not possible because of economies of scale, then service by the informal sector offers a major source of supplementary financing which can be redirected if formal services can become more responsive to consumers' demands in an efficient and accountable way.

The existence of this 'hidden water and sanitation economy' has important implications for service provision. First, there is a high demand for services which has not been met successfully by the formal sector. Second, although some of these services are provided efficiently by the informal sector (such as tubewells in Pakistan), in other cases (such as water vending in the urban periphery) the costs of service are exorbitant, in large part because the informal providers cannot take advantage of the large economies of scale involved in transmitting

water by pipe rather than by person or vehicle.

The specific implication for the formal sector is profound and clear – there is an enormous reservoir of resources which can be drawn into the formal sector at reduced costs for all, as and when the formal sector is able to provide the services that consumers want in a responsive, accountable way.

## **Toward a financially sustainable sector**

An important backdrop to this discussion is the radical rethinking which has taken, and is taking, place in all aspects of economic development policy and natural resource policy. In this context, it is instructive to characterize and contrast an 'old view' of sector policy (and the related financing challenges) which derive from the central planning model which dominated development thinking between the 1950s and the 1980s; and a 'new view' that is emerging as a result of the central place now occupied by efforts to introduce more 'market-friendly' policies, and by concerns of environmental sustainability.

### *The old view of sector financing*

The 'old view' assumes that government has the primary responsibility for financing, managing and operating the services. It is government's task to define the services which are to be provided, to subsidize these services (especially for the poor), and to develop public organizations for the delivery of the services. And it is the function of external support agencies to assist by providing the resource transfers necessary for providing such services.

Over the past 20 years there have been many assessments of the 'financing needs for the water supply and sanitation sector' based on this 'old view'. These analyses have followed a well-defined and often used format, comprising the following steps:

- an assessment of 'the proportion of the population which is served';
- an estimate of the per capita investment costs of providing services to those 'who are not served';
- an aggregation of these costs, globally and by country and region; and
- a comparison of these 'investment needs' with current levels of investment in the sector.

With this format, the conclusions, too, are common and stress:

- the large 'backlog' in services;
- the slow pace of improving coverage;
- the size of 'the resource gap' if coverage targets are to be met; and

- the need for governments and external support agencies to increase the resources devoted to the sector so that targets can be reached.

The calculations underlying Agenda 21 are typical of this approach:

The current level of investment . . . is about US\$10 billion per year. It is estimated that approximately US\$50 billion a year would be needed to reach full coverage by the year 2000. . . Such a fivefold increase is not immediately feasible. A new strategy is based upon doubling of current investments to US\$20 billion per year.

To the advocates of the 'old view' what is needed is more strenuous advocacy so that external support agencies and national governments will dedicate larger proportions of available public resources to the sector.

#### *The new view of sector financing*

In recent years the limitations of the financing perspective implicit in the 'old paradigm' have become painfully clear to many water and sanitation sector professionals (although they were becoming increasingly clear to governmental financing departments earlier).

At the most fundamental level, although complaints about 'insufficient priority for the sector remain common', a review of the record shows that allocations to the sector from public sources in developing countries increased from about 0.25% of GDP in the 1960s to about 0.45% of GDP in the 1980s and that these levels of public investment were maintained even in the years of financial stringency of the late 1980s. This privileged place at the table notwithstanding, and partially because of it, sector performance remains poor (in terms of the number of people served, the quality of service, the efficiency of the supply organizations and the quality of the environment).

The invocations at international water conferences pleading for 'increased priority to the sector' and the repeated 'commitment' to ambitious targets have become an embarrassment to sector professionals. The delegates at the International Conference on Water and the Environment, held at Dublin in January 1992, specifically rejected proposed targets and the pleas for the resources to meet those targets (International Conference on Water and the Environment, 1992).

Of greater significance, a sophisticated understanding of sector financing has begun to emerge in the sector. As is true for development policies in general, this has entailed a rigorous separation of wish from reality, with specific attention being focused on the incentives which face individuals and organizations.

Possibly the most important element of this new

understanding is that 'sector finance' is not a subject to be dealt with as a mechanical 'requirement' (as was the case previously) after the major policies are decided upon, but rather a set of considerations which are at the heart of developing a sector which provides the services that people want in an efficient, accountable and environmentally friendly way.

