Social Issues in the Provision and Pricing of Water Services

OECD

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ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

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FOREWORD

This book explores the links between social issues and the provision of water supply and sanitation services in OECD countries.

The main focus of the report is the affordability of water services, as well as the social measures currently in place aimed at resolving these affordability problems. The report also examines the potential role of the private sector in incorporating the social dimension into water pricing decisions, as well as issues related to making the transition towards higher levels of access to water services.

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- **Ana-Mari Hamada, Eduard Interwies,** and **Andreas Kraemer**, ECOLOGIC, Berlin, Germany (private sector participation and regulatory oversight in Chapter 4).

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Executive Summary

EXECUTIVE SUMMARY

Water pricing policies can contribute to environmental and economic goals, but may face social resistance.

This book examines social issues related to the provision and pricing of household water services. Properly designed water management policies can contribute to both environmental and economic goals, but may face resistance due to the perceived negative social impacts for some stakeholders. Given the importance of household water supply and sanitation services for social welfare, these social dimensions need to be taken into account when key policy decisions are made regarding the provision of water services.

Some basic "social" concepts in water services provision include…

Social issues in the provision of water services can be considered from the perspectives of the impact of policies on different income groups; different consumer types; different regions; or different generations.

…access…

While the social and public health requirements of "access" to public water supply have largely been fulfilled in OECD countries, some still have as many as a quarter of their population without individual household connection to piped supply. As for wastewater collection and treatment, several OECD countries have a backlog of investment requirements, with the result that they still do not meet their own water quality standards.

and affordability.

"Affordability" is the social aspect of water service provision that is most clearly and closely linked to pricing policies. Affordability of water services may not be distributed equally across income groups or neighbourhoods - a lower income household will inevitably pay a higher proportion of their income for water services than a higher income household does.

Many OECD countries have seen water charges increase recently, which will continue to put pressure on the affordability of water services.

Many OECD countries have seen a real increase in household water charges in recent years. The factors behind this trend include continuing pollution of water sources (necessitating more expensive treatment), combined with additional national legislation and EU directives that require higher standards of wastewater treatment. This trend toward higher prices is likely to continue, and will therefore continue to generate pressure on the perceived affordability of water services.

The affordability of water in about half of OECD countries is either an issue now, or will become one in the future.

There are several methods available for measuring the affordability of water charges. "Macro-affordability" indicators are developed by relating national average household water charges to either average household income (disposable or gross) or average household aggregate expenditure. “Micro-affordability" indicators disaggregate the former by income groups, family types or regions. Available evidence of affordability indicators suggests that, in about half the OECD countries (15 out of 30), affordability of water charges for low-income households is either a significant issue now or might become one in the future, if appropriate policy measures are not put in place.

The trade-offs between efficiency and equity objectives in the provision of household water services typically occur when moving from an unmeasured to metered charging structure, when rebalancing tariffs away from fixed charges towards volumetric charges, and when increasing fees and tariffs towards full-cost pricing. There is considerable experience in OECD countries with policy measures to address water affordability for vulnerable groups, while attempting to make water pricing reveal the full economic and environmental costs of water services.

Affordability measures can be broadly classified into income support measures…

Affordability measures can be classified in two main groups: *income support measures* and *tariff-related measures*. The *income support measures* address the individual customer’s ability to pay from the income side (through income assistance, water services vouchers, tariff rebates and discounts, bill re-phasing and easier payment plans, arrears forgiveness).

…and tariff-related measures.

Tariff-related measures keep the size of water bills low for certain groups (e.g. refinement of increasing-block tariffs, tariff choice, tariff capping). There seems to be clear potential benefits from increasing block tariff structure, which adjusts a free or very low-priced first block by household size, and then reflects the transition form “basic” to “discretionary” water use in subsequent blocks at prices closer to marginal social costs. There is evidence that the use of such tariffs is increasing.

Co-operation between the public and private sectors in the provision of water services is expanding.

While the provision of urban water supply and sanitation is traditionally considered a public service, there is a trend of increasing commercialisation and private sector participation (PSP), for a number of reasons. Whether water services are provided by the public or private sector (or both), it is important that social and environmental objectives continue to be met.

OECD countries already use several different forms of private sector participation (PSP).

Different types and degrees of PSP in household water services are found in OECD countries. These can be characterised as *Administrative PSP*, *Corporative PSP, Legal PSP* and *Financial PSP*, according to legal status, asset ownership, operation and management, and capital investment responsibility. Several examples of different forms of PSP are included in this book. These examples illustrate how these water service providers are being regulated in the areas of pricing, service standards, operational efficiency, investment practices, water quality, environmental protection, and consumer protection. Some key criteria for evaluating the effectiveness of water service providers in meeting economic, social, and environmental objectives are also considered.

There are OECD countries where the extent of coverage of water services remains incomplete.

Access to public water supplies is no longer a serious problem in most OECD countries, (especially in urban areas), with at least 75% of the population (and often as high as 90%) already being served. Thus, the social and public health requirements for universal access have largely been fulfilled. However, in a few OECD countries or regions, the extent of coverage of water services is still suboptimal, due to incomplete infrastructure development and/or uneven availability of the resource.

Filling these service gaps may be managed through "differentiated" approaches.

Filling these "service gaps", including the installation of water services infrastructure for the first time, typically occurs over a transitional period. The potential roles of "differentiated" approaches are therefore explored in the book (e.g. private wells, water trucks, septic tanks, community-managed systems).

Mexico is an OECD country where gaps still exist in the "first-time" provision of water and sanitation services.

Mexico provides an example of an OECD country where gaps still exist in the "first-time" provision of water and sanitation services, particularly in: (i) rural areas, where widely dispersed and marginalised communities lacking access basic water services; and (ii) and peri-urban areas, where informal settlements surround rapidly growing cities. The existing conditions, and therefore the transitional solutions, will differ between rural and urban settings. An overview of the household water sector in Mexico is provided, followed by a more detailed focus on the three southern States of Chiapas, Guerrero and Oaxaca – among the poorest in the country.

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Chapter 1

Introduction

The book examines social issues related to the provision and pricing of household water services. Water management policies can contribute to both environmental and economic goals, but may face resistance due to the perceived negative social impacts for some stakeholders. This chapter briefly considers the ecological, as well as the public, private, common, and merit good characteristics of water, and how this unique natural resource serves economic, social, and environmental objectives. It also reviews some basic concepts, such as equity, access, and affordability in water services provision. It briefly summarises examples of social tariffs, and considers justifications for subsidies as transitional or welfare measures. The chapter then introduces institutional issues, such as private sector participation and the regulatory role of government, as well as exploring the significance of water management in poverty alleviation efforts in developing countries.

CHAPTER 1. INTRODUCTION

1.1 Objectives and assumptions

In declarations at the Bonn 2001 International Freshwater Conference and again at the 2002 World Summit on Sustainable Development (WSSD) in Johannesburg, ministers expressed concern at the 1.1 billion people in the world who, at the beginning of the 21st century, live without access to safe drinking water, and the 2.4 billion without access to proper sanitation. They urged governments, the private sector, and civil society to work together to help close this gap. In addition, the Millennium Development Goals, expressed in the UN General Assembly's Millennium Declaration, call for halving the population of people without access to safe drinking water by 2015. The Plan of Implementation adopted at the WSSD also set a similar target for access to sanitation.

The *OECD Environment Strategy to 2010* (OECD, 2001a), adopted by OECD Environment Ministers in May 2001, also identifies freshwater as a priority issue for OECD countries. It points to the need to manage the use of freshwater resources and associated watersheds in a way that maintains an adequate supply of freshwater of suitable quality for human use, while still supporting aquatic and other ecosystem needs. In adopting this strategy, OECD countries pledged to undertake national actions aimed at meeting this challenge, and adopted three broad indicators for measuring progress: reduced intensity of water resource use; improved ambient water quality; and a larger share of the population connected to secondary and tertiary wastewater treatment systems.

Underlying this kind of initiative is the view that the social dimensions of water services need to be taken fully into account when key policy decisions are made about water resources. For example, the *OECD Environment Strategy* (OECD, 2001a), the *OECD Environmental Outlook to 2020* (OECD, 2001b), and the OECD Sustainable Development Project (OECD, 2001c) all stress the need to better understand links between social and *environmental* issues in general, and between social issues and *water* management in particular.

Box 1.1. **Social issues in water pricing**

Changing water pricing structures to better reflect environmental externalities and resource cost will always entail social acceptability issues. OECD experience suggests, however, that "social" water pricing can often contribute simultaneously to economic efficiency, resource conservation, and equity goals.

Improving access to water services and filling water infrastructure investment gaps have cost implications, and the distribution of these costs is important for policy implementation. Institutional frameworks for water governance also determine how (and by whom) water pricing is set and regulated, as well as how environmental and social concerns are dealt with.

OECD work has shown that appropriate water pricing is an important incentive for water conservation and a disincentive for water pollution. Also, optimal levels of service in water supply and sanitation have both human health and environmental implications. Lack of access to good water is a key element of poverty, but pricing water in a way that reflects environmental and efficiency concerns can sometimes be controversial due to social considerations (especially affordability for low-income households).

The question is often framed as one of efficiency *versus* equity. However, these two approaches do not necessarily have to result in conflicting policy options. Under certain conditions, water pricing systems can promote efficiency while addressing equity goals. One such approach would define the "basic needs" part of water demand, access to which should be guaranteed for all (especially low-income) households, and beyond which the prices for water services should reflect economic and environmental policy objectives.

This book explores the latter links, particularly in the context of the provision of water infrastructure services to households. Water management in general, especially as concerns the allocation of water among competing uses (industry, agriculture, domestic, and ecosystems), is not addressed. Three key premises underline the book:

- Water simultaneously serves economic, social development, and environmental objectives. Its economic value is mainly as input for industry and agriculture, in addition to household consumption. Water's environmental functions include supporting aquatic ecosystems, contributing to flood control, and serving as a "sink" for rural and urban pollution. The social value mainly reflects water's life-sustaining functions, its role in meeting "basic human needs". Water also contributes to rural development, food security, and employment goals. Water has cultural values, as its use in traditional festivals and rituals shows. It has historically contributed to the formation of "social capital" — people and communities often organise themselves around water management functions.

- Properly designed water management policies will help meet environmental and economic goals but their implementation sometimes faces resistance due to perceptions that such policies have negative social impacts for some stakeholders. It is therefore important to know what approaches have been developed to address this barrier, how successful they have been, and, ultimately, if they might be applied to other contexts.

- Many of the water management challenges that OECD countries face also exist for developing countries. Some of the lessons from OECD experience in addressing these challenges could therefore be of value to developing countries in helping them reach their water management goals. This book contributes to further dialogue towards this end.

After reviewing the background issues, the report turns to a more detailed discussion of affordability (Chapter 2) and the social policy responses related to water pricing decisions (Chapter 3). Chapter 4 examines the actual and potential role of the private sector in incorporating social and environmental dimensions into water policy decisions. Chapters 5 and 6 focus on the social issues involved in making the transition to a higher level of water supply and sanitation services in specific circumstances. Chapter 7 presents a few conclusions.

1.2 Some basic concepts

It is important to distinguish two main types of water management activity: (i) activities that regard water as a *natural resource* within natural ecosystems; and (ii) activities that recognise water's role in the provision of *services,* which are generally infrastructure-intensive. The former involves abstraction of water and its allocation among competing uses (e.g. industry, agriculture, municipal water supply, recreation, and ecological and aesthetic functions), as well as protection of surface water bodies and groundwater reservoirs from degradation. The second activity involves investment, operation and management of water infrastructure, and delivery of water services to final customers — that is, treatment and distribution of piped water supply, wastewater collection and treatment, and irrigation works. This book focuses on social issues associated with the second type of activity for the household sector.

"Public good" or "private good"? Debates over how water should be allocated and managed arise due to differing views and definitions of water, and are often rooted in differences in the legal status of water in various countries. Water is sometimes regarded as a "public good" — a "gift" from nature (as exemplified by enjoyment of a lake for its aesthetic value or for public bathing), the use of which by one person does not diminish the potential for use by others (non-rivalry in consumption), and access to which cannot be restricted (non-excludability). In this view, everyone has a right to water, and it is ultimately the government's responsibility to ensure that every citizen's basic human needs are met in terms of sufficient quantity and quality. At the same time, it is generally acknowledged that the right to water does not mean unlimited

consumption, especially when ecological or economic constraints prevail. In fact, where water is provided through infrastructure, access is marked by rivalry in consumption (consumption by one person reduces availability for others) and excludability (access to the resource can be restricted unless payment is made). Water then acquires "private good" characteristics and the costs of service delivery to final consumers need to be reflected in water pricing to promote efficient levels of consumption and infrastructure investment. When water is abstracted as a natural resource, whether from a private well, as input for piped water supply, or for irrigation, it arguably should be treated as a private good and paid for. This is not always practical, however, especially where water abstraction rights and ownership are not well defined; such situations may lead to inefficient allocation and overuse.

Somewhere between the definitions of "public good" and "private good" is the notion of water as a "common good," with non-excludability and non-rivalry characteristics only until the resource becomes scarce and its benefits to a given community begin to decrease. *In-situ* functions of water as part of ecosystems (e.g. for maintaining marshlands) can be considered as a common good. In this context, water must be governed within a framework of shared responsibility.

Water for basic human needs: Water supply and sanitation services are often considered "merit goods", with social benefits that exceed the private benefits. Under certain conditions and tariff structures, private consumption levels may be lower than the social optimum. In other words, when provided through market mechanisms, the level of private consumption may be lower than the level the society would otherwise be willing to pay for. For example, very poor families that find water bills too high may reduce their water consumption to a level where their basic needs are not being met, and thus compromise positive externalities such as public health. While water supply and sanitation services should generally be considered as private goods and thus efficiently allocated through volumetric pricing systems, the component that serves basic human needs can usually be considered a merit good, sometimes requiring special measures to ensure that socially optimal consumption levels are reached. In 2002, the Committee on Economic, Social and Cultural Rights of the United Nations formally recognised the right to water as a human right.[1]

Water as an integral part of ecosystems: Freshwater resources are quite different from natural resources such as ore and oil deposits in that they can be both renewable and non-renewable. While sufficient levels of precipitation and natural recharge of aquifers make surface water and groundwater renewable resources, if this natural cycle is disturbed by climatic changes or pollution from human activities they can become non-renewable (or "renewable" over only very long periods). Water is vital for sustaining ecologically sensitive areas (e.g. wetlands) and for conservation of biodiversity. The arrangements, under which water resources are allocated and

1. General Comment No. 15 (November 2002), on the implementation of the International Covenant on Economic, Social and Cultural Rights (ratified by 145 states, including 28 OECD member countries).

managed, in terms of both quantity and quality, are significant determinants of whether ecosystems function properly.

Equity: Many of the social issues involved in water management can be considered in terms of "equity", which in turn has four basic dimensions: (i) equity among income groups; (ii) equity among consumer types; (iii) equity among regions; and (iv) intergenerational equity.

The most obvious social aspect of household water pricing and charging is equity among *income groups*. It is generally accepted that charges for at least basic water services (including sewerage) should be affordable to poorer water consumers. The implication is that they should not have to pay a disproportionately larger part of their disposable income for water services than better-off water consumers do.

The equity question can also be considered in terms of *consumer types* (i.e. higher- or lower-volume consumption levels). It is important to distinguish this aspect from equity among income groups, as low-income households are not necessarily low-consumption customers. Low-income families may be large in size or live in multi-family housing units with shared water taps. Measures to provide preferential treatment to lower-consumption water customers could unintentionally penalise low-income (but larger) families.

Equity can also be considered in terms of *disparities among regions in access to water services*, which have two distinct causes. First, the distribution of water resources around the world is naturally uneven because of differing hydrologic, geologic, climatic, and other natural conditions. Thus, variations in water prices and charges, reflecting differences in scarcity and in production and delivery costs, are only to be expected. The second cause of disparity in access to water supply and sanitation is simply that optimal service coverage has not yet been reached in some regions. There is evidence of continuing disparities of this type among parts of the OECD, particularly between urban areas and rural or underdeveloped regions. The transboundary nature of water resources can also lead to geographic inequity in terms of access and quality. It is increasingly recognised that quantity and quality pressures on freshwater resources, coupled with the naturally uneven distribution of water across the globe, represent a potential source of international conflict in this century, as oil was in the last century. A few such "hot spots" already exist — in South Asia and the Middle East, for example. The issue of "water security" was an important theme of the second World Water Forum in The Hague (2000), as was "water for peace" at the third WWF in Kyoto (2003).

Finally, we should consider *intergenerational* equity — an issue broadly related to environmental sustainability. Water resource management, to be sustainable, must ensure that consumption levels today do not unduly diminish future generations' opportunities to benefit from water resources. Intergenerational equity requires conserving and protecting water as a finite natural resource, and reversing the trend of increasing quantitative and qualitative stress on surface water bodies and groundwater reservoirs. In terms of quantity, water resources must be efficiently allocated among competing uses (agriculture, industry, municipal water supply, etc.) and ecological

functions (marshlands, lakes, ponds, etc.) Striking a balance between growing demand for water for agriculture and for maintaining ecosystems is a particular challenge. Water use by industry and for municipal water supply has largely been rationalised in most OECD countries. In terms of quality, agricultural run-off remains a major source of surface water pollution and poses a growing threat to groundwater. While most OECD countries have made significant improvements to municipal sewage treatment in recent decades, there is still room for progress in removing nutrients and persistent chemicals, the accumulation of which can lead to negative health impacts.

Access: These notions of equity can be considered in the context of access to water and sanitation services. Access to public water supply, especially in urban areas, is no longer a serious problem in most OECD countries, with at least three-quarters of the total population (and often more than 90%) already being served. Thus, the social and public health requirements for "universal access" have largely been fulfilled (OECD, 1999a). Yet, up to a quarter of the population in some OECD countries may still be without access to public water supply. Those not connected to piped water rely on sources such as private wells, public water fountains, and private vendors of barrelled and bottled water. Meanwhile, the global situation is dismal: as has been noted, more than 1.1 billion people – one in five of the world's inhabitants – have no access to safe drinking water.

The situation is worse for wastewater collection and treatment. In several OECD countries a considerable backlog of investment needs — for rehabilitating old systems, increasing connection rates, and improving wastewater treatment — remains unmet. Inadequate wastewater treatment is part of the reason many OECD countries still do not meet their own water quality standards. By and large, however, unconnected households have alternatives such as private or community septic tanks, which in sparsely inhabited areas can be cost-effective without diminishing the assimilative capacity of the local environment. The marginal cost of connecting an additional customer to a piped sewer system must be weighed against its marginal benefits, and in some cases it is more sensible to have differentiated levels of service adapted to local situations than to strive for universal coverage of standardised services.

If physical access to water and wastewater services is to be improved, and ageing systems in older cities rehabilitated, significant capital investments will be required to expand service coverage and to ensure that the existing infrastructure functions efficiently.

Affordability: Affordability can be thought of in terms of the level of prevailing charges for water services in relation to the disposable income of consumers. It can also be related to consumers' "ability to pay", as distinct from "willingness to pay". Affordability influences access, and vice versa. If water is priced beyond what a consumer can afford, this excludes him or her from access to the service. Conversely, improved physical access via expanded service coverage could be reflected in higher water charges (assuming capital cost recovery is built into the price), thereby affecting affordability for consumers. Similarly, rehabilitation of aged systems can lead to higher charges. Affordability is the social aspect of water that is most clearly and closely

linked to pricing. Affordability of a piped water supply service may not be distributed equitably among income groups or neighbourhoods. For the same water consumption level and total bill, a poorer household will inevitably pay a higher proportion of its income than a richer one (this is the "micro" aspect of affordability). If the poorer household is in a new housing development, even its absolute water prices could be higher than those in a richer but older neighbourhood nearby, because of the need to cover the costs of service expansion.

1.3 Measures aimed at aligning efficiency and equity objectives

Equity and affordability can be addressed in various ways, without necessarily compromising efficient water allocation. For example, water tariffs are an effective tool for sending the relevant signals to consumers. Several tariff-based solutions in OECD countries are aimed at guaranteeing minimum levels of access on basic-needs grounds and/or improving affordability of water supply and sanitation services for low-income households.

One important approach towards more efficient allocation is to move towards volumetric charges rather than fixed charges so as to avoid the wasteful consumption patterns that the latter encourage.[2] *Increasing block tariffs*, in which the charge increases with each additional unit of water used, send a more explicit conservation message and have been increasingly adopted in OECD countries. Even they can be somewhat regressive, however, because sometimes the lowest "first block" is effectively reserved for smaller families, so large poor families could end up in more expensive blocks and pay significantly higher average volumetric rates than smaller higher-income households. The design of increasing block tariffs can be adjusted in several ways to make the sizes and prices of tariff blocks deliver the intended distributive effects.

Some tariff structures, such as *"lifeline" service,* are aimed at guaranteeing a minimum level of access for all, justified by the argument that water is a basic human need and hence should be made available either for free or at rates below full-cost pricing. However, setting the minimum level too high can lead to over-consumption among average-sized or smaller households, and thus encourage over investment in infrastructure.

Installation of meters for individual houses is widespread in OECD countries, and metering of individual apartments appears to be on the increase. Metering is essential for volumetric charging, but it is sometimes resisted on equity grounds and because expanding meter installation to new areas can be expensive and not necessarily cost-effective.

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2. The goal here may not be to reduce consumption *per se* (especially where water is relatively plentiful), but to prevent previous inefficiencies from reappearing.

Whatever changes in tariff structure or metering may be introduced, one important social consideration is to ease the *transition* for water customers. To this end, water utilities in a few OECD countries have allowed consumers to choose which tariff system will apply to their bills, instead of forcing all consumers to switch to a single new system.

Several measures address affordability through *subsidies*. Fixed charges and "lifeline" blocks that are sub-optimally priced are one form of subsidy. Socially adjusted tariff systems also involve subsidies from one consumer group to another (e.g. between higher- and lower-income groups). Other measures, used in several OECD countries, include rate reductions, payment discounts, arrears forgiveness, and income support payments aimed at low-income families, retired people, and those with disabilities. Such programmes need to be carefully targeted.

Direct subsidies are often provided to municipalities, water utilities, or irrigation works to finance infrastructure investments, thereby lowering the cost of water infrastructure services for all final consumers. This can trigger a vicious cycle of lower unit prices, encouraging users to consume more than they would at full-cost pricing, inducing service providers to increase supply even further, and thus leading to stressed and poorly managed infrastructure. Hence, the subsidisation of water services is best considered only as a *transitional measure* making the move towards full-cost pricing easier for consumers, or as a well-targeted *welfare measure* for disadvantaged consumers.

1.4 Water governance and institutional issues

As pricing is only one of several policy tools for promoting efficient and sustainable water allocation and management, it is important to consider its social aspects in the context of overall water governance at local, regional, national, and international levels. Among the elements of this context are the legal and institutional frameworks, including the body of policies, rules, and practical procedures prescribing specific roles and responsibilities for various stakeholders such as national and sub-national governments, the private sector, communities, and individual water users. In most cases water management responsibilities should be decentralised to some level of local government. Public participation, built on public awareness, is another important element of achieving social acceptability for water governance processes.

Government's role is particularly related to the management of water as a finite natural resource. First, in efficiently allocating water among competing demands (including ecological ones) and protecting it from overuse and pollution, government has the essential role of avoiding the market failures often associated with public goods, such as the "tragedy of the commons." Second, in managing a capital-intensive sector that requires efficient infrastructure systems for service delivery at affordable prices, government has the ultimate responsibility in setting up the institutional and regulatory frameworks for infrastructure services and ensuring that even poor households have a minimum level of access. Since water utilities could exploit their potential positions as

natural monopolies, it is important to have effective regulation by government, regardless of whether the service providers are public or private.

Private sector participation in what has traditionally been considered a public service (and thus usually provided by public agencies) has been increasing in recent years, both in OECD countries and beyond. This trend is largely driven by the combination of high infrastructure investment costs and limited public funds. Growing water demand, coupled with years of sub-optimal pricing and underinvestment in infrastructure, often translates into large investment gaps. In such cases, municipal authorities have increasingly opted for injections of private capital, rather than continuing to meet investment needs with government transfers. For developing countries, dwindling flows of development aid, which has traditionally financed water service infrastructure, mean that public sources of finance can no longer keep up with the increasing costs of system expansion needed to meet rising demand.

Whether water services are provided by the public or private sector, the most important result is effective overall water governance. Increasing awareness and acceptance of water as a private good, and of the related need for water pricing, have contributed to trends towards a more proactive private sector role in water governance. There are many different forms of private sector participation. A private contractor may handle only metering, billing, and/or collection ("contracting out") for a public utility. Asset ownership may remain in public hands but day-to-day management of operations and maintenance is provided by a private entity ("management contracts"). Private participation may even extend to financing of capital investments ("BOOT/BOT concessions"). Under shared ownership or divestiture arrangements, a private entity may assume ownership of infrastructure assets (Johnstone and Wood, 2001; The World Bank, 2000a).

There is evidence in OECD countries of highly efficient utilities that are purely public, while other evidence shows improved performance — higher billing and collection rates, increased revenue, reduced water losses, better service (increased coverage/new connections, more reliable supply) — with the greater participation of private sector contractors or operators.

As government changes its role from one of water service *provider* to that of water service *regulator*, it still needs to ensure that social and environmental objectives are met. Regulators need to require that: (i) public and private service providers do not use their market power to exploit customers; (ii) public health and environmental externalities are taken into account in policy decisions; (iii) mechanisms are in place to ensure that water consumption is sustainable and that the resource is allocated efficiently among competing uses; and (iv) a minimum level of service is guaranteed that is consistent with a basic standard of living (Johnstone and Wood, 2001).

1.5 The global perspective: water and poverty alleviation in developing countries

The significance of social issues related to water management becomes magnified outside OECD countries. Disparities in access to, and affordability of, water are far more pronounced in developing countries than in OECD countries. In addition to the billions without access to safe drinking water or adequate sanitation, some 6 000 children die every day from water-borne diseases (Appleton and Chatterjee, 2001; WHO/UNICEFF, 2000). Often, piped water supply systems in growing urban centres of developing countries serve richer neighbourhoods on a priority basis, while poorer areas are underserviced or unserviced. Those not covered by public supply resort to substandard (and often more expensive) alternatives to meet their basic needs. Past mismanagement and underinvestment in the water and sanitation sector have, furthermore, left surface- and groundwater polluted by untreated municipal and industrial wastewater. The amount of investments needed globally for water supply and sanitation to meet the aspirations of present and future generations, including demand from urban population growth and industrial expansion in developing countries, is estimated at USD 75 billion a year over the next 25 years, not counting rehabilitation and renovation (World Water Vision, 2000).

The huge number of underserved poor suffer from the classic relationship between *poverty, health, and environment*: poverty leads to deprivation, which results in lack of hygiene and the burden of disease, leading to lower productivity and increased poverty. Meanwhile, in developed and developing countries alike (but again, the phenomenon is far more pronounced in the latter), it is commonly observed that poorer or more marginalised members of society tend to be disproportionately exposed to pollution and other environmental hazards. A key element in escaping from this poverty trap is access to clean water and adequate sanitation. Many participatory studies have asked poor people to rank their problems or the cause of their poverty. Water was consistently ranked second after income in 80% of the surveys (i.e. more often than food security or health) (The World Bank, 2000b).

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Social Issues in the Provision and Pricing of Water Services

Chapter 2

Measuring the affordability of household water charges

Most OECD countries have experienced increases in household water charges in recent years: pollution of water sources necessitates more expensive treatment; new national legislation and/or EU directives that require higher standards of wastewater treatment. This trend is likely to continue. Factors such as income distribution and water resource endowments lie behind the perception of water affordability problems in OECD countries. "Macro-affordability" indicators relate national average household water charges to either average household income or average household expenditure. "Micro-affordability" indicators disaggregate macro-affordability indicators by income groups, family types, or regions. Evidence suggests that, in about half of OECD countries, affordability of water charges for low-income households is either a significant issue now or might become one in the future, if appropriate policy measures are not put in place.

CHAPTER 2. MEASURING THE AFFORDABILITY OF HOUSEHOLD WATER CHARGES[3]

2.1 Background

Earlier OECD work on water pricing (OECD, 1999a) concluded that most OECD countries were making progress towards pricing systems that: (i) better reflected the marginal social costs of service provision; and (ii) encouraged economic efficiency and the more sustainable use of water resources. In the same study, household water charge data from 18 member countries for various periods ending in the mid- or late 1990s revealed annual real unit price increases in the range of 0.3% to 153%. Four of the countries were deemed atypical outliers; the other 14 had real annual increases in the range of 2% to 6%, with an unweighted mean of 3.7%. Growing concern about affordability was noted in some of these countries, together with a number of initiatives taken by water service utilities and governments towards lessening the burden on low-income households (OECD, 1999b).

2.1.1 Factors driving water charges

Some five years later, the factors behind these real increases in water charges still exist. Groundwater sources that are polluted either continue to require more sophisticated (and therefore more expensive) treatment or have to be abandoned, which means developing more expensive demand-management or supply-based programmes. Maintenance and enhancement of existing supply sources may require more elaborate treatment to deal with new organic pollutants, often from non-point sources. Additionally, both national legislation and EU directives are tightening wastewater treatment standards.

In a number of countries, the subterranean water infrastructure has been neglected, increasing the risk of other types of environmental deterioration. Rectifying this situation implies increased water bills, even as continuing demand growth (in line with higher living standards, increased urbanisation, shrinking household size, etc.) prompts

3. For advice and information for this chapter, particular thanks are due to: Stefano Cima (Institute for Social Research, Milan); Martin Fitch (Centre for Utility Consumer Law, University of Leicester); Judit Rakosi (ECO plc, Budapest); John Sawkins and Valerie Dickie (Heriot-Watt University, Edinburgh); and Gary Wolff (Pacific Institute, Oakland, California).

the development of more costly supply sources or the extension of demand-management programmes. For the European Union, the new Water Framework Directive is requiring both existing and future members to move towards full cost recovery from water service users, with obvious implications for pricing. In sum, further real increases in water charges are likely over the next decade, both as the price of past neglect and lack of understanding, and in response to growing demands for more sustainable use of the resource and its protection.

A different (though complementary) way to look at the politics of water affordability issues involves the distinction between a household's willingness to pay (WTP) for water services and its ability to pay (ATP). Clearly, significant affordability problems exist, and must be addressed, where prices exceed both WTP and ATP for a sizable number of customers. If prices are lower than both WTP and ATP, affordability is not an issue. The interesting cases are those where prices lie between WTP and ATP. Any dichotomy between willingness to pay and ability to pay is generally due either to recent history (low WTP being found where past prices were low, even if strict ATP is greater than those prices), or to lack of financial planning for extreme events, like hot weather, that lead to high water consumption (the general WTP exists, but the ATP, relying on cash flow, may be inadequate). Very different types of policy initiatives are called for in these situations. In the first, there is a transitional difficulty but no real underlying affordability problem: price rises should be gradual (forward-looking marginal cost pricing would have anticipated the problem). In the second case, micro-(household-) oriented measures are required to smooth the financial burden and to obviate the need to borrow at high private loan rates. Programmes incorporating more frequent billing and bill-smoothing (e.g. direct debit systems and escrow accounts) would be the appropriate policies. Chapter 3 discusses these issues further.

2.1.2 Access to potable water and adequate sanitation for all

In addition to economic and environmental developments, interest has recently been growing at both the national and international levels in the principle of safe and affordable water supply and sanitation for all. Smets (2002a) lists over 20 international protocols, conventions, and declarations proclaiming this principle between 1966 and 2001.

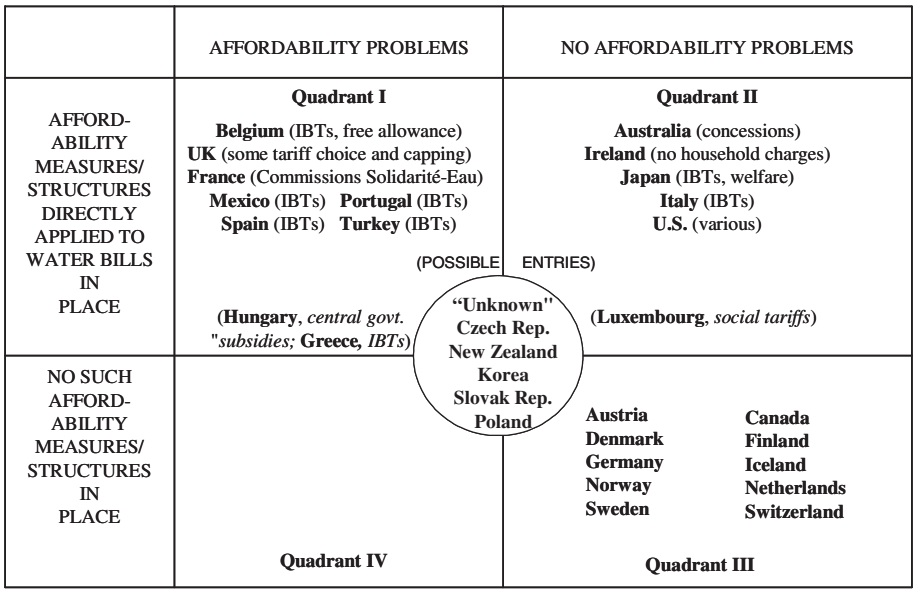
For most households in OECD countries, the goal of a safe and affordable potable water supply has been achieved. However, there is evidence that, for a significant minority, the ability to pay for water even for essential uses fails to match its cost. Concern over this situation is at its strongest when households with low incomes (or with persons with health conditions giving rise to high water demand, e.g. for hemodialysis) are subject to individual water metering; financial hardship may be an incentive for such consumers to cut back on essential water use, probably resulting in damage to personal and public health.

2.2 Is affordability a significant issue in OECD countries?

To gather material for this report and explore the above question, country-specific studies were examined and contacts made with over 150 government officials, water supply industry representatives, academics, consultants, and researchers. As a result, it has been possible to reach a preliminary conclusion, for 22 of the 30 OECD countries, as to whether household water affordability is perceived as a significant issue. For three other countries, a "possible" view was formulated; for the remaining five, the information found was insufficient. No scoring system or weighting criteria were used.

Clearly, the views thus formed are quite subjective and based on general perception in each country. Nevertheless, the findings are interesting, especially when juxtaposed with an outline of the major policy measures and/or tariff structures directly applied to water bills (henceforth referred to as *measures and structures*) that each country reports as being in effect to alleviate affordability problems of vulnerable households (i.e. low-income households, disabled or retired people). Figure 2.1 shows the results graphically.

Figure 2.1. **Perception of affordability problems and measures/structures in place**



Note: IBTs = increasing block tariffs.

2.2.1 Affordability measures, structures, and problems: cause and effect

The categories shown in Figure 2.1 merit further comment. First, there is clearly no simple and general cause-effect relationship between the presence/absence of relevant affordability measures and structures applied to water bills, and the absence/presence of a general perception that there exists a significant affordability problem. Other factors must therefore partly account for the perceived presence or absence of the defined "problem".

On the other hand, in five or six countries the existence of measures and structures *may well* have had a bearing on the perceived absence of a problem. This may be most strongly argued for **Australia** and **Ireland**. In the former, what are known as "concessions" (a form of rebate) are now so much part of the economic culture that affordability was found to be generally perceived as a non-issue. In Ireland, where all household water charges were abolished in 1996 and consolidated into general taxation, household water affordability problems as such ceased to exist by definition.

Now consider the opposite possibility — that the presence of an affordability problem is the main reason for the direct application of affordability measures and structures to water bills of vulnerable households. Here there is much more support. The ten countries with no measures/structures in place generally seem not to have an affordability problem (Quadrant III); and the nine countries described as certainly or possibly having an affordability problem already have some measures or structures in place.

Thus there is at least superficial support for the theory that significant affordability measures and structures, used effectively, may affect the view or perception of affordability problems. For the six countries in Quadrant II, it looks as though measures and structures may have been applied effectively enough to cause affordability problems to be perceived as insignificant. In contrast, in the seven to nine countries in Quadrant I, the effects of measures and structures may have been either insufficient to offset the perception of affordability problems, or outweighed by other influences. The following section discusses the nature of those influences.

2.2.2 Affordability problems: poverty and other factors

Other than the countervailing pressures of affordability measures and/or tariff structures, three main factors probably affect perceptions that affordability is, or is not, a significant issue.

First, is the extent of relative poverty in a country (usually quantified through "breadth" and "depth", alluding respectively to the numbers of the poor and the "intensity" of their poverty). All else being equal, the greater the extent of poverty, the larger the perceived problem. Second, if good water resources are plentiful and household water services relatively cheap, affordability may be a non-issue even in the

presence of considerable poverty. Third, past neglect of water service infrastructure may lead to high water charges to recoup rehabilitation costs, putting a significant burden on a particular generation even if the country's income distribution is relatively flat and the numbers living in poverty are relatively few.

Table 2.1 brings together the most recent available consistent indicators of relative poverty for 21 OECD countries and some judgements about "water plenty" and "past infrastructure neglect". The 21 countries – all outside the area labelled "Unknown" in Figure 2.1 – are here divided into two groups, according to whether measures and structures are in place. The relative poverty indicators date from the mid-1990s (1992-97), and it is assumed that they have not changed significantly since.

The results are striking. In the lower half of the table, only **Canada** shows indicators of the population proportion in relative poverty that are *above* the 21-country average. That country is known to have abundant supplies of relatively unpolluted water, and, due to significant subsidies for infrastructure investments, water prices in the mid-1990s were determined to be the second lowest in the OECD (OECD, 1999b; Table 13). So it can be surmised that the sheer cheapness of water (even after allowing for the probably considerable hidden subsidies), combined with supplementary welfare payments that cover water bills, has "overcome" the relatively large size of the population proportion in *relative* poverty, thereby explaining the perception of "no affordability problem". For all other countries without measures or structures, the proportions in poverty were less than the 21-country average; three revealed a higher than average *intensity* of poverty, but "*numbers* living in poverty" is generally the indicator that is publicised, and is most appropriate for use here.

In the upper half of Table 2.1, of the 12 countries listed as having water affordability measures and structures directly applied to water bills, nine had at least two poverty indicators of the four with values higher than the 21-country average. **Japan** and **Belgium**, however, had just one indicator in the higher-than-average category. In both cases, it is the less-used income-gap ratio. And while Japan is in the group claiming no significant affordability problems, Belgium is firmly in the other camp, according to a written submission from the Flemish Environment Agency). None of the **French** indicators were higher than the 21-country average.

Non-poverty factors play a role here as well, with the **US**'s relatively cheap water, high *average* standard of living and array of locally based affordability measures (see Chapter 3) seemingly outweighing the effects of the high numbers in relative poverty. In **Hungary**, an opposite effect appears to have occurred. Here, despite relatively low values of the poverty indicators, and still-sizable central government subsidies for water services, the dominant factor is the large real price increases for redressing past infrastructure neglect.

This fairly rough and ready analysis, combined with the possible differences in effectiveness of affordability measures and structures directed at water bills of vulnerable households in various countries, permits construction of some feasible

explanations of the country affordability perceptions presented earlier. The hypotheses that have emerged will be considered in Chapter 3.

Table 2.1. **Factors contributing to affordability perceptions, mid-1990s**

	Definition of extent of 'relative threshold' poverty				Water Plentiful and Cheap?	Past Neglect?
	< 40% of median income	< 50% median income		<60% median income		
	Head-count ratio	Head-count ratio	Income gap Ratio	Head-count Ratio		
Affordability measures for water bills in place						
Belgium	4.1	7.8	31.1*	13.2		
United Kingdom	3.8	10.9*	19.6	19.5*		
Mexico	14.8*	21.9*	33.8*	27.7*		
Turkey	9.6*	16.2*	28.6*	23.4*		
Greece	8.1	13.9*	29.9*	21.7*		
Hungary	4.0	7.3	26.8*	13.9*		YES
Australia	4.5	9.3	31.5*	18.8*		
Ireland	1.6	11.0*	12.0	20.7*		
Japan	4.4	8.1	28.1*	13.9		
Italy	8.5*	14.2*	35.5*	21.9*		
France	3.2	7.5	23.4	13.5		
United States	11.1*	17.1*	34.7*	24.0*	YES	
No such measures in place						
Germany	5.2	9.4	25.4	15.7		
Austria	2.8	7.4	20.7	13.7	YES	
Canada	5.7*	10.3*	27.3	16.5	YES	
Denmark	2.0	5.0	25.2	12.0		
Finland	2.1	4.9	21.8	10.8		
Norway	3.4	8.0	28.1*	14.6	YES	
Netherlands	3.1	6.3	27.3	13.5		
Sweden	4.4	6.4	42.1*	10.3		
Switzerland	3.5	6.2	32.1*	11.8		

Notes: 'Relative threshold' poverty lines are fixed in terms of real median income in each period. Head-count ratio: number of persons in households below the poverty line, as % of all persons. Income gap ratio: average shortfall of low incomes with regard to the poverty line. * indicates that the value shown is above the 21-country average for that measure.

Source: (poverty data): Forster, 2000 (OECD Labour Market and Social Policy Occasional Paper No. 42), Table 5.1.

2.3 Measuring affordability

This section explains the indicators of macro and micro affordability, offering examples of both. It also points out some problems of interpretation and considers projections of such indicators, given an assumed future stream of expenditures, tariff structures, etc.

2.3.1 Macro affordability indicators

*Aggregate (*or *macro) affordability* for a country is measured by relating average household water charges to either average household income (disposable, or, failing that, gross) or, failing those, average household aggregate expenditure. It should be noted that the ratio of average household charges to average GDP per household would serve as a poor substitute for an aggregate indicator of affordability. It seems appropriate to relate charges to disposable income wherever possible, since the latter most closely represents the household budget constraint.

Table 2.2 updates information on the macro affordability indicators originally presented in OECD, 1999a. The dispersion of figures in the final column is considerable, reflecting at the top end the higher percentages that would be expected for countries engaged in large infrastructure rehabilitation or expansion programmes. Other differences are in part due to variation in the available comparator variable (gross or net income – sometimes not clarified in the earlier study – or expenditure).

Interpreting such average data in the context of this study entails a number of problems. First, the data fail to convey any significant information about the situation of low-income households. As has been seen, the share of the population in households classified as living in relative poverty (with any given threshold) varies widely across the OECD; e.g. persons in households with less than 50% of the median household income varied between 5% (**Finland**) and 22% (**Mexico**) in the mid-1990s. This variation suggests that the "shape" of income distribution varies considerably among member States. Thus an estimated aggregate macro affordability figure does not convey the affordability situation faced by the relatively less well-off households of a country.

For any given country, the poor would be expected to devote a larger than average proportion of their income to water charges. But how much larger? And how precisely are "the poor" to be defined? Clearly what is needed is an examination of the burden of water charges across a country's whole income distribution.

Table 2.2. **Recent macro affordability indicators, selected OECD countries**

Country	Year	Denominator (all refer to households)	PWS	S&ST	Water charges as proportion of income or expenditure
Poland	1999	Disposable Y			2.2%/2.4%[1]
Hungary	2000	Net Income	1.4%[2]	0.7%[2]	2.1%[2]
Turkey[3]	1997	"Income"			1.2-1.7%
Portugal[3]	1997	"Income"			1.6%
Luxembourg[3]	1997	"Income"			1.0-1.5%
Netherlands	1999	Disposable Y	0.6%	0.8%[4]	1.4%
Mexico[3,5]	2000	Disposable Y	1.3%	n.a.	n.a.
Austria[3]	1997	"Income"			1.0-1.3%
Germany	2000	Disposable Y	0.5%	0.7%	1.2%
England & Wales	1997-00	Disposable Y			1.2%
Denmark	1998	Disposable Y	0.5%	0.6%	1.1%
France	1995	"Income"			0.9%
Slovak Rep.	2001	Net Income			0.9%
Scotland	1997-00	Disposable Y			0.7%
Japan	2000	Expenditures			0.7%
Italy	1997	Expenditures			0.7%
Korea[3]	1997-98	Expenditures			0.6%
United States	2000	Disposable Y			0.5%

Notes:
PWS = public water supply;
Y = income;
S&ST = sewerage and sewage treatment;
n.a. = not available.

1. Calculations from data presented in a paper by J. Berbeka and K. Berbeka in Villacampa, Brebbia, and Uso (2001). See text on Poland in Section 2.3.4 for an explanation of the two values presented.
2. Original data gave an overall value of 2.0%. Because significant numbers of lower-income households had no sewerage, the figure has been altered to render the value comparable to those of other countries, using more detailed 1999 data for Hungary, which underlie its appearance in Table 2.3. The PWS/S&ST division is also based on 1999 data.
3. Data presented originally in OECD (1999b), Table 22.
4. Assumptions required about incidence of S&ST charges – see Section 4.3 for details.
5. Mexican data appear to exclude S&ST charges.

Source: See Annex A.

The second interpretation problem is that a national average figure reveals nothing about variation by region, water utility, or municipality. Yet, much water policy

formulation, resource planning, and financial planning (including that relating to tariff structures and levels) is undertaken at one of these levels, and tariff and affordability projections are an appropriate part of those exercises. Average figures also hide variations by family type (e.g. retired people and households with and without children), which may have a role in social policy formulation, for example concerning social security benefits or welfare payments.

Third, not all water used in the home, particularly in developed economies, is for essential needs. An increasing proportion in some of the more affluent societies is associated with "luxuries" such as power showers, garden sprinklers, and pressure washers. The percentage of income spent on water for such purposes should be of no particular concern to those interested in social and affordability policies, unless this water demand is met only at the expense of essential use by poorer households. In short, care is required in interpreting proportions of income spent on water services. It cannot be assumed that all, or even most, of such expenditure is "essential".

The macro affordability indicators we have used are thus asymmetric. High values are the most likely to hide significant problems for households (i) at the lower end of the income distribution; and/or (ii) in certain (water-scarce, high-cost, low-income) regions. However, low values do not necessarily rule out problems in (i) or (ii). This asymmetry necessitates an examination of the *micro* affordability indicators, which effectively break down the macro figures considered above.

2.3.2 Micro affordability indicators by income group

Macro affordability indicators can be disaggregated by: (i) income group, (ii) region or other area, or (iii) family type; alternatively, one can (iv) select a particular burden threshold (e.g. 3% of disposable income) and use household budget studies to estimate the proportion of households with water expenditure at or above that. This section presents examples of the estimation and policy application of (i) and (iv), Section 2.3.3 considers (ii), and Section 2.3.4 reviews affordability indicator *projections*. Little national evidence is available for (iii).

Tables 2.3, 2.4, and 2.5 present evidence from nine OECD countries measuring water charge burdens across income groups for a recent year (or two). For five countries (Table 2.3), the burden is estimated across a formal description of the income distribution (deciles, quintiles or quartiles); the UK is divided into **England and Wales** and **Scotland,** whose water charging systems differ (in **Northern Ireland**, as in **Ireland**, household water is not charged but funded by general taxes). The information comes from national statistics offices' household budget studies, located on Web sites (**Mexico**, **United States**), in a publication (**Hungary**), via private communication (**Netherlands**), and through academic research, using a data archive (**UK**). The budget studies are all based on sample surveys (diaries and interviews), ranging in size from 1 850 households in the Netherlands to nearly 110 000 in the US. For three other countries (Table 2.4), percentile income distributions were unavailable but data found in various publications were used to calculate water charge burdens across a number of

specified income classes with convenient absolute income boundaries – six classes each for **Italy** and **Denmark**, nine for **France**.

