

# Practices and Procedures for Pricing Services

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## 1. Introduction

The concept of socio-economic sustainability of irrigation, drainage and flood control infrastructure and services is not new. This has been, and continues to be, the fundamental characteristic that rural societies seek to assure in all factors important to their primary economic activity -- agriculture. The extent of these services differs from one area to another, but their effectiveness in different settings is one of the primary determinants of the success of the peoples' endeavours. And without question, the adequacy of the associated institutions and financial mechanisms, in combination, is critical to 'sustainability'.

This has held true for centuries. Accordingly, we should consider what prior generations did to sustain these services, particularly those that continue today. Though societies must deal with today's situations, which reflect the investment and institutional actions of governments over the past 70 years, solutions that are still applicable may have been devised during much earlier times. During the recent period, governments in developing countries made most of the decisions on expanding agriculture and related services, including the extent and means for financing. However, in the decades / centuries prior to the recent burst of development, farmers and rural communities largely carried those responsibilities.

Meanwhile, today's increasing demands on government budgets to support the rapidly expanding urban population; improved health, education and infrastructure, are forcing governments to reconsider their financial support to rural services. There are urgent competing needs for limited funds; political influence is shifting from the rural areas to the urban sector making it more difficult for the rural sector to maintain its historic share of the nation's general budget. A consequence of these factors is the desire of many countries to transfer to the benefited farmers and rural communities the responsibility for most, if not all, of the management, maintenance and financing of the governments' recently-built systems.

In this document, the term Water Service Entity (WSE) is used to signify the service provider. Whether the organizational form of the WSE is a government agency; a quasi-government customer-owned; another form of non-profit customer-owned; or a for-profit organization, the concepts of financial sustainability, financial self-sufficiency, financing mechanisms, service charges and fundamental responsibilities are similar. And in many respects, it does not matter whether the service is irrigation, agricultural drainage, storm drainage or flood control (the scope of ICID) or urban services.

One class of WSE warrants definition. Quasi-government entities have very limited government powers, but play a major role in providing services to an identified group of citizens. These entities have essentially no traditional powers of civil government and do not report to other government agencies, except where a local government body may oversee such a WSE, particularly entities such as 'country' drainage districts. They are created under legislation and monitored for fiscal performance. Their classification stems from their power, granted by legislation, to levy property taxes -- a government-only power in a country. They may issue general obligation bonds backed by these taxing powers, and in the case of water-related WSEs, may issue revenue bonds backed by power sales or other sources of revenue deemed of low risk.

As will be seen, this form plays an immensely important role as WSEs in developed countries and many developing countries.

## **1. Some Principles Pertaining to Service Charges**

Several characteristics of water-related services and the principles that apply to their financing should be kept in the forefront of any discussion of service charges.

All water-related services provide economic and social benefits to easily identifiable, direct beneficiaries. It has been historical practice and a basic policy of social equity that groups within society who benefit from a given service should pay the resulting costs.

Where the government's social policies do not require beneficiaries to pay full costs of services, the government should explicitly, by a legal document, identify the sources of the replacement funds and the mechanism and schedule for payment to the WSE of the funds sufficient to cover the full cost of the services.

The objective of collecting service charges is to finance the cost of those services. This holds true for urban and rural services in both the developed and developing countries.

The following lender conditions that bear on service charges are set out in this paper because increasingly WSEs – new, existing and transfers – are going to need access to commercial bank loan/bond financing. These arrangements are common in countries where effective WSEs are financially self-sufficient, particularly the larger schemes. In the future, a country that wishes to make available the least-cost financing to its urban and rural WSEs will have to adopt the legal structures and legislation needed to satisfy these lender policies (Indeed, these features should be adopted regardless of the source of financing). However, the legislation would be most effective in lowering borrowing costs if it includes the option to create quasi-government WSEs with restricted powers of levying property taxes.

If commercial bank loans or bonds are used to finance any portion of the costs, the policies of lenders may directly affect financial policies and mechanisms adopted by the WSE. Again, with some modification, this holds true regardless of the organizational form of the WSE or its service.

Lenders will insist that the WSE has reliable and fully adequate sources of revenues for the period of the loan / bond. Government guarantees of prompt payment to the WSE of any necessary subsidies must be explicit in legal documents, since lenders are very reluctant to rely on politically adjusted government subsidies. The record of adequacy and reliability of government subsidy payments does not instill confidence.