Starting with this perspective, a remarkable, radically different, consensus has started to emerge in recent years on policies (including financial) for managing water resources and for delivering water supply and sanitation services on an efficient, equitable and sustainable basis. At the heart of this consensus are the two, closely related, 'guiding principles' enunciated at the 1992 pre-UNCED Dublin conference, namely that:

- Water has an economic value in all its competing uses and should be recognized as an economic good.
- Water development and management should be based on a participatory approach, involving users, planners and policy makers at all levels, with decisions taken at the lowest appropriate level.

These principles are now being widely adopted (for instance in the World Bank's *Water Resources Management Policy Paper* (1993), by the Danish International Development Agency (DANIDA, 1991) and by the Development Assistance Committee of the OECD). The great challenges now facing the sector are articulation of the details implicit in these general principles and the translation of the Dublin principles into practice on the ground.

The new consensus gives prime importance to one central principle (long familiar to students of public finance) which should underlie the financing of water resources management and water supply and sanitation services. This principle is that efficiency and equity both require that private financing should be used for financing private goods and public resources be used only for financing public goods. Implicit in the principle is a belief that social units themselves – ranging, in this case, from households to river basin agencies – are in the best position to weigh the costs and benefits of different levels of investment of resources for benefits that accrue to that level of social organization.

The vital issue in application of this principle to the water sector is the definition of the decision unit and the definition of what is internal (private) and external (public) to that unit. And here it is useful to think of the different levels at which such units may be defined, as illustrated in Figure 3.

To illustrate the implications of the 'decision-making rosette' (Figure 3), it is instructive to consider how water supply and sanitation services should be financed.

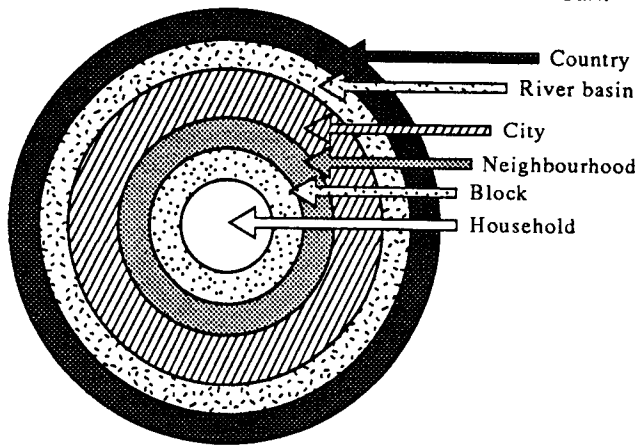


Figure 3 Levels of decision making on water and sanitation

#### *How water supply services should be financed*

The economic costs of providing water include: (a) the financial costs of abstracting, transporting, storing, treating and distributing the water; and (b) the economic cost of water as an input. The latter cost arises because when water is taken, for example, from a stream for use in a city, then other potential users of that water are denied the possibility of using the water. The value of the most valuable opportunity foregone because of this water (known technically as the 'scarcity value' or 'opportunity cost') constitutes a legitimate element of the total production cost of water. In the most appropriate forms of water resources management (discussed later), charges are levied on users for this privilege. As an empirical matter, the financial costs of water supplies to urban consumers and industries usually greatly exceed the opportunity costs. For low-value, high volume uses (specifically irrigated agriculture), this relationship is frequently just the opposite – opportunity costs comprise a considerable fraction of total costs, especially in situations of water scarcity.

What of the benefit side? The provision of water supply to households has several different benefits. Households themselves value a convenient, reliable and abundant water supply because of time savings and amenity benefits and, to a varying degree, because of the health benefits it confers on them. Because these 'private' benefits constitute the bulk of the overall benefits of a household water supply, the public finance allocation principles dictate that most of the costs of such supplies should be borne by householders themselves. When this is the case, households make appropriate decisions on the type of service they want (for example, a communal tap, a yard tap, or multiple taps in the household). The corollary is that, because this is principally a 'private good', most of the financing for the provision of water supply services should be provided through user charges sufficient to cover both the

economic costs of inputs (including both the direct financial cost of inputs such as capital and labour and the opportunity cost of water as an input).