Table 2.3. **Water charge burden across household income distribution in 5 OECD countries**

(Average annual water charges in national currency and as % of average income or average total expenditure)

	E&W 1997-8	**E&W 1999-00**	**Scotland 1999-00**	**Hungary 1999**	**Nether-lands 1999**	**Mexico 2000**	**US 2000**
% of what?	Gross income (GBP)	gross income (GBP)	gross income (GBP)	net income (1000 HUF)	Disp. Income (NLG)	disp. income (MXN)	disp. income (USD)
Overall Average	-	251 (0.85%)	159 (0.76%)	6774 (1.81%)	755 (1.42%)	924 (1.26%)	214 (0.47%)
Percentiles of income distribution							
0% (low) – 10%	214 (3.99%)	227 (3.75%)	137 (2.24%)	3743 (2.53%)	569 (2.38%)	314 (3.84%)	119 (0.66%)
10% – 20%	208 (2.52%)	236 (2.61%)	125 (1.43%)	5035 (2.31%)		484 (2.74%)	
20% – 25%	213 (2.15%)	237 (2.18%)	125 (1.22%)	5159 (1.99%)		545 (2.23%)	178 (0.67%)
30% – 40%	211 (1.78%)	236 (1.82%)	136 (1.12%)	6106 (2.09%)	728 (1.89%)	598 (1.89%)	
40% – 50%	219 (1.52%)	256 (1.63%)	146 (1.00%)	6054 (1.88%)		720 (1.79%)	198 (0.57%)
50% – 60%	229 (1.31%)	256 (1.34%)	159 (0.91%)	7226 (2.03%)	834 (1.45%)	779 (1.53%)	
60% – 70%	235 (1.12%)	255 (1.11%)	168 (0.79%)	7518 (1.92%)		857 (1.35%)	244 (0.49%)
70% – 75%	238 (0.93%)	263 (0.93%)	174 (0.66%)	7749 (1.76%)		1018 (1.22%)	
75% – 80%	243 (0.74%)	267 (0.75%)	197 (0.58%)	9135 (1.78%)	890 (0.97%)	1013 (0.84%)	329 (0.33%)
80% – 90%	269 (0.45%)	275 (0.41%)	222 (0.39%)	10029 (1.25%)		2136 (0.73%)	
90% – 100% (high)							

Source: See Annex A.

For the first set of analyses — those focusing on an ordering of household incomes to generate a formal income distribution — it is desirable to allow for the fact that in general people living in larger households need less income per person to achieve the same standard of living as those in smaller households. This is because some costs (such as housing expenditures) do not increase proportionately in larger households and children's needs are generally lower than adults' needs. An appropriate procedure is first to order household incomes on a *per equivalent adult* basis, assigning a higher weight to the first adult in a household, lower values to subsequent adults or non-dependent children, and still lower values to each dependent child (for a discussion of income units and equivalence scales, see Forster, 2000). With the resulting "new" income distribution of households, average household water charges are still related to average *actual* household income or expenditure for different percentile groups, to generate appropriate average burden measures. In the empirical work that follows, only in the cases of **England and Wales**, **Scotland,** and **Australia** have "equivalent adult" corrections been made (by national statistical offices).

Table 2.4. **Water charge burden across income classes in 3 OECD countries**

(Average annual water charges in national currency and as % of average income or average total expenditure)

	France 1995		**Italy**		**Denmark 1998**
% of what?	"income" (FF)		Expenditure (1000 ITL)		Disposable Income (DKK)
			1985	1995	
Overall Average	1503 (0.88%)		(0.27%)	164 (0.43%)	2787 (1.13%)
Income class		Income class			
1 (low)	990 (2.18%)	1 (low)	(0.45%)	105 (0.90%)	1523 (1.93%)
2	1127 (1.33%)	2	(0.36%)	129 (0.60%)	2360 (1.63%)
3	1353 (1.18%)	3	(0.25%)	152 (0.47%)	2877 (1.15%)
4	1495 (1.03%)	4	(0.27%)	183 (0.43%)	3566 (1.03%)
5	1624 (0.90%)	5	(0.23%)	222 (0.40%)	3795 (0.86%)
6	1768 (0.79%)	6 (high)	(0.20%)	229 (0.27%)	4384 (0.61%)
7	1948 (0.65%)				
8	2210 (0.52%)				
9 (high)	2397 (0.37%)				

Source: See Annex A.

In the single case of **Australia**, the only relevant information available was in marginal rather than average terms — identifying the effects of water and sewerage price changes on each ("adjusted" income distribution) quintile's household water charges over the 1990s. This could be applied only to eight capital cities — which cover, however, about two-thirds of the population. Table 2.5 shows the results.

Table 2.5. **Real changes to Australian household water and sewerage expenditure arising from price changes over 1991-2001, by income quintile**

(In AUD per capital city household in 2000-01 and as a proportion of aggregate household expenditure in 2000-01)

Income quintile	Sydney	Melbourne[1]	Brisbane	Adelaide	Perth	Hobart[1]	Darwin[2]	Canberra[3]
Lowest 20%	16.03 (0.08%)	-64.74 (-0.31%)	40.48 (0.23%)	31.43 (0.19%)	16.26 (0.08%)	-91.20 (-0.49%)	34.43 (0.13%)	20.17 (0.13%)
Second	17.85 (0.06%)	-98.23 (-0.36%)	40.38 (0.15%)	39.96 (0.17%)	21.24 (0.08%)	-91.50 (-0.35%)	40.83 (0.15%)	30.51 (0.11%)
Third	21.16 (0.06%)	-104.92 (-0.28%)	47.23 (0.13%)	61.48 (0.18%)	26.61 (0.07%)	-175.64 (-0.52%)	55.77 (0.15%)	40.25 (0.10%)
Fourth	26.95 (0.05%)	-119.36 (-0.24%)	61.83 (0.13%)	64.78 (0.14%)	31.35 (0.07%)	-162.40 (-0.35%)	84.37 (0.17%)	44.12 (0.09%)
Highest 20%	32.43 (0.05%)	-147.79 (-0.22%)	79.15 (0.12%)	97.52 (0.15%)	40.39 (0.06%)	-162.11 (-0.24%)	148.42 (0.21%)	58.18 (0.08%)
All House-holds	24.09 (0.05%)	-111.03 (-0.26%)	53.37 (0.14%)	56.25 (0.16%)	27.20 (0.07%)	-131.51 (-0.36%)	91.34 (0.18%)	45.12 (0.09%)

Notes:
1. - indicates a real reduction in water charges because real prices declined over the period.
2. Expenditure changes for households in the lowest three quintiles should be interpreted with care, since the underlying data are associated with relatively high standard errors.
3. Expenditure changes for households in the lowest quintile should be interpreted with care, since the underlying data are associated with a relatively high standard error.

Source: See Annex A.

Tables 2.3, 2.4, and 2.5 provide some interesting results, on which commentary is first offered before considering how the outcomes for different countries might be compared. In nearly every data set, the percentage water charge burden on households (henceforth the *burden*) declines noticeably with each move from a lower to a higher income group. This is as would be expected for a utility service that is still dominated by "basic uses" and for which the array of possible luxury uses remains relatively narrow (no matter how important at the margin). The rate at which the burden declines

as income increases, however, varies enormously. Compare the cases of **England and Wales** and **Mexico** (falling from nearly 4% to about 0.4% and 0.7%, respectively) with those of **Hungary** (from 2.5% to 1.25%), the **Netherlands** (2.4% to 1%), the **US** (from 0.66% to 0.33%) and most of the **Australian** cities (where the *change* in the burden over the decade fell by only a half to a third of its lowest quintile value in comparing the experience of the lowest and highest income groups — note that where real water prices *fell*, poorer households fared better, as would be expected).

A number of factors are clearly at work here. First, the smaller the number of divisions of the income distribution (e.g. quintiles rather than deciles, six classes rather than nine), the more hidden are the true burdens at the extremities of the distribution, because of the greater averaging occurring in the calculations. Second, use of gross income, net income or aggregate expenditure in the denominator is bound to affect the measurement of the burdens in a manner that is highly country-specific, because it depends on, among other things, tax policy (helping determine the gross/net income relationship across the income distribution) and savings behaviour (determining the net income/aggregate expenditure relationship). Indeed, for **Denmark**, where survey data for average gross income, average net income and average aggregate expenditure are *all* known for *each* income class, not even the *qualitative* relationships between the net-income-based and the aggregate-expenditure-based burdens for the different income classes could be predicted (because of negative net saving in the two lowest income groups). Third, in any country in which most households have a significant volumetric element in their water charges, an income effect on water demand (and thus, on water charges paid) is to be expected, as is an effect due to variation in the average number of people per household in different income groups.

All this qualification on the data makes it difficult to offer organised comparisons among the charge burdens in the different countries surveyed. In the case of **England and Wales**, for example: (i) the use of *gross* household incomes, rather than *net*; (ii) the fact that annual water charges at the high end of the income distribution are — very surprisingly — only about 25% higher than those at the lower end; and, perhaps, (iii) a relatively unequal distribution of income in the first place, may all have played a part in the large observed burden differential. Are there any ways we can usefully compare such "summary statistics" for micro affordability across the countries for which data are available?

One practical approach would be to split the countries into two groups – those with nine or ten income groups, and those with four to six – then attempt to assemble relevant "burden" statistics based on *disposable* household income, since this is both the household budget constraint and the most common measure used as the denominator of the water charge burdens reported in Tables 2.3 and 2.4. But what "relevant statistics" should be used? The possibilities are:

- Absolute size of the percentage charge burden of the lowest-income group(s).

- Ratio of the charges *actually paid* by the lowest-income group to *either* those of the highest-income group *or* the overall average paid (remembering that the ratio would generally be expected to be lower, the fewer the number of income groups).

- Ratio of the percentage charge burden of the lowest-income group to *either* that of the highest-income group *or* the overall average percentage burden (same caveat).

Table 2.6. **Comparative water charge burden statistics for 8 OECD countries**

Country	Year	Percent-iles or number of classes?	'Original' basis for measurement of water charges burden		'Disposable income' as basis for measurement of water charges burden	
			Burden of lowest-income group	Ratio of lowest-income-group burden to average burden	Burden of lowest-income group	Ratio of lowest-income-group burden to average burden
England & Wales	1999-00	Deciles	3.75%	4.4	3.75%[1]	3.1[2]
Mexico[3]	2000	Deciles	3.84%	3.0	3.84%	3.0
Hungary	1999	Deciles	2.53%	1.4	2.53%	1.4
Scotland	1999-00	Deciles	2.24%	2.9	2.24%[1]	<2.9
France[4]	1995	Nine	2.18%	2.5	2.18%	2.5
Netherlands	1999	Quartiles	2.38%	1.7	2.38%	1.7
Denmark	1998	Six	1.93%	1.7	1.93%	1.7
Italy	1995	Six	0.90%	2.1	0.90%[5]	>2.1
United States[6]	2000	Quintiles	0.66%	1.3	0.66%	1.3

Notes:
1. Average gross and average net income for the lowest income group are assumed equal.
2. Separate data provided by the UK Office of National Statistics enabled this figure to be estimated directly.
3. Data are believed to refer only to public water supply.
4. The income measures used in the sample survey are assumed to refer to disposable income.
5. For the lowest income groups total expenditure is assumed equal to net income.
6. Communications with the Federal Bureau of Labour Statistics led to the assumption that, in the case of the three lowest-income quintiles, the reporting of income was so incomplete that total average household expenditure for those groups would be a better guide to average disposable income.

Source: See Annex A.

However, further consideration suggests the absolute or relative burden of the *highest* income group is of little or no relevance to affordability concerns. Table 2.6 presents, for each country, the actual percentage burden of the lowest-income group as well as the ratio of its percentage burden to the average burden for the whole income distribution. These two statistics are shown both as calculated from the Tables 2.3 and

2.4 data and (for England and Wales, Scotland, and Italy) as amended to reflect disposable income as the denominator, so the data in the last two columns are broadly comparable, at least within each of the two country groupings. (Certain assumptions had to be made in arriving at these data.)

One policy application of this type of affordability indicator to household water charges is that done by the World Bank to assist its decisions on infrastructure investment financing in developing countries. For some of its projects, the Bank requires the post-loan water charges to be no more than a figure variously quoted to be in the range of 3% to 5% of household incomes. The "flexibility" of this approach is illustrated by (i) the range quoted and (ii) the failure to specify whether the figure is meant to relate to the average burden (among *all* households affected), the burden for a low income group (decile? quintile?), or even the burden for *any single* household. Hence, Stottmann (2002) has characterised the approach as "no more than a very imperfect rule of thumb".

In Table 2.6, consider initially the first group of countries, each with nine or ten income groups. **England and Wales** and **Mexico** show a high burden for the lowest decile, both in absolute terms (nearly 4%) and relative to the average burden in those countries (more than three times its value). For **Scotland** and **France** the lowest-income burden is not so high (just over 2%), but this is (probably, in the Scottish case) still 2.5 times the average burden. For **Hungary,** however, the distribution of the burden is much "flatter", so the lowest-income burden is much more in line with the average burden than for the other countries.

For the second group — the other four countries — the lowest income group percentage burdens from Tables 2.3 and 2.4 will, as already explained, understate the burden on the lowest 10% of households. Taking account of the patterns of the burdens across the income distributions in the *first* country group, it is suggested that only the **Netherlands** would be likely to produce a "lowest decile" burden of more than 3%, and only in **Italy** might the "true" lowest decile burden (still probably less than 2%) be more than 2.5 times the country average. For all the reasons given in the text and in the notes to Table 2.6, however, these conclusions should be treated with caution.

The only area for which the water charge burden has been estimated for the very lowest percentiles in the income distribution (below 10%) is **England and Wales.** Smets reproduces (2002a) and reports (2003) on UK government data made available in 1999, suggesting that in 1997/98 the shares of disposable income accounted for by water bills for the lowest 10%, 5%, 2%, and 1% of households were, respectively, 4.1%, 5.6%, 8%, and 10.5%. The last figure, if applied to the whole country, suggests that about 200 000 households had to commit over 10% of their disposable income to water and sewerage charges at the time.

Only one published example of the "burden-threshold" method of measuring micro affordability – by estimating the proportion of households spending more than x% of income on water charges – has come to light among OECD countries, again for **England and Wales.** In 1999, the UK government selected (Department of the

Environment, Transport and the Regions) "for illustrative purposes" 3% as the "threshold for the percentage of disposable income above which water charges may represent hardship", and reported in 1999 the proportion of households so classified as 21.8%, 20.2%, 19.3%, and 18.4% over the years 1994/95 to 1997/98. Although falling, this was a relatively large proportion and suggests (together with the data in Table 2.3) that in 1997/98 most of the lower two deciles were spending more than 3% of their income on water. It is, of course, not known how many of the 18% were households choosing to spend a relatively large share of their income on discretionary water use such as garden watering and luxury showers, but the number was probably very small. This is confirmed by the additional information that in 1999/00 the average expenditure on water charges of households in the three lowest-income decile groups was still 3.2% of average disposable income (Fitch, 2002).

2.3.3 Micro affordability indicators by location and family type

Indicators of micro affordability at sub-national level are available across the income distribution only for **Italy.** From 1995 data provided by the national statistical office, Cima (1998) calculated a set of percentage water charge burdens, corresponding to the six income classes used in Table 2.4, for the North-West, North-East, Central, South, and Islands regions. Table 2.7 shows the burdens (based on total expenditure) for the region with the lowest charges (North-West) and the two regions with the highest (Central, Islands).

Table 2.7. **Water charge burden across Italian regions, 1995**

(as % of total household expenditure)

Region	**Income class**						
	I (poor)	**II**	**III**	**IV**	**V**	**VI (rich)**	**Total**
North-West %	0.68	0.41	0.36	0.32	0.28	0.22	0.30
Central %	1.06	0.85	0.53	0.53	0.44	0.33	0.51
Islands %	1.05	0.63	0.61	0.48	0.55	0.24	0.56
Italy %	0.90	0.60	0.47	0.43	0.40	0.27	0.43
Ratio of highest to lowest regional value	1.6	2.1	1.7	1.7	2.0	1.5	1.9
Ratio of highest regional to national value	1.2	1.4	1.3	1.2	1.4	1.2	1.3

Source: Cima (1998).

Table 2.7 shows that the regional spread can be significant for lower-income groups; the highest regional burden for income class II is 40% above the national figure and 110% above the lowest regional value. Policies based on national information thus run the risk of not having the desired or expected effect at regional level.

Other regional information is available for **Hungary** and **England and Wales** (Tables 2.8 and 2.9). Both sets of data are limited to the average burdens for all households, however.

For Hungary, the regional burdens (second column of data) are much more closely bunched than those of Italy and of England and Wales, echoing the results between deciles highlighted for Table 2.6. This is believed to be a consequence of the form of water affordability policies followed in Hungary in recent years (see Chapter 3). In contrast, England and Wales introduced no significant policies to ameliorate water bill burdens until 2000. Italy has relied for nearly 30 years on the increasing block tariff as the sole instrument for dealing with water poverty. Chapter 3 discusses these issues in more detail.

A study by Raftelis Financial Consulting (2002) covering about 100 utilities in the **US** presents the relationship between charges for benchmark consumption rates of 465 and 931 litres/property/day and local median household income (MHI). The higher benchmark is close to average US household consumption (Vickers, 2001). Association of the Raftelis data with low-income profiles like those for the US in Table 2.1 suggests that at least 10% to 15% of households have water charge burdens greater than 2%, much higher than the US data implied by Table 2.3 and more in line with Rubin's earlier estimate (1994) that 17% to 25% of households were paying more than 2% of household income.

Table 2.8. **Hungarian regional burdens, 2000**

Region	Annual water and sewerage charges (HUF)	Water charges as a proportion of net income
Central Hungary (of which Budapest)	11 148 (12 305)	2.31% (2.38%)
Central Transdanubia	9 181	2.02%
Western Transdanubia	8 665	2.09%
Southern Transdanubia	8 008	1.97%
Northern Hungary	6 882	1.82%
Northern Great Plain	6 305	1.68%
Southern Great Plain	7 191	1.80%
Hungary (overall)	8 578	2.02%
Ratio of highest to lowest value	1.8	1.4
Ratio of highest to average value	1.3	1.1

Source: Hungarian Central Statistical Office (2001), Tables 4.3 and 4.4.

Table 2.9. **England & Wales average regional burdens (1997-2000)**

Region	Weekly water and sewerage charges (GBP)	Water charges as proportion of disposable income
North East	4.40	1.44%
North West	4.40	1.27%
Yorks.&Humber	4.50	1.36%
East Midlands	4.40	1.23%
West Midlands	4.40	1.20%
Eastern	5.10	1.30%
London	3.80	0.84%
South East	4.60	1.08%
South West	5.20	1.47%
England	4.50	1.18%
Wales	5.20	1.69%
England & Wales	4.55	1.21%
Ratio of highest to lowest value	1.4	2.0
Ratio of highest to average value	1.1	1.4

Note:
Data from Family Expenditure Surveys for 1997/98, 1998/99 and 1999/00.
Source: Fitch (2002).

The strong emphasis on MHI in US water affordability indicator and policy discussion both confirms and reflects the Environmental Protection Agency's current use of affordability criteria. Under the 1996 Safe Drinking Water Act, EPA assesses small (population 25 to 10 000) water supply systems' compliance costs in meeting proposed new drinking water quality regulations (EPA, 2002a). The *expenditure baseline* is the actual "current" median household water bill for each of three sizes of "small systems", and the *affordability threshold* is the 2.5% of MHI that EPA believes (currently) to be a reasonable upper limit for water bills. The first is deducted from the second to determine the *expenditure margin*, the maximum increase in household water bills that can be considered affordable. This method helps EPA make technology affordability assessments when deciding how to meet new quality regulations. The 2.5% threshold was not chosen randomly; it was arrived at after comparing the cost of household public water supply with other household expenditure and that of alternative risk-averting behaviour (e.g. treatment at household level, home delivery of bottled water). Recently, under direction from the US Congress, EPA initiated a review (EPA, 2002a) of its national affordability criteria (e.g. adoption of a non-50th percentile and/or a figure other than 2.5%). Water utility representatives are reported (Mainstream, 2002) to be pressing for consideration of alternative approaches to an affordability threshold as well, and have suggested considering the nature of the income distribution below the 50th percentile as one option.

2.3.4 Projections of affordability indicators

Two reports give projections of the implications of full cost recovery for future water tariffs and thus affordability: a 1996 study of half of the **European Union** countries and a 2001 report on the situation in **Poland**. Table 2.10 summarises the most relevant results of the report by Ecotec (1996) to the European Commission. Positing a new water supply and wastewater development for 20 000+ people on a greenfield site in a hypothetical urban area, Ecotec examined the social (i.e. financial) impact on households under the (then) existing tariff levels and in a full cost recovery scenario. Modelling involved specifying plausible, country-specific assumptions about uses, their price-responsiveness, current and cost-recovery prices and future household incomes.

Table 2.10. **Financial impact of greenfield site development under existing tariffs and full cost recovery, selected EU countries**

(Resulting water charges as % of household income burdens)

Country	Existing water tariff levels and structures		Full cost recovery on new site	
	All households	Lowest-income group	All households	Lowest-income group
Non-Cohesion Fund				
Denmark	0.8	1.5	0.9	1.7
France	1.1	2.0	1.5	2.6
Germany	0.9	1.8	1.0	2.0
United Kingdom	1.2	1.9	1.3	2.1
Cohesion Fund				
Greece	0.4	0.7	2.1	3.9
Ireland	0.3	0.5	1.9	3.6
Portugal	0.5	0.9	2.8	4.9
Spain	0.4	0.7	1.6	2.8

Source: Ecotec (1996), pp. 55-65.

Clearly, the 1995 tariffs of three of the four non-Cohesion Fund countries were close to full cost recovery; only France was seen as experiencing a significant extra burden on households, both on average and, more especially, for the least well-off of six defined income classes. For the four Cohesion Fund countries (Ireland still had household water charges at the time), it was a very different story: all except Spain would experience increases of 400% or more both on average and in the lowest income classes (and even for Spain the forecast increases were 300%).

Berbeka and Berbeka (2001) estimated the impact on households in **Poland** of implementing the EU directives on urban wastewater treatment (91/271/EEC) and drinking water quality (98/83/EC) over a 15-year period. The authors surveyed available

information on the current water charge burden on households, analysed residential water demands, established the cost implications of implementation, transformed phased costs into unit prices, and forecast both the likely effects of those price increases on demand and the future growth of real incomes.

They identified two ways to estimate current burdens on households: (i) drawing on expenditure survey questionnaires undertaken by the Institute for Household Management in Warsaw; and (ii) comparing average household water use (associated with the national average price) with average disposable income. Both methods are liable to a number of errors, but nevertheless a reassuring consistency emerges for 1999: 2.4% of disposable income by method (i) and 2.2% by method (ii) (hence the Polish entry in Table 2.2).

The assumptions and calculations behind such a broad-brush exercise are of course numerous; in sum, the main ones were future real income growth of 1.4% a year, household income and price elasticities of the demand for water of zero and –0.2 respectively, linear increases over time of the annualised implementation costs, and annual rates for future real price increases over 2000-15 ranging between 4.2% ("maximum" EU aid) and 7.9% (no EU aid). These inputs generate average household income shares for water charges in 2010 of 4.3% (no EU aid), 3.5% ("minimum" aid) and 3.1% ("maximum" aid) — very large by any standards.

The Berbekas note the sensitivity of their results to the fairly low price elasticity assumed, in that an increase from –0.20 to –0.25 generated a price increase of such magnitude that "the scenario of implementation of the directives without EU assistance becomes impossible". This surprising conclusion (in a situation of inelastic demand) seems to have arisen because of the insensitivity of much wastewater-sector expenditure to demand. The authors also see difficulties in the uneven effects on prices (and therefore burdens) that will result if price decisions continue to be made in Poland by local authorities, often with small operators covering single municipalities.

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Social Issues in the Provision and Pricing of Water Services

Chapter 3

Social measures for household water charges: balancing environmental and social concerns

Trade-offs between efficiency and equity objectives in household water services provision occur when moving from unmeasured to metered charging structures, when rebalancing tariffs away from fixed charges towards volumetric charges, and when increasing fees and tariffs towards full-cost pricing. This chapter examines OECD experience with policy measures addressing affordability for vulnerable groups, while attempting to make water pricing reflect the full economic and environmental costs. Income support measures address the individual customer's ability to pay from the income side (through income assistance, water services vouchers, tariff rebates and discounts, bill re-phasing and easier payment plans, arrears forgiveness). Tariff-related measures keep the size of water bills low for certain groups (refinement of increasing-block tariffs, tariff choice, tariff capping). Subsidies also play a significant role in the management of affordability problems in a number of countries.

CHAPTER 3. SOCIAL MEASURES FOR HOUSEHOLD WATER CHARGES: BALANCING ENVIRONMENTAL AND SOCIAL CONCERNS[4]

3.1 Equity, affordability, and environmental protection

Household water charging systems are usually designed with the following objectives in mind:

- economic efficiency, meaning the pursuit of an optimal allocation of economic resources for the provision of water services to households;
- equity and fairness among generations, sectors, and individual consumers within a sector, trying to ensure in particular that everyone receives an affordable supply of water services (water supply and wastewater disposal) for essential needs;
- the generation of revenue sufficient to meet the utility's financial requirements;
- environmental effectiveness, meaning the sustainable use and protection of the environment, especially of water resources.

Pursuit of these objectives is normally constrained by their possible implications for public health, consumer understanding and acceptance, and the costs of administering the existing system and any proposed changes.

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Household water tariffs typically have a flat-fee component or fixed ("service") charge, plus either a single volumetric rate or a series of blocks and block rates (generally increasing, but sometimes decreasing in North America), from which the volumetric charge is calculated (OECD, 1999a). If there is no metering, the fixed charge is often related to some consumer characteristic(s) — e.g. property value, lot size, or water appliance inventory. A minimum charge, whereby a certain volume of water is paid for in each billing period whether or not it has been consumed, is occasionally used, although it has clear economic and environmental disadvantages. Charges for sewerage and sewage treatment services are either a fixed fee or are based on the measured quantities of water supplied, with efficiency arguments again favouring the latter.

The importance of the goals of economic and environmental efficiency and broad social equity were stressed more strongly in OECD member countries in the 1990s than in the previous decade (OECD, 1999b). Now, just beyond the turn of the millennium, it is clear that the objectives of environmental sustainability and the affordability of basic water needs have become more prominent in public debate than before (UKWIR, 1998; Saunders *et al.*, 1998; OECD Seminar on Social and Environment Interface, 1999; and Smets, 2002a). In the **UK**, publication of a flurry of reports on water affordability in late 2002 illustrates this trend (Sawkins and Dickie, 2002; Fitch and Price, 2002; and National Consumer Council, 2002).

3.1.1 Environmental and equity/affordability goals

Given this emphasis on affordability, it is instructive to examine more closely the environmental and equity/affordability objectives and their relationship. First, the *environmental objective:* it is increasingly recognised that full cost recovery for water services is an important component of environmental protection. The arguments in favour were made succinctly during preparations for the adoption of the new EU Water Framework Directive (Commission of the European Communities, 2000; Economic and Social Committee, 2001).

Full cost recovery not only generates revenue that can be invested in expanding and rehabilitating water service systems, but also provides possible incentives to reduce use, via two approaches: (i) showing individual consumers the actual costs of the water services they use; and (ii) charging higher volumetric prices for marginal (extra) units of consumption. Such incentives can be especially effective during summer peaks, when household demand tends to be more price-elastic. Customers may respond by forgoing lower-value uses, reducing in-house (and in-garden) losses, using alternatives to piped water (e.g. rainwater), investing in water-saving devices such as low-flush toilets and water-efficient appliances, and demanding further technological innovation to allow them to achieve given results with less water service inputs (thus spurring research into more water-efficient technology). The environment stands to benefit from all these changes.

Second, the *equity/affordability objective.* An important part of the concept of equity in water charging is that everyone, especially those on the lowest incomes, should have access to good water for essential uses at affordable prices. In most OECD countries this is generally interpreted in urban areas (and in many rural areas) as the right to piped potable water and a piped wastewater disposal system, meeting essential drinking, cooking, and sanitation needs, at prices that are affordable to all. Once a community's piped networks for water supply and disposal are in place, two distinct and major affordability problems can impede realisation of this objective.

One arises if water charges are so high for low-income households, whether unmetered or metered, that they lead to non-payment followed by cut-offs or restrictions on use. The other, which applies only to individually metered low-income households, is that volumetric prices may be so high that they induce the household to cut its water use to such an extent as to jeopardise private and public health, and thus the general welfare of the family and immediate community. The problem is magnified if the household includes someone with a health condition whose treatment or stabilisation requires the use of large amounts of water (in which case special attention by the relevant health authority or the water utility is called for).

This discussion enables us to identify precisely where and how the trade-offs between the pursuit of environmental and affordability objectives may occur. There are essentially three trade-offs, two arising from the effect on a lower-income household of a change in its tariff structure, and the other from the effect of an increase in the unit price of water services.

Trade-off 1: Moving from an unmeasured to a measured charging structure. Informing households of the true costs of their increasingly heterogeneous water uses (in order to provide incentives for them to manage their own demand sensibly and thus contribute to environmental protection) requires volumetric pricing, and therefore metering at the individual household level. But introducing metering may induce a low-income household (depending on the tariff structure) to reduce consumption too much, in terms of private and public health; and/or it may increase the household's general financial stress.

Trade-off 2: Rebalancing tariffs towards volumetric elements. With a given penetration of metering at the individual household level, rebalancing of tariffs away from fixed charges and towards volumetric elements can also increase the incentive for lower-income households to cut back on essential use. Simple financial arithmetic suggests this is particularly likely for a larger low-income household (e.g. with several children), although it should be noted that, by the same logic, small lower-income households with relatively low water use may find their financial situation significantly eased. Alternatively, the financial stress is shifted to other areas of expenditure.

Trade-off 3: Level of volumetric prices. With a given penetration of household metering and a given balance between fixed and volumetric charges, increasing volumetric rates to recover more economic and environmental costs may, once again,

provide an incentive to reduce consumption, affecting low-income households as described above.

To resolve or, more realistically, to ameliorate the potential seriousness of these trade-offs, a whole range of measures is available to policy makers. The next section outlines these, and a full discussion follows in Sections 3.2 and 3.3.

3.1.2 Measures to reconcile environmental and affordability objectives

Relevant policies and measures can be classified into two main types, *income support measures* and *tariff-related measures*. Figure 3.1 shows how these policies and measures derive from both a household's ability to pay and the size of its water bill — the two main elements that determine the affordability of its water charges.

In the rest of this chapter, the objective is to identify the policies and measures being used in OECD countries to address affordability concerns. The actual *measures* (rules, policies, tariff structures) are presented country-by-country within Sections 3.2 and 3.3. Evidence-based information about the results of these measures has proved, however, to be very elusive. For example, little information has been forthcoming on the extent to which the measures were utilised (i.e. *measure take-up)* or on any resulting *water charge burden relief*. Nor is much data available on the costs of implementation and administration.

The "*income support*" group comprises all measures addressing the individual customer's affordability problem from the income side. Absolute-value water bill reductions or waivers that become known before or well after the act of consumption should be included in this group rather than as a tariff-related measure, since they are similar to an earmarked, exogenous income increase. The types of income support measures are:

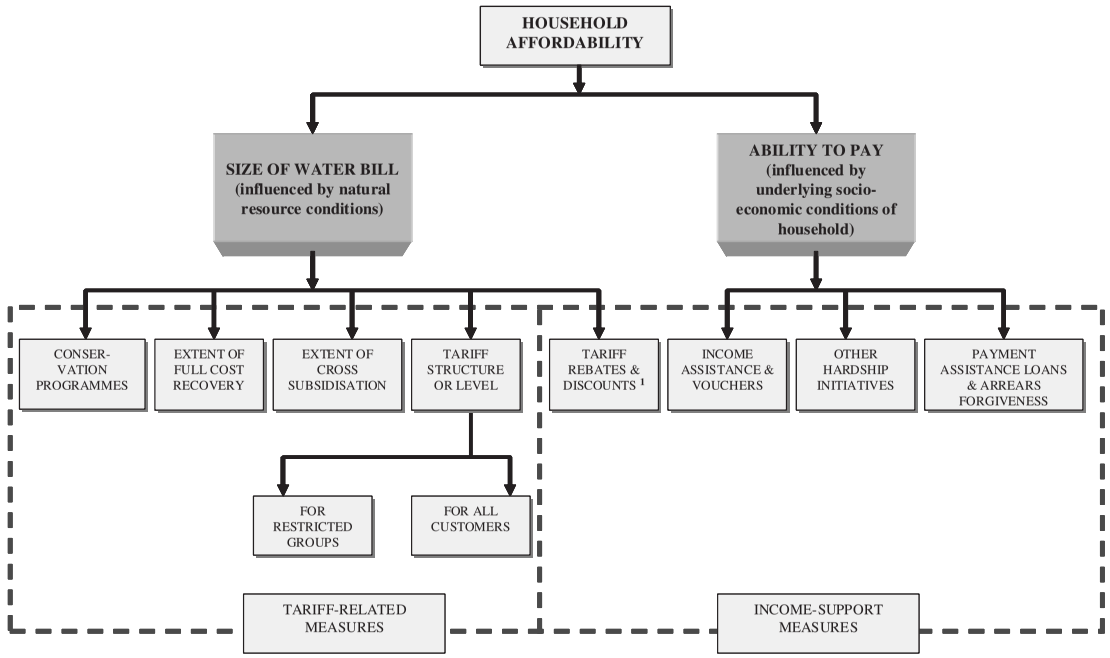
- Direct income assistance or water service vouchers from government, water utilities, or other private or charitable sources.

- Capped tariff rebates and discounts, giving rise to reductions in charges of a predetermined amount.

- Payment assistance in the form of easier payment plans, special loan facilities, and arrears forgiveness.

- Other hardship initiatives providing assistance directly to households.

Figure 3.1. **Policies and measures addressing affordability**



Note:

1. Tariff rebates and discounts are included in the 'Income-Support Measures' box since in the majority of cases they are fixed in advance and thus not subject to variation due to changes in consumption behaviour. Since their effect is thus to increase disposable income, they have most in common with income-support measures.

Tariff-related measures are normally developed and implemented by government (central, regional, or local) in its financing role, or by the water utility itself (usually subject to agreement by any economic regulator). Because water bills are a function of price and quantity (i.e. the tariff structure, charge rates within that structure, and the volume consumed), in principle governments and utilities may seek to reduce low-income consumers' bills by restricting price and aiming to reduce consumption. The related policies/measures include:

- Using subsidies to "manage" utility prices by keeping them lower than they would be at full cost recovery.

- Designing tariff structures and fixing tariff levels to influence or perpetuate the extent of cross-subsidisation, either of households by other sectors or of low-income households by the rest of the household sector, by introducing or refining increasing-block tariffs or by allowing tariff choice. Sometimes known as "social tariffs".

- Capping metered tariffs for low-income consumers.

- Designing special (or "social") tariffs that are restricted to designated groups, such as low-income households.

- Using special demand management programmes that target low-income households (thus helping to reduce quantity rather than price).

3.2 Income support measures

Income support measures are favoured by some because, in focusing on income rather than price, they do not interfere with the economic and environmental signals sent by the size of water bills and, especially, by marginal prices. Even the idea of waiving or reducing the charge on "early units" in a given billing period finds some support; it is argued that this is analogous to an income increase in that little tampering with scarcity signals results.

Some policy makers, regulators, and water industry and consumer representatives will still occasionally argue that the distribution of purchasing power is not part of the proper role of a water utility. In this view, redistribution should be left either to government (through the tax and welfare systems) or to private charity.

This argument would not only greatly reduce the options open to utilities, but complete reliance on government and/or private charity is seen by many as thoughtless or even immoral. In recent years, public and private water utilities alike, in a number of relatively rich countries, have come increasingly to believe that dealing with affordability problems is part of their responsibility as suppliers of a crucial public service. Certainly this is the case in **Australia**, **England and Wales**, and the **US**, as

shown below. In this view, the utilities are in touch with their customers like no one else, and thus are in the best position to assess and respond to their needs.

3.2.1 Welfare assistance and housing-related allowances

In one form or another, most OECD countries have welfare programmes, either universal or means-tested, covering sickness, disability, unemployment, maternity, widowhood, retirement, etc. Many low-income households rely primarily on such income sources to buy the essentials of life, including piped water services.

Such benefits are often linked to a consumer price index (CPI) based on an "average basket of goods and services" that the "average consumer" buys. As noted earlier, however, the real price of water has recently been increasing at an average annual rate of 3.7% (Section 2.1), and the share of water service expenditure by the lowest decile in some OECD countries approaches 4% (in one country for the lowest percentile it was estimated at 10%) while the overall average is much nearer 1% (Section 2.3).

It is easy to show (by assuming stylised data) what would happen to the real income of the poor and the very poor who rely on State benefits if those benefits were increased by, say, 5.7% a year for only the 1% of their "basket" of expenditures assumed to be devoted to water charges (rather than for the actual 4% to 10%) and by 2% a year for the other 99% of the "basket" — a practice known as benefit uprating. Box 3.1 shows the calculations and the deleterious effects, leading to the result that the real income of the lowest-decile household would have fallen by 1.3% after ten years, and that of the lowest-percentile household by 3.7%.

Here is a real-life example of the effects of benefit uprating when water bills increase faster than general inflation. In the **UK,** income support claimants' water charges were paid on an individual, case-by-case basis until 1988, when the responsibility for paying the charges was passed to the claimants themselves. Eventually, a Member of Parliament wrote to the House of Commons Library Research Division enquiring about the effects of this change. The response: water charges had grown so much more than the CPI since 1988/89 in England and Wales that the income support benefit intended for water was meeting only 69% of the initial water allowance by 1996/97 (Cracknell, 1996). Extension of the methodology used to 2002/03 shows that, even though water charges in England and Wales have been quite stable in the last six years (the average annual nominal increase being 0.4%), the 2002/03 water allowance meets only 76% as much as the 1988/89 allowance did.

Box 3.1. **"Benefit uprating" problems when water charges rise faster than the CPI**

Assume that water charge expenditures increase in price at 5.7% a year and all other consumer expenditures at a uniform annual 2% rate, for ten years. Let the initial positions of stylised poor (lowest income *decile*; water burden of 4% of income) and poorest (lowest income *percentile*; water burden of 10%) households be as shown in the Year 1 column (all figures in EUR), and assume that benefits are increased to match inflation of the "water" and "other" expenditure categories, with no real increase. Benefits are assumed to be increased by government in line with the spending pattern of the average household (which has a water burden of 1%). — i.e. in line with the *average* household's CPI.

	Year 1		Year 11
LOWEST DECILE HOUSEHOLD			
Spending need assumed by government			
water services	2.00 (1%)	↑ at 5.7%/yr	3.48
other expenditures	198.00	↑ at 2.0%/yr	241.36
Total	**200.00**		**244.84**
Actual spending need			
water services	8.00 (4%)	↑ at 5.7%/yr	13.93
other expenditures	192.00	↑ at 2.0%/yr	234.05
Total	**200.00**		**247.98**

Thus, by year 11, real income of household has decreased by 1.3%

LOWEST PERCENTILE HOUSEHOLD			
Spending need assumed by government			
water services	1.00 (1%)	↑ at 5.7%/yr	1.74
other expenditures	99.00	↑ at 2.0%/yr	120.68
Total	**100.00**		**122.42**
Actual spending need			
water services	10.00 (10%)	↑ at 5.7%/yr	17.41
other expenditures	90.00	↑ at 2.0%/yr	109.71
Total	**100.00**		**127.12**

Thus, by year 11, real income of household has decreased by 3.7%

Information on the detailed workings of benefit systems with regard to water bills of low-income households is limited, but there is slightly more information about housing allowances. In parts of **OECD Europe** poorer households have traditionally received cash or rebates from government to help them pay housing and housing-related costs — notably rent, local property taxes, and water charges. This assistance has generally been means-tested.

More recently, with utilities in some countries becoming more "corporatised" or even "commercialised", it appears that water charges are starting to be separated from housing expenditures. Until 1988, the **UK** had a type of general safety-net income support known as supplementary benefits. Although this support was a "national" benefit, its value reflected reasonable local housing costs and water charges (virtually all of which at that time were based on the property tax value of a house or apartment). After the system was changed in April 1988, what was known as the housing benefit continued to be paid separately but specifically excluded water charges. Water was theoretically included in the former supplementary benefit, now renamed "income support". As a result, the annual CPI uprating of the benefit has not kept pace with increases in water charges.

Other countries still maintain housing allowance programmes that include water charges. The **Slovak Republic** reports having no special direct subsidies, assistance, or other tools directed at helping low-income households pay water supply and wastewater charges. However, a housing benefit provided since January 2000, under the 1999 Act on Housing Benefit, is a State social benefit through which the government contributes to the payment of all housing-related expenditures (which notionally include water charges) if the household's income is low enough. The amount of housing benefit (HB) is calculated as the difference between a household's "minimum expenditure allowed for housing" (HA; determined by the Act), and the product of: (i) the "index of the household expenditure burden" (N); and (ii) the income of the household (Y).

$$\text{Thus, } HB = HA - NY$$

In May 2002, HA was set at national level as the equivalent of EUR 40 a month for a one-person household and EUR 49, 60, and 69 a month for, respectively, two-person, three-person, and four-or-more-person households. N was equal to 0.29 at the time. Thus, for example, for a three-person family, HB would be paid only if the household income was below EUR 207 a month (60 divided by 0.29). HA is nationally determined and therefore insensitive to local water charges (as, indeed, to local rents), so it may become subject to the same type of criticism as the UK system after 1988.

Finally, Smets (1999) has noted that water charges in **Finland** are explicitly included in the housing benefit. In the mid-1990s, over 7% of the population was receiving this benefit, which accounted for about 0.4% of GDP and operated so as to

pay 80% of all eligible costs above an unsubsidised lower limit (subject presumably to the claimant's income).

3.2.2 Other regional and local government assistance

Assistance to individual families experiencing difficulties in paying water charges appears to be available at a sub-national level – most typically via the municipality – in most member countries. About a quarter of OECD countries provided information on how this assistance works. This section summarises that information; Section 3.2.3 then examines the systems of rebates or discounts on water bills sometimes available from utilities or from various levels of government (e.g. State governments in Australia).

In Belgium, the situation depends on the region. In **Brussels** (about 9% of the population), a social fund supports low-income household and welfare beneficiaries who are having trouble paying their water bills. A draft decree in **Wallonia** would establish a similar social fund to help households in financial difficulties pay their bills. SPGE, a major Wallonian water supplier, would administer the fund, which would be replenished through a small uniform levy per cubic metre added to household water bills.

At least one supplier — *Societe Wallonne de Distribution d'Eau* (SWDE) — already allocates about BEF 50 (EUR 1.24) per household each year to such a fund. Local social service departments decide who should receive assistance from this fund, and how much, up to a maximum per customer of about BEF 7 000 (EUR 173.53) per year. Only about 60% to 70% of the funds made available are used, accounting for about 0.3% of SWDE's turnover. About four customers per thousand are helped each year, receiving on average BEF 4 500 (EUR 111.55) each.

Water utilities in **Germany** are required to adhere to commercial principles and so cannot assist households in financial difficulties; such matters are dealt with by community welfare centres regulated by legislation under the Federal Ministry for Labour and Social Affairs. No figures are available to indicate the scale of such assistance. Similarly, in **Luxembourg** any direct financial assistance is made by central and municipal bodies (although note the reference at the end of Section 3.3.4 to the many social water tariffs at the level of the commune, which is responsible for water supply in Luxembourg).

In parts of **Poland,** water and sewerage expenses in apartment buildings are often part of the charges that have to be paid to the building management. The municipal or district *Social Support Centre***,** which is responsible for giving financial aid to poor households, may help pay the water charges as part of housing assistance. The local centre is also responsible for any financial assistance given directly to assist with water charges for single-family houses. In Poznan, a city of 600 000 people, about 3% of households (5 000 to 6 000 households) currently receive such support. No information was available on the monetary amounts involved. Some municipalities in **Hungary** are believed to give direct cash subsidies to help poor families with water bills. The

Budapest water supply utility, for instance, pays the city authorities a certain sum of money each year to distribute to needy families (Rakosi, 2002).

It is difficult to generalise about the situation in **Japan**, which has more than 1,900 public water supply utilities. All utilities are part of the municipality. Financial support to water customers experiencing payment problems is sometimes given through the local welfare system, perhaps following a referral from the waterworks department. Additionally, the waterworks department, under various national and local laws, exempts certain customers from the 5% consumption tax on water charges. Municipal welfare offices decide who is eligible for this exemption; the criteria include family situation and employment status, and, it is believed, financial circumstances. Some 2.5% of Tokyo residential customers are currently exempt from the tax.

Smets (1999) reports on various types of assistance in **France**, including departmental and municipal initiatives taken since the November 1996 Charte Solidarité-Eau was signed by the government and representatives of the associations of French Mayors, of Water and Sanitation Enterprises, and of Franchising and Water Authorities. The charter was an attempt to establish, for the first time, a national programme for the benefit of water customers facing genuine financial hardship, and was mainly directed at residents of single-family houses. It followed a period (1991-96) of real increases in water prices, an annual average rate of 7% — one of the highest among OECD countries in recent years (OECD, 1999b).

The charter specified that a household in serious financial difficulties and unable to pay a water bill should continue to receive a minimum supply for up to three months while their case is put to a departmental Commission Solidarité-Eau. The commission decides, case by case, on applications for water debt forgiveness. A ceiling on the amount to be written off annually in any department is set at the equivalent of FRF 2 (about EUR 0.30) for every domestic water customer. Using Smets' estimate, based on the average annual water bill (then about FRF 2 000/EUR 305), this would mean a full debt write-off for one per 1 000 customers. Half of this is borne by the water utility, and the other half by government. Box 3.2 describes the genesis and evolution of the departmental commissions.

In the **US**, most water utilities are associated with – indeed, are usually part of – local government, covering a town, city, group of towns or counties, etc. Thus, assistance with water charges has come to be centred on the utility itself. Section 4.3.4 below presents an overview of policies applied in the US.

Another type of support for households struggling to pay water bills is the distribution of vouchers. In Dreux, France, for instance, 390 vouchers were issued in 1997, financed by the water company Lyonnaise des Eaux and the local authority to the tune of FRF 100 000 (EUR 15 245) each. The vouchers were given to households identified by the Centre Communaux d'Action Sociale, an organisation that has an important role in the French programmes described earlier (Smets, 1999). In **Australia,** certain customers of Sydney Water in financial difficulty may also obtain water vouchers.

Box 3.2. **Social measures for water charges in France**

In the early 1990s, French anti-poverty legislation began referring to water as an "essential good", to which the poor should have guaranteed access for reasons of dignity as well as sanitation. In 1991, a special Fond de Solidarite Logement (FSL) was established to help low-income apartment-dwellers to avoid being evicted by providing support towards the general apartment building charges. When individual apartments' water use is not metered, water is included in the building charges and so, to a certain extent, the FSL contributes to water affordability. But it has no effect on metered households' water charges, and 88% of French households were metered by 1995 (all single family houses and some apartments).

1996 brought the Charte Solidarité-Eau, a voluntary agreement signed by the stakeholders benefiting from the timely payment of household water bills. The charter, which represented a step towards guaranteed access to water for poor metered households, was essentially an agreement to write off water debts. Nevertheless, in the late 1990s, 130 000 water disconnections a year were still occurring — 20 000 of these affecting poorly housed low-income households — though only 2 000 of the total cut-offs lasted more than a day. Unpaid water bills were estimated to amount to EUR 15 million a year, or less than 0.1% of the total billed.