For long-term financing of facilities construction or any other cost component, lenders will require full cost recovery and usually that the WSE has powers of taxation, a substantial emergency reserve fund or like means to carry it through periods of lower revenues due to drought or economic downturns.

Lenders want to ensure that there is a reliable full service to the beneficiaries in order to better guarantee a WSE's repayment capacity. Thus, during low revenue periods most lenders prioritize expenditures made by the WSE using its available revenues. Routine O&M is first priority, replacement reserve fund is second, emergency funds is third, interest on loan / bond is fourth and capital repayment last. (This is identical to the priority payment policies that the WSE itself should have.) Lender provisions will require automatic increases in charge rates if a prolonged revenue deficiency develops.

It should also be noted that lenders will require that a water service WSE has been granted a legal, fully committed and recorded water-use right of adequate quantity, quality and reliability. This is as important to the lender as an assured revenue stream and for the same reason – sustainability of the service, the agriculture and the WSE. Farmers' commitment of funds to improving their agriculture, including irrigation technology, depend on permanent rights.

To ensure such agreements between lenders and borrowers governments should create a professional government audit/regulatory agency to review WSE borrowing plans, particularly if they involve bonds. This is essential to help assure the lenders and bond purchasers that the specific WSE's program is sound and viable. Equally, such examinations will instill confidence within the entire country in the broader use of this form of financing.

Two other features of rural water-related services must also be considered when structuring the WSE and formulating service pricing and financing policies and mechanisms. Usually farmers require two and in some cases even all three services -- irrigation, drainage and flood control -- for a viable agriculture. A WSE commonly provides more than one of the services at the local level. Increasingly, the local villages (often composed of farmers as well as the agricultural-related merchants and support) are beneficiaries of the same infrastructure for their services. A jointly used water delivery is common, but the village may also discharge waste into the natural and constructed watercourses, the treatment cost of which should be a village-only cost. The villagers cause the pollution of resources and the receiving channels are basic facilities of other WSEs.

Any consideration of alternative approaches to service charges must understand the financing relationships. They are very real constraints on formulating practical, consistent service charge policies and mechanisms in a specific setting.

### **2.3 Considerations in Discussing Service Charge Practices**

Before discussing existing practices concerning irrigation, drainage and flood control financing and service charges, it may help to discuss some related terms and concepts. The terms 'market pricing,' and 'opportunity pricing' hold no meaning in discussions of drainage and flood control services. 'Market pricing' has very limited, if any, validity in formal transactions, even in irrigation (or urban) services. The physical, institutional, political and social restraints to market pricing of services in developing countries make it infeasible. The bulk prices of water supplies to San Francisco and from the Colorado River to Los Angeles are a fraction of the charges for adjacent irrigation water. These supplies are not marked up to any 'market' prices and certainly that water is not available to any 'markets'. In the rare situation of a partial market for water use rights, the sale price for the right to use water is a separate cost paid to the rights holder – not a part of a 'market' service charge. 'Opportunity pricing' has no application in pricing any rural or urban services. It is not utilized for any services in developed or developing countries.

Finally, there must be both a political will to adopt and society's acceptance of the mechanisms for any charging policy to survive. The policies and mechanisms for assessing and recovering charges must be simple, easily understood by the customer/beneficiary, and judged to be obviously fair. The term used in this document is 'service charges' covering all methods of assessment – service tariffs, property taxes, routine labor assessment and one-time assessments.

As shown in the report, "ICID Survey on Funding of Operation, Maintenance and Management of Irrigation and Drainage Projects", (Lee, 2000<sup>1</sup>) those WSEs obtaining customer payments close to full funding of O&M rely on both tariffs and some form of property taxes. These may be paid in labor, common in many developing countries, particularly on customer/beneficiary-owned schemes.

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<sup>1</sup> Lee, P. (2000), ICID Survey on Funding of Operation, Maintenance and Management of Irrigation and Drainage Projects. ICID Central Office, New Delhi

As the following discussion indicates, by far the most common basis for charges for rural and urban services – and found in utility principles – is full financial cost of services. Costs include investments, replacement, O&M and repayment of any borrowing. The calculation to collect all costs on a consistent basis from all beneficiaries is straightforward and the customer/beneficiary can understand the principle as being equitable.