#### *How sanitation, sewerage and waste water management should be financed*

The benefits from improved sanitation, and therefore the appropriate financing arrangements, are more complex. At the lowest level, households place high value on sanitation services which provide them with a private, convenient and odour free facility which removes excreta and waste water from the property or confines it appropriately within the property. However, there are clearly benefits which accrue at a more aggregate level and are therefore 'externalities' from the point of view of household. At the next level, the block, this means that households in a particular block collectively value services which remove excreta from the block as a whole. At the next level, that of the neighbourhood, services which remove excreta and waste water from the neighbourhood, or which render these wastes innocuous through treatment, are valued. Similarly at the level of the city, the removal and/or treatment of wastes from the environs of the city are valued. Cities, however, do not exist in a vacuum – the wastes discharged from one city may pollute the water supply of a neighbouring city. Accordingly, groups of cities (and farms and industries and others) in a river basin perceive a collective benefit from environmental improvement. And finally, because the health and well-being of a nation as a whole may be affected by environmental degradation in one particular river basin, there are sometimes additional national benefits from waste water management in a particular basin.

The fundamental axiom of public financing prescribes that costs should be assigned to different levels in this hierarchy according to the benefits accruing at different levels. This would suggest that the financing of sanitation, sewerage, and waste water treatment be approximately as follows:

- households pay the bulk of the costs incurred in providing on plot facilities (bathrooms, toilets, on lot sewerage connections);
- the residents of a block collectively pay the additional cost incurred in collecting the wastes from individual houses and transporting these to the boundary of the block;
- the residents of a neighbourhood collectively pay the additional cost incurred in collecting the wastes from blocks and transporting these to the boundary of the neighbourhood (or treating the neighbourhood wastes);
- the residents of a city collectively pay the additional cost incurred in collecting the wastes from blocks and



transporting these to the boundary of the city (or treating the city wastes);

- the stakeholders in a river basin – cities, farmers, industries and environmentalists – collectively assess the value of different levels of water quality within a basin, and decide what level of quality they wish to pay for and on the distribution of responsibility for paying for the necessary treatment and water quality management activities.

In practice, of course, there are complicating factors to be taken into account (including transactions costs of collection of revenues at different levels, and the interconnectedness of several of the benefits). What is striking, nevertheless, is that the most innovative and appropriate forms of sector financing (and service provision) follow the above logic to a remarkable degree.

The case study above presents the case of the financing of sewerage services in an informal urban settlement in Karachi, Pakistan. In this case households pay the costs of their on lot services, blocks pay the cost of the tertiary sewers, blocks pool their resources to pay for the neighbourhood (secondary) sewers, and the city (via the Municipal Development Authority) pays for the trunk sewers. This evocative 'feeder/trunk' distinction is now being applied on a much larger scale to the provision of urban services in Pakistan.

A similar case is that of the financing of low-cost 'condominial' sewers in Brazil (de Melo, 1985). Although the arrangements are not quite as refined as those in Karachi, the same principle applies, and applies successfully – households pay for the on lot costs, blocks pay for the block sewers (and decide what level of service they want from these), with the water company or municipality paying for the trunk sewers. Even when the appropriate financing and institutional principles are followed, however, very difficult issues arise with respect to financing of waste water treatment facilities.

In industrialized countries it is possible to discern two models which have been used. In many industrialized countries the approach followed has been to set universal standards and then to raise the funds necessary for financing the required investments. As is becoming increasingly evident, such an approach is financially infeasible, even in the richest countries of the world (*Financial Times*, 21 February 1994). In the UK the target date for compliance with the water quality standards of the European Union is being reviewed as customers' bills rise astronomically to pay the huge costs involved (over US\$60 billion this decade). And in the USA local governments are revolting against the unfunded mandates of the federal government. A particularly pertinent case is the refusal of cities on the Pacific coast to spend the resources (US\$3 billion in the case of San Diego alone) required for secondary treatment of sewage. The

National Academy of Sciences of the USA has advocated rescinding the 'secondary treatment everywhere' mandate and developing an approach in which the costs and benefits are both taken into account in the management of sewage in coastal areas (US National Research Council, 1994).

In a few countries a different model has been developed. In these countries, institutional arrangements have been put into place which: (a) ensure broad participation in the setting of standards, and in making the trade offs between cost and water quality; (b) ensure that available resources are spent on those investments which yield the highest environmental return; and (c) use economic instruments to encourage users and polluters to reduce the adverse environmental impact of their activities.