To give teeth to the water charter, a 1998 law obliged government and operators to define their financial contributions and tell exactly how they intended to assist poor households in paying their water bills. The law also turned the voluntary agreement into a binding national convention, to be implemented by bodies at the level of the *département* (roughly the equivalent of a county). The intent was to involve all local operators (about 16 300 in 1998) and to maximise management efficiency by having existing local organisations run the new scheme. The law also prohibited water disconnections once households requested assistance.

The national convention, signed in 2000, further stipulated that no water disconnection could occur when a baby or an elderly dependent person was part of the household, whatever its financial situation. Those involved in implementing the convention generally chose a system analogous to the voluntary charter, with departmental commissions writing off debts if certain social criteria were met. The convention envisioned funding "water solidarity" by both consumer and taxpayer contributions. The main private water companies' association promised to provide up to EUR 3 million a year (adding about EUR 0.30 to the average annual water bill), while the central government promised up to EUR 4.5 million for the balance of the unpaid water charges. (Municipalities, many of them public water service operators themselves, could not make any such "national" promise.)

Box 3.2 continued over page.

Box 3.2 **Social measures for water charges in France** (*cont.*)

A large number of operators need to join the system for it to be effective. This constitutes a major challenge, and thus special attention has been given to progress in implementation. Typical management costs at local level could reach up to 10% of the overall amount of aid given. By December 2001, 38% of the *départements* had agreed a convention, 23% were negotiating one, 13% were still using an alternative assistance system, and 52% had allocated some funds.

During this implementation phase, suggestions for improving the system have included:

- Merging the new water solidarity fund with the FSL and other similar funds for energy and telephone bills, which could lead to local management cost savings since requests and funds could be managed conjointly.

- Having operators make direct *ex ante* contributions to the fund, instead of writing off debt. When an operator writes off the debt of a particular water service customer, it implies that the operator has previously joined the local convention and agreed to its conditions. *Ex ante* operators' contributions would make the fund operational and enable it to fulfill any justified request, even if not all operators have joined yet.

The water voucher possibility has been the subject of discussion in the **US** (Saunders *et al*., 1998), largely because of problems that may arise in making water affordability programmes work for tenants. For example, it may be difficult to ensure, especially in apartment housing, that water utility rebates and discounts actually reach tenants. Issues that arise when a single meter is shared concern the responsibility for reporting income information, apportioning usage-related discounts to tenants, and transforming the application of retroactive rebate into a prospective charge. One solution would be for the utility to distribute rebates directly to eligible households in the form of water vouchers that could be used in part payment for the overall service charge or rent (including water). The landlord could in turn use the vouchers collected in partial settlement of the aggregate water bill.

The main problem identified in the US with such programmes is the impact they might have on a low-income household's eligibility for other assistance, since the vouchers might be considered part of the household's income, and income is often used to determine eligibility. State laws might have to be amended to avoid such effects.

3.2.3 Tariff rebates and discounts

This section examines tariff rebates and discounts that are organised and/or funded by government or a water utility but whose effect is largely that of an income gain to the customer. They are therefore best classified as a form of income support. In most situations examined, they are fixed in advance so as to leave marginal water service prices unaltered. They are generally targeted at particular groups of households that either are actually in financial need or are vulnerable. The groups may be defined, for example, by income, age, occupation, medical condition, or eligibility for another government or utility benefit.

Examples of charge rebates at regional level are available from the UK, Belgium, and Australia. The UK case – that of **Scotland** – is considered in Section 3.3.2, along with other central government subsidy programmes. In the Belgian region of **Flanders**, retired people on a guaranteed income, families receiving a minimum income, and disabled people and certain carers receiving a "substitution income" are reportedly completely exempt from household wastewater charges.

In **Australia,** the largest rebates occur through consumer "concession" programmes organised and transparently funded at State government level. These programmes appear to have their roots in attempts to provide equity between less well-off retired people living in owner-occupied homes and those in rented accommodation. Now, however, lower-income people may hold a variety of "concession cards" that are a kind of passport to a much wider range of substantial rebates on bills. Once a concession has been verified, the State government passes the funds involved directly to the utility. Consumer concessions go mostly to the retired, but also include Health Care Card holders and war veterans holding Gold Cards.

Table 3.1 summarises data on these and other "hardship" programmes for Australia's two most populous States, **New South Wales** and **Victoria**, which together account for 60% of the population. In 2000/01, 30% of households in Victoria received financial assistance through concessions amounting to about a quarter of the average water bill in the State; in Sydney the corresponding figures were nearly 15% of households and half of the average bill. Total assistance covered about 10% of total household bills in Victoria (1.5 million customers) and in the service area of Hunter Water (200 000), and over 7% in the Sydney Water service area (1.5 million).

In addition, Victoria's Utility Relief Grant programme provides assistance to people having difficulty paying an energy or water debt as a result of an unforeseen financial crisis; to qualify, the claimant must hold a relevant concession card or having equivalent low income and be able to demonstrate that the household cannot afford to pay the bill. Over 1 800 such grants were made in 2000/01, averaging just over AUD 330 each. The major reasons debts could not be paid were a sudden decrease in income (unemployment, family breakdown; 55% of grants), very high unanticipated expenses (funeral, medical, essential household appliances; 36%) and unaffordable high use of the utility (8%).

Table 3.1. **Assistance to customers in two Australian States (2000/01)**

State and/or water utility	Type of programme	Assistance funds (AUD)	Assistance shared by		Average assist. per h/h (AUD)	Average water bill (AUD)	Average assistance (share of aver. bill)
			Number of h/hs	How many h/hs per 1000?			
Victoria	Concessions	59.6	516 014	300	115	450	26%
Victoria	Utility Relief Grant	0.6	1 819	1.2	334	450	74%
Victoria	HRWSCS[1]	0.6	238	-	2 434	n.a.	n.a.
Sydney Water	Payment Assistance[2]	0.5	c. 5 000	3.4	100	600	17%
NSW/SydneyWater[3]	Concessions	65	200 000	134	325	600	54%
NSW/HunterWater[3]	Concessions	8	n.a.	n.a.	AUD 8m = 10% of total bills		

h/h = household ; n.a. = not available.

Notes:

1. Hardship Relief Water and Sewerage Connection Scheme (2000/01 to 2002/03 only).
2. Funded by Sydney Water (all others by State taxpayers).
3. 2001/02.

Source: See Annex A.

Table 3.2. **Raftelis surveys (1997, 2001)**

Size class of utility	Number of utilities	Low-income rate Discount programme		Low-volume rate Discount programme	
		% of utilities covered	% of sample population in those utilities	% of utilities covered	% of sample population in those utilities
Large	36	36	42	14	11
Intermediate	42	5	6	7	8
Small	62	6	6	4	5
All	140	13	29	7	9
(All in 1997)	(153)	(9)	(14)	(5)	(9)

Source: Raftelis Financial Consulting (2002), Raftelis Environmental Consulting Group (1998).

Sydney Water has its own Payment Assistance Scheme, whereby households reporting difficulty in paying are referred to welfare agencies for advice and assessment of their circumstances. These agencies, acting independently of Sydney Water, have the discretion to issue AUD 25 water vouchers, which customers apply towards their quarterly bills. Sydney Water spends nearly AUD 470 000 per year on this programme, which assists over 4 600 households.

Australia's "concession" programmes are unlike anything found in other OECD countries' household water sectors. They provide large amounts of support to lower-income households, but it is unclear whether all of this assistance is essential. On the other hand, with concession cards so deeply embedded in Australian economic culture, the administration costs per customer assisted are probably extremely low. States have been unable to increase the maximum annual cash values of customer concessions for many years now; if this continues to be the case, as is likely, the real value of concessions will continue to decline slowly.

Some consumers' volumetric charges (as opposed to fixed charges) qualify for concessions up to a maximum annual Australian-dollar value (not high) – typically AUD 67.50 in Victoria – so most consumers' marginal prices are unaffected (*ex post*, the "first" units are free). However, examples exist in other Australian States of concessions on volumetric charges in the form of unit price discounts for eligible retired people: 33% (Sydney Water, Additional Transitional Rebate, if connected to water but not to wastewater services and for consumption up to 75 kL per quarter), and 50% (Western Australia, annual maximum consumption between 150 kL and 600 kL, depending on location). Here, volumetric charges – and thus, scarcity signals – are obviously seriously compromised by the discounts, but no analysis has been found indicating the overall impact of such arrangements. Eventually, on environmental grounds, volume charges may come to play a more important role in Australian households' water bills (in 1996/97, volumetric charges still represented just 30% of the average bill), at which point the concession may need to be switched to the "first" consumption units in a billing period; for the vast majority of households, this should not affect the prices faced at the margin.

In the **US**, some water utilities have had affordability programmes for many years. The Raftelis survey of utilities (Raftelis Financial Consulting, 2002), made every two years, reports on whether utilities apply two forms of payment assistance — low–income and low–volume discounts. Table 3.2 summarises the results as of late 2001.

Of the 140 utilities Raftelis surveyed in 2001, 13% had low-income discount programmes, and 29% of the survey population lived in those utilities' service areas. Although the findings cannot easily be generalised to the whole country, it may be significant that the latter percentage is double what it was in the equivalent study undertaken four years earlier.

Discount and rebate programmes in the US may be categorised as follows (Saunders *et al.*, 1998):

- Straight discounts (a specified percentage discount on the whole bill).
- Discounts on usage charges.
- "Lifeline" rates (meeting a theoretical minimum requirement at a lower-than-cost rate).
- Fixed charge waivers.

In all practical examples of such programmes, eligibility is tied to whether the household's recent or current income falls below a specified level (which may itself be linked to federal poverty criteria) or to existing eligibility for other benefit programmes. Because of administrative time lags, credits do not arrive until after the "determining consumption" period, and changes in financial circumstances (e.g. increases in income) do not generally result in immediate loss of eligibility. Thus the theoretically possible effects on demand are subtle, and in any case probably dominated for low-income consumers by cash-in-hand availability; so credits amount to a form of earmarked income support: bills are simply lower than would have otherwise been the case.

Table 3.3 shows details for city programmes in Seattle, Los Angeles, and Philadelphia. Eligibility is usually linked to State median income or federal poverty criteria, with different benefit levels for single family–house (SFH) and multi-family dwelling (MFD) residents.

3.2.4 Charities, donations and gifts

In a few countries private donations are used to help pay water debts and current bills. There is also some evidence of indirect private assistance through support of debt counselling.

By late 1998, ten private water companies out of the 27 then existing in **England and Wales** had made arrangements through which customers could receive charitable help if they faced disconnection of their water supply for non-payment. Disconnection has since been banned, but the arrangements remain and the demands upon them continue to grow. Fitch (1998) identified five charitable trusts financed by, but independent of, their "sponsoring" water companies, and five companies with in-house hardship funds. In all cases, the economic regulator (Director-General of Water Services) has insisted that operational costs as well as donations should be met by shareholders out of distributable profits, rather than via customers' bills.

Table 3.3. **Water affordability programmes in three US cities**

(All benefit amounts are expressed in USD per month)

City	Eligibility (refers to customer income)	Benefits	Aggregate cost per year	No. of customers assisted	Effect on 'typical' household*
Seattle	SCs/disabled: <70% of State median income; Others: <125% of FPL	Aim of c. 50% discount on w. bill, but averaged to give fixed amount/month; in 1995: SFHs:$7.17(w)+$12.15(ww) MFDs: $2.67(w)+$6.08(ww)	$1m in 1995; 3% of residential bill	15 000 (11 000 SCs) out of 266 000 (5.6%)	total bill down from 8.9% of income to 5.3%
Los Angeles	*Lifeline* SCs/disabled: <175% of FPL *Low-Income Assistance* SCs/disabled/low-income residents of MFDs or SFHs	$10 credit for w. bill + 25% discount on first 25kL/month of ww $5 credit for <4-person household + $1 credit for each addit. h/h member; credit cap of $10 (if bill is < $10, nothing to pay)	$16m in 1995	220 000	Bill (aver. sewer use) reduced from 2.6% of income to 1% (*Lifeline*) and 1.7% (*Low-Income Assistance*)
Philadelphia	Households < 150% of FPL and behind with at least 1 monthly payment; *Or* can demonstrate financial need	City grants + Federal/State assistance + private funds to work towards elimination of arrears; in 1992: 22% of balances paid in full; 3% of h/hs set up payment plans; 75% arrears suspended/ recd. money/set up plan	n.a.	11 244 in 1992	n.a.

Notes:
w = water; ww = wastewater; SCs = senior citizens; FPL = federal poverty level (varies by household size); h/h = household; SFHs = single-family homes; MFDs = multi-family dwellings; n.a. = not available.
*3-person household living in SFH and receiving federal assistance under the AFDC (Aid to Families with Dependent Children) programme. AFDC income is State-specific.
Source: Saunders *et al.* (1998), Chapter 2.

The four charitable trusts for which information was available in 1998 were then spending about GBP 2.4 million a year on debt clearance to assist nearly 5 300 customers (i.e. GBP 450 per customer). The financial situation changed for most of the privatised water companies in England and Wales after a tough price settlement was made by the regulator in 1999. This led Anglian Water to drastically reduce its annual donation to its trust, thus revealing one of the disadvantages of this kind of approach in a more commercialised water industry.

In the **US** and **France,** charitable organisations and some religious groups, such as the Salvation Army, are reported to be involved in maintaining water supplies in cases of real hardship by writing off unpaid bills (Saunders *et al.*, 1998; Smets, 1999). In addition, 250 utility fuel funds in the US, which are partnerships between energy utilities and welfare programmes, dispense privately raised money to help low-income households pay their energy bills. In 1993, these funds raised USD 70 million, one-third of which came from customers responding to energy bill inserts allowing them either to pledge gifts or to have their bills rounded up for the purpose (Saunders *et al.*, 1998).

Water funds appear to be rare in the US, but one is run by the Washington Suburban Sanitary Commission, serving 1.6 million households from Laurel, Maryland. In 2001/02, the utility raised USD 55 000 for the fund, 95% of which came through water bill round-up contributions. Total household bill revenue in the period was USD 455 million.

3.2.5 Payment assistance, loans, arrears forgiveness and other hardship initiatives

Water utilities in OECD countries make many other types of arrangements as well to assist low-income consumers, directly or indirectly, with their bill payments instead of simply disconnecting service until the household has paid all the arrears. Indeed, as Saunders *et al*. (1998) emphasise, it is to the benefit, not just of the household, but also of the utility to keep customers connected to the system and paying at least the variable costs of the continued service provided, as long as other customers are not made worse off financially.

Direct arrangements between utilities and customers take the form of: (i) the publicised availability of flexible payment systems (a wide range of different possible payment methods, frequency and timing, including budget billing, with regular weekly or monthly contributions to a water bill); (ii) agreed debt repayment plans; and (iii) utility willingness to contact a customer directly to attempt to establish helpful communication as soon as it is apparent that a bill has not been paid (rather than immediate disconnection or threat of court action).

Some utilities have found it helpful to spell out the rights and responsibilities of both customers and themselves in a "contract"; the most recent version of the Sydney Water Customer Contract, for instance, includes safeguards for low-income customers (Sydney Water, 2002). In other cases, utilities have signed up to a nationally agreed

industry code of practice covering relationships between the utility and a customer who is having difficulty making or maintaining payments.

Indirect arrangements (e.g. in the **US**, **France**, **Belgium, England and Wales**, and **Australia**) often involve utilities' willingness to work through entities with specialised knowledge of the problems of low-income customers. Examples are general advice bureaux, money advice centres, debt counsellors, the social services department of the local government, and private charitable organisations that provide welfare assistance (e.g. the Salvation Army). For example, Sydney Water allows certain welfare agencies to distribute AUD 25 water vouchers to needy households. Utilities and utility trust funds in Australia, England and Wales, and **Poland** are also known to have instituted formal grant programmes involving welfare organisations and financial counselling agencies, as well as scholarships for financial counselling students and training for advice centre staff (Yarra Valley Water, 2002; and Anglian Water Trust Fund, 2002).

3.3 Tariff-related and conservation measures

Where governments are unwilling or unable to offer financial relief to low-income households, tariff structuring is increasingly seen as a more promising approach to helping those who cannot meet their most basic needs, while also reconciling environmental and affordability objectives. What is more, a growing number of examples of low-use and social tariffs are found in other utilities, notably telecommunications and energy.

Recognition of the division of household water consumption into basic needs and discretionary uses (Section 2.3) also provides a powerful rationale for re-examining measured tariffs, since tariff structures can reflect better this division.

3.3.1 OECD household charging structures and levels

Table 3.4 summarises the latest available information about selected household tariff structures in OECD countries. Overall, it reveals a continuing but limited shift towards more progressive tariffs since the last OECD survey in 1999. This shift is seen most clearly in:

- **Australia**, which has reduced the use of decreasing-block tariffs (DBTs).
- **Canada**, with a 6% increase in increasing-block tariffs (IBTs) over the three years, but with the basis switched from number of utilities surveyed to population served.
- **Italy**, which began phasing out the minimum charge in 2001.
- **England and Wales,** where the proportion of households metered doubled to 23% between 1998 and 2002.

- The **United States**, where IBTs and constant volumetric rates together rose by 6% over 1998-2002 at the expense of flat-fee tariffs and DBTs.

The only change in the other direction was in **Spain**, where a near-doubling of the number of utilities surveyed over 1996-2000 was accompanied by a fivefold increase in the number reporting DBTs (while the total sample of utilities had only doubled). For about half of OECD countries, however, no information was available for the period since the 1999 report was published.

Table 3.5 presents charges (per cubic metre) for household water services for 25 of the 30 OECD countries. Totals for public water supply plus sewerage and sewage treatment are available for 20 countries for various years from 1997 to 2002. These range from EUR 0.67/m^3 in **Italy** to EUR 5.41/m^3 in **Norway**; most lie between EUR 1 and 3/m^3. The usefulness of such comparisons is limited, however, since economic and environmental conditions, the extent of water service cost recovery, and households' purchasing power vary enormously by country. Of more interest is the proportion of PWS and S&ST charges taken up by fixed (as against volumetric) charges, since the former contribute little to economic and environmental efficiency (although perhaps much to cost recovery). Here the changes since the last report (OECD, 1999b) are mixed: three countries report growth in the fixed component of PWS charges (**Australia**, **Sweden**, **Germany**) and three a reduction (**Denmark**, **Finland**, **Greece**); for S&ST the fixed element is down in **Australia**, up in **Sweden**.

The right hand side of Table 3.5 gives recent annual rates of change in the charges, in nominal and real terms, for 14 countries (Belgium being represented by the Brussels region) as well as for Scotland and for England and Wales. The two largest annual real increases, for **Scotland** and the **Czech Republic**, are atypical, because they are transitional. The combined real annual estimates for PWS plus S&ST for the remaining 12 countries range from –1.5% (**Australia**) to +5.0% (**Denmark**), with a simple, unweighted mean of +1.6%. This is significantly less than the 3.7% annual increase identified in the 1999 report, and suggests that although the underlying trends remain upwards, governments may have begun to regulate price increases more carefully.

Table 3.4. **Public water supply: household tariff structures (% of utilities or population with a given structure)**

	Year	No. utilities in sample (and % of pop. represented)	Unit	Flat fee	CONSTANT VOLUMETRIC RATE			INCREASING-BLOCK SCHEDULE			DECREASING-BLOCK SCHEDULE			Normal number of blocks
					no fixed charge	plus fixed charge	plus fixed + min	no fixed charge	plus fixed charge	plus fixed + min	no fixed charge	plus fixed charge	plus fixed + min	
Australia	2000-1	17(72%)	P(U)	-	-	73%(12)	-	-	27%(5)	-	-	-	-	2
Austria	1999	71	U	1	5	65	-	-	-	-	-	-	-	-
Belgium														
Brussels	2001	2	U	-	-	1	-	-	1	-	-	-	-	2
Flanders	2001	17	U	-	-	-	-	-	17	-	-	-	-	2
Wallonia	2001	46	U	-	4	21	-	-	17	-	-	4	-	2
Canada	1999	1214 (77%)	P	43%	←	36%	→	←	9%	→	←	12%	→	2
Denmark	2000		U,P	Rural	←	most	→							-
Finland	2000		U,P	-	-	100%	-	-	-	-	-	-	-	-
France	1990	500	U	2%	5%	46%	47%	-	-	-	-	-	-	-
Germany	2001	1030	U,P	-	<5%	>95%	-	-	-	-	-	-	-	-
Greece	2002		U	Rural				-	← most→					5
Hungary	1997	268	U	-	95%	-	-	5%	-	-	-	-	-	2
Iceland	2002		U,P	All	-	-	-	-	-	-	-	-	-	-
Ireland	2002	All domestic water charges have been consolidated into general taxation since 1 January 1997												
Italy	1998		P	-	-	-	-		-	100%	-	-	-	3-5
Japan	1998	1900	U	-	-	-	42%	-	-	57%	-	-	1%	2-7
Korea	1998		P,U	-	-	-	-	←	100%	→	-	-	-	6-10
Luxembourg	1997	118	U	-	←	some	→	←	some	→	←	some	→	2-3
Mexico	2002		U	-	-	-	-	←	most	→	←	most	→	6-7
N. Zealand	1998		P	75%	-	25%	-	-	-	-	-	-	-	-
Netherlands	1998	18	U	-	1	16	-	-	2	-	-	-	-	2
Norway	2002		P	87%	-	13%	-	-	-	-	-	-	-	-

Table 3.4 continued on next page.

Table 3.4. **Public water supply: household tariff structures (% of utilities or population with a given structure)** *(cont.)*

	Year	No. utilities in sample (and % of pop. represented)	Unit	Flat fee	CONSTANT VOLUMETRIC RATE		INCREASING-BLOCK SCHEDULE				DECREASING-BLOCK SCHEDULE			Normal number of blocks
					no fixed charge	plus fixed charge	plus fixed + min	no fixed charge	plus fixed charge	plus fixed + min	no fixed charge	plus fixed charge	plus fixed + min	
Poland	1998		P,U	-		most								
Portugal	2002	23	U	-	-	-	-	-	23	-	-	-	-	3-5
Spain	2001	700	P(U)	-	← 10% (<200) →		← 85% (<500) →				←	5%(15)	→	2-5
Sweden	2000	288	U	-	-	100%		-	-	-	-	-	-	-
Switzerland	1998	all	P(U)	-	-	95%(235)	-	-	5%(1)	-	-	-	-	2
Turkey	1998		P	Rural	-	-	-	←	<100%	→	-	-	-	3
UK	1998													
E&W	2002	all (26)	P	77%	-	23%		-	-	-	-	-	-	-
Scotland	2000	all (3)	P	>99	-	0.014%		-	-	-	-	-	-	-
N. Ireland	2002	all domestic charges met from general taxation												
US	2002	145	U		1%	1%	← 35%	1%	← 33%	←	29%		→	2-4

Notes and *Sources* (*continued on next page*):
U = utilities; P = population.

Australia: Tariff structure applies to year ending 30 June 2001and is summarised from information in WSAA *Facts 2001*, Figure 10.1.
Austria: Raw tariff data for 71 municipalities provided by Federal Ministry of the Environment.
Belgium: Information derived from data provided by Belaqua (Brussels). Tariff structures with free allowances per household or per capita designated as IBT.
Canada: Figures refer to % of population sample (=77% of national population) served by each tariff type; see Environment Canada (2001), Annex 2, Tables 2 and 19. 60% of population served by non-flat fee schedules have a fixed minimum charge, which is included in the average prices given in Table 3.5, and 16% of the population served have a minimum volume included (average, weighted by population served, is 11.9 m^3/month; see Annex 2, Table 3 of same reference).
France: Old survey data. 1992 Water Law ruled out (with minor exceptions) (i) flat-fee and (ii) constant volume .rate + fixed + minimum charge, which are now in decline.
Germany: Information provided by Stadtfeld (2002), BZW, Bonn. Note that at most 5% of utilities apply a linear tariff, with no fixed element.

Notes and *Sources* for Table 3.4 (*continued from previous page*):

Italy:	A very small fixed charge (meter rent) is applied, and often a free minimum allowance as well. The minimum charge, which constitutes the first (lowest-priced) block, charged at the basic rate, is being phased out over four years, from April 2001.
Japan:	While Japanese water utilities levy a minimum charge, they generally do not impose a separate fixed charge.
Netherlands:	Information from VEWIN (2002b), pp. 5-6. One utility (Wgron) offers domestic consumers a free allowance of 25 or 28 m^3/year/household, and another (Brabant Water) gives household consumers in one of its four districts a free allowance of 15m^3/year/household.
Portugal:	Information applying to 23 larger water supply utilities published in *Tecnologias do Ambiente*, No. 44, Novembro-Dezembro 2001, pp. 38-9.
Spain:	Information taken from Asociacion Espanola de Abastecimientos de Agua y Saneamiento (2002), p. 114.
England & Wales:	Population on unmetered and metered tariffs from Office of Water Services (2002a), Table 18.
Scotland:	Estimates of numbers metered from Wilson (2002), Water Industry Commission for Scotland.
United Kingdom:	In all parts of the UK except Northern Ireland, a choice of domestic metering (and volumetric charging) is available to all households, except those living in new houses (which are generally metered when they are built) and (i) users of garden sprinklers and swimming pools and (ii) certain other selected groups of high-use houses or households, which are also compulsorily metered.
United States:	Data derived from Raftelis Financial Consulting (2002), Exhibit 2.
Apartments:	There is no necessary consistency in the data embedded in Table 3.4 that reflect the tariff structures by which individual apartments and apartment buildings are charged in different countries. The best presumption is probably that the percentage figures refer jointly to single-family houses and apartment buildings. This is not uniformly true, however: in England and Wales, for example, the option of 'free metering' (no installation cost is paid) extends to all individual apartment-dwellers.

Table 3.5. **Household tariffs: levels and recent trends**

	Water service prices per m^3 (fixed element as % of total, in brackets)								Recent % annual increase			
	Year	Curr -ency	Measure	PWS	S&ST	Total	EUR	USD	Years	Measure	Nominal	Real
Australia	2000	AUD	WAV(200):70%	1.15 (38%)	1.43 (90%)	2.58 (66%)	1.62	1.49	1996-00	WAV(200)	0.2	-1.5
Austria	1999	AUT	SWAV(150)	14.52	19.72	34.24	2.49	2.65	1992-99	AV(Vienna)	5.7	3.8
Belgium												
Flanders	1997	BEF	AV(120)	60.0 (16%)	24.5 (0%)	84.5 (10%)	2.08	2.36				
Brussels	1997	BEF	AV(120)	59.6 (11%)	14 (0%)	73.6 (9%)	1.81	2.06	1988-98	"COW"	5.1	2.7
Wallonia	1997	BEF	AV(120)	60.5 (13%)	16 (0%)	76.5 (10%)	1.89	2.14				
Canada	1999	CAD	WAV(300):70%	0.69	0.45	1.14	0.72	0.77	1994-99	WAV(300)	3.2	1.5
Czech R.	2000	USD	AV	0.54	0.45	0.99	1.07	0.99	1997-00	AV	21.7	14.8
Denmark	2001	DKK	AVE	15.8 (25%)	18.3 (0%)	34.1 (12%)	4.58	4.10	1995-01	AVE	7.4	5.0
Finland	2002	€	WAVE	1.34 (22%)	1.55 (10%)	2.89 (16%)	2.89	2.73	1997-02	WAVE	3.1	1.1
France	2000	€	WAV(120)	1.26	1.39	2.65	2.65	2.44	1995-00	WAV(120)	3.1	1.8
Germany	2001	€	WAVE	1.70 (12%)	2.18 (?)	3.88 (?)	3.88	3.47	1995-01	WAVE	2.4	0.8
Greece	2002	€	AV(150)	0.59 (8%)	0.30	0.89 (5%)	0.89	0.84	n.a.			
Hungary	2002	HUF	AV	156	127	283	1.15	1.09	1997-02	AV	12.1	2.1
Italy	2001	€	AV	0.43	0.24	0.67	0.67	0.60	n.a.			
Japan	2001	JPY	AV(240)	145	n.a.	n.a.	1.33	1.19	n.a.			
Luxemb'g	1994	LUF	WAVE	36.1	n.a.	n.a.	0.89	1.01	n.a.			
Mexico	2001	MXN	AVE:26%	2.34	n.a.	n.a.	0.28	0.25	1997-01	AVE:25%	10.5	-2.1
Neth'nds	2000	€	WAVB:55%	1.57 (22%)	1.82 (100%)	3.39 (64%)	3.39	3.12	n.a.			
Norway	2002	NOK	AV(120m^2)	18	22	40	5.41	5.10	n.a.			
Poland	2002	PLN	AV	2.13	2.37	4.50	1.25	1.09	n.a.			
Portugal	2002	€	WAVE(180)	0.58 (40%)	n.a.	n.a.	0.56	0.53	n.a.			
Spain	2000	€	WAVE(180)			0.97	0.97	0.89	n.a.			
Sweden	1999	SEK	WAVE(200)	9.5 (40%)	14.1 (40%)	23.6 (40%)	2.68	2.86	1991-99	WAVE(200)	4.1	2.4
Switz'nd	1996	CHF	WAVE	1.6	n.a.	n.a.	1.02	1.29	n.a.			
Turkey	1998	TRL	AVE(160)	264000	132000(50%)	396000	1.36	1.51	n.a.			
UK												
E&W	2001	GBP	AB(137)	0.78	0.88	1.66	2.67	2.39	1994-01	AB	1.2	-1.4
Scot.	2000	GBP	AB(127)			1.49	2.45	2.25	1997-00	AB	19.2	16.1
US	2001	USD	AVE(340):25%	0.63	0.77	1.40	1.56	1.40	1997-01	AVE(340)	2.9	0.4

Notes: *(continued on next page)*:
PWS: public water supply.
S&ST: sewerage and sewage treatment.
n.a.: not available.

Notes for Table 3.5 *(continued from previous page)*:

- Practices in countries vary a great deal in terms of the costs these tariffs reflect. For example, some of the charges above reflect part of the costs of connecting a property to a given system. Also, in some countries sewerage and sewage treatment charges often include rainwater collection, treatment, and disposal costs, while in others those costs are covered by separate charges not reflected in this Table.
- All the tariffs reflect charges for water abstraction and discharge that are passed on to households, as well as certain other special levies and taxes (e.g. Danish drinking water levy, 5 DKK/m^3; and Japanese consumption tax, 5%). VAT is included when known.
- High inflation rates in some countries (e.g. Turkey, Hungary, the Czech Republic), especially in the earlier part of the period under consideration, reduce the precision of cross-country price comparisons.

Measures used:

AB(x)	Average bill covering all flat-rate and metered customers, average household consumption being estimated as x m^3/year.
AV	Average price of water across all utilities and households, = total revenue from households/total m^3 consumed.
AVE	Unweighted average across utilities of volumetric rates and of volumetric charge equivalent to average fixed charge.
AVE(y):P	As AVE, but utilities in sample cover P% of population of country and stipulation is household consumption of y m^3/year.
AV(y)	Unweighted average of utilities' (average) bills when household consumption is y m^3/year.
WAV(z):P	Weighted average of household bills for households (covering P% of population) with stipulated consumption of z m^3/year.
WAVB:P	Weighted average of household bills for households covering P% of population.
WAVE	Weighted average of volumetric rates and of volumetric charge equivalent to average fixed charge.
WAVE(y)	WAVE, with stipulated household consumption of y m^3/year.
SWAV(z)	Semi-weighted (= imperfectly weighted) average across utilities of household bills for stipulated consumption of z m^3/year.
"COW"	Cost of Water, as defined by sources in the Belgian submission to OECD (1999b).
Canada	Applies to rate charges only, as comparison is not possible for assessments (through taxes or otherwise), thus only 70% of the population is included, as opposed to the 77% in Table 3.4; See Environment Canada (2001), Annex 2, Table 12.
Greece	Athens only; average household bill when consumption is 150 m^3/year.
Norway	Average across utilities of average household bills, unmeasured customers' bills being based on either 120 m^2 house floor space or, if equivalent consumption is stipulated, 175 m^3/year.
Portugal	Lisbon only; reflects steeply increasing block tariff of EPAL for a household consuming 15 m^3/month (details at www.epal.pt)

Sources: See Annex A.

3.3.2 Central government influence over tariffs

A government that subsidises public water services can affect affordability by properly targeting the subsidy. Even if such a policy is only transitional, with full cost recovery, the ultimate policy objective, it may be worthwhile to reduce the burdens on poorer households in high-cost areas via geographical targeting.

This appears to have been the conscious policy followed in **Hungary** for the last ten years. In 1989-92, the large automatic price subsidy on household charges was eliminated completely (1989 household water and wastewater charges covered only about 20% of actual costs). This radical change, together with overdue asset revaluation, meant average household charges rose about tenfold. Because further increases would have led to enormous problems, especially for those with the highest bills, a subsidy directed at the highest-cost areas was introduced. It has grown in value from HUF 1.5 billion annually over 1992-94 to HUF 4.9 billion in 2002 (Rakosi, 2002). The enormous range in prices (and costs, to some extent) across the country is reflected in the range in water prices and sewerage charges in 2001: HUF 29 to 277/m^3 and HUF 23 to 395/m^3, respectively. The subsidy has always been directed at the highest-cost water service suppliers; in 2002 it was limited to areas where water supply costs were above HUF 240/m^3 (and, in cases where combined connections were available or feasible, water and wastewater costs above HUF 434/m^3). The government meets 95% of the costs above these thresholds. The real value of the total subsidy (using the CPI) is now 27% higher than in 1994.

This subsidy is the main instrument affecting water affordability in Hungary. It clearly gives financial relief to the better-off as well as the poor, but it has low administrative costs. The subsidy is a major reason for the relatively low water charge burdens for Hungary shown in Tables 2.3 and 2.8.

A similar system has existed in the **Slovak Republic** since at least 1991, the Ministry of Agriculture (2002) reports, with the Ministry of Finance setting the maximum volumetric prices to be paid by households for water and wastewater services. In 2001 the prices (before 10% VAT) were capped at SKK 10.45/m^3 for water supply and SKK 6.81/m^3 for wastewater service; but the "economically legitimate costs" for the services were defined at national level that year as SKK 13.76/m^3 and SKK 9.49/m^3, respectively: the maximum prices were under that by 24% and 28%. It is presumed that the central government met the difference. Hungary has been turning its waterworks and sewage enterprises into municipal joint stock companies, however, with a new Authority for Network Sectors Regulation regulating individual companies' prices according to "economically legitimate costs and adequate profit rate" principles. Whether a transitional period of continuing subsidies is envisaged is unknown.

A similar concept of concentrating subsidies for an essential utility in high-cost areas led to **Mexico**'s policy of supplying free drinking water to remote villages; those assisted are among the poorest in the country. Though **Poland** appears to have no general subsidy equivalent to that in Hungary and the Slovak Republic, some

infrastructure development in the sector is eligible for limited support from public funds, such as the National Environmental Fund (Berbeka, 2002).

The **UK** has experience of a more transitional subsidy. Large charge increases have been made in **Scotland** to finance infrastructure rehabilitation necessary to raise the quality of Scottish water services to EU standards. Two Transitional Relief Schemes were put in place to ease this process. The first (1996/97 to 1998/99) covered sewerage; it totalled GBP 90 million the first year, falling to GBP 30 million. The second (GBP 8 million a year from 2001/02 to 2003/04), under the new Scottish Executive, is for water and sewerage charges. These have been straight central government subsidies, in the second case financed by the Scottish Executive out of its block grant. The charge increases resulted not only from rises in capital investment but also a radical industry restructuring; and, in the earlier period, a bid for customer acceptance of the first-ever appearance of a separate sewerage charge on water bills (Sawkins and Dickie, 2001).

Householders in Scotland pay their water charges, like their general property taxes, as a flat fee based on the Council Tax Valuation Band of their homes. For the first two years of the initial Transitional Relief Scheme, the grant was distributed according to the standard relative weightings, with houses in the top band receiving three times as much as those in the lowest band. But after the Scottish Water and Sewerage Customers Council refused to approve the draft charges for the third year, largely due to the impact they would have on low-income households, the Secretary of State for Scotland ruled that the final year's relief would be given as a flat-rate payment to all households, regardless of band. The second Transitional Relief Scheme is directed at households receiving the Council Tax Benefit and having water and sewerage charges above a threshold value fixed at GBP 180 for 2001/02. The resulting water charge reductions amounted to up to GBP 90 per household. Assuming that the average reduction was GBP 45, about 8% of Scottish households would have benefited from the subsidy that year.

The four cases above are reported as examples of the use of subsidies to pursue affordability objectives, and no value judgements are intended. The Hungarian and Slovakian examples could appear to compromise environmental objectives, in that the price of water is reduced below what it would have been; but in fact per capita water demand has been falling rapidly in both countries. An *a priori* case could thus be made for the affordability policies described, as long as they are seen as transitional: short-term in Scotland, medium-term in Hungary and the Slovak Republic, and perhaps very long-term in Mexico.

Two other examples of governments influencing affordability, this time without constraints on cost recovery, should be noted. One involves tax reduction, the other tax introduction.

First, government decisions about rates of VAT and similar consumption taxes, and their application to household water services, can have a significant effect on prices and thus affordability. VAT rates on water supply vary considerably in OECD countries, from zero in **Switzerland** and the **UK**, through specially reduced rates in

Belgium, the **Czech Republic**, **France**, **Portugal,** and **Spain** (5-6%), to full VAT in **Denmark** (25%), **Norway** (22%) and **Sweden** (25%). No significant affordability issues were reported in any of these last three countries.

The **Netherlands** has implicitly tried to recognise the distinction between essential and discretionary water use by fixing VAT at 6% on the first $20m^3$ of water used per year and at 17.5% (the full rate) on the rest. Perhaps recognising the "public good" nature of household wastewater services, **Belgium, Italy, Netherlands**, **Portugal**, **Spain**, **Switzerland**, and the **UK** impose no VAT on sewerage and sewage treatment charges.

Second, governments can influence affordability by cross-subsidising groups of water consumers through earmarked taxation. A special light tax on all water bills, to finance what are deemed particularly worthwhile expenditures in the sector, puts a small burden on all for the benefit of particular groups. For example, a 1% water bill tax in **France** finances provision of new infrastructure in rural areas, and thus keeps rural water prices from shooting up because of added capital costs.

3.3.3 Social tariffs: traditional increasing-block tariffs

This section addresses the core issue of Chapter 3 — the methods by which countries have sought to reconcile the environmental and affordability tariff objectives highlighted in Section 3.1. After examining the use of "traditional" increasing-block tariffs in OECD countries, the discussion moves to the adaptation of IBTs to address affordability concerns, then looks at other relevant tariff innovations.

In the traditional IBT, the marginal price of a unit (usually a cubic metre) of water in a given billing period increases as consumption rises, usually in steps (hence the notion of the "block") until a final, open-ended block is reached. Where the IBT structure encompasses all sectors (household, commercial, industrial), only larger users will reach the higher blocks. There may be a separate fixed "service charge", and a minimum charge for a certain amount of water per billing period is sometimes imposed, irrespective of actual consumption. Economic and environmental objectives are best served if the fixed charge is restricted to costs that are: (i) customer-specific (e.g. meter reading, billing, payment collection) or (ii) not related to water service volumes, even in the longer-term. Minimum charges are best avoided altogether: by clouding scarcity and environmental signals, they confuse incentives, and also frequently undermine equity (OECD, 1999b).

By presenting a scale of rising prices linked to rising consumption, an IBT can convey to consumers a scarcity scenario, providing a consumption disincentive more compelling and stronger than that carried by the simple fixed-plus-volumetric two-part tariff. Traditional economics may be ill-equipped to handle such "moral demand" ideas, which can interact with "green consciousness" factors to restrict water demand in certain local and national situations.

The IBT is commonplace for the household sector throughout the OECD Mediterranean countries (**Greece, Italy, Portugal, Spain,** and **Turkey**; usually with three, four, or five blocks). It is also found in **Mexico** and much of East Asia (e.g. **Japan** and **Korea**, with a larger number of blocks). It has a history in **Belgium** in a reduced form (two-block) and in **Luxembourg** (with complicated blocks; see OECD, 1999b). It did not make a serious appearance in **US** or **Canadian** summary statistics of tariff structures until the 1980s.

In **Italy** (Muraro, 2002), the current form of IBTs dates from 1974, when an Interministerial Committee on Prices, the CIP (Comitato Interministriale Prezzi), introduced a five-part pricing structure for household users to control water consumption and waste. It was used first in Genoa, Naples, Rome, Turin, and Trieste (OECD, 1987). The CIP set forth the five blocks and prices as follows:

- "Reduced rate" (subsidised) block (*tariffa agevolata*), purportedly linked to "essential" household uses, but without directly considering family size, income, and house type. It is not clear that it would have been possible to meet this requirement.

- "Basic rate" (*tariffa base*), which ideally would reflect average costs of production.

- First excess (surplus) block, with a price 1.5 times the *tariffa base*.

- Second excess/surplus block, 1.5 to 2 times the *tariffa base*.

- Third excess/surplus block, more than twice the *tariffa base*.

The four last blocks would constitute the tariff for non-household consumption, so the preference for (and indeed cross-subsidisation of) the household sector was clear. The price ratios have not always been followed. The first block was generally fixed at 6-8 m^3/month (200-267l/day), though variation in family size makes it impossible to offer a rationalisation of such a range. A 1975 pronouncement by the CIP made clear that the reduced-rate block and its price constituted a minimum charge to be paid by all households, so very-low-volume consumers contributed at least something towards fixed costs. This minimum charge has distorted scarcity messages, as there is no financial incentive to hold consumption below the first-block ceiling. The principle was recently abandoned: the Comitato Interministeriale per la Programmazione Economica announced that it would be phased out over 2001-05.

In **Spain** as well, where there are usually three or four blocks, the first block for households is always considered the "social block"; the second is presumed to be at average cost and the third and fourth are "where water utilities apply incentives to discourage excessive use" (Maestu, 2002).

Turkey's reported reasons for the IBT (generally three blocks) are: (i) to respond to affordability concerns; and (ii) to provide a consumption disincentive (Esen, 2002). However, as most low-income Turkish households are of above-average size, the fixed width of the first block (for all households, irrespective of size) means the affordability rationale is hampered. In some cites, such as Samsun, variable billing periods are handled via the specification of household blocks on a litres/day basis. Furthermore, a significant number of Turkish utilities, including that of Istanbul, have adapted the IBT structure so that, for any household, *all* water is consumed at the price of the block reached by the end of the billing period. This generates very high marginal prices at block boundaries,[5] which has strange effects on incentives. In any case, the affordability rationale is demolished by such a severe variant of IBT, although the disincentive effect is presumably strengthened overall.

While no details have become available concerning the origins or current rationale of IBTs in **Greece** (usually five or six blocks) or **Portugal** (from two to six blocks, but usually four), interesting information has come to light on the situation in the **Belgian regions**. In Belgium, the "reduced" IBT takes the form for many utilities of a two-block tariff including a "free" block for each household. In **Flanders** (58% of the Belgian population), where all water utilities have had such a tariff since at least 1976 (Section 3.3.4 below discusses more recent developments), the purpose was "to guarantee the good quality of the water at the tap, and to take care of public health" (Steyaert, 2002). About 20% of the supply utilities in **Wallonia** (33% of the population) and at least one of those serving **Brussels** (9%) were offering a free block of water to each household in 2000; no information could be found on the history of these tariffs or the present situation.

All municipalities in the **Republic of Korea** have had IBTs since the 1970s. After the government issued the Comprehensive Water Management Countermeasures in August 1996, 59 local utilities abandoned the minimum charge (which had generally covered the first $10m^3$ per household per month) to encourage people to use water more carefully (OECD, 1999b). No information was available concerning the rationales for IBTs in **Japan** and **Mexico**.

When addressing affordability problems through IBTs where a household's "essential" water use is provided at a price below cost, an obvious problem arises: a first low-price block that is identical for each household does not address the needs of different-sized households. Such an arrangement will tend, in effect, to favour small households and penalise larger ones. Even if larger households are catered for through a very wide first block, that block will enable smaller households, including better-off ones, to meet higher proportions of their overall demand at low price. Thus, relatively speaking, the smaller households still have the advantage — and small high-income

5. At the margin between blocks n and n+1, the marginal price (MP) of a cubic metre, or whatever unit of water triggers the movement between blocks, is given by: MP = p[n+1] + x[n]. (p[n+1] – p[n]), where p[n] and p[n+1] are the prices of the nth and (n+1)th blocks and x[n] is the upper bound of the nth block. If, for example, p[n] = EUR1/m^3, p[n+1] = EUR2/m^3 and x[n] = 50 m^3, then the MP of the 51st m^3 = EUR52.

households may well pay a significantly lower average price per cubic metre than large low-income families.[6] Using the data presented in Table 3.6, it should be possible to make some broad-brush judgements about this issue for countries where IBT structures dominate.

Table 3.6. **Typical first-block widths and household consumption in 'IBT countries'**

Country	Typical billing period	Typical size of first block (and as litres/ hh/day)	Average per capita consumption in litres/ head/day[1]	'Basic use' (how many people 'covered' by first block)[2]	
				'Basic use' = half per capita consumption	'Basic use' = 60 litres/ head/day[3]
Belgium	3 months	$15m^3$/h/yr (41 l/*head*/d)	120 (2000)	all (2/3 of it)	all (2/3 of it)
Flanders	n.a.	$20\text{-}30m^3$/yr (55-82)	120 (2000)	1-1.4	1-1.4
Greece	3 months	$5m^3$/month (164)	140 (1995)	2.3	2.7
Italy	3 or 4 months	$100m^3$/yr (274)	213 (1997)	2.6	4.6
Japan	2 months	$10\text{-}20m^3$/month (329-658)	275 (1999)	2.4-4.8	5.5-11.0
Korea	n.a.	$10m^3$/month (329)	183 (1997)	3.6	5.5
Portugal	n.a.	$6m^3$/month (197)	119 (1994)	3.3	3.3
Spain	1-3 months	6-16 m^3/month (197-526)	144 (2000)	2.7-7.3	3.3-8.8
Turkey[4]	1-1.5 months	$10m^3$/month (329)	195 (1995)	3.4	5.5

h/h = household
n.a. = not available.

Notes:
1. Some consumption data are out of date; typical first block sizes, however, are fairly constant over time.
2. Two alternative measures of what constitutes 'basic use'.
3. In most OECD countries a 40-50 litre minimum is suggested. See Smets (1999) and Section 6.5.
4. About half of Turkey's utilities charge for all water consumption at the price of the last block reached.

Sources: Country data submissions as listed in Annex A.

6. Boland and Whittington (2000) claim that IBTs produce "inefficiency, inequity, complexity, lack of transparency, instability and forecasting difficulties", and are puzzled by their increasing popularity in developing countries. The only argument they raise relating directly to developed economies was their doubt that IBTs necessarily enhance the financial situation of the poor. Still, while IBTs could reduce equity in that sense, they could also increase it. All depends on the number, size, and prices of the blocks, household size across the income distribution, how demand differs among income groups, and the income elasticity of the demand, as well as the comparator.

Except for Italy, Korea, and Japan, the countries in Table 3.6 are also among the countries where, according to Figure 2.1, household affordability appears to be regarded as a significant issue. Judging by the last two ("coverage") columns of Table 3.6, **Wallonia**, Belgium, followed by **Greece** and parts of **Spain**, and then **Portugal**, could be expected to have the *least* satisfactory IBTs in terms of how much assistance generally accrues to larger poorer households. This is because their coverage of a typical low-price first block is just over three people (or less).

Pressures for change and policy adaptation would thus be expected to be the strongest in those four places. Not surprisingly, then, in three of them the IBT policies are indeed known to have been rethought recently, with a view to lessening the burden on larger low-income households. In **Wallonia** there have been moves to emulate the innovation of Flanders by gearing the first free block to household size, and initiatives to give special treatment to larger households have been reported in parts of **Spain** and **Greece**. The next section discusses these and similar developments.