There are strong economic and social equity arguments for countries to have consistent policies for the recovery of the costs for all services in both the rural and urban sectors. Discussions in any one sector should be within the transparent framework of policies that the country applies to all water-related services in all sectors. Then all beneficiaries will feel they are treated equally, garnering the political support so necessary for payment of the charges.

Farmers in the adjacent areas or regions of rain-fed agriculture do not believe subsidizing irrigation is equitable when they receive neither a service nor a subsidy. Nor is it judged equitable to assess any irrigation cost to adjacent village / urban beneficiaries any more than assessing farmers for village services.

## **2.4 Gaps in Information on Policies and Practices**

ICID has developed considerable information for the evaluation of service charges. This is reported by Lee (2000). The findings are based on data from schemes representing ‘best practices’ secured by the respective National Committees in twenty-three countries. Information was obtained on eighty-two water service WSEs. Fifty are ‘public /semi-public’ where the government sets conditions of service, sets charges and usually subsidizes the service agency. Twenty-three WSEs were government departments that provide the service and a budget subsidy to augment customer payments, if any.

However, even with such data and analysis, there is a serious gap in information. There is inadequate information on customer-owned and managed service entities. Very few entities of this class belong to the National Committees of ICID, essentially none in the developing countries. For various reasons, country water departments have little information on this class of WSE. IWMI, universities and other organizations have conducted some investigations, but even these are limited. Yet, very significant areas of many countries have farmer-constructed and owned irrigation and drainage systems. Most important, they have proved over many decades to be financially and physically self-sustaining.

One fact should be borne in mind. Customer/beneficiary-owned WSEs provide the majority of water-related services – urban and rural -- in the world.

These may be a quasi-government with a customer-elected board of directors, a similarly organized non-profit entity without taxing powers, or sub-units of local government governed by a council that is elected by the customers. Typically, these are the best managed WSEs precisely because the customers set forth their service objectives and elect their representatives to the management body that has the power to hire and fire the administration and as a result, their workforce as well. The customers have a continuing ‘regulatory’ oversight with direct communications to those responsible.

There is another characteristic consistently found in these and other water supply and/or distribution WSEs that are physically and financially self-sufficient. The WSE, be it a municipality or customer-owned irrigation service provider, retains the entire water right and does not delegate it to the customers. Typically, and in accordance with utility principles, the charter requires the WSE to provide equitable services to all within the boundaries of its jurisdiction. But that does not constitute ownership of a recorded or tradable portion of the water right by the individual customers. The water right is the most important and an

irreplaceable asset of these WSEs. The membership cannot afford to have some members sell their portion of the water right outside the WSE since it affects the financial viability of the WSE. Such sale / transfer would also directly affect the operational utility of the infrastructure for remaining members. And lenders relies upon this asset remaining in full with the WSE organization and its obligated membership. Only the WSE can negotiate changes in its water right. This aspect of WSE financial self-sufficiency cannot be divorced from other preconditions for setting service charges.

Obviously, there are a great many examples where government agencies at the state or central level provide very efficient, high quality, reasonably priced services. Caution should be exercised before judgment is rendered concerning such WSEs. There are good reasons why village, town, county and city services are largely provided by subunits of local government in most developed countries and many developing.

Nevertheless, efficiency and competence of such WSEs can be impossible to attain where the politics of high employment, inadequate civil service rules and enforcement and financial malfeasance are encountered. These conditions may change as democratic principles are introduced at all levels of government.

Very limited information on all water-related services for the urban and rural sectors is available in a common format. In some countries, subsidies for urban water-related services and sewerage are greater than those given rural services. Since the one objective of the Second WWF was full cost recovery and since equity is a universal objective, a country's service charge policies and practices should be examined on a common basis for all sectors. A full study is beyond the scope of this document.

## **2.5 Country Experiences with Financing Policies and Practices**

As discussed, a range of historic information is required to properly analyze options and formulate fair, sensible, financing and service pricing policies. These include the experience of all classes of WSEs, the 'sustainability' of the various classes, the stated policies of government, and the degree of consistency of policies in both urban and rural sectors.

**2.5.1 Worldwide Experience** Those principles of full financial cost recovery discussed earlier largely held true in Europe and North America prior to the early 1900s after which government projects were launched with varying levels of subsidies. Indeed, the principles remain in areas developed prior to the 1900s and have continued to be applied in many of the more recent projects.

Prior to the era of international lending, construction of many existing irrigation systems in developing countries - Nepal (65%), Indonesia (20%), Morocco (55%) and India (unknown) – indeed, in just about every country – was entirely funded by the farmers organized as customer/beneficiary-owned WSEs. These continued with self-financing of the O&M.