These principles were first applied immediately before World War I to the management of the Ruhr River Basin in Germany's industrial heartland and have provided the underpinnings for the management of the Ruhrverband ever since (Ruhrverband, 1992). Learning from the experience of their German neighbours, France developed a national river basin management system based on the Ruhrverband principles and has been applying it since the early 1960s. In this model stakeholders – including the users and polluters, as well as citizens' groups – are involved in deciding the level of resources which will be raised and the consequent level of environmental quality they wish to 'purchase'. This system, which obviously embodies the central principles codified in the Dublin Statement, has proved to be extraordinarily efficient, robust and flexible in meeting the financing needs of the densely industrialized Ruhr Valley for 80 years, and the whole of France since the early 1960s.

For developing countries the implications of the experience of industrialized countries are clear. Even rich countries manage to treat only a part of their sewage – only 52% of sewage is treated in France and only 66% in Canada. Given the very low starting points in developing countries, and the vital importance of improving the quality of the aquatic environment, what is needed is a process which will simultaneously make the best use of available resources, and provide incentives to polluters to reduce the loads they impose on surface and ground waters.

Against this backdrop, developing countries face an awesome challenge. The 'old agenda', namely the provision of water supply and household sanitation services, is clearly a relatively 'easy' task if sensible financial policies are adopted, since consumers want and are willing to pay for these services. And yet only a handful of developing countries have been successful in meeting this 'easy task' in an efficient, responsive, and financially sustainable way. The 'new agenda', which centres

on management of waste water and the environment, is a much more difficult and expensive one, and one in which successes (in terms of efficiency and financial sustainability) are few and far between even in industrialized countries.

What is heartening is that there is evidence that the right lessons are being drawn from the experience of many developed countries. Just five years ago the Baltic Sea clean up was conceived of in classic terms – setting quality standards and then determining what was needed to finance the needed investments. In this case (as in all others), once the calculations were done, it became clear that the necessary money (over US\$20 billion) could not possibly be raised. In the Interministerial Conference on Financing of the Baltic Sea Clean-up in Gdansk in 1993, this approach was abandoned for a far more productive one, namely, ensuring that limited available resources were invested in such a way as to develop financially sustainable, efficient water and sanitation utilities, and to ensure that the limited resources for waste water treatment were allocated to the highest priority investments.

Daunting as the 'new agenda' is, there is cause for hope. It is encouraging that delegates from over 100 countries agreed at the International Conference on Water and the Environment in Dublin (1992) on the global relevance of the principles underlying the Ruhr and French water resource management systems. Even more important are the signs that the Ruhr/French system is now being adopted, with appropriate modifications, in Spain, Poland, Brazil, Venezuela and Indonesia, and is likely to be applied in many developing countries in the near future.

### **Summary of the financing implications of 'the new view'**

In summary, the articulation of the 'new view' of sector financing represents a radical departure from the old. Financing is seen not as an exogenous afterthought. Rather, it is seen as central to the development of a sector which will provide people with the services they want and are willing to pay for, and to developing the right balance between environmental quality and cost. The way in which investments are financed matters for all issues – resource mobilization, the efficiency of allocating these resources, the efficiency with which assets are operated, and the accountability to customers and stakeholders – which are central to the development of the sector. Indeed, if financing policies can be 'got right', all of the other key sector issues – involvement of users, the assignment of responsibility for different actions to 'the appropriate level', the development of accountable institutions, appropriate standards, technology and service selection – will more readily fall into place. Where the 'new view' of financing is adopted, the

focus will be precisely on the central sector problems (see World Bank, 1993), namely:

- managing water resources better, taking account of economic efficiency and environmental sustainability;
- providing, at full cost, those 'private' services that people want and are willing to pay for (including water supply and the collection of human excreta and waste water);
- mobilizing and using scarce public funds only for those services (specifically the disposal and treatment of wastes) that provide wider communal benefits; and
- developing flexible, responsive, financially sustainable institutions for providing these services, with a larger role for community organizations and the private sector.

#### *Possibility of mobilizing financing from the private sector*

Faced with constraints on public financing, some countries have looked to the private sector for financing of the massive investments required. There are many reasons – efficiency, innovation and separation of provider and regulator – suggesting that it is often appropriate to involve the private sector in the provision of these services. And there are an increasing number of examples of private sector financing being mobilized for waste water investments (especially for build–operate–transfer schemes) in Mexico, Malaysia, Indonesia and other developing countries.