3.3.4 Recent changes to IBTs

Water utilities, especially in the Mediterranean countries, have not ignored the equity problems associated with IBTs. A few utilities in both OECD and non-member countries have been receptive to the arguments in favour of a fairer system related in some manner to the number of persons in the household, and various initiatives have been reported in the last decade. Table 3.7 summarises the details. It is usually understood that such arrangements should not extend beyond a customer's primary (main) home, though the degree to which utilities are capable of checking on possible abuse in the case of second homes is unknown.

Some of the recent literature on energy pricing (e.g. World Bank, 2000c) has discussed the "lifeline tariff" issue (whereby the basic block is available at a price affordable by all), but only two practical energy examples of what is termed as the "floating tariff" are known. Table 3.8 shows that the **Republic of Moldova** was using a "heavily subsidised" price, as of 1998/99, for a first tranche of household district heating, which was linked proportionately to the number of people in the household. In **Malta**, since 1999, the four-block tariff for household electricity supply has included a first, free block of 200 units per household and a second, low-price block (44% of the full price) geared to household size. The latter, oddly, seems to reflect diseconomies of scale in use as a household grows larger.

Box 3.3. **Water charges in Barcelona (1990s)**

The Barcelona metropolitan region went through a ten-year dispute that was triggered by large increases in water bills over 1990-92, and has only recently been resolved (Tello, 2000 and 2002). To protest the increases, families began refusing to turn over to the various authorities the payments associated with their water bills, putting the money instead into bank accounts, opened by residents' associations, until the dispute could be resolved. The number of families eventually reached 80 000, and a quarter of a million people were involved.

The main trigger for this unprecedented action was not so much the tariffs of Agbar, the water supply utility, but rather the sizable new charges imposed by the Catalonian regional government and Barcelona Metropolitan Municipal Authority for abstraction and treatment, and by the Barcelona City Council for sewerage and a waste tax, tied to water consumption. With the metropolitan area's population and economic activity expanding, new costs were spread over the whole population, being concentrated on the volumetric components of the various water charges and taxes. The fixed part of water charges rose only about 9% over 1990-92, but tariffs for the first and second consumption blocks, including the associated levies, increased by 34% and 25%, respectively, and the charge for a newly added third block was 68% higher than the old second block. These increases hit some larger households particularly harshly: a four-person household using 400 litres/head/day, for instance, saw the *real* cost of its water bills increase over 1991-92 by more than 16% — rising to 19% if consumption was 600 lhd.

Faced with the continuing protests, the authorities involved voted later in the 1990s for increases in water charges and taxes, but by less than general price inflation, thus helping to bring the opposing camps together. The dispute was finally resolved when the Catalonian government and the Confederation of Residents' Associations used the principles of the new EU Water Directive in their negotiations over a new draft water law for the region. These principles included: integrated management of the whole water cycle, full cost recovery, and availability of basic consumption to all at an affordable price. The law ended the uncoordinated imposition of multiple taxes on households' water bills.

The resulting rationalised suite of water-related tariffs is not perfect. For example, smaller households now claim they are unfairly affected because the fixed service charge is relatively large (Tello, 2002); a single-person household using 130 lhd now faces a fixed charge equal to more than 50% of its quarterly bill. See the Section 3.3.5 discussion on tariff choice for details of how some OECD utilities have sought to deal with this "low use" issue.

Table 3.7. **Adapting essential/basic water use in IBTs to household size**

Country/ Location	Year	h/h size or no.of children: H or C	Block changes in tariffs for households in single family houses (SFHs)	Block changes in tariff for apartments	Reference
Spain: Barcelona Option 1[1]	2002 (since 1991?)	H	For *each* extra person in H>4 blocks 1and 2 *each* ↑ by 4.5 m^3/qtr. (49 lhd) on basic 18m^3/qtr (197 l/hh/d).	all households have own meters; thus as for SFHs	Garrido (2002) & www.aguas debarcelona.es
Madrid	2002	H	H>4: if cons. < 30 m^3/qtr, 1st block extended from 15 m^3/ qtr to actual consumption. H>5: if cons. < 40 m^3/qtr, 2nd block extended from 30 m^3/qtr to actual consmptn.	1 meter for whole building; H>4 [>5]: if building's aver cons.is 45-90 [>90]m^3/qtr/ hh, collective receives an extra 45[30] m^3/qtr for each large hh, in its 1st[2nd]block	Garrido (2002) & www.cyii.es
Seville	2002	H	For each extra person in H>4, first block increased by 4 m^3/month (131.5 lhd) on basic 16m^3/month (526 lhd)	1 meter for whole building; for building, hh size=ratio of Σpopln to Σno.of hh's; as hh size increases by s, 1st block ↑ by 4s m^3/qtr./hh	Garrido (2002)
Murcia	2002	C	5-block system; 1st block is C<3: 0-20 m^3/bi-monthly C=3: 0-45 m^3/bi-m. C=4,5,6: 0-54,63,72/bi-m. C=>6: *all* cons. is 1st block	n.a.	Garrido (2002) & www.emuasa.es
USA Los Angeles	Since 1995	H	2-block system: SFHs have 1s block of 1209 to 6045 l./ property/d [=f(season,temp. zone,lot size)]; for H>6 to 9 (>9 to 13), block ↑ by 186(93) l/prop./d/person	None	www.ladwp.com

Table 3.7 continued over page.

Table 3.7. **Adapting essential/ basic water use in IBTs to household size** *(cont.)*

Country/ Location	Year	h/h size or no. of children: H or C	Block changes in tariffs for households in single family houses (SFHs)	Block changes in tariff for apartments	Reference
Greece: Athens	Since 1993	C	5-block system: For C=0 to 2 1st block is 0-15m^3/qtr.; C=3 ⇨ 0-45 m^3/qtr. ; each extra child, extra 9 m^3/qtr.	n.a.	Ninou (2002)
Thessaloniki	n.a.	C	C=0–2 ⇨ normal tariff; for C>2, cons. In m^3 is ↓ 50%	n.a.	Ninou (2002)
Larissa	n.a.	C	C=3,4 (5-7; >7) ⇨ for cons. up to 50 (80; 100) m^3/qtr, only half is charged	n.a.	Ninou (2002)
Malta	1999	H	*Domestic*: 0-11 m^3/person/ /4-months (90 lhd) is 85% below standard price. *Social Assistance*[2]: first 5.5 m^3/person/4-months is free; next 5.5 m^3/person/4-months is 85% subsidised.	n.a.	www.wsc.com.mt
Belgium Flanders	1997	H	First 15 m^3/person/yr (41 lhd) is free; all other use is charged at full price.	same as for single family houses	OECD (1999b)

Notes:
h/h = household; lhd = litres/head/day.
1. Barcelona offers two tariffs to households in SFHs; in Option 2 (two blocks only; not summarised in the table) the first block increases by 9 m^3/person/qtr for each extra person in H>4.
2. Describes persons who are neither employed nor self-employed and who receive social assistance benefits.

Table 3.8. **Examples of basic electricity use linked to household size**

Country	Utility	Year	Fixed charge/ billing period	Consumption charge	Reference
Moldova	District heating	1998/99	n.a.	First 12m^2 floor space *per capita* in an apartment was charged at a "heavily subsidised price"	World Bank (2000c)
Malta	Public electricity supply	since 1999	MTL 12/year (regular domestic); or MTL 8/year ("social assistance"[1])	1st block (free): 0-200 units 2nd block (2 cents/unit): 1 person – 800 units) 2 persons – 1050 units) 3 persons – 1375 units) 4 persons – 1800 units) >5 persons – 2350 units) 3rd block: to 6400 units: 4c./unit 4th block: >6400 units: 4.5c./unit	www.mra. org.mt

n.a. = not available.

Note:

1. For eligibility, see Table 3.7, note 2.

At least four cities in **Spain** have significantly amended their IBTs, all in the 1990s as far as can be determined (Garrido, 2002). In Barcelona (see Box 3.3), Madrid, and Seville, the main concern was to widen the first (and/or sometimes the second) block for households of more than four people. In Murcia the basic block extension applies only in the case of three or more *children* (whatever the number of adults, presumably). In all four cases, smaller households still benefit in terms of a wider first block per capita, since the first block is constant up until, and including, household sizes of four — though it can be argued that such gains are offset by the fixed charge, which is not considered here. Larger households must prove their status as *familias numerosas* via a certificate issued by the central government. It appears that, by convention, the block adjustments are also applied to abstraction levies and charges for sewerage and sewage treatment.

Cities and some larger towns in **Greece** offer special water tariffs for families with three or more children, as Table 3.7 shows (Ninou, 2002). Of the three examples in the table, only EYDAP (Athens) formally augments the initial tariff block. EYAE (Thessaloniki) and Larissa apply 50% discounts in volumetric charges up to a certain rate of consumption (determined in Larissa by the number of children). The 50% reductions could be applied as a reduction in the overall bills (including later consumption blocks) for larger families, but it would be at a cost of halving the marginal cost of additional water use. So the equity gain is offset by possible reductions in economic and environmental efficiency. However, it would only involve a small number of families: in 2002, out of EYDAP's 1.8 million household accounts, only 20 000 had three or more children. In **Turkey**, however, a 2002 law prohibits discounting of the water bills of households with four or more children, a practice that used to be found in some cities.

In the **US,** the Los Angeles allowance for very large households in SFHs was part of a package of domestic tariff reform in the mid-1990s that abolished the minimum charge, introduced a credit for low-income consumers independent of water usage, and related the size of the first of two blocks for SFHs to "household needs". This is determined by property size (five categories), temperature zone (three), season (two), and household size: an extra first-block allowance of 186 litres a day each for the seventh to ninth household members, plus 93 litres a day each for the tenth to 13th members (see OECD, 1999b; and www.ladwp.com).

The "purest" forms of IBT tariff adjustment for household size are found in **Belgium** (Flanders) and **Malta**. The **Flanders** tariff, highlighted in the earlier OECD report on household water pricing (OECD, 1999b), has been operating since 1997. It should be seen as an evolution of the earlier Flemish system in which some utilities allocated a free block of water to every household in their area.

In theory, the Flemish tariff is in many respects ideal. It both: (i) combines equity (a free block of water for all people) with a move towards economic efficiency and appropriate environmental signalling (a unit price necessarily higher than average cost)

and the power to generate required revenue; and (ii) reflects closely the idea that potable water supplies can be divided into basic uses and discretionary (or "luxury") uses. Annex B compares a traditional "fixed-plus-volumetric" tariff with a Flanders-style tariff, showing that the only conditions under which introducing a free allowance could worsen the relative situation of poorer households are when: (i) the less well-off are extremely concentrated in smaller households (and the better-off in larger ones); (ii) the water use economies of scale are extremely large for wealthier households relative to the income elasticity of demand; and (iii) the average per capita consumption in better-off households is actually lower than that in less well-off families. This combination of social and economic phenomena seems very unlikely.

In practice, however, the Flanders tariff has had a mixed reception. Utilities in Flanders stress that extra overhead and operating costs (largely related to information technology) arise from the need to build and maintain a comprehensive database on household size. At least one company, VMW, reports that the group of households not using all their free allowance is increasing, and the reasons are unclear. It is also said that the new price structure gives "the impression that water is not as important as it seems because we give it away for free" (Hammenecker, 2002). Van Humbeeck (2000) argues that low-income households have actually been made worse off, though it seems likely that this is wholly or partly due to other tariff and social assistance changes instituted at the same time. Certainly it has not been shown that better-off Flemish households use less water per capita than lower-income ones, which is the necessary condition for the "perverse" result Van Humbeeck claims (see Annex B).

The two **Maltese** household water tariffs are very much in the same spirit, yet provide an interesting contrast with Flanders. Until recently, the "domestic" tariff provided two subsidised blocks, the first giving 5.5m^3 per four months per capita (45 lhd) at 10% of the "standard" price, and the second an identical additional rate (45 lhd) with a subsidy of 75%. Thus only consumption above 90 lhd was paid for at the full price. In 1999, these two blocks were collapsed into one that is 90 lhd "wide", and priced at 15% of the standard price. Meanwhile, the "social assistance" tariff (see notes to Tables 3.7 and 3.8) maintains a free first block (45 lhd) and a similar block priced at 25% of the standard price, as well as free meter rental (Water Services Corporation, 2001).

The apparent generosity of these arrangements is emphasised when the range of consumption is considered. Average consumption for the lowest-consuming 75% of households in 1999/00 was 85 litres a day, while for the 25% highest it was 397 litres a day. Of total consumption, 82% was subsidised, costing MTL 0.165/m^3; only 18% was billed at the full price of MTL 1.10/m^3. It thus seems there is significant cross-subsidisation both among households and from other sectors; and it is perhaps not surprising that household demand grew by 5% from 1999/00 to 2000/01 (Water Services Corporation, 2001), with the effective marginal price of water being so low for so many consumers.

Table 3.9. **IBT first-block allowance in per capita terms as household size increases**

Utility or Region	Block 1 price as % of standard price[1]	Litres/head/day for household consisting of								
		1A	2A	2A+ 1C	2A+ 2C	2A+ 3C	2A+ 4C	2A+ 5C	2A+ 6C	2A+ 7C etc.
Barcelona[2]	42	197	99	66	49	49	49	49	49	49
Madrid	79	164	82	55	41	66	55	47	41	37↓
Seville	41	526	263	175	132	132	132	132	132	132
Murcia	96.5	329	164	110	82	148	148	148	148	n.l.[3]
Los Angeles[4]	73	1209	605	403	302	242	202	199	198	196
Athens	66	164	82	55	41	99	99	99	99	99
Thessaloniki[5]	65	164	82	55	41	66	55	47	41	37↓
Malta										
Domestic	15	90	90	90	90	90	90	90	90	90
Social Assistance	free	45	45	45	45	45	45	45	45	45
Flanders	free	41	41	41	41	41	41	41	41	41

A = adult, C = child(ren).

Notes:

1. For each Spanish and Greek utility, the first-block unit price is compared to that of the block that includes consumption of 15m^3/month (except for Seville, where the second block starts at 16m^3/month). For Spanish utilities, the price includes charges for abstraction, sewerage and sewage treatment, distribution, supply, and any water levy, if these are determined by the quantity of water consumed by a household.
2. Data are for Barcelona's Option 1 (see Table 3.7, note 1).
3. n.l. = no limit. In Murcia, all consumption by a family with seven or more children is charged in the first block.
4. A 'base' case of 1 209 litres per property per day represents the first block for SFHs in the low-temperature zone during low season and with a lot size of less than 7 500 square feet (the smallest lot category).
5. No extra block allowance is specified for larger households. The allowance in the table is calculated as the 'equivalent allowance' for a household of that size before the higher unit price is reached.

Sources: See references for Table 3.7 and Annex A.

Table 3.10. **Equity and efficiency ratings of adapted IBTs**

Utility/ Location	Equity[1]		Economic & Environmental Efficiency[2] (assessed by whether most households, including larger ones, still pay a 'standard' marginal price)
	Actual assistance to customers from low-priced block	Equity between different-sized households	
Barcelona	high	high for > 2H	high (except 1H)
Madrid	low	fairly high for > 2H	high (except 1H)
Seville	high	high for > 2H	very low (wide, low-price first block)
Murcia	very low	Fairly high for > 2C	high (high-price first block)
Los Angeles	limited	high for > 5H	high (except 1H + 2H)
Athens	limited	high for > 2C	high (except 1A)
Thessaloniki	limited	fairly high for > 2C	high (except 1A)
Malta			
Domestic	very high	very high	very low: at least 70% of consumers
Soc. Assistance	very high	very high	stay in 85%-subsidised (or free) block
Flanders	very high	very high	very high in theory, but not quite so high in practice?[3]

H = number in household.
A = number of adults.
C = number of children.

Notes:
1. Judgement made in light of relative price and block allowance data from Table 3.9.
2. Judgement made in light of size of block allowance (Table 3.9) and average per capita consumption.
3. Judgement informed by the fact that VMW, one of the largest Flemish utilities, reports that the "group of households who do not use all their free cubic metres is increasing" (Hammenecker, 2002).

Sources: See references for Table 3.7 and Annex A.

Table 3.7 shows that arrangements to accommodate larger families, particularly in the case of the **Spanish** and **Greek** water utilities, can be detailed and complex. Thus, it is not easy to compare the systems as described in the table. Another way of assessing the equity of the tariff systems in Spain and elsewhere is to examine the extent to which the low-priced block actually yields significant savings for low-income households, (compared with the "standard" price). Another way is to calculate how much the "width" of the lower-priced first block grows in per capita terms as family or household size increases. Table 3.9 gives examples of calculations using the latter method.

These data enable judgements on two aspects of equity: (i) the extent of assistance to low-income households from the initial cheaper block; and (ii) the treatment of households of different sizes in terms of the marginal per capita width of the first block as household size increases. Table 3.10 gives rough rankings based on those two aspects and on the extent to which economic and environmental efficiency is maintained by the width and price of the lower-priced blocks. Reaching the latter judgement required, among other things: (i) applying knowledge of the approximate amount of per capita consumption in the countries under consideration, and (ii) ignoring the fact that overall level of economic and environmental cost recovery in many of the tariffs may be well below Full Cost Recovery (e.g. in **Greece** and **Spain**; see Table 2.10). The efficiency test adopted here is whether most households' consumption goes beyond the low-priced blocks before the end of the billing period and thus faces the "standard" price as the "real" marginal price.[7]

Barcelona comes out best of the **Spanish** tariffs, with Madrid lagging on both of the equity assessments. Seville and Murcia lag further behind on one criterion each. Data for the former suggest that many households would not actually consume outside the low-priced block, while in the case of the latter the first-block discount (3.5%), and even the second (only 3.75% less than the third-block price), hardly seem worth the administrative costs. The two **Greek** utilities' assessments are marginally better than Madrid's because of the greater first-block discount. **Los Angeles** begins to extend the first-block width only for households of six and above, thus sharing first-block benefits among all households but ensuring that those with five or fewer members have significantly more than their fair share.

It is difficult to see how Malta and Flanders could score any higher on the equity criteria, but with regard to efficiency the stories are very different. For 1999/00 it appears that at least 70% of households in **Malta** (and at least 75% of those with three or more persons) had billing records that showed all their water was being bought at a subsidised rate (Water Services Corporation, 2001). This is potentially injurious to economic efficiency and environmental protection, depending upon the price elasticity of demand and the scale of any environmental costs resulting from abstraction and other parts of the water and wastewater production processes.

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7. Potentially complex IBT issues, relating to the effect of future demand uncertainty on a household's actual and expected marginal prices (and thus of its actual demand) in the course of a given billing period, are not treated here.

If we ignore the theoretical nicety that the "really ideal" tariff would – by widening the basic block allocation for larger households – capitalise on economies of scale in household water use, **Flanders** emerges with the best all-round picture. This is because, in addition to the equity objectives' being met, the likelihood is that a very high proportion of households would find themselves outside the 41 lhd basic block, and therefore paying the "full" price for their marginal units of consumption. It is therefore unsurprising that in both **France** and the Wallonian region of **Belgium,** there have been moves in recent years to emulate the principles of the Flanders tariff in, respectively, national and regional legislation.

Finally, note that **Luxembourg** includes IBTs among its extraordinary array of water tariffs. Few summary statistics are available, but it was reported for this study that about 6% of municipalities have "drinking water prices decreasing with the consumed quantity of water or with the number of family members" (Lang, 2002). In the first case, the reasons are unknown (as perhaps are the possible implications for conservation), but affordability and equity may be driving the family-size price adjustment in the price, as in Thessaloniki. There are also examples in Luxembourg of complex IBT systems that relate all blocks to household size, as Table 3.11 shows.

Table 3.11. **Complex IBT, Luxembourg Commune (1996/97)**

Water price (LUF/m^3)	**Consumption in m^3 per year in households consisting of**						
	1 person	**2 persons**	**3 persons**	**4 persons**	**5 persons**	**6 persons**	**7 persons**
40	≤60	≤100	≤140	≤180	≤220	≤260	≤300
50	61-70	101-120	141-170	181-220	221-270	261-320	301-370
70	≥71	≥121	≥171	≥221	≥271	≥321	≥371

Source: Eurostat (1997).

Incidentally, no studies could be found analysing the extent to which better-off households cross-subsidise low-income families through IBTs and adapted IBTs. The willingness-to-pay issue as regards cross-subsidies does not seem to have arisen in the countries considered here.

3.3.5 Tariff choice, tariff capping, and restricted tariffs

This section deals with the implications of three related approaches that further relieve low-income customers' water charge burden: tariff choice, tariff capping, and restricted tariffs.

Tariff choice

Two sorts of tariff choice for individual households are found in OECD countries: first, customers paying a flat fee can opt for a meter; second, customers already paying a metered tariff can switch to a special low-volume tariff. The introduction of these options has been driven by considerations of general fairness rather than affordability, but both can have implications for affordability for some groups — sometimes beneficial, sometimes adverse, sometimes both. National optional metering programmes are found in the **UK** and **Norway**, and single utility examples exist in **Belgium** (Antwerp Water Works) and **Canada** (Calgary).

In 1999, new legislation in **England and Wales** made it mandatory for all water companies to offer "free metering", which triggered much switching: 23% of households are being charged by meter in 2002/03, as against 14.5% in 1998/99. The impetus behind the new law seems to have been the government's desire to give retired people, who often have relatively low incomes and also low water usage, a clear financial inducement to switch. Paradoxically, many larger low-income households living in relatively low-value houses, and therefore having low water charges, have found their unmeasured water charges rising much faster than they would have otherwise, as a direct result of others switching to metering.

This is because of "tariff rebalancing". The economic regulator has an obligation to ensure that charges for the "unmetered" and "metered" parts of the household sector are non-discriminatory (i.e. that the two sectors have, overall, approximately the same cost per cubic metre consumed). The more successful "free metering" is in helping some poorer households, the worse the situation becomes for the remaining low-income households that are still not metered and previously had the least incentive to switch. Someone has to pay for "free metering". Thus, the incentive to opt for metering perpetuates itself.

Household metering is also growing in **Scotland**. Large charge increases — of between 18% and 46% in 1999/00 and 2000/01 — made it worthwhile for a few hundred households to switch to metering even without free installation. The proportion of Scottish households paying by meter shot up in a year, from 0.001% to 0.015%. No affordability objective is involved in this movement, however; nor is there any in **Norway**, where new regulations in 2001 permitted either a municipality or an individual customer to opt for measured consumption. In **Canada,** the Calgary city government tried three times in 30 years to impose universal metering but the move was consistently voted down in city plebiscites. So, in 1991, Calgary began an optional metering programme with free installation. By 2000, half the households had switched and household consumption per capita was down by 11%. No affordability consequences are known.

Just a few examples were found of options to switch to low-volume tariffs. In **England and Wales,** three water companies, covering 10% of the population, offer such an option. The idea is to encourage low-usage households to opt for metering, by abolishing the fixed charge but increasing the volumetric rate above the standard level.

Table 3.12 gives the relevant metered charges of Anglian Water, the pioneer of tariff choices in Britain. As the table shows, any metered household using less than 75m^3/year would be better off leaving the Standard tariff and opting for SoLow. The savings would be slight for an economical two-person household but up to about 25% for a frugal single person. Such reductions must be financed through cross-subsidisation, an issue taken up under *Restricted Tariffs* along with the financing of the company's other special tariffs.

From the affordability viewpoint, a disadvantage of low-volume tariffs is that their targeting may be poor; any low-use household – rich or poor, whatever the reason for low consumption – can choose the tariff and the gains that may accrue. The same appears to be true for low-volume discount programmes in the **US**, which have similar financial outcomes (see Table 3.2). Figures from the 2001 Raftelis survey (Raftelis Financial Consulting, 2002) showed a similar proportion of the population in utilities surveyed, about 9%, living in areas with such programmes available. No operational details are available, although it is clear that the US variants reduce the volumetric prices, thus "easing" economic and environmental signals, whereas the examples in the UK, by abolishing the fixed charge and increasing the volumetric rate, have the opposite effect.

Table 3.12. **Household metered charges for water services, Anglian Water (2002/03)**

		Standard tariff	SoLow tariff	Aquacare Plus tariff[1]
Standing charge	(GBP/year)	64.00	-	140.00
Volumetric rate	(GBP/m^3)	1.7832	2.6366	1.0232
Annual bill (GBP)	36.5m^3/yr (100 l/hh/d^2)	129.09	96.24	177.35
	50 m^3/yr. (137 l/hh/d)	153.16	131.83	191.16
	75 m^3/yr. (205 l/hh/d)	197.74	197.74	216.74
	100 m^3/yr. (274 l/hh/d)	242.32	263.66	242.32
	150 m^3/yr. (411 l/hh/d)	331.48	395.49	293.48
	200 m^3/yr. (548 l/hh/d)	420.64	527.32	344.64

Shaded areas identify preferred tariff choices for given household consumption.

Notes:

1. Households receiving Income Support, the Job Seekers Allowance or Family Credit may choose any of the three tariffs. All other households choose between Standard and SoLow.
2. l/hh/d = litres per household per day.

Sources: See Annex A.

Tariff capping

The 1999 legislation that introduced "free metering" for **England and Wales** stressed "fair and affordable" water charges as a key objective of water policy. In

commentary on the law (Department of the Environment, Transport and the Regions, 2000), the UK government recognised that in some situations people using large amounts of water for essential purposes and facing metered charges might have to cut down on water for basic use if they did not receive assistance. The government therefore introduced regulations to protect certain "vulnerable groups".

The Vulnerable Groups Regulations, published in 1999 and in effect since April 2000, are narrowly cast. They cover only households in which at least one person receives one or more of six designated government benefits or tax credits, and either has three or more dependent children under 16 or includes someone with a specified medical condition[8] causing significant extra water use. If such a household's application for assistance under these regulations is granted, it can pay either: (i) what its measured charge would be; or (ii) the average charge for all household consumers (measured and unmeasured) served by its water company, whichever is less. Essentially, the household's measured charges are capped at the level of the water company's average household bill.

As of March 2002, 1 665 households, or 0.2% of metered households, were taking advantage of these regulations, according to information from Anglian Water (Bohanna, 2002). If the proportion is the same for all 4.3 million metered households in England and Wales, then about 9 000 households may be receiving assistance. An earlier study estimated that 300 000 households both received income-related benefits and had three or more children (Department of the Environment, Transport and the Regions, 1998). If it is assumed that there are two to five times as many unmetered households as metered ones, the estimate of eligible households in England and Wales is in the range of 75 000 to 150 000. Based on such estimates, it may be supposed that only 6% to 12% of eligible households were making use of the regulations by the end of the second year. Again, questions relating to cross-subsidisation are germane, and will be taken up in the next section.

Restricted tariffs

Sometimes utilities (or governments) design tariffs specifically to reduce hardship to low-income households. Normally, entry is restricted to low-income groups or to categories in which low-income groups figure significantly, and eligibility is established by income or by prior entitlement to benefits. Five examples of such "restricted tariffs" have come to light in this study — three from the **UK**, one from **Spain,** and one from **Malta**. The Spanish case is a special tariff for retired people; in the other examples, entry is restricted to those receiving social benefits (in one example, it also includes those with a medical need for high water use at home).

8. Limited to desquamation, weeping skin disease, incontinence, abdominal stoma, and renal failure requiring dialysis at home.

In **England and Wales**, the water companies involved are the same as those offering low-user tariffs: Anglian Water (Aquacare Plus or its equivalent, for water supply and sewerage, since 1998), Hartlepool (Aquacare Plus, water supply only) and Mid Kent (HelpuMedico, water supply). Table 3.12 presented the details of the Anglian structure: the fixed charge under Aquacare Plus is more than twice that of the Standard tariff while the volumetric rate is little more than half. Eligible households consuming more than $100m^3$ a year (slightly more than an average two-person household) would expect savings under Aquacare Plus that grow significantly with water use (and household size). A six-person household with reduced per capita consumption of 90 lhd (economies of scale at work) would expect to pay just over GBP 342 a year, saving about GBP 75 a year (nearly 20%) over the Standard tariff.

Aguas de Murcia in **Spain** offers the retired a remarkably generous water supply tariff. The first $15m^3$ in the two-month billing period (247 litres a day) is free; the next $10m^3$ (164 litres a day) is priced at 34% below what is charged to all other households in a given household-size-related initial block. After that, the general household tariff holds, but most one- and two-person households of retirees would expect to pay a very small usage charge, if any, and the fixed service charge is only EUR 7 per bill. Cross-subsidisation is therefore quite considerable.

The Social Assistance tariff in **Malta**, an IBT first introduced in 1981 (described above and analysed in Tables 3.7–3.10), is also very generous. It is currently restricted to one- and two-person households receiving social assistance, and it seems that virtually no one ends up outside the subsidised blocks. Again, cross-subsidisation is very high.

Table 3.13 shows that the estimated cross-subsidisation of Anglian Water customers benefiting from: (i) the company's own two special metered tariffs; and (ii) the national Vulnerable Groups tariff-capping regulations costs other households about GBP 1.60 (EUR 2.60) annually, on average. This is relatively low, equal to about 0.7% of the average metered household bill in the company's area (GBP 223/EUR 350) and 0.5% of the average unmeasured bill (GBP 318/EUR 500).

Table 3.13. **Anglian Water's special metered household tariffs (April 2002)**

Special tariff	Number of households using tariff	Number per 1000 metered households	Estimated Proportion of those eligible	Extra annual charge for all households (GBP/year)		
				PWS	S&ST	Total
Low-user tariff (SoLow)	87 000	109	33%	0.50	0.97	1.47
Vulnerable Groups Regs.[1]	1 665	2	6%-12%	0.06	0.07	0.13
Aquacare Plus	698	1	?	0.01	0.01	0.02

Note:
1. Anglian Water calls this government-mandated tariff Aquacare.
Sources: Cols. 1 and 4: Bohanna (2002); Cols. 2 and 3: author's calculations.

Assume, in the absence of other information, that the take-up of Aquacare Plus is in the range estimated for Vulnerable Groups tariff-capping in Anglian (between 12.5% and 22.5%); and suppose that the take-up of all three special tariffs in Anglian's area were to rise to 66%. (A figure well short of 100% is chosen because of the possibly frequent new entry to and exit from all three tariffs, the uncertainty of water consumption, and the rising marginal costs of reaching increased take-up.) Assuming proportional increases in the total extra annual charges (the fourth data column of the table), the annual cost to non-participating households is in the range of GBP 3.40 – 3.80/EUR 5.40 – 6.00. That is, respectively, 1.5-1.7% and 1.1-1.2% of present average metered and unmetered bills.

How much actually could or should be spent on such cross-subsidisation? What would be "reasonable" in trying to balance financial hardship and fairness to all households? One approach to such questions is to ask what existing customers think. Box 3.4 discusses the methodology and results of one such enquiry.

It is difficult to associate the results reported in Box 3.4 with the Anglian Water cross-subsidisation "requirements" estimated earlier, both because of the differing assumptions and figures used in the two exercises and because of the higher average bills prevalent in Anglian, compared with England and Wales generally. However, if the claimed 2.5% "cost" of a water utility offering general payment flexibility to its customers is imported into the Anglian exercise, it can be estimated that the overall cost of maintaining protection in the region (three special tariff arrangements with 66% take-up plus the 2.5%) works out at 4-4.2% of an average metered consumer's bill (GBP 9.00-9.40, on GBP 223) and 3.6-3.7% of the average unmetered bill (GBP 11.35-11.75, on GBP 318). Achieving 99% take-up for the three tariff arrangements would increase these ranges to 4.8-5.05% (GBP 10.70-11.30 metered) and 4.1-4.3% (GBP 13.05-13.95 unmetered).

Three of these four possible ranges for the Anglian region would breach the GBP 10.50 absolute limit referred to at the end of Box 3.4 — estimated, it should be remembered, from discussions involving customers in regions with lower water bills. But if it is percentages that matter in determining what customers will tolerate, only one of the four Anglian ranges would break through the 5% "barrier" suggested by the focus group research. It does seem, therefore, that there is some general support for a limited amount of tariff-based assistance in England and Wales. There also seems to be scope for increasing such assistance, but only up to a point. Just where that point lies is difficult to tell, given the present limited evidence concerning customer views.

Box 3.4. **UK qualitative research on willingness to pay for special tariffs for low income households**

The economic regulator in England and Wales, Ofwat, recently attempted to shed light on customer attitudes towards, and willingness to pay for, special tariffs for vulnerable, low-income, and low-user households (D.V.L. Smith Ltd., 2000). Because public awareness of the details of current household protection programmes in the UK water sector was known to be low, a "focus group" approach was chosen over a questionnaire-based survey. Four group discussions, involving various predetermined mixes of individuals by income and age, were held in each of three water company areas: Severn Trent, Yorkshire, and Wessex. The nature of the discussions, and the fact that much explanation of present arrangements was necessary, confirmed that qualitative research was the appropriate method for exploring these issues. The main results were:

- While a small minority of customers rejected the idea of assisting others through the tariff system, (i) a substantial minority supported assistance but did not feel the need to understand how such help was delivered; and (ii) the majority supported the idea with two qualifications – that those who qualified for help were not abusing the system, and that the definition of "vulnerable" customers should not be too narrow.

- There was widespread support for the idea of water companies providing flexible payment options to help people manage their utility bills; it was claimed that the average annual cost of these to a customer paying by direct debit was about GBP 5, or roughly 2.5% of the average household water bill nationwide.

- The Vulnerable Groups arrangements (discussed under Tariff Capping) were reported to cost GBP 0.50 a year (0.25% of the average bill); both principle and practice were approved.

- Spontaneous support for a low-user tariff was considerable, with people aware of other utilities (e.g. telecoms) applying such tariffs; as the necessity of cross-subsidisation emerged in discussion, most people thought there should be some qualification criteria but there was little agreement on who should qualify, though retired people were generally accepted as an appropriate group.

- There was a general agreement with the extension of the Vulnerable Groups capped tariff to cover a wider range of medical conditions, at an extra cost of GBP 0.50 per year.

- The possible extension of the capped tariff to a wider range of welfare beneficiaries — in the extreme case, to all — costing in the range GBP 2 to 5 a year per existing customer (1%-2.5% of the existing average bill) was seen as more problematic. Respondents were generally unhappy with the idea of extending special support solely on the basis of existing State benefits, without other qualifying conditions. At the upper end (GBP 5), the absolute level of support required, when added to existing protection, was beginning to seem too high at GBP 10.50 a year, about 5% of the existing average bill.

3.3.6 Conservation programmes for low-income consumers

Apart from a service charge, most water bills are generally made up of a price element and a quantity element. The material in this chapter has so far concerned reducing price for low-income households, in one way or another. Now, we discuss an alternative, and usually complementary, method of decreasing the water bills of those with lower incomes: reducing quantity. This section summarises examples of water conservation programmes directed at low-income households in **Australia** and the **US.**

In Australia, both Melbourne and Sydney have taken recent conservation initiatives. In December 1998, the Victorian State Department of Human Services joined with Yarra Valley Water (serving 1.5 million people in the northern suburbs of Melbourne) to begin a project called Smart Homes to give low-income households the opportunity to reduce water consumption costs, become more conservation-aware, and to improve their ability to pay their utility bills. Eligible customers are low-income home owners with unusually high annual water use. They receive a free water audit, after which a plumber repairs leaks and replaces inefficient appliances, free of charge.

By mid-2002, 170 households had participated, at an overall cost of AUD 29 000. Public housing and rental properties are currently excluded, but Yarra Valley Water has asked the Victoria government to make them eligible (Yarra Valley Water, 2002). In 2002, Sydney Water ran a similar campaign called Every Drop Counts, also involving a home visit by a plumber, free minor repairs, and the supply of devices such as shower heads. Customers holding Pensioner Concession or Health Care Cards were eligible (Woodfine, 2002). No results are yet available on how much reduction in their bills has been achieved through these two programmes.

In the US, Saunders *et al*. (1998) argue that conservation programmes targeted at lower-income households are especially attractive because they provide a double dividend because: (i) US water use has traditionally been high overall, and many poorer people live in older housing where leaks are common, the return on a water utility's conservation investment can be considerable; and (ii) such programmes directly address affordability concerns. Since water-saving devices are often inexpensive and easy to install, programmes are not necessarily costly; it is crucial, however, not to require the household itself to make a financial outlay.

New York City chose (in the early 1990s) to reward landlords for reducing water use. In return for participating in toilet and showerhead rebate programmes, allowing free audits to be run, undertaking to repair all leaks discovered, and enrolling their building managers in conservation seminars, property owners' bills were capped at USD 750 a year for the first building and USD 500 a year for each additional building; in addition, high bills resulting from leaks that had been corrected were capped at 150% of the post-repair charge. In Philadelphia, a pilot programme by Philadelphia Suburban Water provided conservation education, leak detection and repair, aerator taps, low-flow showerheads, and toilet dams to 240 low-income households with a history of payment

problems. Benefits accrued through arrears forgiveness: every household that signed up received a USD 50 credit, and successful reductions in water use generated a USD 25 credit. Each month that a household paid its water bill in full (and on time) generated a credit of USD 5-10 (Saunders *et al*., 1998). A similar fixture repair programme, with free material and labour up to a value of USD 1 000 per household, has operated, since 1997 in Portland, Oregon as part of a major programme of measures to address water affordability problems (Hassan, 2002).

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Social Issues in the Provision and Pricing of Water Services

Chapter 4

Governance and private sector participation

This chapter examines how social and environmental objectives are being met under different models of water services provision, involving different forms of "private sector participation" in the provision of those services. It provides case studies of different types of water service providers from France (Amiens), Germany (Hamburg), UK (Welsh Water), US (Suburban Water Systems), and Mexico (Mexico City). The chapter also considers some key criteria for evaluating the effectiveness of water service providers in meeting economic, social, and environmental objectives.

CHAPTER 4. GOVERNANCE AND PRIVATE SECTOR PARTICIPATION

4.1 Introduction

This chapter examines how social and environmental objectives are being met under different models of water service provision in OECD countries. The operation of urban water services typically falls under the heading of "public services", even where they are provided by private enterprises. It is not tradition alone that dictates the importance of keeping water management in the "public interest"; it is also the existence of positive and negative externalities, which are not captured by market mechanisms, that defines a role for government. In the past, externalities relating to urban water services have been mainly associated with public health. For example, should sewerage not be effective in removing human wastes from an urban area, epidemics are likely to follow. Disease affects not only those without connection to serviceable sewers, but eventually every citizen who is not immune. Thus, everyone has an interest in effective sewerage service.

Today, environmental externalities have also gained in prominence. It has become important to protect against overextraction of water from natural aquatic systems. When the water table in a catchment area is lowered, it affects vegetation and surface flows, and thus water supply externalities occur. Effective and stable treatment of wastewater is necessary to reduce pollution, and nutrient removal must be carried out to avoid eutrophication.

In addition, urban water service provision is largely indivisible: the technical systems required are complex and must cover long distances, the capital expenditure needed is large relative to operating costs, and so is the marginal cost of connecting an additional user. Hence, it is not economical to build separate supply systems for just a few inhabitants of a city — it is more economic for everyone to be connected to one system. In any case, once a system is in place, it is all but impossible to build a second one. In consequence, urban water systems are usually considered natural monopolies.

In order to ensure that these natural monopolies adequately consider public social and environmental priorities, it is important to have proper forms of governance in place. Regulation, both formal and informal, contributes to establishing and maintaining such governance, most significantly in protecting against abuses of monopoly power. Economic regulation in particular seeks to address the conditions of supply access and prices. Customer service, water quality, investments, profits, and return on capital are also often subject to regulation.

Therefore, irrespective of the type of private sector participation selected (see below), municipalities seeking to reform water services need to select institutional arrangements that are conducive to meeting the following broad goals:

- Achieving minimum service levels, ensuring that services are affordable for all users, and encouraging public participation in tariff modification (social objectives).

- Adequate drinking water quality and sufficient water-based ecosystem protection (environmental objectives).

4.2 Private sector participation

The most pressing of the many challenges associated with reforming urban water services may be grouped under the following headings (Hall, 2001a):

- Infrastructure (reduction in leaking, replacement/expansion of networks, technological innovation).

- Financial (sustainable and equitable tariffs, efficient revenue collection, investment).

- Environment and health (public health needs, conservation, environmental management).

- Socio-political (affordability, transparency, accountability, expansion of coverage).

- Managerial (improving efficiency and productivity, capacity building, efficient procurement).

Few would question the need to address each of these challenges, but there has been considerable debate as to how to do so. One approach to reform of urban water services is private sector participation (PSP). A number of developments have placed PSP at the forefront of discussions on ways to reform water services. These developments have their source in discussions relating to redefinition of the role of the State, the function and size of the public sector, utility management in general and the water industry specifically, and taxation and user charges. Box 4.1 summarises the "drivers" of PSP as a policy option.

Box 4.1. **Factors driving PSP**

Societal: Public agencies have been unable to satisfy basic water needs for all. The context is one of dwindling public funds, increased demand, large investment gaps, ageing infrastructure in need of rehabilitation, and calls for increased decentralisation.

Commercial: The Dublin Water Conference in 1992 established water as an "economic good". This challenged the traditional approach to water service provision, which held that water services were the domain of public agencies alone.

Financial: There is a belief that the private sector can mobilise capital faster and cheaper than the public sector. The expectation that by shifting assets from public control into private ownership and capital markets, economic efficiencies can be unleashed.

Ideological: This refers to the notion that "smaller government is better".

Pragmatic: Inability of governments to finance increasing capital, operation and maintenance costs of municipal water systems. Need to invest in infrastructure, increasing population, and constrained public finances.

Sources: (Hall, 2001b) (Thompson, 2001) (Kraemer, 1998). (Categories taken from Gleick, *et al.*, 2002).

A former Argentinean government official, attempting to explain why private sector participation in one public water utility system had been so contentious, said she had told an executive of the multinational water company serving the city of Tucumán that local residents see water as "a gift from God". The executive replied: "But he forgot to lay the pipes." (*New York Times*, 2002). This exchange illustrates the dilemma at the core of any government's need to provide water and sanitation services. With demand for services increasing, public resources shrinking, and infrastructure deteriorating, PSP may be a partial solution — yet it is one that can lead to serious problems related to social acceptability, if not properly managed.

At the heart of this exchange, and more broadly within the debate over introducing PSP into water service provision, lies the conceptual issue of whether water should be treated as a commodity, or as a social service with public good and merit good properties (Rees, 1998). The question is often framed in terms of a trade-off between water's importance as a "substance necessary for life itself" and as a "profit-making business" (*New York Times*, 2002).

On the one hand, PSP is proposed as a solution to perceived government failures that are commonly attributed to State ownership and management. In this view, "most governments do a poor job of delivering water and sewerage services" (*Economist*, 25 March 2000). Those who hold this view mostly point to State organisations that are insulated from competitive incentives and exposed to short-term political interventions

and interest group capture. The argument is that State managers pursue their own utility needs, not those of the public interest (Rees, 1998). It should be noted that those making general references to "State" or "government" often have in mind national or central governments, and not necessarily local or municipal governments.

This view also contends that environmental goals can best be accommodated in the PSP model by incorporating environmental norms into the pricing structure (economic instruments). It further holds that achieving social goals related to water management can best be achieved by redistributing the surplus generated through a more efficient system in the form of social transfers. In short, the accent of this approach is on the economic objective of efficiency as well as the use of economic instruments to promote environmental and social goals.

On the other hand, those concerned about the PSP model stress the implications of private actors' assuming responsibility for social and environmental objectives such as equal access to good drinking water, affordability, and environmental sustainability. Often pointing to the track records of selected private water companies, proponents of this view cite the following risks (Gleick *et al*., 2002), claiming that private actors could:

- Usurp a basic government responsibility.
- Bypass under-represented and underserved communities.
- Worsen economic inequalities and the affordability situation.
- Fail to protect public ownership of water and water rights.
- Neglect to include adequate public participation and contract monitoring.
- Ignore impacts on ecosystems or downstream water users.
- Neglect the potential for long-term water use efficiency and conservation improvements.
- Lessen protection of water quality.
- Weaken dispute resolution procedures.
- Irreversibly transfer assets out of local communities.

PSP is also seen by opponents as leading to recurring patterns of crises by introducing a "vicious circle of instability" into certain types of institutional arrangements. For example, it has been suggested that as public services come to be provided by private enterprises in small areas, mergers and acquisitions gradually lead to a concentration of power (Gomez-Ibanez and Meyer, 1993). Monopoly abuse ensues,

and regulatory regimes (often in the form of price caps or service provision requirements) are instituted. Regulation reduces profitability, leading in turn to undercapitalisation of the industry. The result is a reduction in service quality and scope. At some point, government has to inject large amounts of capital or provide regular subsidies to maintain service standards and levels. The end result is the re-nationalisation of the water industry, where the cycle begins anew (Kraemer, 1998).

4.2.1 Type and degree of PSP

Defining PSP in the context of urban water services requires determining where the responsibility lies for assets, operation and management, risk, and capital investments, as well as establishing the operator's legal status.

Administrative PSP is characterised by public ownership of assets, and public management, operation, investment, and legal status. Separate units, with separate accounts, may be set up within the municipal administration.

Corporative PSP describes cases where a separate public body ("corporation") is formed. The water service provider has both active and passive legislation requiring it to represent itself in any conflicts arising from interference in day-to-day operations. This legal standing enables the provider to minimise political interference more than administrative PSP does. Assets are publicly owned, but investments are received directly by the water provider, not in the form of central budget transfers. The provider has the right to finance operations independently, and often pay as much as the private sector. In both administrative and corporative PSP, operations and management duties may be contracted out to the private sector or other public agents.

Legal PSP takes three basic forms: (i) a municipal enterprise, a private-law body 100% owned by a municipality or territorial corporation; (ii) a public enterprise, with the assets owned by more than one municipality or territorial corporation (both forms of enterprise are subject to company law, and asset/share exchanges occur); (iii) a mixed enterprise. Like the first two, it is a private-law body operating under company law, but in this case 50% or more of the assets are municipally or publicly owned by one or more partners. Private actors control the rest through investment and capital participation.

Under ***PSP by delegation***, assets are public while operations, management, and capital investments may be carried out by a private contractor. Contractual options vary, ranging from leases to concessions to services. The length of contracts may also vary, from three to 30 years. At the end of the contract, assets are transferred back to the municipal or (rarely) to State authorities.

Financial PSP is often called "full privatisation", because 100% of the assets are owned by private investors. It is the rarest form of PSP, found mainly in the **UK** and the **US**, in the form of investor-owned utilities.

Table 4.1. **Classification of urban water supply: institutional arrangements**

Characteristics of PSP	Option/Mechanism	Public Responsibility	Private Responsibility
Financial	Divestiture (sale or transfer)		Asset Ownership, O&M, Capital Investment, Commercial Risk
Delegation	Concessions, BOT	Asset Ownership	O&M, Capital Investment, Commercial Risk
Legal (Muni. Entreprise, Public Entreprise, Mixed Entreprise)	Leasing, Shared Ownership	Asset Ownership, Capital Investment, Commercial Risk, Joint Corporate	O&M, Commercial Risk, Legal Status, Joint Corporate
Corporate & Administrative	Management & Service Contracts (Tech. Assistance, Supply, Civil Works)	Asset Ownership, O&M, Capital Investment, Commercial Risk, Legal Status	O&M

BOT = build, operate, transfer; O&M = operations and maintenance.
Source: Kraemer (1998), Johnstone and Wood (2001).

Drawing on work by Kraemer (1998) and Johnstone and Wood (2001), and definitions used by the World Bank, Eureau, and several regional development banks (EIB, IADB, EADB), Table 4.1 provides a classification of different forms of PSP in urban water services. This classification will serve as the basis for definitions used in the rest of this chapter.