The world-famous Valencia Water Court in Spain is but part of a very comprehensive WSE organizational structure established by the Arab Cordoba Caliphate over 1,000 years ago and respected by all subsequent rulers. This provides a water rights system that is tied to the land and not permitted to be sold separately; operating rules; equitable full cost recovery from customers and an internal enforcement mechanism. This WSE has been truly sustainable through all matters of rule, adversities and economic conditions.

In widely separated countries, people living in areas prone to inundation by storm water organized and dealt with flooding in the same manner. In the Netherlands, local rural communities in 1100, in Germany in 1200 and England shortly thereafter established what became customer-owned WSEs. Many of these WSEs have evolved into multi-purpose

water, waste, and environmental management entities (van de Ven 1993 and others<sup>2</sup>). (Some countries, such as the Netherlands subsidize construction of the main drainage pumping plants, seen as a broader public good.) There are tens of thousands of these WSEs in these countries to which may be added similar numbers in North America. Earlier irrigation, drainage and flood control developments of similar structure are found in Asia, the Middle East and North Africa.

Today, government irrigation agencies in the developing countries rationalize some level of cost recovery for setting service charges on the recently constructed schemes. By the very nature of political influence over government services, the adequacy of charges to cover costs vary greatly – but are almost uniformly below full costs of services.

The greatest variation regards recovery of the capital cost component. Most developing, but also developed countries such as Australia and UK governments, have foregone recovery of past capital costs on water-related service facilities. Australia and UK policy are to recover costs on new investments – in the case of UK by the for-profit companies now operating the facilities. Through the assessment of local labor contributions, China did recover a majority of the costs of constructing irrigation and agricultural drainage and even major components of regional flood control works. The policy of the US government is to recover all capital costs of urban and power services. The only subsidies to irrigation on the US Bureau of Reclamation (USBR) projects are interest on the initial construction. However the full capital costs of irrigation is included in service charges. Recovery of capital costs of local flood control facilities have varied.

Taxes on farm produce are used in some countries, but it is difficult to ascertain the portion allocated to the water-related services. This will be discussed further in the examples of individual countries.

Local storm drainage, agricultural drainage, and flood control services typically protect all property within an area. In many countries today, O&M service costs for such services are now assessed to all beneficiaries (sometimes prorated among zones of different benefits) and varying portions of capital costs are collected through a property tax or a required contribution of labor for maintenance. Local government councils and their tax collection units often function as the management agency since O&M is low and intermittent; hence, no permanent WSE administration staff is required. Typically there is no cost recovery for regional drainage or flood control in the developing countries either, though some may require adjacent beneficiaries to provide labor for maintenance.

Subsidies are common in essentially all countries. Developed countries and the developing may subsidize services for purposes of accelerating the completion of facilities and hence the service – particularly for pollution control. All countries have policies to assist the most poverty stricken with access to services for purposes of basic health and those economic activities that they pursue for economic survival. It is in the latter vein that irrigation and drainage subsidies are justified in some regions. Unfortunately, political pressures in every country also result in subsidies that cannot be justified for those reasons – be it agricultural in some of the richest developed countries or irrigation in the developing.

When subsidies are deemed to be justified, some urge paying the subsidies directly to the farmers as being more efficient than reducing the service charges below actual costs of services. This obviously holds true wherever an excess water supply is available, but can be very costly to administer.

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<sup>2</sup> Van de Ven, G. P., 1993. Man-made Lowlands Utrecht, Stichting Matrijs.

A more pressing question exists concerning subsidizing water-related services for the developing countries. Can the country afford to grant funds adequately to ensure a sustainable service? The answer in an increasing number of countries is that the mushrooming demands on their national budgets will force the customers/beneficiaries of irrigation and drainage services to pay full O&M at a minimum in labor or fees for the services -- or there will not be any services. The financial resources available to each individual country will dictate the portion of the costs to be recovered. But very few developing countries can meet the huge need for urban infrastructure in the immediate decades without substantial customer/beneficiary payments towards the construction of all service infrastructure, including much of that in place. The governments' obligations for outstanding infrastructure related debts to international, bilateral and private lenders have a high priority.

Privatization has been touted as the solution to much and that includes the water services sector. However, China is restraining further trails in the rural sector at this time. Results of attempts in the urban sector of both developing and developed countries are also found.