In the context of this discussion, there are two major factors to be taken into account in assessing the role of the private sector in financing of waste water investments in developing countries. First, public facility projects are often characterized by a long construction period, followed by a gradual increase in the revenue extracted from the operation. The result is that investors may have to wait 8–10 years before receiving their first dividend and 15–20 years before obtaining a rate of return comparable to that offered by an industrial investment. In addition, the entire construction period may be characterized by considerable uncertainty about the ultimate profitability of the investment (because of potential cost overruns and because of the uncertainty about operating revenues). During this period of great uncertainty, remuneration of the investor's risk should compare to that of venture capital and run at the level of 25 to 30%. In contrast, when tariff levels are known following commencement of operation, revenues are not likely to vary as much as in an industrial project. The risk (and appropriate return) is thus less (Davezies and Prud'homme, 1993).

Three observations are relevant in this context. First

**Table 2 Private and public financing of privately-operated water and sewerage services in France (approximate/%)**

	Water supply	Sewerage
Affermage (public financing)	30	70
Concessions (private financing)	70	30
All designated management	100	100

(see Table 2, in France, the country with the longest history of private sector participation in the water sector, the bulk of privately operated water supplies are privately financed (concession contracts), but the majority of privately operated sewerage is publicly financed (affermage contracts). Second, where capital markets are relatively shallow – as is the case in most developing countries – the transition from public financing to long-term private financing is going to take time and ingenuity. And third, because the investment costs are so large, cost recovery frequently has to be scheduled over a number of years.

### Financing of fresh water in Agenda 21 context

The verdict on the 'old' top-down, populist, supply driven financing policies is clear: despite the good intentions which underlie these policies they have failed on all counts – they are inequitable, inefficient and unsustainable. The overwhelming supporting evidence notwithstanding, in certain political fora, populism and good intentions still hold sway.

Consider these two examples. The 1990 New Delhi Consultation (to mark the end of the International Drinking Water Supply and Sanitation Decade, 1981–90) declared that the driving principle should be 'some for all rather than more for some', a noble intention which had manifestly failed in practice.<sup>1</sup> What is particularly striking is that such a declaration was made just as the counterproductivity of such policies was leading many developing countries to take a less romantic, more pragmatic, and more productive policy position.

<sup>1</sup> Interestingly, nowhere had the 'some for all rather than more for some' maxim been followed more closely than in India, the country which hosted the New Delhi Consultation. In India this approach led to a 'low level equilibrium trap', in which, in the name of equity, service quality, willingness to pay, revenues etc were all low. The end result was poor service for those who had service and no service for those whom the policy was ostensibly designed to benefit (Singh *et al.*, 1993). Interesting, too, is the fact that the Indian government itself now recognizes the counterproductive nature of these policies and is in the process of abandoning them (Government of India, 1992; 1993).

Next consider the fresh water sections (Chapter 18) of Agenda 21, the outcome of the United Nations Conference on Environment and Development. The pre-UNCED technical meeting (the International Conference on Water and the Environment, 1992) was attended by delegates from over 100 countries. Many of the delegates were veterans of previous international water conferences and were acutely aware both of the seductiveness of the populist positions which had prevailed at such conferences, and of the ultimately counterproductive nature of those positions. The delegates at Dublin resisted the standard calls – for unachievable targets, for additional resources, for unimplementable laundry lists. In particular, they drew attention to the total impracticality of the draft recommendations on financing (which formed the basis for the discussions on financing in Agenda 21), where the volume of external resources 'required' for fresh water exceeded the total volume of official development assistance! Instead the Dublin delegates focused on defining the two key principles which had proved to be effective in managing water resources. The result was a document – the Dublin Statement – which has proved to have widespread acceptance and applicability and has come to frame the debate on water resources policies in many external support agencies and countries alike.<sup>2</sup> Numerous countries and external support agencies are showing the way by developing participatory, efficient, and financially and environmentally sustainable policies of the sort described in this paper.

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<sup>2</sup>For example, the 'Dublin Principles' underlie the recently formulated World Bank *Water Resources Management Policy* paper, and provide a benchmark against which OECD countries have agreed to assess their water resource assistance strategies. The principles are being implemented in a concerted fashion by many bilaterals, most notably the Nordic countries and France. And several governments in developing countries – including the states of São Paulo and Ceará in Brazil, Venezuela, Poland and Peru – are basing their new water resource policies on the Dublin Principles.

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