The categorisation is based on service provision, system operation, and legal status. It only loosely corresponds to the spectrum of "more private" to "more public" arrangements, being roughly scaled from "greatest PSP" to "least PSP" (Financial PSP indicating the greatest and Administrative PSP the least). The "Public/Private Responsibility" columns detail the components/elements of the water service provider that are under the private or public domain, based on the type of option or mechanism chosen.

Table 4.2 provides an overview of the situation in OECD countries with respect to water-related PSP institutions. It demonstrates that most OECD countries employ legal and/or administrative forms of PSP. Delegation is often found with administrative PSP. Financial PSP is the exception, predominately found in **England and Wales**, and used

to a limited degree in the **US**, **Australia**, and **Norway**. In **eastern Europe**, **Mexico**, and **Turkey**, mixed-enterprise legal PSP is often the preferred form because of historical State centralisation and dependence on foreign investment and aid, and nascent regulatory frameworks. Very few countries employ a combination of delegation, administrative, and legal PSP (**Spain**, **Belgium**, and **Italy**), apparently because of regional traditions or ambiguous case law.

4.2.2 Reforming municipal water services

To reform municipal water services, public authorities must first look at three critical factors: (i) the organisation of water services (local or regional); (ii) the speed at which the reform is to take place (incremental changes or radical restructuring); and (iii) the degree of local control over water assets. The framework that governs the creation of public and private law corporations is highly significant as well. Where municipal water services can be organised as public law bodies, the choices are typically limited to administrative and corporative PSP, as the other modes would offer few additional advantages. If a municipality lacks the capacity or resources to achieve reform on its own, the option of forming an association with other municipalities may permit some economies of scale to be reached. In the rare event that a municipality is unable to form a public law body but can create a publicly owned private-law body, the main option is legal PSP in the form of municipal, public, or mixed enterprise.

Figure 4.1 illustrates the numerous options available to municipalities seeking to reform the public provision of water services by introducing some form of PSP. It is important to note that in these cases, municipalities or territorial corporations own 100% of the assets.

Where municipalities are unable to form dedicated public or publicly owned private law bodies, the choices are limited to financial PSP (i.e. full privatisation) and delegation. If neither of these is an option, one would expect municipalities to lobby for public sector reforms that would facilitate the creation of dedicated public law or publicly owned private law bodies, or to seek additional help from public sources to build capacity and improve service. Figure 4.2 summarises the options for pursuing reforms with a private partner.

Table 4.2. **PSP arrangements, options, and examples in the OECD**

	Dominant Types of PSP	Common Options & Mechanisms of PSP	Example
Australia	Cor/Del/Fin/Leg	BOT	Sydney Water Corporation
Austria	Adm/Leg	Direct management, public company, co-operatives, association	n.a.
Belgium	Del/Leg/Adm	Direct management, associations, concessions	Antwerp (AAW)
Canada	Del/Leg	Direct management	Montreal/Smith Falls
Czech Rep.	Leg/Fin	Shared ownership, concessions	Brno/Ostrava/Karlsbad
Denmark	Del/Leg	Direct management	Copenhagen Water
Finland	Leg/Adm	Direct management, shared ownership	(municipal)
France	Del/Adm/Leg	Concessions	Grénoble/Paris/Alsace
Germany	Leg/Del	Shared ownership	Berlin/Hamburg
Greece	Leg/Adm	Direct management, shared ownership	Athens
Hungary	Leg	Shared ownership	Szeged/Pecs/Budapest
Iceland	n.a.	n.a.	n.a.
Ireland	Adm	Direct management	Cork County
Italy	Leg/Adm/Del	Service contracts, concessions, direct management	Monza (AGAM)
Japan	Adm	Directs management	Yokohama
Korea	Adm	Direct management	Pusan
Luxembourg	Adm	Direct management, production associations	n.a.
Mexico	Del/Adm	Concession, service and lease contracts	DF/Chihuahua
Netherlands	Adm/Leg	Public company, waterworks	GWA Amsterdam Water
New Zealand	Adm/Leg	Public company	Auckland/Kapati Coast District Council
Norway	Adm/Leg/Fin	n.a.	n.a.
Poland	Leg/Del	Lease	Gdansk
Portugal	Del/Leg	Concession and BOT	Lisbon
Slovak Rep.	(Proposed) Adm/Leg	Proposed corporation, direct management	Water & Sewerage Works
Spain	Del/Leg/Adm	Direct management, shared ownership, concession, lease	Seville
Sweden	Del/Leg	Direct management, shared ownership, limited company	Motala River Basin
Switzerland	Leg	n.a.	n.a.
Turkey	Adm/Leg	Public company, concession	ANSU/Izmit
UK	Fin/Adm	Investor-owned assets, management service contracts	Thames Water Co./London
US	Leg/Fin/Adm	Public company, investor-owned assets, management service contracts	Anaheim/Suburban Water

BOT = build, operate, transfer; n.a. = not available.
Source: ECOLOGIC.

Figure 4.1. **Private sector participation in water services provision: Case 1**

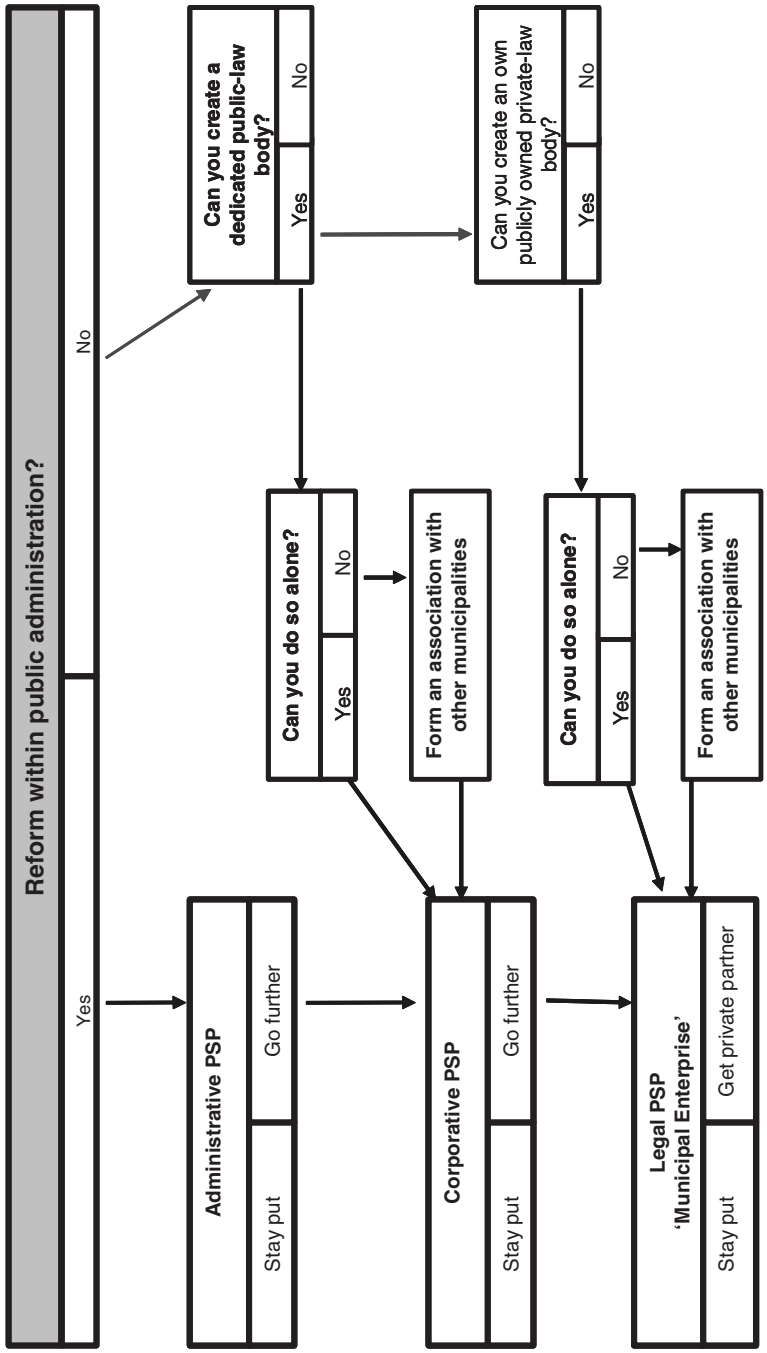
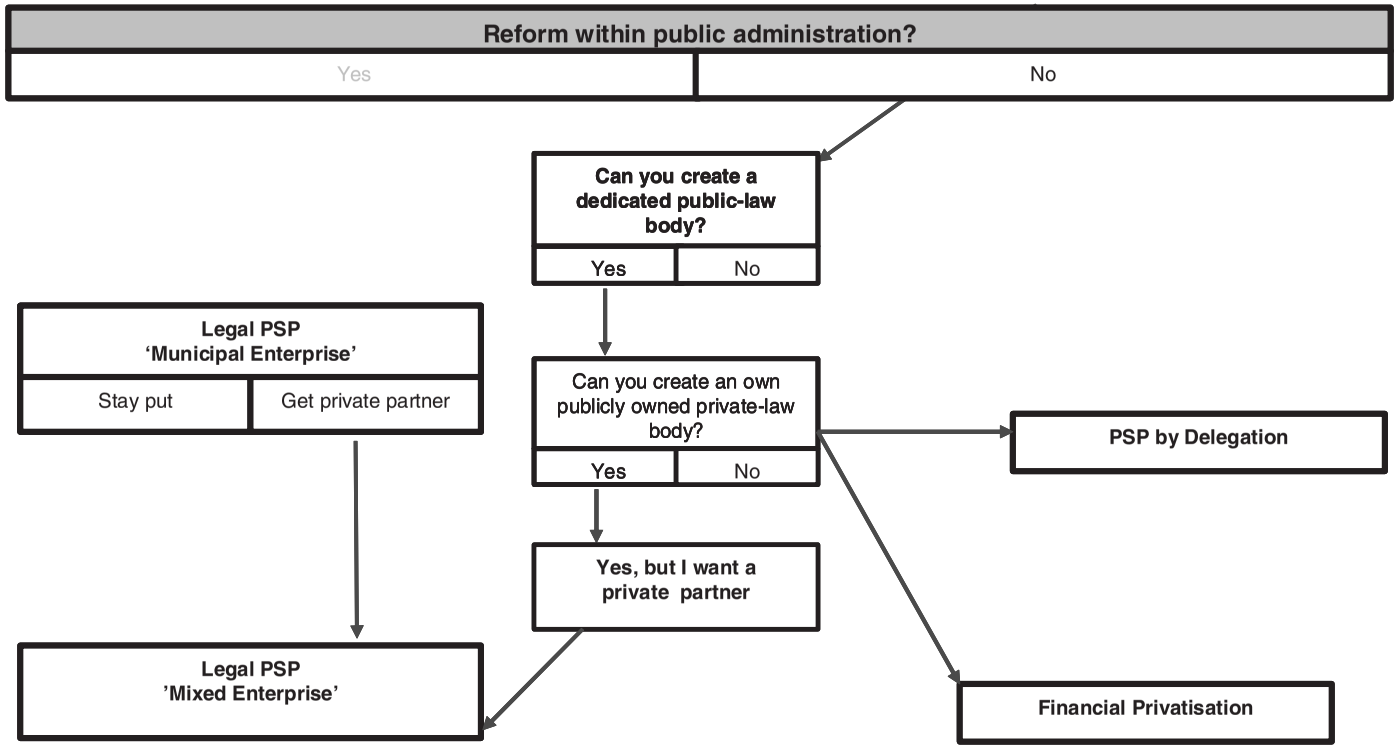


Figure 4.2. **Private sector participation in water services provision: Case 2**



There are other criteria to consider when seeking to reform public services. For example, social or political considerations may make it important to maintain public participation and local involvement in water management decision-making. Increased PSP also implies decentralising public services, and the type of decentralisation chosen may depend on the context of public policy institutions and political decision-making processes in a given country. In established federal systems with well-functioning State and local level governments (e.g. **US**, **Germany**), devolution is built into the relationship that governs public policy. Where the devolution of authorities is still embryonic (e.g. **Mexico**), or where political institutions are highly centralised (**UK**, **France**), deconcentration will be the preferred form of decentralisation. Deconcentration does not typically require changes to the legal structure governing relationships between national and sub-national authorities, since it is merely a transfer in responsibility, not a transfer of authority for public policy making. Administrative, Corporative, and Legal PSP (and occasionally delegation) are viable options here. While any type of PSP has the potential to increase customer satisfaction (assuming cost and quality criteria are met), introducing local decision-making and agenda setting usually requires a path towards devolution, not deconcentration.

4.3 Selected case studies

The following case studies consider the experiences of water service providers with different forms of PSP. Each provides an overview of the structure and organisation of a country's urban water services, followed by the social, environmental, and economic contexts in which they are provided. The cases illustrate different paths to reform and highlight specific elements of private enterprise characteristics that can be incorporated into public services. The cases of **France**, **Germany**, and the **US** are representative of stable water management systems; i.e. policies and reforms are pursued incrementally. The **Mexican** and **Welsh** examples illustrate the process involved in changing management and operations more radically, from one form of PSP to another.

4.3.1 France

The French water sector is under municipal authority, with the possibility of intermunicipal joint boards. The sector comprises around 16 000 water supply utilities, of various sizes, and a slightly greater number of wastewater utilities. The predominant management formula is delegation. All infrastructure is quasi-publicly owned. Private operators provide water to more than 75% of customers in some 60% of municipalities. Three large multinational companies (Vivendi Water, Suez-Ondeo, and SAUR-Bouygues) dominate the market in terms of both municipal contracts and customer share. Around 50 smaller private companies operate at the local and regional levels. Competition for contracts is not limited to private operators but includes local public entities in administrative PSP. The large ones compete with delegated private utilities. For example, the city of Amiens (Box 4.2) provides water services directly to seven smaller municipalities nearby (Barraqué *et al.* 2002).

Box 4.2. **Administrative PSP: The case of Amiens**

The city of Amiens (population 138 000) and 17 surrounding municipalities make up an urban area of 165 000 people. The city provides water and sewerage services on the basis of a "*régie simple*" (direct control of the municipal government) to Amiens and seven nearby municipalities, a total of 145 000 people; the other municipalities in the urban area have delegated the services to one of France's three major private operators. Water service provision is part of Amiens's overall public services and has no financial autonomy or independent legal standing. Limited delegation exists, however: a private company handles calculation and preparation of bills based on meter readings taken by city employees. Bills are sent by the city, not by the company. This illustrates the vast array of possibilities and the flexibility of French-type delegation.

Drinking water and sewerage services in France must be run under two separate accounts in the general budget. These accounts are commonly referred to as "annex budgets", and their receipts must balance out expenditures. This rule also applies to investment budgets, unless the resulting social impact would be excessive. Water service revenue in Amiens comes from water sales to customers (86.3%), water meter rentals (7.4%), and works carried out at the request of private customers (3.9%). The sewerage charges in water bills cover most sewerage costs. The city has built a separate stormwater drainage system, and the former contribution from the general budget for stormwater control has consequently been phased out. The city Treasury unusually allows the water service budget to include depreciation and provisions for rehabilitation work, so water and sewerage revenue has historically been greater than operating costs. The city has used the surplus to decrease debt in the general budget, and in turn the investment costs for new sewage treatment plant to comply with EU directives are included in the general budget. Thus, Amiens shows that it is possible for administrative PSP to allow good economic management that reduces debt, limits the need for loans to cover investment in rehabilitation, and increases municipal financial autonomy. Accounting rules introduced recently by the national government allow depreciation and provisions for investment under public budgets, which will make direct procurement and service provision by public entities more sustainable and more competitive with various forms of delegation.

Amiens built a well, entirely self-financed, to increase its diversification of water sources and improve supply stability. After lead contamination of drinking water came to public attention in 1991, the city began a lead pipe replacement programme, replacing an average of 1 050 connections a year over 1992-96. Environmental Groups in the region of Picardy, of which Amiens is the capital, have been active in the public awareness campaign against lead poisoning, while consumer groups have focused more on water price increases. Even after a rise in prices of EUR 0.15/m^3 to cover lead pipe replacements, water prices in the Amiens area are considered rather low for a city of its size: about EUR 1.80/m^3, against a national average of EUR 2.78 (Barraqué *et al.*, 2002). The relatively low prices have not led to over-consumption, however: the annual per capita volume sold is 65m^3 (178l/capita/day), including connected industry and services.

Since the enactment of decentralisation laws in 1982-83, there has been no national water tariff regulation. Under Administrative PSP, a municipality can set rates annually. Where there is PSP by Delegation (under contract with an outside operator), prices are set for the duration of the contract. In either case, public participation in establishing tariffs is indirect, conducted by elected public officials responsible for public budgets (Kraemer, 1998). At regional level, the prefect (representing the central government) is responsible for ensuring that prices follow legally-established accounting rules: if they do not, the case may be referred to an administrative tribunal for legal review. There is no legal basis for tariff setting based on social considerations. On average, fewer than 0.3% of water bills go unpaid, for affordability and other reasons. In recent years the trend has been increasingly to limit the circumstances in which water companies can disconnect users for not paying. Social welfare agencies can provide aid for up to three months to households in certain vulnerable groups having the "*droit à une aide*" — that is, meeting eligibility criteria, as determined case by case (Smets, 1999 and 2002b) (see Chapter 3, Box 3.2).

The Water Laws of 1964 and 1992 supplement a long-established legal framework for water service provision. The polluter pays principle is applied, and water charges take into account the need to improve water quality and prevent system deterioration (IISD, 2002). At national level, the ministries dealing with environment and health are responsible for defining the general rules regarding withdrawal, discharge, and public health. The national government is also responsible for imposing "solidarity taxes" whose revenue is administered by six Water Agencies (*Agences de l'Eau*) and the National Fund for Rural Water Supply (FNDAE). The Water Agencies, which cover the country's six main river basins, function as the executive bodies that manage water resources territorially. They collect the revenue from water bills and provide municipalities and industries with investment aid for wastewater treatment and water resource protection infrastructure (OIEau, 2002a and 2002b).

The Decentralisation Laws of 1982 and 1983 further defined responsibility at the national level to guarantee public health and safety and enforce related legislation. Municipalities or groups of municipalities (called syndicates) are responsible for providing water and wastewater services. To improve the transparency of delegation contracts (lease, management, and concession), tender is required under a 1993 law. Tender must occur at the first delegation and at the end of all contracts for further delegations. Contracts are awarded to the "best value" bidder, whether public or private. A 1995 Law limits water and sewerage concessions to 20 years, and a proposal to lower the limit to 12 years has been made.

France has long adhered to a principle of "equality of customers"; that is, all else being equal, everyone pays the same price. Therefore, while municipalities are not forced to set up services, once they do so, they must serve all residents (Barraqué *et al.*, 2002). No minimal universal service obligation is imposed, but it is uncommon to disconnect services to those who cannot pay.

Under the Local Democracy Law (February 2002), a Consumer Consultative Public Services Committee may be set up for any utility serving more than 3 000 people, and must be established for communities of 10 000 or more, associations including at least one community of 10 000 or more, and syndicates serving at least 50 000 residents. The committee is responsible for improving transparency by providing a forum where accounting, technical options, and prices are discussed. Prices and related customer service matters are not subject to direct regulation, but are indirectly regulated by elected municipal officials responsible for local budgets.

Information must be made available to the public under the 1978 Law on Openness, the 1983 Law on Public Inquiry, and the 1992 Water Law, along with a 1981 decree. This legislation provides for public inquiry about new water management plans, water quality, environmental impacts, and administrative information held by public authorities (Nunes Correira, 1998).

The national government and its representatives at sub-national level, the prefects, are responsible for legislating and enforcing environmental and health standards. Other authorities can also use economic instruments and benchmarking, among other tools, in ensuring that the standards are met. For example, the Water Agencies, by virtue of the investment aid they provide, are in a better position to give economic incentives for more environmentally sustainable use of water than is the ministry responsible for environment. Similarly, municipalities can set prices directly with operators as long as they respect the rules of balanced budgets (compulsory for operations budgets, subject to derogation for the investment budget).

4.3.2 Germany

Municipal enterprises handle water services in many places in Germany. They act like private companies, but are owned by the municipalities, which occasionally seek private participation in capital. Of the approximately 6 000 water companies in Germany, 96% are community owned, 3% are of mixed ownership, and 1% are private. All must achieve full cost recovery, including capital expenditure.

Some companies discourage excessive water use by applying increasing-block tariffs (which rise as volume increases). These charges are set under a framework called the KAG (Kommunalabgabengesetze). Private operators cannot levy such charges; they are limited to municipal-owned or mixed enterprises. Private companies must set their prices according to private law, though in practice they often follow KAG formulas. Charges and prices tend to be based on metering and/or a combination of basic charge and volumetric charge. Customers have an indirect role in setting tariffs via representation on city councils and local utility boards (for both private and public utilities). VAT is charged on water services.

In 1988, the State of Baden-Württemberg instituted a tax called the “water penny”, intended to take environmental externalities into account. By exercising the constitutional right of State-level control over water resources, Baden-Württemberg and

other States, such as the city-State of Hamburg, are using water resource taxes as a complement to traditional direct regulation by prohibition and prescription (Box 4.3).

Box 4.3. **Legal PSP/municipal enterprises: The case of Hamburg**

The Hamburg Wasserwerke (HWW) is one of the oldest public water service providers in Europe. With close to 2 million customers, it is the fourth largest water company in Germany (HWW, 2002). It is a municipal enterprise with a subsidiary, the Hamburg Pool Company (Bäderland Hamburg), which runs 23 public swimming pools. In addition, HWW is involved in consulting on water management and redevelopment of contaminated water sites via another subsidiary — Consulaqua. HWW carries out additional water supply activities in co-operation with the Schleswag power supply company, with which it founded Holsteiner Wasser GmbH in 1993 to acquire a water supply system in the Pinneberg area, north of Hamburg.

Since 1986, HWW's goal has been to maintain a strategic commitment to the safeguarding of sustainable water supply (EAUE, 1998). HWW has concentrated on groundwater resource protection and the introduction of an "economic use" of drinking water to promote sustainability. HWW has a high degree of extraction flexibility through an interconnection system.

To stimulate water savings and more economical use of water, HWW embarked on a programme of installing water meters in dwellings. It targeted multi-family dwellings, equipping apartments with meters in an effort to change consumption patterns. First, over 1986-89, an HWW demonstration project studied the effects of water consumption with and without meters and other water saving devices and techniques. At the end of three years, consumption data from before and after meter installation were collected for 967 households. The results indicated average savings rates of 15% with conventional meters alone and 25% with new meters (including additional water savings devices) (EAUE, 1998). It was on the strength of these results that the city and HWW decided to introduce water meters to the entire distribution area.

The introduction of metering required not only technical innovations but also significant legal changes (particularly with regard to rent laws and water supply regulations). For example, the water company previously could enter into contracts only with property owners, but amendments to the rent laws allowed tenants to become direct customers of the company. In addition, the building code and related laws were changed to make meter installation obligatory. This measure was retroactive, and owners were given ten years (1994-2004) to comply. For multiple dwellings, amendments to national regulatory standards established that water meters could be treated as modernisation and that the costs of meters could therefore be covered by rent increases. Until 1992, the city of Hamburg gave a grant of EUR 51.10 for each meter installed. Since then, HWW has provided financial support to customers for meter installation.

The city-wide meter installation was accompanied by an aggressive water savings campaign that lasted seven years. Public relations activities were conducted at fairs and exhibitions, customer information papers were distributed, teacher education incorporated conservation techniques into the curriculum, and information centres were set up.

Responsibility for payment of water bills in most cases rests with the property owner and not the tenant, so it is highly unlikely that renters would be faced with the immediate threat of having their water services disconnected. There could be exceptions to this, especially since the desire to extend metering has led to reforms of rental laws so that tenants are increasingly becoming the direct customers of the water company. Nevertheless, the consensus is that disconnection of services poses an unnecessary threat to public health; it is generally illegal in Germany to disconnect water services for non-payment. While utilities do not provide discounts, credits, or other relief to those who cannot pay for water, social services provide income support on an individual basis.

The three primary levels of jurisdiction with respect to water management are Federal, State, and municipal. Federal framework laws are implemented through State water laws to take into account local and regional conditions and policy priorities. Legislation, institutions, and organisations vary by State, though in the larger States there are typically a further three levels for enforcement and legislation concerning water: the Supreme Water Authority, Upper Water Authority, and Lower Water Authority. In addition, Water Directors are the most senior officials responsible for water management. They have established a co-ordination network that promotes exchange of information, pooling of resources, and harmonisation of administrative procedures and water laws. The guiding principle for the various institutional arrangements is that water should be managed as part of the environment. Although at first glance, the degree of decentralisation appears to be high (which is logical, given the federal context), a significant amount of sectoral integration exists, along with the process of water legislation and policy formulation.

Wastewater treatment, water supply, and the development and maintenance of local water bodies are deemed matters for self government (*Selbstverwaltung*), which means essentially that local authorities, intermunicipal co-operatives (*Zweckverbände*) and water user associations (*Wasserverbände*), along with industrial and agricultural groups and private persons, are all part of the institutional structure of water management. Water quality management is well integrated with environmental management through these local actors, since environmental management is purely sectoral.

The Federal Information Act permits public access to environmental information held by public authorities. Public access to information is strengthened by the Federal Water Law of 1990 (which provides for public inquiry into major discharges to water) and the Land Water Act.

4.3.3 United Kingdom (England and Wales)

Water management in England and Wales is characterised by strong central control, limited powers for local authorities, statutory public consultation, and extensive private provision of services. The water industry in England and Wales was completely privatised under the 1989 Water Act. This process involved about ten public water companies, and in addition 25 already private companies were brought within the regulatory framework. Mergers and acquisitions followed, so that today there are 26 water or water and sewerage companies, some of which have diversified into non-water services as well.

The privatisation legislation also established an economic regulator, supported by the Office of Water Services (Ofwat). Ofwat sets price caps every five years, establishes standards of service, investigates consumer complaints, and monitors company performance. It must also approve all charge regimes and is responsible for protecting vulnerable customers. The regulated companies file regular returns, which are compiled into an annual return on which the regulator bases its activities. The "June Return", for instance, requires information relating to key outputs, non-financial measures, regulatory accounts, and financial measures. In addition, Ofwat uses information from independent reporting, auditing, and valuation professionals to gauge comparability between companies, statutory accounts, and land prices.

The customer services that Ofwat regulates are those related to operational, drinking water quality, environmental, and service performance (Ofwat, 2002a). Frequency and duration of supply interruptions and incidences of low pressure are evaluated under operational performance standards. The customer service indicators most commonly used are: speed of response to complaints and billing inquiries, meter reading, and ease of telephone contact. Aside from the regulation that occurs at the time of licensing or renewal, each utility is obliged to compensate customers with a cash payment if it fails to meet the service standards stipulated in the contracts.

The national government sets drinking water quality and environmental standards. Wherever an environmental obligation is imposed, the Drinking Water Inspectorate and the Environmental Agency advise the Inspector General on whether prices need to be raised to meet environmental targets. These two bodies also have enforcement powers allowing them to prosecute non-compliant companies. All companies must meet environmental and health standards as outlined by EU Directives and the World Health Organization. Stricter standards can be authorised where customers so prefer.

Customer interests are represented indirectly by Customer Service Committees (CSC) at regional level, which is the water supply companies' level of operation. Ofwat establishes, finances, and maintains the CSCs and appoints their members, in consultation with local governments. CSC duties include investigating customer complaints and representing local customers. The Water Voice (formerly the Ofwat National Customer Council) brings together the ten regional CSC chairmen to facilitate input at national level; it also provides information to the media and the government regarding customers' interests.

Box 4.4. **Corporative PSP: The case of Glas Cymru/Welsh Water**

Welsh Water was a regulated water company, privately owned by investors, serving over 1.1 million household customers in much of Wales and some adjoining areas of England. In November 2002, Glas Cymru acquired Welsh Water. Glas Cymru was formed as a dedicated public law company limited by guarantee, with the sole aim of acquiring and owning Welsh Water. It is owned and controlled by 50 members and organised as a non-profit entity. Board members act as shareholders, but are accountable directly to the Welsh National Assembly. They receive no dividends and hold no financial interest in the company. Glas Cymru is subject to the same regulatory procedures and framework as all other water companies in England and Wales. Financing of assets currently stands at one-third of all revenue (Welsh Water, 2002). Additional financing must come through the issuance of bonds. Financial surpluses must be reinvested in operations. No ordinary dividends are to be issued.

Since Glas Cymru's members serve without traditional shareholder incentives, several features aim to introduce public accountability and efficiency incentives into board decisions. The board is held publicly accountable for performance not only through legislative review but also through the use of benchmarks, published annually by regulators. Benchmarking is also used to ensure that director and manager pay is equivalent to that in the rest of the water industry. Customers have an indirect interest in efficiency, since Glas Cymru must distribute financial surpluses in the form of bill reductions. Finally, the company must comply with reporting and best practices obligations required of companies listed on the London Stock Exchange.

Customers do not own Glas Cymru (it is not a "mutual"), the logic being that this protects them from any financial risks or liabilities in adverse trading conditions. While the company's by-laws prohibit diversification into other activities, outsourcing day-to-day operation of assets and customer services has increased under Glas Cymru from 60% to over 80%.

The Water Industry Act of 1999 prohibits companies from disconnecting households for non-payment of charges. Instead, water companies may arrange a payment plan with the customer directly or use normal civil debt recovery procedures (i.e. sending bailiffs to recover money or goods, seeking payment from a debtor's employer, seeking payment from a bank or building society account, or preventing the sale of the house or land until a debt is paid) (Department of the Environment, Transport and the Regions, 1998b; Welsh Water, 2002).

Members of vulnerable groups who are in arrears may ask the social service department or benefit agency to intervene on their behalf, in which case the water company usually does not proceed with local claims. In addition, the benefit agency pays the water company directly for individuals receiving income support. Low-income working families and disabled persons receive a tax credit to offset utility bills. Customers who have medical certification as disabled or suffering from prolonged illness receive special rates. Recent changes in tariff setting policy have resulted in some cross-subsidisation from higher-income to lower-income users; companies must now offer discounts for larger lower-income families, as well as retired people (who can opt for charges based on average household use rather than meter readings) (Department of the Environment, Transport and the Regions, 1998b). In a recent High Court decision

on the use of Budget Payment Units (in essence, "pre-paid" electronic cards that can be attached to meters), the court ruled that companies may not cut off water supply when credits run out.

When the companies were licensed in 1989, each was given an Instrument of Appointment, imposing conditions that the Director General of Water Services must enforce. One condition is that the company must give customers a code of practice outlining services, charges, billing arrangements, and complaint procedures. There is also a code of practice relating to the provision of counselling if a customer is unable to pay (Jouralev, 2000).

The Environmental Protection Act (1990), Environmental Information Regulations (1992), and Water Resources Act (1991), among other laws and regulations, guarantee public access to information. The legislation usually requires keeping a public register of application for consents, conditions, water samples, incidents, licences, protection zones, orders, and authorisations. Environmental information held by authorities is also to be made public (Santos and Rodriguez, 1998).

4.3.4 United States

Water supply in the US is provided by over 60 000 drinking water companies nationwide, and the sector is highly fragmented (Kzylkhodjeva, 2002). Some 60% of the companies are municipally owned and 40% privately owned. Large municipal utilities serve around 85% of the population, over 228 million customers, while private companies serve the rest. Various forms of private sector participation exist, but Financial and Administrative PSP are the commonest forms (EPA, 2002b). Corporative PSP is increasingly being promoted to encourage financial discipline, as well as greater transparency and public accountability. Unlike for telephone service and electricity, federal aid for water bills exists only where the water utility is municipally owned.

Regulated public utilities can disconnect water services for non-payment. The utility notifies customers of shut-off schedules and makes arrangements for payment. Customers must be given several warnings, and may always dispute charges at the State Public Utility Commission. On average, the period between the first notice of delinquency and the actual shutting off of water is 45 days. Individual utilities may decide to provide financial counselling, forgiveness of arrears, payment discounts, income-based payments, or flow restrictions. Until 1992, a common practice in California was to offer a discount on water services to customers in lower income categories (determined by household size and yearly income). This "Lifeline" programme provided discounted prices on the first block of water, with all subsequent blocks charged at metered rates. According to the California Water Association, however, only two utilities now offer lifeline rates: Seaside Community in Monterrey and Southern California Water in Morongo Valley (see Chapter 3).

Box 4.5. **Financial PSP: The case of Suburban Water Systems**

Suburban Water Systems is a regulated water utility in Southern California, owned by Southwest Water Company. It serves some 300 000 people in a 41-square-mile area of the San Gabriel Valley. Groundwater comes from 14 wells in the San Gabriel and Central basins. Well water is chlorinated. It is often supplemented by water from Covina Irrigating Company, California Domestic Water Company, and the Metropolitan Water District of Southern California. One of the fastest-growing businesses of Suburban's parent company, Southwest, is outsourcing water sources and sub-metering contracts. Southwest has maintained an active presence in contract operation of utilities since 1985, when it began to diversify its operations.

Southwest has been particularly successful in maintaining relatively stable water prices. Between 1996 and 2002, service charges in Suburban's Whittier-La Mirada service areas, for instance, increased from a base of USD 9.60 to USD 9.90 and quantity charges per 100 cubic feet ranged from USD 1.034 to USD 1.093 (Suburban Water Systems, 2002). Charges even fell in some areas, particularly those at higher elevations. This situation is the direct result of a company policy requiring 10% of gross revenue from active projects and 30% from passive projects to be passed back as price reductions to the consumers in the service areas concerned. Under a State ruling in 1999 that sought to lower regulated public utilities' costs of raising capital by letting them offer services not directly related to water supply, Suburban began providing facility space and properties for antenna leasing, for which higher elevations are particularly suited. The company passes back 10% of the gross revenue from this activity to water customers in these areas.

Suburban, like all investor-owned utilities in California, is subject to formal economic regulation by the California Public Utilities Commission. Water charges are based on a metered rate schedule consisting of a fixed service charge and a volumetric rate. Service charges are designed to cover 50% of the utility's fixed costs. Metering costs do not reflect 100% of fixed costs but are meant to cover variable costs and the remaining 50% of the fixed costs. Under normal circumstances (i.e. no severe water shortage), volumetric rates do not vary. During shortages, two or more increasing block rates are established to encourage conservation (they increase as water consumption does). Some customers receive a flat rate based on property size, but under the 1990s legislation all new service connections must be metered.

Utilities can apply for permission to raise rates every three or more years, and can factor in both historical costs (past six years) and projected costs (four years). The Commission can take months to consider revenues, expenses, financial outlook, and quality. Public hearings and evidentiary hearings are permitted. Customer complaints regarding billing practices and prices may be included in evidentiary hearings. (In many cases where a water company has threatened disconnection, the customer may formally challenge the move by requesting arbitration.) An administrative law judge presides over all hearings and hands down a decision for comment; the commission then issues a decision accordingly. The entire process takes about ten months. The Commission also permits water companies to file offset rate increases or decreases after the actual changes in costs are known. In each water district, there are monthly water board meetings, open to the public, where rates, water quality, and customer service issues may be presented (Suburban Water Systems, 2002).

EPA regulates water quality standards at Suburban, with the health department enforcing the EPA quality standards and setting limits for substances that may affect health or aesthetic qualities of water. According to Suburban Water Systems' annual water quality report, all reported substances were below detection levels.

One of the best known cases of tariff structures addressing social and environmental concerns is the Los Angeles tariff reform of the 1990s (OECD, 1999a). The Mayor's Committee on Water Rates proposed the abolition of a minimum charge, cash payments to low-income customers independent of water use, and the establishment of water blocks based on household need and not solely on metered use, plus seasonal rates. The new rates became effective in 1995.

Drinking water quality is subject to Federal, State, and municipal regulation. At the federal level, regulatory jurisdiction is vested with the Environmental Protection Agency (EPA). The Federal Safe Drinking Water Act sets nationwide limits for harmful contaminants and affects certain aspects of construction, operation, and maintenance of systems.

State Public Utility Commissions regulate private water utilities' rates, service, water quality, and operational performance. Government-owned water systems, whether municipal or district, are self-regulated. State health departments monitor drinking water quality standards.

Much of the focus of regulation in the US is on assuring public access to information, especially as concerns fully privatised utilities. EPA also serves an important function in publishing information on service quality performance. By requiring utilities to provide consumers with annual drinking water quality reports ("Consumer Confidence Reports"), EPA introduces a simple and inexpensive measure that complements its other regulatory mechanisms.

4.3.5 Mexico City

The area traditionally known as the Mexico City metropolitan area corresponds to the Federal District (DF) and parts of the State of Mexico surrounding the DF. The DF covers 1 504 km^2 and its official population is about 8.5 million (INEGI, 2001). The water connection level is 98% (connection to house or proximity to a common faucet); the remaining residents get their water from tank trucks or private vendors.

Almost 72% of water used is drawn via wells from the aquifer under the Basin of Mexico, in which the urban area lies. Protection of groundwater quality is of utmost concern. Serious problems are associated with hazardous waste from the large amount of industry in the area. Risks associated with water contamination from agricultural pesticides are also considerable. The Ministry of Health certifies drinking water and issues standards regarding requirements for the water supply system, transportation of drinking water, and sampling. The DF water department is responsible for water quality analysis.

Box 4.6. **PSP by delegation: The case of Mexico, DF**

In October 1992 the Federal District opened bidding for private sector participation in the management of its water distribution. The aim was to reform the sector and improve its poor performance: high network water losses, lax billing, tariff levels covering only 28% of operating expenses and investments, and low labour productivity. Within a year, four ten-year contracts had been awarded to private consortia for rehabilitating and improving the drinking water supply system. There are 16 districts grouped into four zones, with each operator running one zone. The contractors are responsible for operations and commercial aspects of distribution, but not production. The DF retains ownership of infrastructure as well as control over policies.

The contracts are in three phases, each of which can be negotiated separately. Bidders had to provide unit prices for each task specified in the three phases and to establish risk management measures where they could not charge a fee and adjust their direct costs accordingly. The government used a method of net-present value of the costs of actions to determine the number of zones and allocate them to bidders (Haggarty *et al.*, 2001).

During Phase one, companies had to take a census, update customer registers, install meters, map the distribution system, and evaluate its condition. Phase two involved setting up the billing and collection system. In the third phase, contractors may purchase and distribute bulk water from the DF and assume responsibility for commercial activities. Between Phases, the DF Water Commission can postpone or cancel projects. The first two phases were structured on a "fee for service" basis. The third will be linked to actual tariff collection (ECLAC, 1998; National Research Council, 1995). Implementation of the first two stages was delayed for various reasons, including Mexico City mayoral elections, a currency devaluation, and contract disputes. Thus, the third Phase had not yet started as of end of 2002. The current general contracts expire in 2003.

To date, results of the reform include an improved information base, with an electronic map for overall network planning and a customer census for identifying unregistered connections. As of 1998, some 1.2 million meters had been installed, and 64% of customers (up from 53%) were receiving metered bills. An additional 16% were billed for the average metered use under a contract provision stipulating that, once metering reaches 70% in a given zone, the remaining non-metered customers can be billed on basis of the average metered use in that zone. Cost recovery slightly improved, from 64% of operating costs to 71%. To some extent, cost recover has been limited by the lack of a payment culture. Operating costs have not decreased (Haggarty *et al.* 2001). Tariff setting was hampered by the low number of actual meter readings, cross-subsidies, and high inflation after the devaluation. The regulatory environment proved insufficient, especially because the number of public organisations in the water sector led to severe co-ordination problems.

As part of a national water sector reform to decentralise regulation, the DF Water Commission was established in 1992. It is responsible for the administration, operation, and maintenance of infrastructure in the DF. It is meant to be the primary agency

responsible for water services, though most of its responsibilities overlap with those related agencies. Water supply management in the DF was fragmented before the 1992 reform, and is still shared among three sets of institutions: the Direction General for Hydraulic Construction and Operation, the 16 political districts of the DF, and the Treasury.

Water charges are designed to take public needs into account regardless of the cost of the resource and delivery. The withdrawal fees that the National Water Commission charges water utilities are often lower than the full economic and resource costs, and require congressional approval. The DF government sets water tariffs for final users. An increasing block tariff schedule is applied, but since only 64% of customers are metered and difficulties associated with bill collection and enforcement remain, many users pay a flat rate based on past use. A form of cross-subsidisation exists between non-household users (including industry) and households, with industrial and commercial users subject to an increasing block rate (National Research Council, 1995). Metering has been more extensive for large businesses than for households, and such enterprises present fewer of the difficulties and high costs associated with installing, reading, maintaining, and billing of domestic meters.

The DF government uses financial measures to ensure that water is affordable, including water charge discounts and arrears forgiveness for those that have difficulty paying their water bills. For example, late payment charges and fines for non-payment over 1995-98 were forgiven after customers paid their bills (Saade-Hazin, 2002). A current programme provides a 50% discount to retirees over 60. In the 1930s, federal health legislation banned the complete disconnection of residential users for non-payment, but the Federal District Financial Code authorises reduction of service to minimum "vital levels" in the event of non-payment.

Recently established regional River Basin Councils are expected to provide a forum for consumer participation regarding water policy. The councils are designed to facilitate open debate among all water users on issues such as pricing, rights, conservation measures, and infrastructure development.

4.3.6 Summary of case study findings

The case of Amiens provides an example of *Administrative* PSP that has not only met standards of financial efficiency but even occasionally contributes to the city budget. Full cost recovery has been achieved, prices are lower than the national average (including comparisons with private operators), and long-term investments are being made to assure adequate supply. Amiens illustrates the potential for publicly owned local water operations to meet environmental and social objectives when the appropriate legal framework, mechanisms for public consultation, and enforceable standards are in place.

Hamburg, with a city-owned, private-law company, provides an example of *Legal* PSP in which the company has chosen to seek economies of scale with other

municipalities. In this case, too, full cost recovery has been achieved and water prices are stable, even as the company embarks on many innovative conservation programmes. Hamburg has also had a high level of success in meeting its social and environmental objectives, with minimum service levels for all users and local public participation in tariff setting. Drinking water standards are met, and water conservation is promoted through water saving devices and consumer education campaigns. Most remarkably, what could have been a contentious social issue — extending metering to all households by reforming rent laws — was resolved with a high degree of acceptance, thanks to consultation and participation of all levels of government and of political and social leaders (e.g. teachers). This success demonstrates the importance of co-ordinating action when managing social transitions.

Suburban Water Systems, a subsidiary of the investor-owned regulated company Southwest Water, is an example of *Financial* PSP. Of particular interest here is the regulatory framework that encourages stable prices and a high level of service quality. *Financial PSP* requires special safeguards against monopoly abuse. The rate-of-return (ROR) method of price regulation has minimised price increases while allowing adequate investment in infrastructure and good quality drinking water. Pressure from consumer protection groups and the media has led to measures such as the EPA-mandated Consumer Confidence Reports, which have been instrumental in encouraging companies to comply with EPA standards and rules. This applies to cleanup efforts as well as compensation based on legal liability for damage stemming from poor water quality. In addition, a well-functioning, independent judicial branch is necessary when addressing incidences of monopoly abuse. The rate-of-return calculations that regulators use to set tariffs focus increasingly on efficient water use and conservation goals via such options as seasonal, increasing block, and lifeline rates. Nevertheless, the continued inattention to meeting minimum service levels is of concern, especially given the link to questions of affordability. Vulnerable groups have no statutory protection and often can suffer as a result of disconnection. The situation of low-income groups is particularly aggravated by the lack of social welfare benefits to help offset utility costs.

The Federal District of Mexico initiated service contracts with private partners in the early 1990s in a unique approach to PSP. The public authorities sought to introduce competition among contractors in their initial bids for service contracts while striving to minimise the risk of contract failure and the high transaction costs associated with public bidding for all stages. A multiple contractor, multiple phase option was chosen in hopes of saving time and starting several short-term projects quickly. The reforms have led to a greater potential for meeting future conservation and affordability goals, chiefly through the expansion of metering. While minimum service levels are still far from acceptable in all districts in the city, the operation and use of customer service centres have improved, as has billing. This case shows the difficulties in implementing a type of PSP that requires supervision without a clearly demarcated regulatory framework. PSP by *Delegation* requires a clear delineation of the supervisory duties of public institutions, something that was lacking in the Federal District. The DF does attempt to assist vulnerable groups through the use of discounts and normalisation of arrears. Caution is needed nonetheless in drawing conclusions regarding the use of PSP by

Delegation to build capacities in the DF; the reform is still very much a "work in progress".

The Glas Cymru (Welsh Water) case demonstrates a novel approach to *Corporative* PSP, the formation of a member-owned public body. What was previously a classic example of a *Financial PSP* utility has been turned into a not-for-profit limited guarantee company that has no officially designated shareholders, but is instead controlled by a group whose members are appointed by the regional Welsh Assembly. Particularly noteworthy is the use of benchmarking for director and executive pay, and the separation of ownership from operation (an example of the need to insulate consumers/community from risk associated with private investment). This form of private sector participation has shown that it can meet economic efficiency targets. When coupled with a responsive customer service approach, lower prices, and social welfare assistance for vulnerable groups, this approach can enjoy considerable social acceptability. The transfer of assets back to the local community received widespread support, largely due to the national sentiment for increased regional decision-making as part of the devolution of authority to Wales.

In summary, the experiences described above indicate that especially where *financial* PSP and PSP by *Delegation* are used, it is important to have established regulatory frameworks that protect consumers from monopoly abuse in the form of low service quality and high prices. Since there is little or no involvement of users in the modification of tariffs, it is essential to have representative political institutions that can intervene on behalf of consumers. While traditional legal systems should in theory provide recourse for customers, given the high costs of reaching agreement, this may be of little practical use in protecting consumers' right to access, especially where disconnection of water services is allowed.

4.4 Regulating municipal water service provision

Where administrative, corporative, or municipal enterprises are the norm, regulation does not always exist in the formal sense. Local control is inherently present when the municipality (or an association of municipalities) owns the assets related to water service provision. A national tariff policy is not necessary to ensure that prices are economically viable. In fact, all the cases discussed above meet full cost recovery criteria, and provide flexibility in decision making and planning. The most common form of assuring accountability comes through indirect political control, namely through the direct election of public officials to municipal and regional authorities responsibility for water management. All these forms of utility management must consider the affordability of services, especially with regard to vulnerable groups, and in the cases discussed above, this condition is generally met through the social welfare system.

Maintaining a degree of collective political control for a potentially monopolistic industry, such as water services, requires regulation to ensure that the following attributes are in place, especially if pursing mixed enterprise or financial PSP in which partial or full ownership of assets lies with private actors:

- *General legal framework:* constitutional rules establishing the jurisdiction and authority of national, regional, and municipal governments.

- *Water resource and environmental laws*: water rights allocation, protection mechanisms, resource conservation, and pollution control agencies must set clear and enforceable standards.

- *Specific legislation*: defining the role of PSP, as well as mechanisms for public scrutiny and consultation.

- *Ability to issue individual contracts or licenses:* including a clear demarcation of company law as applied to different private operators in public services.

The most common areas for regulation in municipal water services include prices, service levels and operating costs, investments, consumer protection, water quality, environmental protection, and safety. Economic regulation has traditionally been the preferred means of balancing the interests of producers and consumers. Introducing different aspects of competition to the water supply industry is also often considered important. There is great diversity in OECD countries regarding the intensity and scope for competition in water service provision.