(Hall and Lobina 2001<sup>3</sup>). The Wall Street Journal headed its July 21/03 "The Outlook Column" – "The World Bank as Privatization Agnostic." It stated that, "The World Bank, apostle of privatization is having a crisis. Its privatization of water projects is failing. " 'There is certainly a lot of soul searching going on,' says Michael Klein, the World Bank's Vice President for the private sector development." Subsequently, the Bank is also restraining its efforts.

China is the only country that has legislated a 'resources' charge for certain classes of water diversions. This charge earmarked for improved resources management purposes is independent of any costs of providing the services. However, at the time examined (1998), records were unreliable/unavailable regarding the application and actual recovery rate. But it appears that any funds that were collected were deposited in the provincial general revenues account. The current status of this policy and its application is unknown.

To augment the general world-wide information, the experiences of several individual countries with service charges, WSE financing and the institutional issues pertinent to these questions are offered in the following sub-sections.

**2.5.2 Bangladesh.** Proven, self-sufficient, for-profit WSEs are essentially limited to small areas for irrigation supply. Nevertheless, they are important in some countries because of the source supply.

In the delta areas of Bangladesh, small groups of farmers, most with 0.5 hectare and less, contract with an individual as a WSE to pump and distribute the water to their rice plantings. Payment to the pumper is a share of the harvested crop. He has incentives to conserve pumping fuel, hence also water, yet to secure maximum production. Each farmer makes partial payment before being allowed by the farmers' group to harvest; final payment is made upon completing harvest.

The individual provides the low-lift pump (transportable), fuel and labor. By nature of the payment, his service includes opening and maintaining the field ditches to ensure efficient water distribution. The 'pumper's' source of water is from natural or government constructed channels, within large leveed areas. The government provides at no charge the bulk supply to the leveed areas by low channel diversion structures or low lift river pumping plants that

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<sup>3</sup> Hall, D. and Lobina, 2001. Private to Public: International lessons of water remunicipalisation in Grenoble, France, Presented at the AWRA conference, University of Dundee, August 2001

entail relatively low O&M cost. Similar services (supply with or without distribution) are provided in many other areas outside the delta proper by well-owners'

**2.5.3 China.** China's particular history of traditional organization, means of construction and assignment of O&M must be understood for an evaluation of its forms of WSEs, cost recovery, service charges and charge mechanisms. China's Central, provincial and some county governments provide bulk water-related services. However, being most similar to a federal form of government, the provinces take the lead. They effectively 'own' the rights to water within their jurisdiction and are responsible to see that their citizens are served. Central government enters only on inter-provincial matters.

The traditional form of WSEs still dominate with the technical management structure of the bulk schemes varying from two levels on the smaller to four levels on the very large (Quin 1994<sup>4</sup>). Most government WSEs are structured to match the appropriate government jurisdictional boundary. Seventy-seven percent of the nation's water service schemes are located within the jurisdiction of one county or the main portion of the benefited area is located within one county, simplifying institutional matters. This number does not reflect the great many small supply/distribution WSEs managed by the farmers also located within one political unit.

Traditionally, an irrigation area "Congress" has oversight and approval power on policy and certain operational matters and serves as the link with sub-areas and their customers. These bodies consist of representatives of the customers and hold annual or semi-annual meetings to discuss water allocation, project repairs and charges; to mediate conflicts; and to provide a degree of management oversight. The Congress is the highest authority and has powers to critique and dismiss the involved governmental WSE's management staff. It elects a small Commission composed of three to five individuals that functions on its behalf to meet regularly and provide the immediate contact and oversight of the region's management units (bureaus, departments, institutes, etc.)

Congresses may be created for every size of governmental WSE and are usually established for each branch and lateral within the bulk service area as well. Often Commissioners for the branches and laterals are elected directly by the customers / farmers. The Congresses may utilize township government to handle administrative matters and country agency professionals or direct hires to operate the scheme.

According to government reports, farmers of the land to be served paid through labor and limited fees over 96% of all irrigation and drainage construction from 1945 (indeed before that too) until recent international lending. Thus, there have been no significant government subsidies for the construction of the service facilities – irrigation and drainage – except for these recent schemes.

Government 'pricing' bureaus set service charges for bulk supply and sometimes for distribution. These often fall short of actual costs and is a major problem in the poorer political jurisdictions that cannot make up the difference by subsidies. Typically, customers pay charges with fees or labor. In some instances, village government provides subsidies to the distribution WSE. In other instances, pricing bureaus have set excessive charges in village areas as a means to finance both O&M and unrelated village programs. Field ditch irrigation and management groups composed of farmers carry out elementary O&M. In response, international agencies' heavily promoted a 'free market' concept. Some provinces are experimenting with various forms of 'for-profit' WSEs to provide bulk water-related services.

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<sup>4</sup> Qian Zhengying, 1994. Water Resources Development in China, Beijing, China Water and Power Press.

Various forms of 'companies' have been introduced. One example 'for-profit' WSE exhibits the potential pitfalls. Existing government officials have been granted most or all of the stock, (in other instances the county may retain some). Farmers are closed out from any consequential stock purchases and from any management roles. There is no recognition of the fact that the farmers paid for the assets – the facilities. Dividends are paid and bonuses are provided to management for reducing O&M costs or expanding services. Obviously, delayed heavy maintenance and replacements can easily be reflected as 'savings' while emergency aid from government can cover major outages. And any expansion of service area (often cited as a virtue of for-profit operations) with the associated increase in water consumption, creates deficiencies to existing downstream or groundwater users. Indeed, the for-profit incentive encourages capture of additional water, always at the expense of downstream users.

Charge rates for these WSEs may be set by the pricing bureaus too; some charges less than sufficient for full O&M. Yet, 'profits' are being recorded and dividends are being paid. Unrelated outside investments by the WSEs may be used to cover the shortfall. But in accordance with some 'for-profit' WSE bylaws, the financial records are designated as 'secret,' not open to the customers and violators can be prosecuted.

China has no effective government regulatory bodies to oversee and audit fiscal and service performance of these for-profit WSEs. A cursory review indicates that these trial 'for-profit' organizations cannot meet objectives, place facilities and services at risk, and will require substantial financial and administrative support from the government. There are reasons why inadequately regulated for-profit monopoly WSE are not found in the irrigation and drainage sector of developed countries. As noted earlier, in mid-2003, most provinces placed a hold on creating more for-profit WSEs and the World Bank has reversed its policies.

Municipal and village services in China are provided by the traditional WSE sub-units of local government. A limited number of water and waste treatment plants are being constructed and will be managed by foreign firms as for-profit WSEs.

The arrangements for local drainage and flood control would appear to parallel the long established arrangements for irrigation, except there is essentially no cost recovery. Regional and national flood control falls under a Central government agency and its river basin commissions with maintenance costs fall under Central and provincial government responsibility. In 1998, China assessed labor contributions to inhabitants of the tier of counties parallel to the Yellow River to help restore and upgrade river flood control levees.

**2.5.4 Ecuador.** Ecuador, several decades ago, legislated the means to form self-financing WSEs in both the rural and urban sectors. The city of Quenca has a quasi-government WSE that provides water, sewerage and electrical services. Smaller towns and villages likewise have established WSEs or sub-units of local government to provide the services. No dedicated government subsidies are provided now, though the treatment of initial capital costs are not known. But Central government passes to local government, which have limited taxing powers, 15% of tax revenues collected by Central government. Rather than tied to specific Central government programs, this allotment augments local government's general budget for its social, infrastructure, security and administration programs as they judge best, including domestic supply in poor areas. The two larger cities of Quito and Guayaquil, however, suffer the corruption of non-payment of the related property taxes and much of the urban service charges.

**2.5.5 Egypt.** The government retains responsibility for essentially all agricultural water-related services. In spite of much study and outside efforts, farmers pay an insignificant, if any, charge for these services. Nevertheless, nominal recovery of capital costs for

improvement works is scheduled over a long period with several years grace and no interest or provision for inflation.

**2.5.6 India.** Water resources management responsibilities reside at the state level. Except for groundwater development, which is essentially unregulated, the 'tank' systems in the south and the numerous small local gravity supply systems, the respective state governments retain responsibilities for services. In some, such as Haryana, cost recovery for O&M through direct charges and special taxes on non-agricultural users within the service areas, exceed 90 percent for gravity-diverted supplies to much less for higher lift gravity systems that entail pumping. This is perhaps the highest recovery rate of any state. Gujarat and Maharashtra levy charges based on crops, but again political decisions influence charge rates and payments constitute an inadequate portion of O&M costs. Groundwater pumping by farmers is subsidized by reduced electricity charges to a varying extent and depending on the party in power.