The "Anglo-Saxon" model is based on centralised public policy making and supervision. It implies limited municipal public policy input, and requires independent regulatory supervision. In the case of **England and Wales** (and to a certain extent in the **US**), there is no direct competition among investor-owned utilities, including no competition for customers or for supply areas. Regulators must therefore evaluate the relative performance of several utilities on a comparative basis. This form of regulation is best suited to cases where there are multiple utilities, so there can be a meaningful statistical evaluation. The regulators also require that natural monopolies be set up as separate profit centres and publish separate accounts. The objective is to limit the likelihood that private operating companies will reduce competition by providing other water goods and services in unregulated areas. In this context, *Financial PSP* requires an active social welfare system to address affordability issues for vulnerable groups, since citizens have no direct role in influencing tariff decisions, and licences are awarded on a long-term basis.

The "French" model builds in competition for monopolies through the use of contracts, in a context of market concentration. Municipal input is permitted, but citizen or consumer influence is limited. While PSP through *Delegation* gives municipalities considerable flexibility, the only basis for public participation in tariff setting comes

through indirect representation at the municipal and regional levels. In **France**, unlike in the UK, competition exists between operators, potential or otherwise. Whereas in the UK, separate accounts are kept to maintain a distinction between operation in the regulated versus unregulated areas, the French case maintains regulation throughout the bidding process (although not so stringently after the granting of the concession). This is similar to the case of the Federal District of **Mexico**, where competition took place at the time of the bidding for the contracts. The Mexican case, however, also introduced competition though benchmarking by designing a three-phase contract and allowing operators to renegotiate contracts at each stage, so that economic regulation can be introduced more often.

The "German" model is based on the principles of industry competition and democratic control through decentralised, autonomous municipalities, along with localised decision making. In **Germany**, there is direct competition among some municipal operators, even though all operators have local monopolies and these are only rarely threatened (e.g. in the form of competition for water-related goods and services). For example, the Hamburg Wasserwerke not only supplies water to the city-State of Hamburg, but also (through the use of subsidiary companies) engages in the running of public pools, redevelopment of contaminated sites, and consulting services in water management. The market is characterised by numerous small– to medium–sized firms seeking to provide services to the increasing number of integrated Querverbund (infrastructure systems). As a result of the dominance of local actors, comparisons of performance are not carried out by external regulators, but take the form of self-enforcing regulation by the operator, or by an external consultant.

4.5 Evaluating the contribution to water governance

When evaluating the effectiveness of meeting social and environmental objectives in urban water management, it is important to see how municipalities and private actors alike contribute to "good governance". Good water governance entails:

- Pursing an efficient allocation of resources.
- Establishing and enforcing the highest water quality standards.
- Pursuing integrated water resource management.
- Increasing stakeholder participation.
- Avoiding irreversible policy decisions.
- Taking into consideration both the willingness and ability of users to pay for water.

The appropriate way to assure an efficient allocation of water is to apply the principle of marginal social cost pricing. Water supply and sewerage fixed costs are high, ranging around 70-90%. Pricing structures should reflect this by having fixed charges that cover at least the fixed costs associated with providing water. For example, where consumption has reached a sustainable level, high fixed charges would be reasonable. Efforts to prevent future increases in consumption could be addressed with increasing block tariffs (Brackemann *et al.* 2002).

Operational efficiency is a necessary but not sufficient condition for efficiency in environmental protection. Efficient operations are more likely to be cost-effective in attaining environmental policy objectives and obtain better results with any given amount of financial resources. When applied to PSP and regulation of urban water supply, which types of management, public and/or private, establish incentive structures that foster efficiency and sustainable development? The tendency to believe that private enterprises will fail to meet sustainability criteria is not without grounds. Given the capital-intensive nature of the water service and contracts that are often based on "cost-plus" arrangements, there may be strong disincentives to reduce water consumption and/or material intensity in the design and construction of technical systems. Rather than invest in low-cost preventative measures to protect water sources, the preferred course of action may be invest in capital-intensive treatment to safeguard drinking water quality.

Another conceptually similar issue relates to water productivity. When compared to other forms of economic activity, water service provision has a high proportion of fixed costs. Given large differences between average and marginal costs, there is a strong incentive to *encourage* water consumption and discourage conservation. The logic is that any reduction in water consumption or sales would have to be followed by commensurate increases in water prices, otherwise fixed costs (such as depreciation and debt service) could not be met. This creates a dilemma, especially with regard to redistributive effects and social and political objectives. In effect, any attempt to promote conservation through higher water prices may meet resistance.

There are two ways out of this dilemma. The first is to increase the *ability to pay* by raising household incomes through subsidies, tariff structures, social transfers and the like. The second is to ensure that public perception of water services and operations remains supportive (in other words, to increase the *willingness to pay)*. If the public believes the revenue from higher prices and charges will be private gains from monopoly rents, raising water prices will be highly unpopular regardless of the degree of support for environmental protection. Similarly, opposition to higher prices is often linked to the frequency of rate increases and not necessarily to their levels.

Important factors that can influence the willingness to pay are linked to the concepts of local control and equity. Local control, in the form of public ownership of assets or democratic accountability, plays a role in increasing the public's sense of responsibility when it comes to protecting local water resources. Such closeness to the issue is important in maintaining transparent and accountable practices. This is the opposite of the "foreign investment syndrome" witnessed in some attempts to introduce

forms of mixed enterprise or Financial PSP that have turned out to be highly contentious politically (and rejected socially). While progressive tariffs, social welfare supports, and cross-subsidies all address affordability, they may have a dampening effect on the levels of willingness to pay by and could be perceived as promoting "free-riding", if not well-targeted.

"Efficiency", as defined in a strict microeconomic sense, is hardly a sufficient criterion for evaluating performance in the provision of urban water supply. For one thing, it fails to take into consideration the significant externalities related to public health and hygiene; for another, it leaves aside questions of equity and redistribution. One important factor has to do with the presence of mechanisms for democratic control (either direct or through representation). This is closely linked to the concept of devolution, where the goal is to maintain localised administration and management, responsive to local demands, with sufficient capacities to maintain and deliver public services. In **Germany** and **Wales**, for example, local elected officials consult with utility managers and regulators to set tariff rates; non-executive members of the board of the utility are also directly accountable to local or regional legislatures. In cases where the utility is public, as in **France**, elected officials are responsible for water management decisions and held accountable by regular elections. The use of appointed officials, either for regulatory agencies or to serve on water utility boards, is also common in **England** and the **US**, and to a certain extent **France** at the regional level, and is a form of indirect democratic control.

Another factor has to do with the independence and flexibility of the management, particularly regarding strategic planning, investment, and development plans. This directly addresses the ability of water service providers to build capacities to a point where they may operate autonomously from higher levels of government (i.e. through the ability to raise finance or to participate in tariff modification). Flexibility to adapt to local changes in demand for services, be they related to quality levels or price, is most frequently found in cases where providers are not locked into long-term contracts or subject to lengthy regulatory processes. For example, Suburban Water Systems in the **US** can adjust prices under ROR regulations that are based not only on the past six years' costs, but also on projected costs. They can also request special rate cases through public hearings in the event of unexpected increases in costs on a yearly basis. Self-enforcing practices within the context of a decentralised system, as is the case in **Germany**, have been particularly useful in promoting flexibility and maintaining autonomous decision making.

Both factors also permit consideration of the stability of the institutional arrangements, particularly since short-term objectives (political intervention) may not always be in line with long-term objectives (returns on capital investments that take several years to manifest). The case studies of water suppliers that rejected radical shifts in the model of water service provision (Amiens, Hamburg Wasserwerke, Suburban Water Systems) all illustrate good track records for full cost internalisation, drinking water quality, and stable prices. In contrast, the degree of uncertainty associated with contract renewal in Mexico City (given institutional changes accompanied by public

sector and electoral reforms) could make it difficult to simultaneously achieve economic, environmental, and social objectives.

Water resource protection is a government responsibility. Groundwater abstraction should not exceed the rate of renewal, and withdrawals from surface water should leave enough water for ecological functions and other sustainable uses of resources. However, given variations in local circumstances, the role of water service providers becomes critical to assuring access to and availability of safe drinking water. Whether water service providers are successful in promoting protection of water resources locally is contingent on three factors:

- The provider must have an *interest in acting* (a service provider dependent on local water sources, when threatened by loss of operational independence in the event these sources become contaminated, is more likely to have a direct interest in mitigating the effects of the pollution).

- The provider must have *the capacity to act* (local water suppliers must have legal recourse and standing to directly challenge the behaviour of polluters).

- The provider should have the *autonomy to act* (local water suppliers must be free from outside interests, political or otherwise, that shift incentive structures towards more capital-intensive drinking water treatment. From a resource protection standpoint, the supplier of this essentially public good is best organised along local production unit lines).

Another indicator of efficient performance relates to the presence or absence of joint operations in technical services at the local level. Horizontal integration will have an impact on the optimal size and scale of operational units for urban water services, since economies of scale at the operational level can be replaced by economies of scope and scale at the company level. PSP that maintains 100% of asset ownership in public hands has the potential to benefit from joint operations that introduce flexibility in management yet secure stable regional solutions to water management.

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Social Issues in the Provision and Pricing of Water Services

Chapter 5

Managing the transition to improved water services

Access to public water supplies is no longer a serious problem in most OECD countries, (especially in urban areas), with at least 75% of the population (and often as high as 90%) already being served. Thus, the social and public health requirements for universal access have largely been fulfilled. However, in a few OECD countries or parts of countries, the extent of coverage of water services is still suboptimal, due to incomplete infrastructure development and/or uneven availability of water resource endowments. Filling these "service gaps", including the installation of water services infrastructure for the first time, will occur over a transitional period. This chapter examines the potential role of "differentiated" approaches (e.g. private wells, water trucks, septic tanks, community-managed systems) to help manage these transitions.

CHAPTER 5. MANAGING THE TRANSITION TO IMPROVED WATER SERVICES

5.1 Introduction

In a few OECD member countries or parts of countries, the extent of coverage of water services is less than optimal, usually due to some combination of incomplete infrastructure development and uneven availability of the resource. The filling of "gaps" in coverage, which may involve installation of water infrastructure and services for the first time, usually occurs over a transition period that may be rather long. While most of the OECD population is connected to public water supply (especially in urban areas), some gaps remain in both rural and urban areas, and wastewater services pose a still greater challenge. This chapter, together with the case study of Mexico in Chapter 6, considers how the transition to improved and expanded water supply and sanitation services may be best managed. The focus is on effective, realistic, and creative solutions that permit a balance of social, environmental, and economic priorities.

Transition areas may include lower-income OECD countries where poor communities have limited access to individual household connections to piped water services provided by mainstream or conventional water utilities (the "formal sector"). While efforts are made to expand coverage of such utilities, costs and affordability of new connections can be important issues, especially in low-income neighbourhoods. Households without private connections may have free access to common standpipes, community fountains and wells, or trucked-in water (i.e. non-market access); but those lacking such access must usually resort to "informal sector" provision, often at higher costs than formal provision, leading to situations where the poor may pay disproportionately more than those served by formal sector services.

This chapter: (i) identifies gaps in OECD countries with regard to water supply, sewerage, and wastewater treatment services; (ii) considers why they exist; (iii) examines approaches by which these gaps might be filled, including the use of "differentiated" (alternative, non-standardised) types and levels of services; and (iv) discusses how government might foster a differentiated approach.

5.2 Some definitions

Transition issues are especially important for poorer areas where few if any water services exist (e.g. informal settlements in "peri-urban" areas, and the poorest rural areas). In global surveys aimed at identifying existing levels of service,[9] the terms "access to an improved water source" and "access to sanitation" represent key steps in improving services above the most basic level. For example, in urban areas, an improved water source may be "a public fountain located no more than 200 meters away"; in rural areas, such access means that household members do not have to "spend a disproportionate part of the day fetching water". Access to sanitation is often defined as "suitable facilities ranging from simple (but protected) pit latrines to flush toilet with sewerage" (Box 5.1). Types of access that meet these definitions may be considered intermediate options for the poorest parts of OECD regions, where no such access exists. The ultimate "access goal" for OECD countries generally is higher.

Box 5.1. **Definitions of 'access' used by WHO/UNICEF and World Bank**

Access to an improved water source

- Reasonable access to an adequate amount of safe water (including treated surface water and untreated but uncontaminated water, such as from springs, sanitary wells, and protected boreholes).
- In urban areas, the source may be a public fountain or standpipe located not more than 200 metres away.
- In rural areas, the definition implies that members of the household do not have to spend a disproportionate part of the day fetching water.
- An adequate amount of water is that needed to satisfy metabolic, hygienic, and domestic requirements — usually about 20 litres of safe water a person a day (although this varies substantially according to climatic zone).
- The definition of "safe water" has changed over time.

Access to sanitation

- At least adequate disposal facilities that can effectively prevent human, animal, and insect contact with excreta.
- Suitable facilities range from simple, but protected, pit latrines to flush toilets with sewerage.
- To be effective, all facilities must be correctly constructed and properly maintained.

Source: WHO/UNICEF (2000).

9. WHO/UNICEF (2000) and World Bank (2000d). Both use the same definitions.

Box 5.1 refers to adequate water for hygiene, as well as drinking and other domestic needs. Global studies have highlighted the importance of not just improving water supply and sanitation in poor areas, but also raising consciousness of public hygiene standards and practices (e.g. hand washing – a simple but effective precaution).

Box 5.2 shows the types of technology constituting "improved" facilities for the purposes of global water supply and sanitation surveys.[10] Part of the basis for the categorisation in Box 5.2 is an assumption that certain technologies are better than others in public health terms. It should be noted, however, this may not always hold; for instance, in some locations an unprotected well could provide a better supply of water, both in terms of quantity and quality, than a household connection characterised by intermittent service and poor water quality (WHO/UNICEF, 2000).

Box 5.2. **Water supply and sanitation technologies as per WHO/UNICEF and World Bank**

IMPROVED	NOT IMPROVED
Water Supply	***Water Supply***
• Household connection*	• Unprotected well
• Public standpipe	• Unprotected spring
• Borehole	• Vendor-provided water
• Protected dug well	• Bottled water**
• Protected spring	• Tanker truck provision of water
• Rainwater collection	** Due to potential limitations on quantity, not quality.
Sanitation	***Sanitation***
• Connection to a public sewer*	• Service or bucket latrines (manual removal of excreta)
• Connection to a septic system	• Public latrines
* Definitions of access and coverage used for OECD countries.	• Open latrine

Source: WHO/UNICEF (2000).

The standard of access to which OECD countries generally aspire is piped connection of individual households to a mains network (also known as a public system) of water supply (connection to each house), sanitation (evacuation from house to sewers), and wastewater treatment (at least primary treatment of sewage and final disposal).

10. Due to lack of information on water safety and sanitation adequacy (based on population-based surveys, for example), WHO has replaced the terms "safe" and "adequate" with "improved".

The OECD goal is to make this standard of access (hereafter called the "general standard") generally available to urban populations throughout all its regions. This implies each OECD country defining and setting standards for water quality and continuous reliable supply, and providing access to wastewater treatment where it is lacking. According to the *OECD Environment Strategy to 2010*, one indicator for monitoring progress is "increase in share of population connected to secondary and tertiary wastewater treatment". Achieving general coverage at this level presents a particularly demanding challenge. National or sub-national administrations may decide to adopt their own intermediate objectives between the basic WHO/UNICEF level and the ultimate OECD goal.

The general standard is unlikely to be applied universally in any given OECD country or part thereof. As discussed below, in some contexts it is more appropriate to rely on "independent" treatment (e.g. use of septic tanks in rural areas and scattered settlements, and, in some cases, non-water-based sanitation technologies).

This chapter uses "coverage" and "general coverage" (i.e. upon completion of transition) to mean service meeting the general standard (including independent facilities where these are the appropriate option) and "service gaps" to mean locations/cases where coverage, as thus defined, is lacking.

While OECD countries aspire to general coverage, this chapter explores the case for a "differentiated" approach that would allow areas undergoing the transition to general coverage to adopt more affordable access for a time.

5.3 Current status of access to water supply and sanitation in OECD countries

The first step in identifying where service gaps exist in OECD countries is to determine the levels of "household connection", "connection to a public sewer" and, where appropriate, of "connection to a septic system" (Box 5.2).

Table 5.1 illustrates the latest available information from *OECD Environmental Data: Compendium 2002* and other OECD sources on recorded access to water services in OECD countries. It indicates the percentage of national population connected to public water supply, public sewerage, and municipal wastewater treatment. While the figures largely reflect the goal of general coverage, they should be interpreted with care, as individual countries' definitions may vary.

Public water supply is defined in this chapter as individual household connection to piped water supply, and public sewerage as networks for the evacuation of domestic and other wastewater (these correspond to the underlined technology types in Box 5.2). "Independent" or "non-public sewerage" refers to individual, privately owned facilities to evacuate domestic sewage where public sewerage is not available, and "independent wastewater treatment" means private facilities (e.g. septic tanks) that treat sewage.

"Wastewater treatment" as such is any or all of the following types of processes to make wastewater meet environmental standards or other quality norms for disposal, recycling, or reuse (Vall, 2001):

- **Primary treatment** (also called mechanical treatment): processes of a physical and mechanical nature, resulting in decanted effluents and separate sludge containing pollutants and micro-organisms Examples include sedimentation and flotation. Ideally used in combination and/or conjunction with secondary, or secondary and tertiary treatment.

- **Secondary treatment** (or biological treatment): processes using micro-organisms to break down organic matters and resulting in decanted effluents and separated sludge containing micro-organisms with pollutants. Examples include percolating filters and aeration tanks. Used in combination and/or conjunction with primary and, ideally, tertiary treatment.

- **Tertiary treatment** (or advanced treatment): processes capable of rendering harmless specific constituents of wastewater or sludge not broken down by secondary treatment. The term covers all operations not considered mechanical or biological. Examples include chemical processes, activated carbon absorption, and reverse osmosis. Generally used in combination and/or conjunction with primary and secondary treatment.

As expected, some of the seven middle-income OECD countries (Czech Republic, Hungary, Korea, Mexico, Poland, Slovak Republic and Turkey) have the lowest rates of water service coverage. Table 5.1 indicates that, for water supply, the lowest rates of piped household connection are in **Turkey** (55%) and **Mexico** (65%). These are the only countries with rates lower than 70%, and they have significant differences in water supply coverage between urban and rural areas. Middle-income countries also have some of the lower rates of connection to public sewerage, with **Hungary**, **Slovak Republic**, **Poland** and **Turkey** at 51%, 54%, 58%, and 59%, respectively, while **Japan**, **Greece,** and **Ireland** record relatively low rates as well: 62%, 68%, and 68%, respectively.

Levels of wastewater treatment remain low in many countries. Wastewater treatment is important from an environmental and public health viewpoint. Much of the water used in households, industry, and agriculture is returned to the environment (to rivers, lakes, or directly to the sea) as wastewater of lower quality than what was abstracted. Public sewers evacuate domestic effluent, industrial wastewater, and other water from users' immediate vicinity, but sewage treatment is still needed to assure the health of water resources and wider ecosystems. This is why the share of population connected to secondary or tertiary wastewater treatment is a key measure of progress, under the OECD Environment Strategy, towards the goal regarding the general standard for water service access.

Table 5.1. **Share of population connected to public water services in OECD countries**

Country	Connected to public water supply		Connected to public sewerage							Not connected to public sewerage	
	Year	%	Year	% **with** Treatment				**%** **without** treatment	**% TOTAL** connected to public sewerage	**% TOTAL** not connected	of which independent/ non-public sewerage, %
				Only primary treatment	Secondary treatment	Tertiary treatment	**TOTAL** with Treatment				
Australia		n.a.		n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Austria	2000	87	2001	>0.0	8.6	77.4	86.0	<0.1	86.0	14.0	14.0
Belgium	1997	98	1998	n.a.	22.5	16.2	38.6	43.6	82.3	17.7	17.7
Canada*	1996	92	1999	16.9	33.7	35.8	86.4	2.9	89.4	10.6	n.a.
Czech	2001	87.3	2000	n.a.	66.4	n.a.	66.4	8.4	74.8	25.2	n.a.
Denmark	1996	90	1998	1.6	3.4	84.0	89.0	0.02	89.0	10.9	10.9
Finland*	1997	87	2001	n.a.	n.a.	81.0	81.0	0.0	81.0	19.0	19.0
France*	1998	99	1998	n.a.	n.a.	n.a.	76.9	2.2	79.1	20.9	10.0
Germany	1998	99	1998	1.1	6.3	83.1	91.0	2.2	93.2	6.8	4.7
Greece*	1996	86	1997	32.4	14.2	9.6	56.2	11.3	67.5	32.5	n.a.
Hungary*	2000	98	2000	2.7	21.0	10.2	33.9	17.4	51.3	48.7	48.7
Iceland	2001	95	2001	n.a.	n.a.	n.a.	33.0	57.0	90.0	10.0	6.0
Ireland	1994	80	1997	35.0	26.0	n.a.	61.0	7.0	68.0	32.0	n.a.
Italy*	1987	98	1995	2.9	36.1	24.1	63.0	(12.0*)	75.0	n.a.	n.a.
Japan	1999	96	1999	N.A.	50.0	8.0	62.0	n.a.	62.0	38.0	7.0
Korea*	1996	84	2000	0.9	67.5	n.a.	70.5	n.a.	n.a.	n.a.	n.a.
Luxembo	1997	99	1999	7.0	75.0	13.0	95.0	n.a.	95.0	5.0	5.0
Mexico*	2001	65	1999	2.6	19.2	n.a.	23.8	49.2	73.0	27.0	n.a.
Netherlan	2001	100	2000	0.0	19.6	78.1	98.1	n.a.	98.1	1.9	n.a.
NZealand		n.a.	1999	n.a.	n.a.	n.a.	80.0	2.5	82.5	17.5	n.a.
Norway	2001	89	1999	21.0	1.0	51.0	73.0	7.0	80.0	20.0	20.0
Poland	2000	89	1999	4.3	31.6	15.6	51.5	6.5	58.0	42.0	n.a.
Portugal	1996	83	1999	n.a.	n.a.	n.a.	55.0	20.0	75.0	25.0	n.a.
Slovak		n.a.	1998	n.a.	n.a.	n.a	48.8	5.1	53.9	46.1	n.a.

Table 5.1 continued over page.

Table 5.1. **Share of population connected to public water services in OECD countries** *(cont.)*

Country	Connected to public water supply		Connected to public sewerage							Not connected to public sewerage	
	Year	%	Year	% **with** Treatment				**%** **without** treatment	**% TOTAL** connected to public sewerage	**% TOTAL** not connected	of which independent/ non-public sewerage, %
				Only primary treatment	Secondary treatment	Tertiary treatment	**TOTAL** with Treatment				
Spain	1996	>90	1995	10.6	34.4	3.3	48.3	n.a.	n.a.	n.a.	n.a.
Sweden*	1997	86	2000	n.a.	6.0	87.0	86.0	n.a.	86.0	14.0	13.0
Switzerla	1995	100	2000	n.a.	22.0	73.8	96.0	n.a.	96.0	4.0	n.a.
Turkey*	1998	55	1998	7.6	4.0	n.a.	22.6	36.6	59.2	0.0	n.a.
UK*	1996	99	2000	8.6	58.8	24.3	94.6	2.0	96.6	3.4	n.a.
USA*		n.a.	1996	6.4	30.9	34.1	71.4	n.a.	n.a.	n.a.	n.a.

n.a. = not available.

Notes:

Canada: Estimates from survey of municipalities with population over 1 000 (covering 83% of national population).
Finland: Non-public/independent sewerage data from 1995.
France: Data reported in % of dwellings, which is considered a good estimate of the population connected. Non-public/independent sewerage data from 1995.
Greece: Data include connections under construction.
Hungary: A programme for new connections is under implementation.
Italy: Connection to public sewerage, data based on 1993 survey. 12% under "without treatment" is the share of population not connected to non-public wastewater treatment.
Korea: Data for primary and secondary treatment are from 1999. Totals updated for 2000.
Mexico: Primary and secondary treatment data from 1999. Rest from 1993.
Netherlands: Primary, secondary, and tertiary treatment data are estimates from 1999. Totals updated for 2000.
Sweden: Secondary (chemical or biological) and tertiary (chemical and biological plus complementary treatment) are 1998 data. Totals updated for 2000.
Switzerland: Secondary and tertiary treatment data from 1999. Totals updated for 2000.
Turkey: Connection to public water supply "piped into house/garden" (urban 65.9%, rural 32.5%, total 55.3%). Sewerage and treatment data from an inventory covering municipalities with an urban population over 3 000; assumes that facilities serve the whole population of the municipalities. Primary and secondary treatment data from 1996.
UK: England and Wales, for financial year starting in April. Primary (removal of gross solids), secondary (removal of organic material or bacteria under aerobic conditions), and tertiary treatment (removal of suspended solids following secondary treatment), data from 1999. Totals updated for 2000.
USA: Excludes rural areas served by on-site disposal systems.

Source: OECD (2002 and 2003, forthcoming); OECD (1999a).

As Table 5.1 shows in the column titled "total with treatment" (referring to any of the three types), wastewater treatment coverage is 90% or more in the **Germany, Luxembourg, Netherlands**, **Switzerland**, and the **UK**, and 80% or more in **Austria, Canada**, **Denmark**, **Finland**, **New Zealand**, and **Sweden**. It is lowest in **Turkey** (23%), **Mexico** (24%), **Iceland** (33%), **Hungary** (34%), and relatively low in **Belgium** (39%).

Europe has seen substantial improvement with regard to the proportion of the population connected to wastewater treatment as well as the degree of treatment, with considerable expansion in the population connected to either secondary or tertiary treatment since the 1980's (Vall, 2001). Since 1995, the EU Urban Waste Water Treatment Directive[11] has required member States to ensure that treatment of wastewater for urban areas of more than 2 000 inhabitants is at least secondary, with tertiary added in areas identified as "sensitive". Countries that formerly had among the lowest connection rates (**Greece**, **Spain**, **Ireland**, and **Portugal**) have consequently seen significant improvements.

There is still a substantial way to go, however, especially in relation to the OECD goal of achieving general coverage of secondary and tertiary treatment systems. Table 5.1 shows that:

- Less than 10% of the population is connected to tertiary treatment in **Greece**, **Japan**, and **Spain**.
- **Belgium**, **Hungary**, **Italy**, **Luxembourg**, **Poland** and the **UK** have relatively low levels of tertiary treatment (only 10-25% of the population).
- The only OECD countries reporting more than 60% connected to tertiary treatment are **Austria**, **Denmark**, **Finland**, **Germany**, the **Netherlands**, **Sweden**, and **Switzerland**.
- No data is available for 11 of the 30 OECD countries.

Independent treatment, not connected to public sewerage,[12] plays a role in **Norway**, **Austria**, **Hungary**, **Denmark**, **France**, and, to a lesser extent, **Iceland**, **Luxembourg**, and **Japan**. Such treatment can be efficient in rural areas or scattered settlements where an explicit choice has been made not to connect the public system — cases where differentiated service is justified. It should be noted, however, that information on the efficiency of various types of independent treatment is insufficient to allow us to assess the technical effectiveness of choosing the independent treatment option.

11. 91/271/EEC.

12. Classified as either "non-public" or "independent" and defined here as individual private facilities installed to evacuate domestic and other wastewater in cases where a public sewerage network is not available.

5.4 Factors leading to gaps in water services

As Table 5.1 clearly indicates, connection rates for water services are not 100% in any OECD country. Service gaps arise, in principle, where availability of water service infrastructure is insufficient. In some instances, water resources do not match demand, a particular challenge in arid and semi-arid areas. Another key cause of imbalance between human settlements and water services is population growth rates outpacing the development of infrastructure (as in **Mexico** and **Turkey**, where population growth rates have recently been among the highest in the OECD).

Migration of people within a country, especially from rural to urban areas, adds pressure on existing water service infrastructure in cities, again producing or worsening service gaps. Migrations also occur in times of instability brought about, for example, by natural disasters, conflicts, or economic crises. Each tends to cause imbalance, locally and regionally, between levels of water service provision and demand. Until the infrastructure is expanded, a country, area, or community is in a transition period, which can last a substantial time and will generally involve different phases or levels of service.

A historical *lack of sustained investment* in maintenance can also lead to service gaps, as it can result in deterioration of infrastructure. Capital investment costs for rehabilitating aged infrastructure, expanding system coverage, and/or significantly raising service standards in a relatively short time (e.g. in relation to EU accession) can be considerable. Investment in water services during periods of transition has generally been a public sector responsibility. Deciding how public funds are applied is ultimately a function of political processes, and investment in water services may not always be given high priority. Resources for sanitation programmes particularly tend to lag behind demand, despite the public health and environmental consequences. The urban poor are often not taken into account in municipal investment projects to improve or extend services such as water supply, sanitation, waste collection, roads, flood protection, health care, and education (Wright, 1997). Less-developed rural regions, as well as low-income neighbourhoods in areas of rapid urban sprawl (especially in middle-income OECD countries), present particular challenges.

Service gaps in some areas often involve *topographic and geophysical conditions* that isolate communities and make construction of piped networks difficult. Situations where communities have become physically isolated and socio-economically marginalised for long periods, and have experienced little or no improvement in water services, present special cases. In such situations, a historical lack of progress towards better water services could indicate a discontinuity in the transition process, indicating that new responses (e.g. special social assistance and support programmes) are required, as the case of Mexico shows in Chapter 6.

Other cases where rural connection rates are below 100% may simply reflect a larger than average proportion of rural population whose needs are being met by means other than piped water services. A distinction needs to be made here between households that are unconnected by choice and those whose situation is the consequence

of an uncompleted transition process. Connections to septic tanks or private wells may not constitute service gaps if they reflect more appropriate technology choices given the prevailing geographic or physical circumstances (e.g. in sparsely populated rural areas where houses are widely dispersed).

An imbalance between human settlement and water service infrastructure may also occur where infrastructure is over-elaborate and/or too costly in relation to the circumstances and preferences of the intended beneficiaries. Such over-specification of infrastructure design would result in resources not being used efficiently. Measures to avoid such cases are discussed below.

5.5 Filling service gaps through differentiated services: an alternative approach

To fill water service gaps in areas or communities in the transition towards general coverage, various approaches exist. Often, for underdeveloped areas and low-income communities, providing "differentiated" types and levels of service has proved more cost-effective than providing standardised water and sanitation systems. Since the ultimate objective is to expand coverage to otherwise unserved or "underserved" populations, various means of access and levels of services may be adopted during the transition and integrated later into the overall water service system.

This section considers: (i) possible advantages in providing differentiated services; (ii) what elements and principles alternative approaches may adopt; (iii) potential disadvantages; and (iv) the role of government in fostering such approaches.

5.5.1 Advantages of differentiated services

It has generally been assumed that, because water service provision is characterised by considerable economies of scale, these services should be provided by a single authority at a standardised level. This approach has sometimes resulted in over-engineered, high-cost solutions requiring large government subsidies and ultimately been characterised by high levels of inefficiency and low levels of coverage (Johnstone and Wood, 2001). As an alternative to standardised types and levels of service, where individual piped connection to water supply and sewerage is the (sole) norm, differentiated services maybe more appropriate, particularly for transitional cases, for several reasons.

Existing access: In neighbourhoods or communities that have long been unconnected to standardised public water systems, households have resorted to alternatives to meet their daily needs. These existing solutions should be the starting point for all initiatives to improve water services in such areas. From an economic, social, or environmental perspective, such facilities may be far from the optimal

solution for the long term, but they are the short-term reality, and must be well understood because they constitute the "baseline".

Local circumstances: Situations in "service gap" areas are typically not homogeneous, since population groups tend naturally to select means of access to water services according to their local conditions and circumstances. Experience has shown that it is better to adapt new water initiatives in such areas to existing circumstances rather than impose standardised models, which are often ill-suited to local realities (Smets, 2002b). In poor urban and peri-urban neighbourhoods, piped infrastructure may be difficult and costly to install in a conventional manner due to physical characteristics such as the absence of regular layout of streets/lanes or the existence of hills, landfills, and floodplains. In rural areas, the distance from piped networks may make new connections uneconomic.

Informal sector: Existing water services in "gap" areas are often provided by the informal sector rather than through a formal system operated by water utilities or authorities. Informal sector services such as water kiosks and door-to-door water vendors may be meeting the needs of the community and are often built on networks of relationships that are elements of the social capital of the community, a factor further discussed in Chapter 6. The existing role of the informal sector should be recognised in designing and planning initiatives to improve water services in such areas.

Resource constraints and technology options: In transition situations, sufficient resources to make a single leap to individual household piped connections are often not available. To bridge the transition period in such cases, a range of differentiated technology choices may be most suitable and would enable communities to choose options matching their preferences and willingness to pay. This approach avoids the risk of over-engineered or otherwise inappropriate systems being proposed for low-income neighbourhoods, and opens the prospect of spreading resources more widely to achieve broader expansion of coverage.

Investment costs: Experience has shown that investment costs associated with extending water service infrastructure can be reduced significantly by including less capital-intensive and more labour-intensive options. For example, mobilising human resources, in the form of residents' time and labour for community-level project management and construction, permits limited financial resources to be spread more widely. Experience in Latin America, for instance, has shown that non-conventional water supply and sanitation can reduce combined installation, operations, and maintenance costs by as much as 75%.

User choices: In a number of countries experience in service gap areas has shown the benefits of presenting users with a range of options for water and sanitation services, then helping them make an informed choice.[13] Such needs-responsive (and differentiated) approaches allow for better reflection of household preferences and

13. See, for example, Wright (1997), Mukherjee (2001), and Foster (1998).

budget constraints. They also tend to result in improved infrastructure sustainability because the users co-operate or even participate in operation and maintenance. The more choice users have as to what they pay for, the more they will feel committed to maintaining it. An example of this kind of approach is that of Mexico's PROSSAPYS programme for provision of support to local communities in poor rural areas (see Chapter 6).

5.5.2 Elements and principles of alternative approaches

Realistic, efficient alternatives to fill service gaps in water supply and sanitation services may be designed in several ways.

Social capital and user participation*:* Water provision is not just about physical infrastructure; it is also about "social capital". There is extensive experience in many countries of mobilising user participation in initiatives to improve water services in poor areas. Successful water and sanitation programmes have generally relied on extensive user involvement in planning and the choice of service levels, scale of investments, charges, and cost recovery structures (Wright, 1997). Municipalities and water utilities thus need to recruit or build expertise in managing participatory processes. Community-level water service improvement initiatives require an understanding of the socio-economic and cultural factors that have shaped the existing patterns of access to water and sanitation.

New partnerships*:* One key to better water management is the formation of coalitions, not only with formal and informal sector providers but also with customers. In such a multisectoral approach, each party aims to provide the part of the service for which it has a comparative advantage. This allows more creative use of formal institutions and informal organisations in "co-production" of water services (Wright, 1997). The cost of mobilising communities is recouped through users' co-operation in the maintenance of equipment that genuinely serves their needs (Foster, 1998). Such formation of partnerships and adoption of new roles necessitates training and capacity building aimed at existing (and possibly new) staff working in water-related services.

Treatment of the informal sector*:* Informal sector service provision usually co-exists with formal sector services, though often in an uncoordinated manner. Households without connection to piped water supply, usually lower-income consumers, often pay much higher prices for water provided by informal sector vendors. While the vendors are serving needs that would otherwise not be met, and the prices reflect the buyers' willingness to pay, such regressive situations without regulation of monopolistic abuse are socially undesirable. Nevertheless the general consensus is that where more use of differentiated and innovative forms of service delivery is to be encouraged, this should include informal sector providers. Rather than marginalising informal sector actors in the process of water sector reforms, governments should regularise them, bringing them into the formal sector progressively by regulating

monopolistic behaviour, testing vendor water quality, enforcing upgrading of service quality, etc.

Flexible programming: Where water utilities are allowed to link up with informal sector providers, this can increase flexibility. A co-operative arrangement makes practical sense where formal and informal sector providers draw on the same water source, for instance. Provision of water services may also be "unbundled" into separate service components to fill service gaps more effectively. For example, a system expansion or improvement project may be divided into smaller projects for: (i) connections; (ii) sewers; and (iii) treatment. This approach can also apply at household, street, or trunk levels. Unbundling implies smaller-scale projects that can be more responsive to local preferences and more likely to benefit customers in low-income communities (Wright, 1997).

Subsidies: Since moving towards general coverage usually requires significant capital investment, and rapid full-cost recovery from consumers may not be realistic or socially acceptable, targeted subsidies may be applied to ease the burden of transition. Such subsidies may be maintained to support vulnerable populations (discussed at length in Chapters 2 and 3). Sanitation improvement initiatives, which tend to have low priority among consumers and politicians alike, may merit such consideration, for example (Smets, 2003). Innovative financing methods for water infrastructure investment, such as micro-credits and trust funds, could also help lower the amount of cost recovery needed from users.

5.5.3 Potential disadvantages: environment and public health implications

While differentiated services can facilitate expanded access to and coverage of water services for otherwise underserved populations, including poor communities, some low-tech and low-cost options may have potentially negative environmental and public health implications. This section looks at possible trade-offs between wider coverage and non-standardised service, and how such trade-offs might be avoided.

Public health: Opting for transitional solutions in water services entails accepting that the goal of general coverage may not be attainable in the short term, which in turn means accepting less-than-optimum public health and environmental standards during the transition. This might be perceived as a disadvantage of differentiated solutions relative immediate conversion to water service systems with full piped coverage, individual household connections, and advanced wastewater treatment.

To address this concern, differentiated services need to: (i) entail some improvement in public health conditions; (ii) enable measurable progress from the baseline conditions, by as frequent stages as possible; and (iii) use technical options that allow existing and transitional installations to be upgraded without having to destroy the results of previous investment. An example of this kind of incremental process is upgrading of ventilated improved pit latrines to pour-flush toilets, which can be connected to a simplified settled sewerage system (Johnstone and Wood, 2001).

Note that where water service improvement projects set overly ambitious objectives in terms of extending standardised piped coverage, unsuccessful implementation can sometimes result. Delayed or incomplete implementation can make populations in service gap areas vulnerable to substandard public health conditions for longer than necessary.

Environment: Provision of water supply and sanitation facilities must take into account the degree of availability of natural water resources for water supply, plus the quality of water bodies receiving treated wastewater. Differentiated services that accommodate existing hydrological and ecological conditions will generally be the most appropriate options in any case, since technology choices will be made to suit local natural conditions. This link between water services and wider water resource management is especially important in water-stressed areas. As the Mexico case study in Chapter 6 illustrates, the challenge is not just to extend and improve piped infrastructure, but also to assure a steady flow of water through the pipes. Where water resources are scarce or subject to stress, less water-intensive technology options may be better than a standardised service of high-volume, high-pressure piped water supply and flush toilets/latrines. If water services are provided by unregulated informal sector actors, there is also some risk of uncontrolled drawing down of water sources.

Where differentiated solutions are ill-adapted to local circumstances, pollution is a risk as well. A simple pit latrine may be affordable and effective in terms of evacuating waste but could contaminate local soil and groundwater. Thus, user preference alone cannot be honoured if it is not compatible with the wider hydrological and environmental context. When financial resources are limited, trade-offs in terms of investment choices may also be necessary. Consider the case of a choice between widening coverage of public sewerage through a differentiated approach or upgrading wastewater treatment but keeping the existing low coverage of sewerage. The former might have more immediate public health and local environmental benefits by limiting population exposure to wastewater; the latter would address pollution of the water body receiving treated wastewater but without increasing the share of population with improved sanitation.

5.5.4 Role of government

No matter who provides water services or what form they are provided in, it is ultimately the government's responsibility to ensure that people can meet their basic water needs and that public health and the environment are protected. This is especially important for vulnerable groups, and during transitions, where it may not be possible to provide the highest level of service to all communities. Regulating and enforcing standards concerning the environment, drinking water quality, and sanitation, by incremental processes where necessary, is therefore essential if differentiated solutions are to be applied during transitions. The goal will be to bring service providers (whether public, private, or informal) gradually under regulation.

In this context, government should recognise, integrate, and regularise informal water service providers in stages, as discussed above. This is important not only from the environmental and public health standpoints but also to ensure that unregulated informal sector actors do not take advantage of monopolistic conditions and charge high prices to water customers who have no other alternatives.

The role of government is increasingly changing from that of service provider to "creator and manager of an effective legal and regulatory framework" (Bonn International Freshwater Conference, 2001). Government agencies also may need training and capacity-building to develop even beyond regulation and enforcement to such skills as defining the framework for private sector participation (setting out clear roles and responsibilities, and inviting/placing contracts on terms that are economically viable and realistic in terms of performance). This evolution implies institutional changes for the wider water governance framework, allowing new strategic partnerships and interactions to be forged among various levels of government, water utilities, informal sector service providers, community groups, and water user organisations. The role of local government is particularly important here, as that is usually the level of government charged with basic service delivery to the population, and local authorities are most closely in touch with the operational realities of service provision.

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Chapter 6

Improving access to water services: Mexico

Mexico is one example of an OECD country where gaps still exist in the "first-time" provision of water and sanitation services. This chapter examines the case of Mexico, which faces challenges in water service provision particularly in: (i) rural areas with widely dispersed and marginalised communities lacking access to water and sanitation; and (ii) peri-urban areas with informal settlements surrounding rapidly growing cities. Existing conditions (and therefore the transitional solutions) will differ significantly between rural and urban settings. An overview of the household water sector in Mexico is first provided, followed by a more detailed focus on the three southern States of Chiapas, Guerrerro and Oaxaca — among the poorest in the country. It also examines both rural and urban (Oaxaca City and its suburbs) cases from these three States.

CHAPTER 6. IMPROVING ACCESS TO WATER SERVICES: MEXICO

Mexico is one of the OECD countries that still need to fill gaps in the provision of "first-time" water and sanitary drainage services, particularly for people living in poor and otherwise "marginalised" areas (characterised by, for instance, water scarcity, lack of arable land, minority populations, and/or remoteness from infrastructure).[14] This chapter presents the case of Mexico and discusses how the country is trying to manage the transition towards filling these gaps.

The water sector in Mexico faces major challenges in: (i) rural areas where the population is widely dispersed and highly marginalised; and (ii) urban areas where informal settlements in the "peri-urban" districts around cities lack services and suffer marked poverty. In both cases, the challenge of providing basic infrastructure, water supply, and sanitation services is exacerbated in some areas by low levels of education and income.

About 78% of the water consumed in Mexico is used for irrigation (Table 6.1). The amount of water lost in irrigation is greater than total household and industrial demand — a telling efficiency indicator. Surface water sources account for 34% of the volume supplied and groundwater sources for the rest.

Table 6.1. **Water use in Mexico**

Use	Percentage
Irrigation	77.9%
Water supply for households	11.5%
Industry	8.5%
Fisheries	2.1%

Source: Comisión Nacional del Agua (CNA) (2001a).

14. To calculate marginalisation indices the National Population Council (CONAPO) considers the following variables: (i) share of population above age 15 that is illiterate; (ii) share of population above 15 that completed primary school; (iii) share of population without access to piped water, (iv) sanitary drainage, (v) electricity; (vi) share of inhabitants whose homes have earth floors; (vii) household size, (viii) share of population in communities of fewer than 5 000 people; and (ix) share of population earning twice the minimum wage.

The geographical distribution of water does not necessarily reflect the distribution of the population or its needs. Some 77% of Mexicans live in the northern and upland parts of the country, where only 20% of water resources are located. These areas generate 84% of the country's GDP, with around 70% of industry and 90% of the irrigated land (CNA, 1999). Resources are seasonally uneven as well, as the rainy season is concentrated in the summer.

Population and economic growth in the recent past has increased pressure on the environment in general, and on the provision of public services such as water and sanitation in particular. Accelerated population growth reduced water availability per capita from around 18 500 cubic metres per capita in 1950 to around 5 000 in 2000 (Tecsasím-Lyonnaise des Eaux, 2000; CNA, 2001a). By 2010, Mexico's population is expected to total about 111 million. In 1960, 50% of the population lived in urban areas. By 2000, the share had grown to nearly 75% (Government of Mexico, 2000). The concentration of people in urban and, particularly, in peri-urban areas results in increased pollution and other stress on water resources and systems.

6.1 Current State of water and sanitary drainage services

Notable regional differences exist in Mexico as regards hydrological conditions, extent of poverty, level of infrastructure development, and coverage of water services. Table 6.2 provides an overview of water resources, development context, and water infrastructure in selected States. It shows, for example, that in the Centre and the North, precipitation levels are significantly lower than in the South-east; that poverty is more widespread in Puebla, Oaxaca, and Chiapas than in other States listed; and that levels of water services provision are lowest in the South-eastern States of Oaxaca, Guerrero, and Chiapas.

In 2000, 88% of Mexico's population had access to potable water and 76% to "sanitary drainage".[15] However, these national figures do not fully reflect inequalities between rural and urban areas. In rural areas, only 69% of the population had access to potable water and 38% to sanitary drainage (INEGI, 2001). In other words, over 11 million inhabitants do not have access to piped water and over 21 million lack access to sanitary drainage. It is also important to point out that these figures refer to access to the service; they do not necessarily reflect quality and reliability of the service, both of which are key determinants for public health.

15. Water supply coverage is defined as the percentage of the population with piped water: inside their home, on the property, another house or a public fountain. Sanitary drainage includes the population connected to a public sewer, septic tank, river, lake, or ravine. What the National Water Commission (CNA) considers sewerage is the equivalent of what the National Institute of Statistics, Geography and Informatics (INEGI) defines as drainage.

Table 6.2. **Development context, water resources, and water service coverage**

CONTEXT		POVERTY	WATER			WATER INFRASTRUCTURE	
State	Location	% of municipalities with high & very high marginalisation levels[a]	Hydrological regions in the State[b]	Rainfall[b] (mm/yr)	Water stress[c]	Water supply coverage[d] (%)	Sanitary drainage coverage[e] (%)
Chihuahua	NW	22	Río Bravo	449	No	81.7	88
			Noroeste	476			
			Pacífico Norte	684			
Federal District	Centre	0	Balsas	806	Yes	79.5	95
Mexico	Centre	9	Balsas	806	Yes	53.3	89
			Valle México Lerma, Pacífico	797			
Puebla	Centre	44	Balsas	806	Yes	48.0	82
			Golfo Centro	1 549			
Oaxaca	SE	62	Pacífico Sur	1 125	Yes	31.5	57
			Golfo Centro	1 549			
			Balsas	806			
Guerrero	SE	66	Pacífico Sur	1 110	No	43.4	63
			Balsas				
Chiapas	SE	63	Frontera Sur	2 258	No	41.6	66
National	n.a.	35	n.a.	772	No	88.7	78

n.a. = not applicable.

Notes and *Sources:*

a) % of municipalities with both "high" and "very high" levels of marginalisation (CONAPO, 1995).

b) Hydrological regions in the State and average annual rainfall for 1941-2000 (CNA, 2001a).

c) Hydrological regions/river basins experiencing water stress or predicted future scarcity, 1995 data (WRI, 2000).

d) % of houses with access to piped water supply (within the house, outside the house, public hydrant, brought from another house) (INEGI, 2001).

e) % of houses with some form of drainage (public sewerage, septic tank, outflow to open water course) (INEGI, 2001).

Box 6.1. **Main service gaps**

Shown below are the States with the lowest shares of houses with access to piped water supply; (the figure in parenthesis is the share of those having connections inside the house).

- Oaxaca 73% (31%), Chiapas 74% (42%), and Guerrero 71% (43%) in the South/South-east.
- Puebla, Hidalgo, Morelos, Tlaxcala, Campeche and Veracruz, elsewhere.

The primary means of accessing water are:

- Piped supply of drinking water: inside the house or outside, from a public hydrant/source, or from another house.
- Non-piped supply of non-drinking water: from water trucks or from well, river, lake, or stream.
- The minimum WHO standards for reasonable access include availability of at least 20 litres of water per person per day from a source within one kilometre of the dwelling.

Shown below are the States with the lowest shares of houses with sanitary drainage (the figure in parenthesis is the share of those having connections to the public sewerage network).

- Oaxaca 54% (57%), Guerrero 46% (63%) and Chiapas 62% (66%).
- States in the Yucatán Peninsula, which have low rates of connection to sanitary drainage and the lowest rates of connection to public sewerage network: Yucatán 58% (4%), Campeche 64% (4%), and Quintana Roo 84% (36%).

The various types of sanitary drainage are: connection to a public network; septic tank; outflow into natural gully or ravine; outflow into a river, lake or stream. In addition, some dwellings are entirely without any form of drainage for evacuating wastewater.

Source: J. Barzallo, B. Zapata, and J. Arista, using data from INEGI (2001).

Oaxaca, Chiapas, and Guerrero have the lowest levels of water services and are the three poorest States in terms of general level of development, including degree of marginalisation. Low rates of connection to public sewerage are found in the States in the Yucatán Peninsula as well but are presumably explained by the geological conditions there (i.e. absence of surface watercourses). It is notable that the proportion of houses without drainage of any form is higher in Oaxaca (54%), Guerrero (46%), and Chiapas (37%) than in the three Yucatán States: Campeche (36%), Quintana Roo (16%), and Yucatán (41%).

Although some information is available on water provision by truck, none is available on water delivery in smaller quantities by vendors, including informal

providers; in practice this is an important source of water in poor areas. Similarly, for sanitation, in many of the remoter parts of the three predominantly rural South-eastern States, population and housing densities are very low, so households often choose connection to a septic system.

Wastewater treatment is rather limited, in Mexico, with only about 10% of wastewater treated in 1996, though the situation seems to have improved recently: the CNA reports that, in 2000, 793 municipal wastewater treatment plants were treating 23% of urban wastewater. The Federal District and seven States in the central region account for about 60% of total wastewater discharges, which occasionally cause significant adverse health impacts in this most densely populated part of the country. In the early 1990s, the annual cost in Mexico City of diarrhoeal diseases caused by water and soil pollution and by lack of sanitation plus food poisoning, was estimated at USD 3.6 billion, making water pollution one of the country's major environmental problems (Margulis, 1994).

Investment in the water and sanitation subsector[16] fell in real terms from 0.3% of GDP in 1991 to 0.1% in 2001 (Figure 6.1). However, even this indicator is very low compared with other OECD countries and even to other countries, in Latin America. Most of the infrastructure is also in relatively bad condition, and there are inadequate incentives for the substantial new investments which will be needed to fill "first-time" gaps in services and to rehabilitate existing infrastructure.

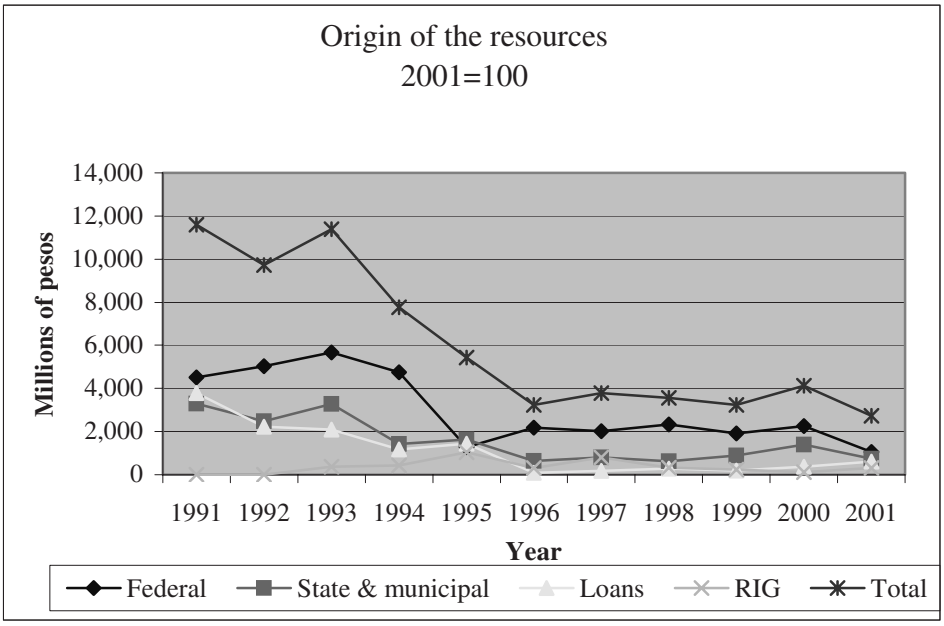
Much of the water sector financing in recent years has come from the federal government. Such transfers of resources often correspond more to emergencies than to the objective of increasing efficiency. Furthermore, the transfers come from many different sources, funds, and programmes, and it is seldom possible to determine the impact of such investments, since they are do not accompanied by clear, verifiable indicators or a well-defined follow-up system (Kemper *et al.,* 2001).

Under the "conservative scenario" of the 2001-06 National Water Programme, from 2000 to 2025 the amount of investment needed to meet established goals in the water and sanitation sector is around USD 41 billion, or an average of USD 1.6 billion per year (CNA, 2002a),[17] almost all for drainage and wastewater treatment. These figures do not take into account operation and maintenance costs. In recent statements the federal government has indicated that Mexico needs to invest at least USD 2.2 billion a year to meet its goals — about five times the combined amount of the current CNA budget, the revenue generated internally by the operating agencies, and international loans.

16. In Mexico, water use is usually categorised according to subsectors: irrigation, water supply and sanitation, hydropower, and navigation.

17. This scenario only allows for maintaining current water and sanitary drainage coverage while increasing wastewater treatment to meet current standards. It assumes minimum action as regards water for agriculture, industry and flood control.

Figure 6.1. **Investment in water and sanitation subsector, 1991-2001**



Notes:
Constant prices. Exchange rate in 2001: USD 1 = MXN 10.
RIG= resources internally generated by water system operators.
Source: CNA (2002b).

6.1.1 Underserved population: social concerns

Despite considerable efforts to give a larger share of population access to modern water and sanitation services, population growth means the total number of people unserved has actually been increasing.

As Table 6.3 indicates, poverty and household conditions are reflected in the large disparities among regions and urban/rural areas. Poor households are more likely than others to lack access to adequate water and sanitation services, and this lack in turn contributes to the vicious circle of poverty. Some 59% of the population in households in extreme poverty[18] are in rural areas that do not have access to piped water. Only 5% of non-poor urban households do not have access to piped water, though that figure probably conceals much higher coverage gaps in informal settlements in peri-urban districts (e.g. in the State of Mexico within the Mexico City metropolitan area, and informal areas around Oaxaca City).

18. Defined as having insufficient income for the basic consumption basket that satisfies minimum nutritional needs in terms of calories and protein.

Table 6.3. **Comparison of households in extreme poverty with other households**

	Households in extreme poverty			Other households		
	Total	Rural	Urban	Total	Rural	Urban
Inhabitants per household	5.8	5.7	6.0	4.3	4.5	4.3
Children under 12 per household	2.4	2.3	2.5	1.0	1.1	1.0
Households without access to piped water (%)	49.2	58.8	33.3	7.9	26.8	5.0
Without prenatal medical care (% of women)	29.5	41.1	16.9	5.0	8.4	4.5
Fertility rate	5.0	5.3	4.7	2.6	2.7	2.6

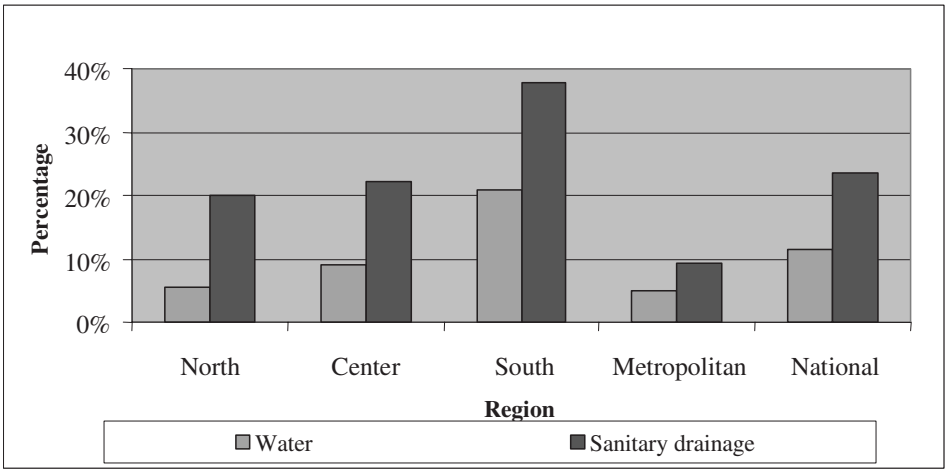
Source: SHCP, Exposición de Motivos del Proyecto de Presupuesto de Egresos de la Federación para el 2000.

Marginalisation is also more extensive in States with a greater proportion of indigenous people, and indicators of access to piped water are worst in those areas as well (Figure 6.2). In the south, where the share of the population living in rural areas is much higher than in other regions, the level of access to piped water and sanitary drainage is lower than the national average and those of all other regions.

Unconnected households have had to adopt alternative, informal options[19] for the provision of water services to maintain a reasonable level of health. Such strategies, although unregulated, are often similar to those adopted by small-scale formal systems, though they may vary in terms of management. For water supply, options include direct withdrawal from surface waters or groundwater through tube wells; purchases from public or private water vendors; bottled water; and illegal connections. For sanitation, options include simple pit latrines, toilets connected to septic tanks, drainage canals, and (sometimes) simplified sewerage systems. It is common for groups of households to form associations or committees to better manage their water systems (Johnstone and Wood, 2001).

19. "Informal" meaning not part of a formal water system operated by public authorities.

Figure 6.2. **Population without access to potable water and sanitary drainage: Regional indicators**



Notes:
North: Baja California, Baja California Sur, Coahuila, Chihuahua, Durango, Nayarit, Nuevo León, Sonora, Sinaloa, Tamaulipas and Zacatecas.
Center: Aguascalientes, Colima, Guanajuato, Hidalgo, Jalisco, Michoacán, Morelos, Puebla, Querétaro, San Luis Potosí and Tlaxcala.
South: Campeche, Chiapas, Guerrero, Oaxaca, Quintana Roo, Tabasco, Veracruz Yucatán.
Metropolitan: Federal District and Mexico State.
Source: CNA (2001b).

A study carried out by the CNA in suburban municipalities of Mexico City found that, on average, families with no access to piped water spend between 14.5% and 28% of their income on water, which they generally get from vendors. INEGI's Household Income-Expenditure National Survey shows that households connected to public supply spend between 0.73% and 3.84% of their income on water services. Families not connected to piped supply consume 104 to 175 litres per person per day — equivalent to 65% of average OECD consumption. The average in the Federal District is estimated to be about 230 litres.

In addition to coverage gaps, the system suffers from inefficiencies, some of them associated with low levels of infrastructure maintenance. System deterioration causes physical losses: around 40% of the water is lost through leakage.

The areas that do not have access to piped water services are often the most marginalised in terms of other infrastructure, such as electricity, roads, and/or telephones. Mexico counts almost 200 000 rural communities, only 4 000 of which have more than 100 inhabitants; of these, over 1 200 lack both water and electricity. Most of these settlements are in the States of Chiapas, Guerrero, Oaxaca, Puebla, San Luis Potosí, and Veracruz, and are inhabited predominantly by indigenous people (Mathieu,

2002). Similar infrastructure gaps characterise many of the informal settlements in peri-urban districts.

A key feature of the Mexican case, compared to most other OECD countries, is the fact that houses often have water storage tanks, particularly in big cities. These are generally of fairly limited capacity, and water can be stored in them only for a certain time. The tanks are typically filled by piped water supply. When water from other sources is exhausted (as often piped service is intermittent or unreliable), the stored water can be used as a supplement, but even this is often not enough to meet basic needs. In that case, they have to make use of water vendors.

Pricing and administrative policies in the water sector have not been very effective in satisfying the increasing demand. In particular, the revenue collected by water services covers very little of the cost of service provision, often not even paying for operation and maintenance. At the same time, the average cost of service provision has increased substantially. Significant cross-subsidies exist, especially between agriculture and household use, with irrigated agriculture receiving substantial benefits.

6.1.2 Mechanisms for allocating water-related investment funds

State and municipal governments receive transfers from the federal government either as allocations from the general tax revenue ("*participaciones"*) or through specific programmes administered by local governments ("*aportaciones"*). There are explicit criteria for allocating these resources, whose amounts are determined by formula. In principle, the objectives underlying this process are promoting equity in regional development, compensating States that collect more local taxes than the average, and taking into account the nature of the programmes administered by every jurisdiction. In general, States with higher marginalisation indices (e.g. Chiapas, Guerrero, and Oaxaca) receive more resources in the form of *aportaciones.* Some historical inertia affects the way resources are assigned among States, however; for instance, Tabasco receives more than the twice as much as Guerrero even though the latter is poorer.

Within the context of the *participaciones,* the *Ramo 33*, a new budgeting mechanism for conditional transfer of resources to States and municipalities based on pre-established disbursement schedule, has been an important step towards decentralisation in water-related investments by granting them greater autonomy in the use these resources. With respect to the water sector, the Fondo de Aportaciones para la Infraestructura Social (FAIS, fund for contributions to social infrastructure) channels resources to projects, activities, and investments in basic services for populations living in extreme poverty.

The FAIS is in turn composed of the Fondo para la Infraestructura Social Municipal (FISM, fund for municipal social infrastructure) and the Fondo para la Infraestructura Social Estatal (FISE, fund for State social infrastructure). FISM is resources are restricted to the geographic limits of a single municipality, while the FISE

is for works of State, regional or intermunicipal scope. "Basic social infrastructure" is defined as including water works, drainage, and latrines; rural electricity, health, and education; and improvements in housing and rural roads. Over 1998-2002, 88% of FAIS resources were distributed via the FISM and 12% through the FISE, according to Social Development Ministry (SEDESOL). In other words, they have been destined mainly for municipalities. In the same period, one-fourth of FAIS money was allocated in Chiapas, Guerrero, and Oaxaca, where the main water service gaps are found.

6.1.3 Institutional framework

A central agency in charge of administering the national waters, the National Water Commission (CNA), was established in 1989. The CNA, the sole authority for federal water management, is attached to the Ministry of Environment and Natural Resources. It is allowed to charge fees for the right to use federal water bodies and for wastewater discharges.

State water commissions provide technical assistance and build, operate, and administer infrastructure and services. In an effort to improve the provision of drinking water supply, the CNA, States, and municipalities promoted the establishment of autonomous operating agencies, "*organismos operadores*", of which there are now nearly 800. Most cities and towns of over 50 000 participate in an operating agency.

Since 1983, municipalities, with the support of States, are responsible for water and sewerage service provision. Since a reform in 1999, municipalities have also been responsible for wastewater collection and disposal. Although water and sewerage services have been decentralised for 20 years, municipalities face many practical problems in discharging their responsibilities. The main issues are described below.

Insufficient technical capacity and qualified staff: The lack of specialised technical capacity and human resources at municipal level increasingly limits the proper management of water resources.

Conflicting priorities and budget restrictions: Municipalities face pressure from citizens to provide more and better services but charge less for them, and to devote often-scarce budgets to other services, such as education, health, and security. These factors make it difficult for municipalities to finance water services.

Inadequate pricing policies: In general, water tariffs fall well short of covering costs, largely because local authorities fear that increasing tariffs would generate a political backlash. In addition, it is generally the States that approve tariffs.

Lack of continuity in policies and programmes: Municipal governments generally change every three years and cannot be re-elected. The resulting lack of continuity translates into a lack of accountability: problems can easily be bequeathed to

subsequent administrations. As municipalities do not have incentives for long-term planning, water works often remain uncompleted.

6.1.4 Legal framework

Mexico's Constitution (Article 27) makes water a national resource. All major water bodies come under federal responsibility.

The most recent water legislation is the 1992 National Water Law, the backbone of the federal water system. Other water-related laws deal with environmental and health issues. A draft River Basin and National Water Law is being considered and, if approved, will supersede the 1992 law.

At the State level, there is no uniform legal framework governing matters such as water fees, investment, private sector participation, and service cut-offs due to non-payment (Table 6.4).

In a move towards harmonising the State legislation, the federal government has analysed the State water laws and developed a Model Water State Law, based on what the analysts considered the most advanced ones. The CNA has promoted the modernisation of State laws, and 27 States have so far moved to change their laws.

6.1.5 Challenges for private sector participation

The federal government has given priority to urban areas so as to help control unplanned growth. A side result of this policy, however, has been significant gaps in rural areas.

Private sector participation in some water supply and sanitation services has taken place in medium-sized and large cities and tourist centres. Private investment in rural and peri-urban areas has been limited because the high costs of building infrastructure and collecting payment, combined with users' low ability to pay, make water provision unprofitable; the result is low incentives for private sector participation.

6.1.6 Differentiated strategies

The solutions commonly used in urban areas are not necessarily the right ones for rural areas. There is no one solution for all communities. The strategies taken by the Mexican government for the provision of water and sanitation services, therefore, vary according to the size of the population. These strategies can be classified in three categories (Table 6.5).

Table 6.4. **State laws on water and sanitation**

State	Tariff approval by	Service can be cut off for lack of Payment	Authorised to give Concessions
Aguascalientes	Water utility board of directors	Yes	Yes
Baja California	Local legislature	Yes	Yes
Baja California Sur	Water utility board of directors	Yes	Yes
Campeche	Government committee (*junta de gobierno*)	Yes	Yes
Coahuila	Water utility board of directors	Yes	Yes
Colima	State management board (*consejo de administracion*)	Yes	Yes
Chiapas	State management board	Yes	Yes
Chihuahua	Water utility board of directors	No	Yes
Durango	Local legislature	No	Yes
Guanajuato	Municipalities	Yes	Yes
Guerrero	State management board	Yes	Yes
Hidalgo	Local legislature	Yes	Yes
Jalisco	Local legislature	No	Yes
Mexico	Water utility board of directors	with restrictions	Yes
Michoacán	Local legislature	No	only for treatment plants
Morelos	Local legislature	Yes	Yes
Nayarit	Water utility board of directors	Yes	Yes
Nuevo León	State management board	Yes	Yes
Oaxaca	State management board	Yes	Yes
Puebla	Local legislature	Yes	Yes
Querétaro	Water utility board of directors	Yes	Yes
Quintana Roo	Water utility board of directors	Yes	Yes
San Luis Potosí	Local legislature	Yes	Yes
Sinaloa	Water utility board of directors	No	No
Sonora	Government committee	Yes	Yes
Tabasco	Local legislature	No	Yes
Tamaulipas	State government	No	No*
Tlaxcala	Municipalities	Yes	No
Veracruz	State management board	Yes	Yes
Yucatán	Water utility board of directors	No	Yes
Zacatecas	Water utility board of directors	Yes	Yes

Note:
* Except for the Matamoros water utility.
Source: CNA (2002b) and direct communication from CNA.

Table 6.5. **Size of communities and strategies applied**

Population category	Number of localities	Total population (millions)	Strategy
50 000 or more	178	50.7	Promote financial autonomy of water utilities, though in the short term they may require fiscal incentives or loans. Private sector participation in management of and investment in water systems is expected to help meet this objective.
2 500 to 49 999	2 863	22.1	Use fiscal incentives, including a mix of resources, with local funds and loans from development banks, to increase the cash flow of intermunicipal water utilities (*organismos operadores*).
Rural communities (<2 500)	196 328	24.7	Implement programmes such as PROSSAPYS (described below) to encourage community participation.
Total	199 369	97.5	

Source: CNA (2001b), data for 2000.

The 2001-06 National Water Programme aims to increase water coverage nationwide from 88% to 89% and coverage in rural areas from 68% to 71%. The programme puts particular emphasis on the needs of the southern States. While these targets in percentage terms do not seem very challenging, the actual number of inhabitants to be connected by 2006 is significant due to the rapid population growth at 1.5% per year, adding nearly 1.5 million Mexicans every year.

6.2 Case studies

The cases of Chiapas, Guerrero, and Oaxaca are analysed together here, based on information collected for a World Bank study (World Bank 2002). Although conditions in the three States are different, they are in the same region (the south/south-east), an area characterised by poverty and mountainous terrain. This part of the country accounts for one-tenth of Mexico's households but about one-fourth of the rural households without water or formal sanitary drainage.

Table 6.6 shows how Chiapas, Guerrero, and Oaxaca compare with national averages for four general indicators. All three States have relatively low GDP shares and high levels of marginalisation, rates of child mortality from diarrhoea, and

populations of indigenous people. Historically, average rainfall in these States is much greater than the national average; they are located in the part of the country with the greatest water availability per capita, and Chiapas alone has almost 30% of Mexico's water resources. But water storage infrastructure is far from sufficient.

Table 6.6. **General indicators for Chiapas, Guerrero, and Oaxaca**

State	Contribution to national GDP (%, 1999)	% of communities with high marginalisation level	Mortality rate from diarrhoea in children under 5 (per 100 000)	% of pop. Belonging to indigenous groups
Chiapas	1.66	90	43.5	24.5
Guerrero	1.75	93	19.8	15.0
Oaxaca	1.54	89	39.8	33.0
National	-	74	25.3	7.5

Source: CNA (2001a), CNA (2001b), INEGI (2001).

High migration rates from the southern States to northern Mexico, or to the US or Canada, are common. The immigrants go mainly for seasonal agricultural work, and many families depend on remittances from immigrant relatives.

As noted earlier and shown in Table 6.7, Chiapas, Guerrero, and Oaxaca together receive one-fourth of the fund for social infrastructure, the FAIS.

Table 6.7. **Share of FAIS received by Chiapas, Guerrero, and Oaxaca**

Year	Total (USD million*)	Chiapas (%)	Guerrero (%)	Oaxaca (%)
1998	224	7.7	7.1	6.7
1999	332	8.6	7.8	7.4
2000	422	9.4	8.5	8.0
2001	494	9.4	8.5	8.0

Note: The exchange rate used is USD 1 = MXN 10.
Source: Secretaría de Hacienda y Crédito Público.

In all three States, as in the rest of Mexico, multiple actors are involved in managing the water sector. Municipalities (with State support where necessary) are responsible for local water and sanitation service provision, which they can fund through cost recovery or Ramo 33 resources (part of the *participaciones,* as explained

earlier). The CNA, under the Ministry of Environment and Natural Resources, is the federal agency responsible for water resource management, and it has State-level delegations. State governments typically have a State Water Commission (*comisión estatal del agua*) or the equivalent.

Among the key water resource management policies has been the adoption of a management strategy along river basin lines, as a result of which CNA now has 13 regional offices. In addition, the State planning commissions (COPLADEs) have subcommittees for water. The Ministry of Health is involved in the definition of water quality standards. Several programmes of the Ministry of Social Development (SEDESOL) are aimed at providing services (including water and sanitation) in poor and marginalised areas. Communities in rural areas are involved in requesting, and often organising, water services; this participation is a key "social capital" element of efforts to improve service provision.

In the case of Chiapas, until very recently there were eight agencies or bodies in charge of water sector-related programmes: the CNA, its regional office, the State government (through its Potable Water Works Directorate and the CNA's State delegation), municipal governments, SEDESOL, the National Indigenous Institute, the Water Foundation (a non-governmental organisation). Agency co-ordination in such a situation is a significant challenge. Most recently, CNA's State commission has taken over some of the other actors' work and the division of responsibility has been streamlined.

Mexico's social, economic, cultural, and political structure has undergone substantial change in recent decades. The southern States in particular have experienced major political reforms. The federal government, seeking ways to improve co-ordination of community activities, has set up community development committees, among other steps.

As noted earlier, most municipal governments in Mexico are elected for three years and cannot be re-elected the following term. In Oaxaca, however, a system known as *usos y costumbres* (traditions and practices) applies in 412 of the State's 570 municipalities. It allows municipal leaders to govern for one, one and a half, or three years, depending on indigenous traditions and practices of the municipality. Although less prevalent, a system of community service called the *tequio* still exists in some communities in Oaxaca. It requires individuals to give some of their time for community work. This system — an example of community organisation and solidarity that other regions or countries might well envy — provides substantial in-kind contributions to the local economy.

The idea that water should be provided via pipes to houses is widely accepted. Communities may demand in-house connection regardless of the costs. Alternative technologies should be considered, as they can cost less over the long term (although they may have higher initial development costs). Case by case analysis should be made to see which type of technology is most appropriate. Oaxaca and Chiapas have received much attention from international organisations and NGOs, which have set up some

pilot projects using alternative technologies and innovative modes of social participation. Because of special features such as the *tequio*, Oaxaca has been an excellent place to experiment with using solar energy to pump water and to promote the use of environment-friendly latrines. Chiapas has some experience with rainwater collection projects taking advantage of its high rainfall and difficult topography (CNA, 2002b).

6.3 Rural areas in Chiapas, Guerrero and Oaxaca

Chiapas, Guerrero, and Oaxaca account for 22% of Mexico's rural population. They also have the lowest coverage for piped water in rural Mexico (Table 6.8).

Table 6.8. **Rural coverage in Chiapas, Guerrero, and Oaxaca**

State	Piped water				Sanitary drainage			
	% 1995	% 2000	Ranking *	Number of households without access	% 1995	% 2000	Ranking *	Number of households without access
Chiapas	49.9	63	29	198 358	34.0	35.0	14	266 771
Guerrero	44.4	53	28	159 868	15.5	19.5	25	235 299
Oaxaca	52.0	63	30	173 183	20.0	20.0	29	322 906
National	65.5	68.7	-	1 972 692	35.2	37.5	-	3 404 397

* Among the 31 States and the Federal District, with 32 representing the worst coverage.
Source: INEGI (1996 and 2001), calculations based on number of households.

In Chiapas, 37% of the rural population does not have access to piped water and 65% lacks sanitary drainage. In rural Guerrero, the figures are 47% and 80.5%, and in rural Oaxaca, they are 37% and 80%; the subregion of Costa de Oaxaca has the lowest coverage. Of the population in rural Chiapas and Oaxaca with piped water, about 25% do not have daily service, and in much dryer Guerrero the figure is 56%. People lacking piped service get water from tankers or open sources (more than 40% of the rural population in the three States draws water from open sources, compared with less than 30% nationwide) (Table 6.9). More than half a million households in Chiapas, Guerrero, and Oaxaca have no access to water services, and about 825 000 have no access to sanitation.

Table 6.9. **Water sources for rural Chiapas, Guerrero, and Oaxaca (%)**

	Piped water				Other sources	
	Water inside the house	On the property	From another house	Public fountain	Water tanker	Open source (lake, river)
Chiapas	10.9	40.2	3.1	2.7	1.0	40.6
Guerrero	11.2	28.4	7.7	3.5	1.3	46.3
Oaxaca	9.4	44.0	7.0	2.7	0.3	35.5
National rural average	20.1	40.2	3.8	3.1	2.32	29.2

Source: World Bank (2002), based on INEGI (2000).

Some water sources belong to different jurisdictions, which has been known to lead to intermunicipal conflict. In Oaxaca (with 570 municipalities) and Chiapas it is common for two relatively nearby communities to refuse to share water resources.

The costs of alternatives to piped water supply, such as surface water, community wells, public standpipes and water vendors, vary by location and are not always strictly economic. Fetching water may mean walking for hours, and in many cases women are the ones charged with this task. Often one of the reasons given for young girls' not attending school is that they have to get water. Because of such non-monetary costs, policy responses need to be geared to making the best of locally available community structures and attributes.

Half of the inhabitants of Chiapas, Guerrero, and Oaxaca live in rural areas (Table 6.10). The rural population is expected to grow, but at a lower rate than the national average, except in Chiapas. Population growth will affect the demand for water services.

Table 6.10. **Rural population and estimated growth**

State	% of rural population*	*% of communities with <100 inhabitants	Number of rural communities	Estimated population growth in rural areas, 2000-10 (%)
Chiapas	54	76	19 309	13.1
Guerrero	45	66	7 593	10.1
Oaxaca	55	62	10 352	5.9
National	25	76	196 369	11.6

* Based on rates given by CONAPO.
Source: CNA (2001b).

Table 6.11 shows investments on rural water and drainage in the three southern States. Chiapas has received the largest proportion of these flows. Table 6.12 indicates investments by the CNA over 1995-2000 in rural areas in several States. Note that the investment per capita in Chiapas was more than 13 times that in Guerrero.

Table 6.11. **Investments in rural water and drainage in Chiapas, Guerrero, and Oaxaca**

(1997 and 2000)

Year	Total national investment in rural water and sanitation (USD millions)	% going to Chiapas	% going to Guerrero	% going to Oaxaca
1997	43.5	34 %*	0.1 %*	6.4 %
2000	84.1	35 %	0.1 %	2.8 %

* 100% from federal *participaciones.*
Source: CNA (1998 and 2001b).

Table 6.12. **Investments by CNA in rural areas, selected States (1995-2000)**

State	Investment (MXN million)	Inhabitants (2000 census)	Investment per capita
Baja California	96.9	190 410	509
Chiapas	**975.3**	**2 039 551**	**478**
Durango	106.3	520 925	204
Sinaloa	124.7	826 022	151
Oaxaca	**130.1**	**1 907 340**	**68**
Puebla	98.1	1 577 078	62
Guerrero	**47.7**	**1 378 448**	**35**

Source: Comision de Agua Potable y Alcantarillado del Estado de Guerrerro (2001), except data from Oaxaca, from Gerencia de Agua Potable y Saneamiento en Zonas Rurales.

Though Chiapas has received the highest share of water and sanitation investment in rural Mexico, it is not clear that significant improvements in service have resulted from these investments.

The San Marcos' situation (Box 6.2), sums up many of the problems facing rural communities in Mexico.

Box 6.2. **Problems facing rural communities: the case of San Marcos**

The village of San Marcos in Guerrero has includes a population of 275. They get their water from springs (*manantiales*). This water is mostly used for human and animal consumption rather than irrigation. The population lives almost completely in a non-monetary economy; the trade of animals for special occasions is the only source of income. The nearest water source is less than 200 metres away. To get water into their houses, people use hosepipes (*mangueras*). One of the main problems that the people of San Marcos face is health risks from using water from an open source. The CNA provides chlorine to many rural communities as part of the Clean Water Programme, but many people do not use them. Consequently, the incidence of disease is high.

6.3.1 Transitional measures in rural areas

Various programmes have been undertaken for rural and marginalised communities to support water and sanitation projects and to promote community participation in the operation and maintenance of water service systems. One example is the Programme for the Sustainability of Water and Sanitation Services in Rural Communities (PROSSAPYS).

PROSSAPYS

The objectives of PROSSAPYS are to support rural communities in their provision of water and sanitation services, assure the quality of services, and foster decentralisation along with organised, active participation of communities.

PROSSAPYS is designed for communities of fewer than 2 500 (though it excludes settlements of fewer than 100). Support is generally aimed at the most marginalised communities, those that have made repeated demands for help, and those with a large indigenous population. For communities that already have piped water, sanitation projects take priority. The community must contribute a given share towards investment and participate in the operation and maintenance. The intent is for the systems to be "owned" by the people they are intended to serve.

The three components of PROSSAPYS are: (i) institutional development, (ii) social care and community participation, and (iii) infrastructure. With respect to the first, the programme fosters decentralisation and capacity building, and assures follow-up for at least ten years after project completion, making sure that water systems are functioning correctly and that fees (*cuotas*) are paid, and providing help in preparing practical manuals and guidelines, along with *ex post* evaluation. The idea is to provide

follow-up until the local organisation can maintain water points or piped systems and administer the system.

Under "social care and community participation", the objective is to involve communities in the planning, development, and operation of new water and sanitation systems. The "infrastructure" component covers engineering investments and costs for building and expanding water supply and sanitation systems.

PROSSAPYS also promotes co-ordination among the national, State, and municipal levels of government. Financing is based on a mix of federal and State resources. The federal government, through the CNA, contributes up to 50% of the programme's annual budget, while State governments meet the rest from their own budgets or with support from communities. The federal share is usually financed through Inter-American Development Bank loans. Typically, after signing a project agreement, a State turns over to the communities involved the share of the *ramo 33* to help cover the system's construction costs. In many cases, the municipalities do not have enough resources and projects cannot be undertaken.

One of the main features of PROSSAPYS is that communities organise committees or another form of association to design, execute, and provide follow-up to the projects. The main actions for community participation are:

- Identify what type and level of service the population wants and what it is willing to pay.
- Establish how, and how much, each household will pay (e.g. in cash, labour, materials).
- Assure a minimum level of sustainability by setting the fees[20] high enough to at least cover operation and maintenance.
- Determine how the installations are to be managed and maintained.

Municipalities generally submit applications for water and sanitation works to the COPLADE. For example, in Oaxaca, only about 10-20% of the applications received can be carried out, owing to financial constraints.

The top priority is building new systems rather than rehabilitating existing ones; this is to fill gaps in first-time service and ensure that the focus of investment is on expanded coverage. The most common types of works undertaken are new pumping systems, new gravity systems, expansion of pumping and gravity systems, rainwater collection, and rural sanitation. Of the 460 545 people in 971 communities that benefited from this PROSSAPYS in 2001, 27% were in Chiapas, 2% in Guerrero, and 6% in Oaxaca (CNA, 2002b).

20. In some communities consulted, the average payment was USD 2 per household per month.

Other programmes

SEDESOL is also running two new programmes[21] to support indigenous communities, mainly in infrastructure projects.

The *programme for the development of indigenous peoples and communities* seeks to fill the infrastructure gap, especially for water and drainage, roads, and electricity. In Mexico, about 22% of municipalities have populations that are 40% or more indigenous. Most such communities have high marginalisation levels. About 3 000 indigenous communities of more than 100 people lack access to potable water, and 5 600 have no access to drainage. This programme seeks to be demand-responsive, to promote local and regional economic development, and to preserve natural resources. Priority is given to the 20 States with the most indigenous people, preferably in particular districts that SEDESOL has identified.[22] Some 90% of the budget is spent on building, rehabilitating, expanding, or improving infrastructure.

The *regional programmes for areas with high marginalisation levels and indigenous peoples* also foster the development of communities in extreme poverty, particularly in Chiapas, Guerrero, and Oaxaca, by helping them with infrastructure projects. This programme also has a focus on education, health, and culture. Local governments approve the projects, which must directly benefit at least 20% of the community. The community may not be receiving aid under other government programmes unless they are complementary. The federal contribution is typically no more than USD 25 000 per project, though for infrastructure projects the amount can be higher. The federal government can contribute up to 50% of the total project cost.

The role of NGOs

Non-governmental organisations play an important role in the provision of water and sanitation services, especially in poor and marginalised communities. Much of their work has focused on Chiapas and Oaxaca. Box 6.3 gives an example of this type of stakeholder involvement in Mexico.

6.4 Urban areas in Chiapas, Guerrero, and Oaxaca

The urbanisation levels in Chiapas, Guerrero, and Oaxaca are among the lowest in the country, comparable to the degree of urbanisation in Mexico as a whole in 1960. Most of the urban population in these States live in cities of less than 50 000 (56% in Chiapas, 43% in Guerrero, and 69% in Oaxaca).

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21. Their operating rules were published on 15 March 2002.

22. These 250 “microregions” cover 476 municipalities with high marginalisation levels.

Mexico's urban population is expected to increase from 72.8 million in 2000 to 82.2 in 2010, an 11.4% rise. CONAPO's forecasts for urban population growth in the three southern States over the same period are: 11.6% for Chiapas, 6.7% for Guerrero, and 5.5% in Oaxaca.

Box 6.3. **Water Forever Programme (Programa Agua para siempre)**

In the parts of Puebla and Oaxaca where many people of the Mixtec group live, the NGO Alternativas y Procesos de Participación Social A.C. has carried out the Water Forever Programme since 1980. Water Forever focuses on providing water to villages that agree in exchange to conserve the soil for agriculture and forestry, using appropriate technologies for the ecologic regeneration of river basins. The water is not only used for household purposes but also supports agriculture, fisheries, industry, ecologic uses, and eco-tourism. So far more than 134 000 people — 114 communities in 38 municipalities — have benefited. More than 733 ecological regeneration projects, geared towards obtaining water, have been undertaken.(Hernández *et al.*, 2002).

As Table 6.13 shows, water and sanitary drainage coverage in urban areas in Chiapas, Guerrero, and Oaxaca are among the lowest in the country.

Table 6.13 **Water and sanitary drainage coverage in urban Chiapas, Guerrero, and Oaxaca**

State	Water			Sanitary drainage		
	% 1995	% 2000	Ranking* 2000	% 1995	% 2000	Ranking* 2000
Chiapas	83.5	85.5	29	83.6	86.6	23
Guerrero	78.5	82.3	32	72.8	74.2	30
Oaxaca	80.9	83.3	30	70.7	71.3	31
National	92.6	94.6	-	87.4	89.6	-

* Among the 31 States and the Federal District, with 32 representing the worst coverage.
Source: CNA.

Table 6.14 indicates water tariffs for household use in 2001 in selected cities for two of the three States. A combination of fixed and volumetric charges is common.

Table 6.14 **Water tariffs in some cities of Chiapas and Oaxaca**

City	Monthly fixed charge (USD[2])	Metered consumption		
		Minimum charge (USD/month)	Minimum tariff (USD/month)	Maximum tariff (USD/month)
Ixtepec, Oaxaca	4.4	3.1	0.22	0.25
Juchitan, Oaxaca	6.5	3.3	0.22	0.25
Salina Cruz, Oaxaca	3.9	3.9	0.25	0.28
San Cristóbal de las Casas, Chiapas	2.4 to 3.4	n.a.	n.a.	n.a.
Tapachula, Chiapas	n.a.	2.4	0.17	0.26
Tehuantepec, Oaxaca	3.0	3.2	0.20	0.26
Tuxtla Gutierrez, Chiapas	n.a.	2.5	0.23	0.74

Notes:
Sewerage not included ; USD 1 = MXN 10.
Source: CNA and Barocio (2002).

Revenues generated in the structure shown are not sufficient to cover even operation and maintenance costs. A survey by the CNA shows the average tariff revenue of water utilities in the south to be very low, the equivalent of USD 0.065/m^3 in Chiapas, USD 0.17/m^3 in Guerrero, and USD 0.05/m^3 in Oaxaca. For every 1 000 litres extracted, only about 400 litres generate any revenue for water utilities (Barocio, 2002).

Affordability is also an issue. While the level of household expenditure on water is half that in the northern cities, the income of households in the southern States is also 25% to 40% lower (Barocio, 2002).

Table 6.15 shows that Guerrero and Oaxaca have more or less the same level of wastewater treatment capacity utilisation as the country as a whole (which is quite low compared to other OECD countries), while Chiapas has no wastewater treatment.

6.4.1 Transitional measures

Programmes dealing with urban water infrastructure are mainly managed by the National Bank for Public Works (BANOBRAS) and the CNA.

The Federal Infrastructure Investment Fund (FINFRA) was established in September 1995 and is now the heart of a programme called the Programme for the Modernization of Water System Operating Agencies (PROMAGUA). PROMAGUA is the backbone of efforts to promote investment opportunities and finance infrastructure projects. It involves federal resources through contributions from FINFRA and the CNA. Operating agencies must obtain authorisation for tariff structures that cover at

least operation and maintenance costs so as to encourage higher private sector participation in the development of basic water infrastructure. In particular, PROMAGUA is directed towards water infrastructure in cities of more than 50 000. To have access to PROMAGUA funds, an operating agency (together with State and municipal authorities) has to sign an agreement with the CNA and BANOBRAS, committing themselves to accept private sector participation and to modify their legal framework to promote such participation, if necessary.

Table 6.15 **Wastewater treatment**

State	Number of treatment plants	Design capacity (lps)	Plants in operation	Plants not operating	Wastewater treated (lps)	% of capacity utilised
Chiapas	13	867	0	13	0	0%
Guerrero	15	2 304	14	1	1 459	63%
Oaxaca	30	578	25	5	358	62%
National	1 018	75 953	793	225	45 927	60%

lps = litres per second.
Source: CNA.

The State and municipal authorities and the operating agencies also agree to undertake structural changes including tariff reform and management capacity building. Although the programme promotes private sector participation, water utilities whose overall efficiency is at least 60% can obtain resources (basically as a subsidy) for up to 40% for sanitation activities without private sector participation. The budget of PROMAGUA is USD 2.8 billion (50% for water projects; 50% for roads).

Fortem II is a multisectoral loan programme oriented towards institutional strengthening of States and municipalities. It provides loans with relatively low interest rates for up to 25 years. The Fortafin programme offers credit to municipalities or paramunicipal entities that have limited annual revenue. Pronidem is a loan programme for municipalities that applies to basic infrastructure of high social impact. It includes some "training" components, and is available to municipalities that meet BANOBRAS' selection criteria.

6.4.2 Oaxaca City and suburban areas[23]

The case of Oaxaca involves a growing city (the population has significantly increased in recent decades), new districts and informal settlements, major water shortages, and the use of alternative water supply (e.g. tanker trucks), in addition to the cultural/ethnic issues mentioned earlier.

The population of Oaxaca City and its 18 suburban municipalities was estimated in 2000 at 453 258. Since the 1980s the city's growth pattern has been irregular. Oaxaca City has absorbed many districts and ranches from its own municipality and neighbouring municipalities. Suburban municipalities preserve some of their land for agriculture and cattle, so most of the incoming migration moves to the city. As a result, demand for public services is rising and service gaps are growing.

The Oaxaca City metropolitan area fares much worse than the rest of Mexico in terms of infrastructure services. For instance, 26% of the population (equivalent to 26 000 households) does not have formal household connections and 42% lacks access to drainage.

There are also service schedules (*tandeos*). Service is provided in certain areas of the city at specified times or on certain days of the week, sometimes as seldom as every eight days. A key concern of water utilities is the programming of the *tandeos* (i.e. the way available water is distributed). Most users have a calendar indicating when service will be provided in their area.

Oaxaca City is divided into 196 *colonias*. Of these, 38 (19.4%) receive water daily and the remaining 158 *colonias* (80.6%) are serviced two to four days a week during certain hours. Although this case is extreme, difficulties in providing service are frequent in other urban areas in the south as well. For example, only 30% of Iguala's population (Guerrero) has continuous service; in certain areas of Tuxtla Gutiérrez (Chiapas), users receive water only once a week (Barocio, 2002). In Oaxaca City, around 70% of the population has access to piped water. Some 118 000 inhabitants lack access to a formal water system and resort to water trucks (mostly private) distributing water mainly obtained from wells. Around 48% of the water distributed by the pipe system is being lost through leaks.

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23. This case is based on "Cost-Benefit analysis of investments in the water sector for the Metropolitan area of Oaxaca City", prepared in October 2002 by Sergio L. Rodríguez Medrano and Francisco Amador Ramírez under the Centro de Estudios para la Preparación y Evaluación Socioeconómica de Proyectos (CEPEP), a trust fund of the Ministry of Finance and BANOBRAS. Mr. Rodríguez is finance director at BANOBRAS and Mr. Amador is project evaluation manager. The views presented do not necessarily reflect those of CEPEP or BANOBRAS. Lic. Celestino Alonso, Mr. Jose Maria Villalobos, and other members of the Oaxaca State Planning Commission (COPLADE) provided inputs for this section.

The water sources serving Oaxaca City are arriving at their limits in terms of available quantity. The sources include 58 deep wells (40 are normally operating), two filtration galleries, and three springs. The wells are distributed among three hydrological basins. Some 73 000 installed household connections provide water to Oaxaca City and parts of its suburbs (335 000 inhabitants). One main problem is low efficiency in the existing infrastructure for abstraction and distribution. The equipment used for abstraction is inefficient, for instance, which increases electricity costs. This illustrates the need for government to address water supply challenges in a wider water resource context.

Most suburbs lack drainage systems. Alternatives include latrines, septic tanks, and direct discharges to roads and rivers. Latrine and septic tank users have to face maintenance costs (Table 6.16).

Discharges to rivers are untreated and therefore pose a significant environmental problem. Such discharges go to the Atoyac, Salado and Jalatlaco rivers. During the rainy season, floods sometimes provoke overflows of sewage from watercourses or groundwater drains. Odours from contaminated watercourses result in reduced property values and affect local fauna.

Table 6.16. **Costs of maintaining septic tanks and latrines for water and drainage users in Oaxaca City**

User according to dwelling type	Costs (USD/m^3)	Consumption (m^3/connection/year)
Poorer, without water or drainage	0.811	94
Medium type, with water but no drainage	0.875	127
Higher class with water but no drainage	1.176	137

Source: Rodriguez Medrano, S. and Amador Ramirez, F. (2002).

Of the 73 000 households in the formal water supply system, about 93% have meters installed — but consumption is metered for only 18% of users. The rest pay charges based on historical average consumption.

Users who are not connected to the formal system consume an average of $8m^3$/month and pay USD 20/month to water vendors (users who are connected to the network pay around USD 0.50/month). Flat fees are lower for households in poorer areas (USD 3.80/month) than for those in "residential" areas (USD 10.30/month).

Oaxaca's State government and BANOBRAS recently concluded that installing a formal system for water and drainage would be more convenient and cost-effective than the current informal system in the long term. For water supply, assuming average family consumption of $94m^3$/year, a formal system would allow a family to have a lower bill at USD 273 per year because they would no longer have to pay for trucked water. It is also

expected that such a family would increase its water consumption from 94m^3 to 127m^3 a year. In an urban/peri-urban area already experiencing intermittent water supply, it is vital for the water resource management implications of meeting this increased demand to be taken into consideration. The family would pay the equivalent of USD 71 for this additional water, but its production costs are around USD 120 per year. Thus the net benefit to the household from installation of a network is USD 224. The same logic applies to drainage projects.

The proposal envisages investment of USD 3.3 million for water supply projects and USD 22.8 million for drainage for Oaxaca City and surrounding areas. For water, this would mean 17 882 connections installed between 2003 and 2006, for additional coverage of 76 175 people. For drainage, the proposed projects would benefit around 188 500 inhabitants, or more than 85% of the population, who now have no formal system.

"Differentiated", alternative services imply different approaches to water pricing. In cases such as Oaxaca City, there are advantages to having differentiated services rather than standardised homogenous piped water and sanitation, considering the population density and the fact that peri-urban, often poor neighbourhoods may be farther away from piped networks, making new connections very costly. Many communities and neighbourhoods are isolated. Some communities are quite sparsely settled, with homes around a kilometre apart. In such situations, it would not be cost-effective to install water and sanitation networks.

6.5. The role of government

The basic role of the government is to work to increase coverage levels over time and assure adequate quality of service. As the installation of private connections for all is conceivable only in the long term, a transitional staged approach is needed. If the government cannot provide or assure formal water services, it can progressively integrate and regulate services that are informally provided.

Another way the government can contribute is by supporting mechanisms to encourage community participation. Mexico's government has actively promoted community participation, particularly in rural areas. In PROSSAPYS, for instance, it is very clear that if communities are not involved from the start, a key element of the social (and therefore financial) sustainability of the services provided by a project will not be realised.

Although municipalities bear the responsibility for providing water and sewerage services, there are still questions concerning who should carry out that responsibility. Arguments in favour of leaving this responsibility with municipalities include proximity to users, access to information, and interdependency of systems. Most municipalities, however, lack the capacity to undertake this task.

Thus, capacity building at all levels, especially municipal and community, is vital. Capacity building includes development of legal and regulatory frameworks, restructuring of sectoral organisations, and development of managerial and professional capacities. Human resource development is a key component of capacity building, especially where health and hygiene issues are concerned**.**

The government can also work to ensure that environmental regulations are enforced and that overexploitation and pollution of water resources are avoided. Many wells, rivers, and other water sources are exploited without permits. Upgrading environmental quality is a substantial challenge, requiring a long-term approach and incremental improvements.

Finally, intergovernmental co-ordination is vital. In Mexico, it will be necessary to modify the legal framework to respond to the needs of the water sector and clearly define the functions of the three levels of government. The central government should take full advantage of the operative capacity of State and municipal governments. In the case of PROSSAPYS, to guarantee co-ordination between the federal and State governments, the Comisión de Regulación y Seguimiento (commission for regulation and implementation, CORESE) was formed. Such mechanisms are needed to regulate the relationships among the all actors involved, at both national and regional levels.

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Chapter 7

Summary and Conclusions

CHAPTER 7. SUMMARY AND CONCLUSIONS

7.1 Affordability measurements, trends, and policies

In 1999, it was shown that for various periods up to the mid- to late 1990s, real household water charges in most OECD countries had been increasing by 2% to 6% per year. Four years later, most recent annual increases range between 0% and 4 %, with the mean annual increase having fallen from 3.7% to 1.6%. In Chapter 2, it was argued that increases in charges are likely to continue well into the present decade, largely for environmental reasons.

Chapter 2 also provided formal measurement evidence of affordability problems in OECD countries, based on quantification of water charge burdens. These were measured either on the basis of national average data ("macro-affordability" indicators) or for income groups or regions ("micro-affordability" indicators). These data, together with an investigation of the perception of affordability in 25 member countries, suggest that in about half the OECD countries affordability of water charges for low-income households either is a significant issue now (or would be in the absence of relevant policy measures), or might become one if such measures are not put in place.

How should affordability issues be addressed, given the desirability of having charging systems reveal the "true" and full economic and environmental costs of water service use at household level? The policies being pursued fall into two groups – income support, and tariff adjustment and innovation. OECD countries have considerable experience with both approaches.

Income support to poorer households is sometimes channelled through social welfare systems or linked to housing benefit programmes, and there are numerous examples of local authority assistance arrangements. Evidence was also found of funds established at departmental level to help write off water debt (**France**), a social fund for needy households financed by a small levy on water charges (**Belgium's** Wallonia region), and charitable trusts established by privatised water companies to pay off water debts (**England** and **Wales**). Various tariff rebate and discount programmes, usually involving a monetary value for individual households fixed in advance (and thus like an income assistance measure in effect), are found in **Australia**, the Flanders region of **Belgium**, and the **US**. Other assistance to low-income households occurs through flexible payment and debt recovery programmes, water vouchers, and assessment of needs by external welfare agencies. Government budgetary constraints, however, often impose limits on the extent to which households may be assisted by all these programmes, which rely on government budgets.

Concerning tariff-related measures, there seem to be clear potential benefits from a "Flanders-type" tariff, which gears a free or very low-priced first block to the number of persons in the household, and then reflects the transition from "basic" to "discretionary" household use in a sizable step to one or more blocks at prices much closer to marginal social costs. Evidence exists that the use of such tariffs is increasing. As long as the first block is not too large, this arrangement scored more highly on both equity and environmental criteria than the other forms of increasing block tariffs that were analysed. The third (or more) block for "discretionary use" should generally be added to the tariff structure only if proven conservation advantages are likely to accrue. A separate fixed charge for each household (perhaps varying by property type) is acceptable, but there are strong arguments for its covering only customer-specific costs (e.g. metering, billing and collection fees), not only to keep the volumetric rate relatively high and but also so as not to disadvantage smaller households. It is clear that significant cross-subsidisation among households occurs with such tariff structures, although the extent of this phenomenon could not be quantified in any of the tariff structures examined.

For a Flanders-type tariff to work, some sort of official or quasi-official record or register of the number of persons in the household must be kept, and regularly updated. Some countries do this already, so no particular problems should emerge in using the information for water charging purposes. In others, however, no such records are kept, and the introduction of such a list might prove politically and socially contentious.

Where such concerns exist, a strong case can be made for serious consideration of tariff concessions, tariff amendments, or special tariff structures reserved for low-income groups. Eligibility would ideally be based on income (as a proxy for ability to pay) or, if that is difficult to establish, via entitlement to existing welfare or other utility benefits. Examples of such measures – from **Australia**, **United States**, **Spain**, **Malta** and **England and Wales** – were presented under both the income support and tariff adjustment groupings, since the effects are very similar. In some cases, such measures involve subsidisation by the taxpayer (e.g. the Australian Pensioner and Health Card concessions). In the others, cross-subsidies from other water utility households is generally the finance source.

Subsidies play a significant part in the management of affordability problems in a number of countries. Apart from the cross-subsidisation that necessarily accompanies increasing block tariff structures (especially when they are amended to enhance their fairness for larger households), examples have been presented of central government subsidies being used to finance: (i) transitional (**Scotland**) and not-so-transitional relief (**Hungary**, and probably the **Slovak Republic**) for poorer households and regions needing rapid infrastructure development and renewal; and (ii) first-time water supply (e.g. remote villages in **Mexico**).

In **Australia**, however, neither case holds. Yet "concessions" for a broad range of consumer groups have been available for nearly 30 years, and the underlying (and transparent) subsidies are now integral to all water utilities' finances. The impact on marginal prices paid by households is very limited now, but this would not necessarily

be the case if, for economic and environmental reasons, Australian water tariffs were to move away from their traditionally high reliance on fixed service charges.

Whether the income support or tariff adjustment route is followed, the experience of OECD countries is that "emergency" or "crisis" assistance programmes are also needed for households that are experiencing genuine financial hardship and that for some reason are not covered by special tariff or income support systems. Examples of emergency programmes include municipal assistance, water utility social funds financed by levies on all customers, and water company trust funds.

As water charges rise, and environmental pressures and public health concerns grow, the reconciliation of environmental, public health, and affordability objectives will become both more urgent and more difficult. Governments and utilities therefore need to take even more seriously than hitherto the roles of tariff innovation, income support, and crisis assistance in their longer-term planning.

7.2 Water governance and private sector participation

Most countries concerned with reforming their water service provision have similar aims, regardless of the degree of any existing private sector participation: providing drinking water that complies with established health standards, achieving full cost recovery, and increasing accessibility. To achieve these aims, certain long-term objectives need to be met. They apply to public and private utilities alike, and ultimately contribute to water service provision that meets social and environmental goals. The most significant of these objectives are:

- Developing a legal and regulatory regime that meets realistic social and economic standards as well as established health and environmental standards.

- Establishing and maintaining institutions that have clear roles and responsibilities and, most importantly, sufficient capacity for policy implementation, including the linking of water service provision to water resource management under given environmental and hydrological conditions.

- Making utilities autonomous and self-financed.

- Ensuring that investment procedures are sound.

- Providing services at the lowest possible price, while taking into account the cost of the services and the value of water.

- Making services affordable for the poor, including through subsidies; this entails establishing progressive tariffs while applying social tariffs to

low-income households, large families, disabled persons, the retired, and other vulnerable groups; guaranteeing minimum supply enough to meet public health requirements; prohibiting disconnection for non-payment; and providing social welfare support such as introducing more flexible billing and payment plans for lower-income households; and

- Striving to maintain consumer-friendly, responsive, services.

The factors influencing the outcome of private sector participation and, in some cases, the incorporation of private enterprise characteristics in publicly controlled management, are the form of private participation, the competitive structure of the sector, the type of private company involved, and the regulatory regime. For municipalities seeking to reform water service provision it is important to chose forms of private sector participation that contribute to the proper governance of water resources — which means, among other things, pursuing an efficient allocation of resources, establishing and enforcing the highest water quality standards, integrating water resource management, increasing stakeholder participation, avoiding irreversible policy decisions, and taking into consideration users' willingness and ability to pay for services.

France, **Germany**, **Mexico**, the **US**, and **Wales** provided examples of how various forms of private participation have contributed to good water governance. Regarding the efficient allocation of resources, one lesson learnt is that municipalities can maintain public control of assets and still use the Administrative, Corporative, or Legal forms of private sector participation to apply marginal social cost pricing principles.

In cases of not-for-profit municipal water utilities in **Wales**, **Germany**, and **France**, the integration of water resource management has led to implementation of policies that have reduced consumption and encouraged investments into low-cost preventive measures to protect water resources.

Where multiple municipalities can form consortia, as is the case under the Corporative and Legal forms of private participation, joint operations in technical services are possible, and can help increase capacity while introducing public accountability through local control.

Mechanisms for democratic control are present in cases where regulation and utility management are decentralised, allowing elected officials to participate, directly or indirectly, in setting tariffs. It is also acceptable for appointed officials to serve on regulatory agencies or utility boards as a form of indirect democratic control, but in such cases it is essential to have well-functioning consumer protection groups and/or independent regulators, to prevent water service provider from being used as political tools.

Autonomous, flexible management is central to good water governance. The flexibility to adapt to local changes in demand for services (by adjusting either price levels or quality standards) is most frequently found where providers are not locked into long-term contracts or subject to lengthy regulatory processes. The formal rate-of-return obligation employed in the **US** has encouraged utilities to pursue investment and development plans that promote efficient and environmentally sound outcomes, but in systems with decentralised publicly owned assets (e.g. **Germany**) it is possible to use self-enforcing practices to the same ends.

Municipalities with Administrative, Corporative, and Legal forms of private participation have also been able to promote consumer willingness to pay for water services by building confidence, enforcing environmental and health standards consistently, avoiding long-term use of cross-subsidies or preferential tariff structures (which foster perceptions of unfairness), and ensuring that tariff changes are carried out transparently and with public participation (preferably local).

7.3 Differentiated services in "gap" areas

In some OECD countries or parts of countries with serious service gaps, as seen in the **Mexico** case study, "business as usual" is not an option. Achieving the long-term vision of improved water services in such areas requires a structural change in existing policies. This does not just concern infrastructure but also has political, social, cultural, institutional, and economic dimensions.

In the case of rural and peri-urban communities in Mexico, the problem is mainly associated with characteristics peculiar to these communities that make it difficult to provide "standardised" or "highest-level" services. When local circumstances differ, different responses are called for, and these may be best provided through a differentiated service system. There is no unique solution for each community. For a given community it may be more or less costly to provide water through alternative sources, such as community-managed programmes or water vendors. The price of water bought from private vendors is often significantly higher than what those connected to piped water supply must pay. The cost of getting water from vendors or water tankers is even higher when opportunity costs are accounted for. It is often women and children who pay these costs, travelling long distances to bring water to the household.

The most successful water supply and sanitation projects, particularly in rural areas, are typically community-based and demand-responsive, focusing on what users want and can sustain. This success requires that community members be involved from the design stage. They also need to be integrated into the planning and implementation phases of water service reform. Projects should allow for a follow-up presence to support communities until the local organisation is capable of maintaining water sources or piped distribution systems.

In sanitary drainage, it is also important to promote investment in order to deal with a major backlog of underinvestment. Information on options for sanitary drainage

management should be disseminated and communities should decide themselves on the most appropriate arrangements for their situation. Investments in sanitary drainage and wastewater treatment will reduce water pollution pressures on existing water supply systems.

Training at all levels is important, whether related to hygiene, water purification, use and application of alternative technologies, or community participation, awareness programmes, management aspects and the like. Technical capacity and qualified staff are badly needed, particularly in smaller municipalities with less political strength. It is also important to develop training programmes for schoolchildren, since children can transfer their knowledge to family members.

ANNEX A. DATA SOURCES FOR CHAPTERS 2 AND 3

Australia

Table 2.5 data reproduce information contained in Tables 4.1 and 4.2 of Productivity Commission (2002). They show real changes to Australian capital city household water and sewerage expenditures arising from water service price changes over 1991-2001, *by each income quintile*, in AUD per capital city household in 2000-01, and as a proportion of the average aggregate household expenditures in each quintile in each capital city. Table 3.5 tariff levels (for the year from 1 July 2000 to 30 June 2001) are calculated from utility data in Figure 10.1 of WSAA*facts*2001 as weighted by household property numbers calculated from Figure 5.1 in the same publication. The recent tariff change was obtained by comparing 2000-01 tariff level with the 1996-97 level calculated from WSAA*facts'97*.

Austria

Table 3.5 data are calculated from information supplied by Federal Ministry of the Environment: annual water costs — for each of 71 municipalities — of a fictitious household comprising two adults and one child, in a rented flat of $80m^2$, with annual water consumption of $150m^3$. The national water bill figure is calculated from (i) a simple unweighted average for all municipalities except Vienna (80% weight) and (ii) that for Vienna (20% weight). The 1992-99 change applies to Vienna only.

Belgium

All Belgian data for Table 3.5 were provided by the Belgian OECD Delegation to the OECD Environment Directorate in a fax of 21 September 1998. VAT is excluded.

Canada

Table 3.5 data are calculated from Environment Canada (2001), "Table 9 – 1991, 94, 96 and 99", which provides both 1999 and 1994 figures in 1999 dollars.

Czech Republic

Table 3.5 tariffs for 2000, in USD, taken from slide 13 ("Water – tariffs") of PowerPoint presentation made by Ctibor Kocman, Ministry of the Environment, to the

OECD Environment Directorate in 2002; 1997 data from Pavel Punochar (Mze CR) in a fax dated 31 July 1998.

Denmark

Table 2.4 data come from Table 240 of Statistics Denmark (2001), found online at www.dst.dk/yearbook (though since November 2002 a *Statistical Yearbook 2002* has been online in its place). Table 3.5 data are calculated from English Summary of *Vandforsyningsstatistik 2000*, provided by Dansk Vandteknisk Forening. Water levy and 25% VAT are included.

Finland

Table 3.5 data for 2002 from Parkkinen (2002), relying on data from Finnish Water and Wastewater Works Association (2002); 1997 data from Finnish Water and Wastewater Association's antecedent charges report five years earlier. VAT of 22% included.

France

Table 2.4 data are from the penultimate table on p. 145 of Maresca *et al*. (1997). Average income for the two outlying income classes is derived from the relationship of average income to class boundaries of the lowest- and highest-income groups in the corresponding *Italian* data set (Cima, 1998). Numbers of households in each French income class vary from 1 085 (<70 kF) to 118 (>500 kF). It is believed that *net* incomes were recorded. For Table 3.5, 1995 and 2000, data are from the Ministere de l'Economie, des Finances et de l'Industrie (2001).

Germany

Table 3.5 data were provided by Stadtfeld (2002).

Greece

Table 3.5 data (Athens only; VAT included for public water supply) for 2001 was provided by Ninou (2002).

Hungary

Water charge burdens in Table 2.3, from Hungarian Central Statistical Office (2000), are affected by the fact that an estimated 40% to 50% of households, mostly outside the four highest income deciles, are not connected to public sewerage. Adjustment of data for the lower six deciles such that their water supply/sewerage charge ratios are set equal to those for the seventh and eighth deciles would produce burdens of 2.80% (lowest), 2.47%, 2.23%, 2.23%, 2.01% and 2.13%, and an overall average burden of 1.88%. Table 3.5 data for 2002 was provided by Rakosi (2002),

updating a series published by the Hungarian Central Statistical Office (2001) that included 1997 data.

Italy

Table 2.4 data for six income classes — but comparing water service expenditures to average household aggregate *expenditures* (average *income* data unavailable) — are calculated from data presented in Cima (1998), Tables 1.7, 1.8 and 1.12. Table 3.5 combined data for 2001 from estimate by Muraro (2001), with PWS/S&ST, split, then derived from more detailed data quoted by Muraro for municipalities covering 11 million people in central Italy.

Japan

Table 3.5 data for 1 April 2001 from Japan Water Works Association (2002), Section 8; the charge is a simple annual average bill for PWS ($20m^3$/month) for 1 904 water utilities (97% of PWS utilities), this excluding 8 979 very small PWS utilities and 3 754 private water supply utilities.

Luxembourg

Table 3.5 data for 1994 are from OECD (1999b).

Mexico

Table 2.3 data are from the Office of National Statistics's Survey of Household Incomes and Expenditures, to be found at:
www.inegi.gob.ms/difusion/espanol/bvinegi/enigh/enigh.pdf

Turn to Cuadro (Table 5.5) for estimates of 2000 water supply expenditures (no estimates for wastewater, apparently) for about half the population (12.2 million households) by income decile (net income, it is believed), and to Cuadro 3.2 for average net incomes of each decile of the (*net*) *monetary income* distribution of the whole population (23.5 million households). Division of the average expenditures per household (Cuadro 5.5) by average incomes per household (Cuadro 3.2) establishes the average water supply charge burden in each decile group, for households connected to public water supply. Table 3.5 data for 2001, as for1997, are calculated as the quotients of two simple (unweighted) averages for 33 Mexican cities (with 26% of the country's population), the numerator being the average household water supply charge and the denominator average consumption per household. Data are from Annex 1e of CNA (2002b).

Netherlands

Table 2.3 data are 1999 household water supply charge data by quartile (first through fourth quartiles being equal to 241, 300, 383, 422 NLG/year), provided by

D. Munck (2002) of Statistics Netherlands, plus an estimated average sewerage charge per household of 189 NLG/year and an average water pollution management charge estimated at 93 NLG/year for one-person households and 3 x 93 NLG/year for all other households. To estimate the pollution charge, household composition by size in each income quartile is estimated so as to be consistent with average occupancy data as provided by Munck. Public water supply data for 2000 in Table 3.5 are from Table 13 of VEWIN (2002a), with Table 7 of the same publication being used to estimate the average standing charge (simple average of 36 water company "areas"). Sewerage and sewage treatment data are built up from estimates of sewer tax per household connection and water pollution management charge for various years in the late 1990s.

Norway

Table 3.5 data for January 2002 are taken from an online article on the web site of Statistics Norway (2002).

Poland

Table 3.5 data apply to 20 March 2002 and come from Poznan Water Utility (2002).

Spain

Table 3.5 data for 2000 are from the Asociacion Espanola de Abastecimientos de Agua y Saneamiento (2002), p. 122.

Sweden

Table 3.5 data for 1999 were found on the VAV web site in June 2002 (www.vav.se), in English under "Costs and Tariffs"; 1991 data are from OECD (1999b).

Switzerland

Table 3.5 1996 data are from OECD (1999b).

Turkey

The 1996 data for Table 3.5 are from OECD (1999b).

United Kingdom — England and Wales

Water charge burdens for *gross* income decile groups in Table 2.3 use equivalised income (see Section 2.3.2) and are taken from calculations undertaken and presented by Sawkins and Dickie (2002, Table 3). The 2001 estimates for Table 3.5 are calculated from average household PWS and S&ST bills in Tables 3 and 4 of Office of Water

Services (2002a), and average household use of water is estimated from Tables 11b and 11c of Office of Water Services (2002b); 1994 estimates are from earlier, similar, publications.

United Kingdom — Scotland

Table 2.3 estimates of water charge burdens (*equivalised gross* income) are from Table 2 of Sawkins & Dickie (2002). Table 3.5 data for 2000 estimated from Table 4 of Sawkins and Dickie (2001) and a consumption estimate based on information in Three Scottish Water Authorities (2000); 1997 Table 3.5 data are from OECD (1999b).

United States

Data for Table 2.3 calculations are from (i) the 2000 Consumer Expenditure Survey, Federal Bureau of Labor Statistics (BLS), reported at www.bls.gov/cex/2000/share/quintile.pdf; and (ii) a data file (part of Table 1100) provided directly by the BLS separating "water" expenditure from "other public services". Excesses of reported total expenditure over reported net income for the lower three quintiles and contacts with the BLS suggested reporting of incomes was so incomplete that total average household *expenditures* would be a better guide to average disposable *income* for these groups, for the Table 2.3 calculations. For Table 3.5 calculations, 2001 estimates are derived from Raftelis Financial Consulting (2002) and those for 1997 from Raftelis Environmental Consulting Group (1998).

ANNEX B. OPERATION OF "FLANDERS-TYPE" HOUSEHOLD TARIFF, INCLUDING "FREE ALLOWANCES PER CAPITA"

This Annex assesses the working of a "Flanders-type" domestic tariff by comparing it with the operation of a "traditional" two-part tariff generating equal revenue for the utility. The former comprises a fixed service charge paid by each household, a free allowance of water per billing period *per person,* and a single volumetric rate for all other water consumed. The traditional tariff has the same fixed service charge, no free allowance and a (necessarily) lower volumetric rate charged for all consumption (once the equal revenue assumption is associated with the reasonable working hypothesis that the difference in the volumetric price has no effect on demands).

Assume initially a "stylised" economy made up of equal numbers (say, one) of each of four types of households — one-person and four-person, both "poor" and "rich". Rich households of any given size are assumed to use one-third more water than poor households, which is not inconsistent with most estimates of the income elasticity of demand for water (significantly less than unity). Economies of scale in water use exist as household size increases, but, in line with observed per capita use, falls more slowly the larger the household becomes; to be precise, assume that in both poor and rich households *four* people use only *three* times as much water as a single-person household.

Table A.1 shows the financial outcomes under the two tariffs, assuming that 100 litres/day (lpd) consumed for a year attracts a (volumetric) charge of 100 EUR (the price is thus about 2.74 EUR/m^3). Because there is just one household of each type, the utility's total revenue from the *traditional* tariff (**I**) is 170+220+470+620 = 1 480 EUR/year. Even though a rich household of any given size uses one-third (33%) more water than the corresponding poor household, the rich households' bills are only 29% (one-person) and 32% (four-person) more than those of the poor households. This is because all households pay the same standing charge, which, relatively speaking, is less important the larger the household.

Assume now the Flanders-style tariff (**II**) has the same standing charge as tariff (**I**) and a free allowance of 40 litres/day per capita. This means the utility's 1 400 EUR/year revenue from the volumetric payment now has to be raised on 365m^3 (1 000 litres/day x 365) rather than 511m^3 (1 400 x 365), so the unit price has to be increased by 40%. Tariff (**II**) benefits the poor households more, since rich households now pay 40% more (one-person) or 49% more (four-person) than poor households. With most of the revenue now coming from the non-free units, the rich/poor water bill ratio (last column but one) approaches the ratio of the quantity of non-basic water used by rich as against poor households. It does not quite reach that ratio because of the continuing effect of the standing charge.

Table A1. **Comparison of traditional and *Flanders-type* tariff: Example 1**

HOUSEHOLD type (size and income level)	Water use (lpd)	Free/ paid water	Standing charge (EUR/ yr.)	Volum -etric payment (EUR/ yr.)	Total water bill (EUR/ yr.)	Rich/ poor bill ratio	Total bill per capita (EUR/ yr.)
I. Two-part tariff with standing charge (no free allowance)							
1-person, poor	150	0/150	20	150	170		170
1-person, rich	200	0/200	20	200	220	1.29	220
4-person, poor	450	0/450	20	450	470		117.50
4-person, rich	600	0/600	20	600	620	1.32	155
II. Two-part tariff with (i) standing charge, (ii) free allowance per capita and (iii) compensating increase in volumetric price							
1-person, poor	150	40/110	20	154	174		174
1-person, rich	200	40/160	20	224	244	1.40	244
4-person, poor	450	160/290	20	406	426		106.50
4-person, rich	600	160/440	20	616	636	1.49	159

However, while larger households benefit from tariff (**II**) in absolute terms, smaller households suffer (final column of Table A.1) because the free allowance per capita is the same irrespective of household size, thus generating benefits to households enjoying economies of scale in consumption. Given the "equal overall revenue" assumption, these benefits have to be paid for by those who don't enjoy either any, or so many, scale economies: smaller households, both rich and poor.

The importance of this last point is shown in Example 2 (Table A.2). Here, the economy is markedly different, with the poor concentrated in small households and the rich in large ones. Assume then, that there are just two households – one small and poor; the other large and rich, but now the consumption economies of scale are slightly greater – a four-person household is assumed to use 2.8 times as much (rather than three times) than the single person with the same income level. The richer, larger household thus consumes 150 x 4/3 x 2.8 = 560 litres/day, the two factors — income and scale economies — determining the rich/poor difference.

Table A2. **Comparison of traditional and *Flanders-type* tariff: Example 2**

Household type (size and income level)	Water use (lpd)	Free/ paid water	Standing charge (EUR/ yr.)	Volum -etric payment (EUR/ yr.)	Total water bill (EUR/ yr.)	Rich/ poor bill ratio	Total bill per capita (EUR/ yr.)
I. Two-part tariff with standing charge (no free allowance)							
1-person, poor	150	0/150	20	150	170		170
4-person, rich	560	0/560	20	560	580	3.41	145
II. Two-part tariff with (i) standing charge, (ii) free allowance per capita and (iii) compensating increase in volumetric price							
1-person, poor	150	40/110	20	153.14	173.14		173.14
4-person, rich	560	160/400	20	556.86	576.86	3.33	144.22

With the traditional tariff (I), the volumetric price of water is the same as in Example 1, so 710 EUR/year is received by the utility from an overall consumption of 710 lpd. After the switch to the Flanders-type tariff, however, and assuming unchanged consumption by both households, 710 EUR needs to be raised on the base of only 510 lpd, since 200 lpd is now "free". This mean a unit price increase of 36.36% (710/510), with the result that the bill of the poor household increases while that of the rich household falls. *So here, the richer household actually gains from the introduction of the Flanders tariff, while the poorer one loses, both absolutely and relatively.*

This is essentially because the polarisation of poverty (concentrated in the smaller households), the smallness of the income effect on consumption, and the size of the consumption scale economies combine to generate what seems, initially, a counterintuitive result. The crucial point in Example 2 is that the per capita consumption of the rich household is less than that of the poor one. This *must* mean that the introduction of an equal free allowance per capita introduces relative benefits for the richer household.

Economies of scale in consumption are, however, most unlikely in practice to be so great as to outweigh the income effects on water consumption (and thus highly unlikely to generate a per capita consumption figure for richer households lower than that for those on low incomes). Nevertheless, the gains in practice from the introduction of a Flanders-type tariff should be seen as dependent on the sizes of empirical magnitudes, rather than deriving from "pure theory" alone. Such magnitudes would, of course, need to be checked before the introduction of such a tariff.

BIBLIOGRAPHY

Anglian Water Trust Fund (2002), *Annual Report for the Year Ended 31st March 2000,* Anglian Water Trust Find, Peterborough.

Appleton and Chatterjee (2001), *Innovative Strategies for Water and Sanitation for the Poor: Access and Affordability*, draft background paper for the International Conference on Freshwater, Bonn.

Association Espanola de Abastecimientos de Agua y Saneamiento (2002), *Suministro de Agus Poltable y Saneamiento en Espana* (2000), AEAS, Madrid.

Barraqué, B., Johannès, B., de Gouvello, B. (2002), *Water 21 Phase 2 Report on France: Sustainability of the Water Services Industry*, Working paper, provided by author, August.

Barocio, R (2002), *Los Servicios Urbanos de Agua y Saneamiento en Los Estados de Chiapas, Guerrrero y Oaxaca.* Mimeo Trabajo elaborado para el Banco Mundial para la Estrategia de Desarrollo de los Estados del Sur, Marzo.

Berbeka, J. and K. Berbeka (2001), "The Impact of the Implementation of Selected EU Water Directives on Households' Sustainable Consumption in Poland". In: *Villacampa, Y., C. A. Brebbia and J-L. Uso* (2001), pp. 523-32. *Op. cit.*

Berbeka, K. (2002), *Personal Communication* (Department of Industrial and Environmental Policy, Cracow University of Economics), 13 August.

Bohanna, D. (2002), *Private Communications* (Anglian Water Company), 17 June.

Boland, J. and D. Whittington (2000), "The Political Economy of Water Tariff Design in Developing Countries: Increasing Block Tariffs Versus Uniform Price with Rebate", in: *(ed.) Dinar, A.* (2000), pp. 215-35. *Op. cit*.

Bonn International Conference on Freshwater (2001), *Ministerial Declaration*, adopted by the Ministers in Session on 4th December, 2001.

Brakemann, H. e*t al*. (2002), "Die Wirtschaftliche Analyse Nach EG-Wasserrahmenrichtliníe *(Teil 1)"*, Wasser und Abfall, Vol. 4, No. 3, 38-43.

Cima, S. (1998), *Le Tariffe Idriche*, Proaqua, Rome.

Comisión Nacional del Agua (CNA) (1999), *Avance del Programa a Mediano Plazo Periodo 1995-1999*. Tuxtla Gutiérrez, Chiapas, Octubre de 1999.

Comisión Nacional del Agua (CNA) (1998), *Situación del Subsector Agua Potable, Alcantarillado y Saneamiento a Diciembre de 1997*, México.

Comisión Nacional del Agua (CNA) (2001a), *Compendio Básico del Agua en México* 2002.

Comisión Nacional del Agua (CNA) (2001b), *Situación del Subsector Agua Potable, Alcantarillado y Saneamiento a Diciembre de 2000*, México.

Comisión Nacional del Agua (CNA) (2002a), *Programa Nacional Hidráulico 2001-2006*.

Comisión Nacional del Agua (CNA) (2002b), *Situación del Subsector Agua Potable, Alcantarillado y Saneamiento a Diciembre de 2001*, México.

Comisión Nacional del Agua (CNA) (2002c), *Programa Para la Sostenibilidad de Los Servicios de Agua Potable y Saneamiento en Comunidades Rurales* (*PROSSAPYS*), Unidad de Programas Rurales y Participación Social, CNA. Septiembre.

Commission of the European Communities (2000), *Communication to the Council, the European Parliament and the Economic and Social Committee*, COM (2000) 477, Brussels, 26.07.00.

Consejo National de Población (CONAPO) (1995), "Indices de Marginación" del Consejo Nacional de Población-CONAPO 1995, Secretaría de Gobernación, México, D.F.

Coplade Oaxaca (2002), *Estrategias Diferenciadas para el Desarrollo Económico Regional en el Estado de Oaxaca.* 31 de enero 2002.

Cracknell, R. (1996), Letter from Richard Cracknell, House of Commons Library Research Division to Helen Jackson, M. P., 17 May 1996.

Department of the Environment, Transport and the Regions (1998a), *The Incidence Effects of Charging for Domestic Water and Sewerage Services*, report prepared for DETR by Maxwell Stamp Plc, DETR, London.

Department of the Environment, Transport and the Regions (1998b), “Water Charging in England and Wales: A New Approach”, Consultation Paper.

Department of the Environment, Transport and the Regions (2000), *Water Industry Act 1999: Delivering the Government’s Objectives*, DETR, London.

Dinar, A. (ed.) (2000), *The Political Economy of Water Pricing Reforms*, Oxford University Press, for the World Bank, New York.

D.V.L. Smith Ltd. (2000), *Protection for Vulnerable Customers*. Report prepared for the Office of Water Services, Ofwat, Birmingham.

Economic Commission for Latin America and the Caribbean (ECLAC) (1998), *Progress in the Privatization of Water-Related Public Services: A Country-by-country Review for Mexico, Central America and the Caribbean. Environment and Development Division,* February.

Economic and Social Committee (2001), "Opinion of the Economic and Social Committee on: Commission of the European Communities" (2000), *Op. cit.* Official Journal 25.4.2001, pp. C 123/65-69.

ECOTEC (1996), *The Application of the Polluter Pays Principle in Cohesion Fund Countries (Annexes 1 to 4),* Ecotec Research and Consulting Limited: Birmingham and Brussels.

Environment Canada (2001), *Municipal Water Pricing 1991-1999*, also available at www.ec.gc.ca/erad/dwnld/waterreportbw.pdf

Environmental Protection Agency (EPA) (2002a), *Report to Congress: Small Systems Arsenic Implementation Issues*, March. Office of Water Report EPA 815-R-02-003, EPA, Washington, D.C., and at www.epa.gov/safewater/ars/congr_ars_mar_02.pdf.

Environmental Protection Agency (EPA) (2002b), *The Clean Water and Drinking Water Infrastructure Gap Analysis*, EPA, Washington, D.C., and at www.epa.gov/305b/2000.

European Academy of the Urban Environment (EAUE) (1998), *Hamburg*: *Water Saving by Consumption Control*, www.eaue.de/winuwd/132.htm.

European Union (EU) (1991), "Urban Waste Water Directive – 91/271/EEC", European Commission, Brussels

Esen, E. (2002), *Water Pricing in Turkey* (Faxed Communication of August 5) and *Personal Communications* (5, 9 and 12 August, and 17 September), General Directorate of Social Sectors and Coordination, State Planning Organisation, Ankara.

Finnish Water and Wastewater Works Association (2002), *Charges in Public Water Supply and Sewer Systems: 1 February 2002*. Helsinki. [in Finnish: Vesi-Ja Viemarilaitosyhdistys (2002), VV-Maksut–1.2.98–Jasenlaitokset, Helsinki].

Fitch, M. (1998), *Water Charities: a Description of Charitable Trusts and Hardship Funds in the Water Industry.* Report 6/98, Centre for Utility Consumer Law, University of Leicester: Leicester.

Fitch, M. (2002), *Personal Communication* (Centre for Utility Consumer Law, University of Leicester), 23 September.

Fitch, M. and H. Price (2002), *Water Poverty in England and Wales*. Public Utilities Access Forum, Newcastle-upon-Tyne.

Foster, M. (2000), *Trends and Driving Factors in Income Distribution and Poverty in the OECD Area.* Labour Market and Social Policy Occasional Paper No. 42, OECD: Paris.

Foster, V. (1998), *Considerations for Regulating Water Services While Reinforcing Social Interests*, UNDP/World Bank Water and Sanitation Programme Working Paper, October 1998.

Garrido, A. (2002), *Personal Communications* (Departamento de Economia y Ciencias Sociales Agrarias, Ciudad Universataria, Madrid), July – September.

Gleick, P. H., G. Wolff, E. L. Chalecki, and R. Reyes (2002), *The New Economy of Water: The Risks and Benefits of Globalization and Privatization of Fresh Water,* Pacific Institute for Studies in Development, Environment, and Security, February.

Gomez-Ibanez, J. G. and J. R. Meyer (1993), *The International Experience with Transport Privatization*, Brookings Institutional Press.

Haggarty, L., P. Brook, and A. M. Zuluaga, (2001), *Thirst for Reform? Private Sector Participation in Providing Mexico City's Water Supply,* Policy Research Working Paper 2654, The World Bank, Development Research Group, Regulation and Competition Policy, August.

Hall, D. (2001a), *Water in Public Hands: Public Sector Water Management: A Necessary Option.* PSIRU, June.

Hall, D. (2001b), *The Public Sector Undertaking: A Necessary Option*, PSIRU, February.

Hammenecker, J. (2002), *Personal Communication* (Commercial Directorate, VMW Brussels), 19 August.

Hassan, D. (2002), "Water Utility Options for Low-Income Assistance Programs", *Journal of the American Water Works Association,* Vol. 94, no. 4, April, pp.128-38.

Hernández Garciadiego, R. and G. Herrerías Guerra (2002), *Una Experiencia Exitosa de Desarrollo Regional Sostenible: El Caso del Programa Agua para Siempre, Alternativas y Procesos de Particpación Social A.C*, Abril de 2002.

Hungarian Central Statistical Office (2001), *Regional Statistical Yearbook 2000,* Central Statistical Office: Budapest.

Instituto Nacional de Estadística, Geografía, e Informática (INEGI) (2001), *XII Censo General de Población y Vivienda,* 2000, México.

Instituto Nacional de Estadística, Geografía, e Informática (INEGI) (1996) *Conteo Nacional de Población y Vivienda,* 1995, México.

Japan Water Works Association (2002), *Water Supply in Japan: Annual Report April 2000 – March 2001,* JWWA, Tokyo.

Johnstone, N. and L. Wood (2001), *Private Firms and Public Water: Realising Social and Environmental Objectives in Developing Countries*, International Institute for Environment and Development. London.

Jouralev, Andrei (2000), *Issues and Options for Latin America and Caribbean*, ECLAC, October 2000.

Kemper, K. and O. Alvarado (2001), *Water in Mexico A Comprehensive Development Agenda for the New Era.* Edited by Giugale, M., O. Lafourcade and V. Nguyen. Washington, DC.

Kraemer, R. A. and R. Piotrowski (1998), *Comparison of Water Prices in Europe: Summary Report*, Ecologic, April, www.ecologic.de/

Kzylkhodjaeva, D. (2002), *The New York City Water and Sewer System: Regulation and Legal Structure,* Second Meeting on Tariff Reform in Urban Water Sector Reform of the NIS, June 2-4.

Lang, F. (2002), *Personal Communication* (Association Luxembourgeoise des Services d'Eau), 10 June.

Maestu, J. (2002), *Personal Communication*. 9 March.

Mainstream (2002), "Costs of SDWA Regs Considered", *Mainstream,* vol. 46, no. 5, September/October, p. 4.

Maresca, B., G. Poquet, L., Pouquet and K. Ragot (1997), "L'eau et les Usages Domestiques", *Cahiers de recherche* no. 104. CReDOC , Paris.

Mathieu, P. (2002), Mexico, *States of Guerrero, Oaxaca and Chiapas, Rural Electrification,* Draft Report prepared for the World Bank Southern States Development Strategy, March.

Mexico, Government of (2000), *Sexto Informe de Gobierno*, Septiembre. Estados Unidos Mexicanos.

Ministère de L'économie, de Finances et de L'industrie (2001), *Enquête sur le prix de l'éau 1995/2000,* at www.finances.gouv.fr/DGCCRF/eau/index-d.htm.

Ministry of Agriculture (2002), *Information on Household Water Affordability in the Slovak Republic.* Faxed Communication of June 14, Bratislava.

Mukherjee, N. (2001), *Achieving Sustained Sanitation for the Poor, Policy and Strategy Lessons from Participatory Assessments in Cambodia, Indonesia and Vietnam*.

Muraro, G. (2001), *Personal Communication* (Supervising Committee on the Use of Water Resources, Rome), 25 September.

Muraro, G. (2002), *Italian Household Water Pricing,* Universita' degli Studi di Padova, Padova.

National Consumer Council (2002), *Towards a Sustainable Water Charging Policy,* National Consumer Council, London.

National Research Council, Academia Nacional de la Investigacion Cientifica, A.C., Academia Nacional de Ingenieria, AC. (1995), *Mexico City's Water Supply: Improving the Outlook for Sustainability,* National Academy Press, Washington, DC.

Ninou, A. (2002), *Personal Communications* (Hydrometers Laboratory, EYDAP, Athens), 24 and 26 September.

Nunes Correia, F. (ed.) (1998), *Selected Issues in Water Resources Management in Europe, Volume 2,* Eurowater, AA Balkema, Rotterdam, Brookfield.

OECD (1987), *Pricing of Water Services*, OECD, Paris.

OECD (1999a), *The Price of Water: Trends in OECD Countries*, OECD, Paris.

OECD (1999b), *Household Water Pricing in OECD Countries*, OECD, Paris.

OECD (2001a), *OECD Environmental Strategy for the First Decade of the 21st Century*, adopted by the OECD Environment Ministers, May 2001.

OECD (2001b), *OECD Environmental Outlook to 2020*, OECD, Paris.

OECD (2001c), *Sustainable Development: Critical Issues*, OECD, Paris.

OECD (2002), *OECD Environmental Data Compendium 2002*, OECD, Paris.

OECD (2003, forthcoming), *OECD Environmental Data Compendium 2003*, OECD, Paris.

Office of Water Services (Ofwat) (2002a), *Tariff Structure and Charges: 2002-2003 Report,* Ofwat: Birmingham.

Office of Water Services (Ofwat) (2002b), *Security of Supply, Leakage and the Efficient Use of Water: 2001-02 Report*, Ofwat: Birmingham.

OIEau (2002a), *Organization of Water Management in France: Municipal Service for Potable Water Supply*, http://www.oieau.fr/anglais/gest_eau/part_d.htm, September 23.

OIEau (2002b), *Organization of Water Management in France: The Organization of Public Authorities*, http://www.oieau.fr/anglais/gest_eau/part_a.htm, September 23.

Parkkinen, T. (2002), *Personal Communication* (Finnish Ministry of the Environment), 5 December.

Poznan Water Utility (2002), *Personal Communication,* 22 May.

Productivity Commission (2002), *Trends in Australian Infrastructure Prices 1990-91 to 2000-01,* AusInfo: Canberra.

Raftelis Environmental Consulting Group (1998), *1998 Water and Wastewater Rate Survey*, Raftelis Environmental Consulting Group, Inc., Charlotte, North Carolina.

Raftelis Financial Consulting Group (2002), *2002 Water and Wastewater Rate Survey,* Raftelis Financial Consulting, PA., Charlotte, North Carolina.

Rakosi, J. (2002), *Personal Communication* (ECO plc), 11 June.

Rees, J. A. (1998), "Regulation and Private Participation in Water and Sanitation Sector", Global Water Partnership, Technical Advisory Committee, Background Paper, No.1 July.

Rodriguez Medrano, S. and F. Amador Ramírez (2002), Análisis Cost-beneficio de Inversions in el Sector Hidráulico del Area Metropolitana de la Ciudad de Oaxaca.

Rubin, S. J. (1994), "Are Water Rates Becoming Unaffordable?", *Journal of the American Water Works Association*, Vol. 86, no. 2.

Saade Hazin, L. (2002*), Mexico's Federal District Water Reform: Lessons and Experience*, in SEIDENSTAT, *et al, Reinventing Water and Wastewater Systems: Global Lessons for Improving Water Management*, Wiley and Sons, Inc. New York.

Saade Hazin, L. (2001), "Private Sector Participation in Water Supply and Sanitation: Realising Social and Environmental Objectives in Mexico D.F.", in *Private Firms and Public Water,* edited by N.Johnstone and L. Wood, International Institute for Environment and Development, London.

Saunders, M. *et al*. (1998), *Water Affordability Programs.* AWWA Research Foundation and American Water Works Association, Denver.

Sawkins, J. W. and V. A. Dickie (2002), *Affordability of Water and Sewerage Services in Great Britain*, available, www.scotecon.net

Sawkins, J. W. and V. A. Dickie (2001), "Affordability of Scottish Water and Sewerage Charges", *Quarterly Economic Commentary*. Vol. 26, No. 3, September, pp. 39-47. Fraser of Allender Institute, University of Strathclyde, Glasgow.

Smets, H. (1999), *Implementing the Right to Drinking Water in OECD Countries*, paper presented at the OECD Seminar on the Social and Environmental Interface, ENV/EPOC/GEP(99)13.

Smets, H. (2002b), *Social Protection in Urban Water Sector in OECD Countries*, OECD March 2002, CCNM/ENV/EAP(2003)18.

Smets, H. (2002a), *Le Droit à l'Eau*. L'Academie de l'Eau. p. 160. www.oieau.fr/academie/gege/.

Smets, H. (2003), *La solidarité pour l'eau potable.* Academie de l'eau, p. 240, avril 2003. www.oieau.fr/academie/.

SHCP (2000), *Exposición de Motivos del Proyecto de Presupuesto de Egresos de la Federación para el 2000,* México, also at www.shcp.gob.mx.

Stadtfeld, R. (2002), *Personal Communication* (BZW, Bonn), 20 August.

Statistics Denmark (2001), *Statistical Yearbook 2001,* Statistics Denmark, Copenhagen.

Statistics Norway (2002), *Sewage Charge from NOK 600 to over 8000,* at www.ssb.no/vis/english/subjects/05/03/kommgeb_en/main.html

Steyaert, T. (2002), *Personal Communication* (VMW Brussels), 20 August.

Stottmann (2002), *Personal Communication* (Water and Sanitation Program, World Bank), 31 July.

Suburban Water Systems (2001), *Annual Water Quality Report 2001*, www.suburbanwatersystems.com.

Suburban Water Systems (2002), Summary Rate Charges.

Sydney Water (2002), *Sydney Water Customer Contract.* Sydney Water, Mimeo.

Tecsasim-Lyonnaise des Eaux (2000), *El Libro del Agua,* La Participación Privada en el Sector Dirigido por Alain Biche, Marzo, México.

Tello, E. (2000), *"*The Environmental Taxation System and the New Water Culture*",* *Environment, Technology and Culture,* no. 25, also online at www.gencat.es/mediamb/revista/rev25-eng.htm; or www.gencat.es/aca/eng/principal.htm.

Tello, E. (2002), *Personal Communication* (Department of Economic History, University of Barcelona), 16 June.

The Economist (2002), "*Coming Home to Roost"*, Special Report on Privatization in Europe, June 29, p.71.

The New York Times (2002), "As multinationals run the taps: anger rises over water profits", by Tagliabue, J., August 26.

Thompson, J. (2001), *Private Sector Participation in the Water Sector: Can it Meet Social and Environmental Needs?*, Opinion, International Institute for Environment and Development, May.

Three Scottish Water Authorities (2000), *Using Water in the Home in Scotland.* East of Scotland Water, North of Scotland Water and West of Scotland Water: Edinburgh, Inverness and Belshill.

UK Government (1999), "The Water Industry (Charges) (Vulnerable Groups) *Regulations 1999.* Statutory Instruments 1999" No. 3441. Made and Laid before Parliament 22 December 1999. In: *Department of the Environment, Transport and the Regions* (2000), pp.22-26.*Op.cit.*

UKWIR (1998), *Towards an Environmentally Effective and Socially Acceptable Strategy for Water Metering in the UK.* Report 98/RG/02/1, UKWIR, Environment Agency, Ofwat, CPRE and RSPB: London.

Van Humbeeck, P. (2000), "The Distributive Effects of Water Price Reform on Households in the Flanders Region of Belgium", In: *(ed.) Dinar, A.* (2000), pp. 279-95, *Op. cit*.

Vewin (2002a), *Water Supply Statistics 2000,* Vewin: Rijswijk, available online www.waterleiding.nl.

Vewin (2002b), *Tarierenoverzicht leidingwater per 1 januari* 2002, Vewin, Rijswijk.

Vickers, A. (2001), *Water Use and Conservation*, Waterplow Press, Amherst, Massachusetts.

Villacampa, Y., C. A. Brebbia and J-L. Uso (2001), "Ecosystems and Sustainable Development III", *Advances in Ecological Sciences, Volume 10,* WIT Press.

Water Services Corporation (2001), *Annual Report 2000-2001, Water Services Corporation*, Valetta, Malta.

Welsh Water (2000), Codes of Practice, available under "Publications" at http://www.dwrcymru.com/english/Homepage.asp.

WHO/UNICEF (2000), *Global Water Supply and Sanitation Assessment 2000 Report*, World Health Organisation and the United Nations Children's Fund.

Wilson, D. (2002), *Personal Communication* (Water Industry Commissioner for Scotland), 29 May.

Woodfine, M. (2002), *Personal Communication* (Sydney Water), 9 August.

World Bank (2000a), *Urban and Local Government Strategy*. The World Bank, Washington, D.C.

World Bank (2000b), *Poverty and Environment,* background paper for the World Bank Environment Strategy. The World Bank, Washington, D.C.

World Bank (2000c), *Maintaining Utility Services for the Poor: Policies and Practices in Central and Eastern Europe.* The World Bank, Washington, D.C.

World Bank (2000d), World Development Indicators 2000, The World Bank, Washington, D.C., also at www.worldbank.org/data/wdi2000.

World Bank (2002), Mexico Southern States Development Strategy: Infrastructure for Rural Growth and Poverty Alleviation. Draft.

World Resource Institute (2000), *Pilot Analysis of Global Ecosystems — Freshwater Ecosystems*, World Resources Institute, Washington D.C

Wright, A.M. (1997), *Toward a Strategic Sanitation Approach: Improving the Sustainability of Urban Sanitation in Developing Countries*, UNDP/World Bank Water and Sanitation Programme Working Document, November 1997.

WSAAfacts (2001), Water Services Association of Australia Inc., 2001, Melbourne.

Yarra Valley Water (2002), *Yarra Valley Water Hardship Initiatives*, Yarra Valley Water Powerpoint Presentation.

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