Gujarat sold several hundred million dollars worth of state obligation bonds (the state guarantees payment) on the domestic market to replace the canceled World Bank loans for the Narmada Project. Ahmedabad likewise financed its urban water system expansion to use its new supply. The state covers bond interest payments during the construction period. However, the adequacy of the service charges that will be applied once full water service commences to cover these and system O&M is unknown at present. Unfortunately, the Narmada power development and associated revenues flow linger.

Several Indian states are experimenting with the transfer of government service responsibilities. However, the financing mechanisms provided, condition of facilities, crop price controls, lack of water rights and politics -- all factors affecting sustainability -- place most of these transfer WSEs at risk. This is true even when no investment costs are included in the calculated service costs.

All drainage and flood control costs are covered by the state governments.

**2.5.7 Peru.** Peru has evolved a basic form of WSEs, essentially identical to a form of WSE found in countries as different as China, Canada, Germany and the US, that has proved highly effective and self-sufficient. The country was also early in enacting a rigorous water rights system. (Unfortunately, President Fujimora shifted administration from his office to local officials who in turn over-allocated water to favored developers. This is now a serious problem in some basins.)

Most of the urban and village services, irrigation and agricultural storm drainage have been provided by customer / beneficiary-owned WSEs, local government-owned WSEs or individuals for many decades. The remaining bulk water supply services now provided by the government agency INADE are to be transferred to such entities in the immediate future. The customers of old irrigation schemes, which serve 80% (650,000 ha) of Peru's irrigated land, pay for all O&M and replacement (OM&R) costs of their distribution systems and local storm drainage. This applies also to the diversion and bulk supply in many of these areas. The production of high value crops for export attest to the quality of services. The Canate is an example, growing asparagus, peaches, pears, nectarines and table grapes for export to Europe. Irrigated farms vary from two to more than 250 ha.

The 15,000 hectares Canate system, built in 1923, consists of five distribution WSEs that receive supply from the valley's 'bulk' supply WSE. Each distribution WSE is governed by a board of directors elected by the farmers that sets and collect charges, maintains its own bank account and directs the O&M staff. The Board of the bulk supply WSE consists of the president and secretary of the member distribution WSEs, and sets and levies service charges to the districts, maintains its own bank accounts and directs its O&M staff.

Essentially, none of the initial government capital investments in these distribution facilities has been directly repaid. And those old and new distribution schemes that receive bulk services from Central government (INADE) today pay little if any of the INADE's O&M costs and none of the investment cost. This holds true for both irrigation WSEs and major cities like Trujillo. Indeed, today (2002) the customers of Trujillo's treated urban water service pay lower service charges per unit of delivery than the adjacent farmers pay for untreated water delivered to their land.

About 20% (180,000 ha) of Peru's irrigated area is owned and served by individuals and small groups that have paid all investment and pay their ongoing O&M. A similar record of cost recovery is found in the water supply service charges in the smaller villages, cities and urban centers. Customers pay to cover the investments and O&M for water supply service, and in the older areas of major cities, for sewerage services. Most of the larger flood control works and those that are entirely rural facilities have been constructed and financed by the Central government. The beneficiaries have not contributed to the investment, but have provided minor maintenance. However, several facilities for local flood control near or within cities and urban areas have been constructed and funded by the local government. This is also the case for urban storm water drainage. In such instances, the beneficiaries pay the cost of the service through taxes.

Drainage to control groundwater levels near the ocean in several Peruvian river valleys is sorely needed. It is anticipated that the irrigation WSEs of each valley, coupled with farmers in the immediate areas of distress will have to finance most if not all costs of such works.

**2.5.8 United States.** Most water services in the United States constructed prior to 1900 were self-financed by the customers except the many very small local well systems built by village entrepreneurs. The quasi-government form was the most common, but non-profit mutual companies were created, particularly in the mountain states. Eighty percent of California's current irrigation distribution systems are quasi-government WSEs constructed in the early 1900s. Then, local quasi-government WSEs were formed to finance, construct and operate systems serving up to 100,000 hectares. (Davis 1984) (Barnes 1987<sup>5</sup>). 'For-profit companies' that constructed major surface water irrigation systems in the late 1800s universally failed. The primary purpose of several investor-owned irrigation companies in the western US at that time was to improve lands to enhance prices for their subsequent sale.

Many thousands of self-financing storm water drainage and groundwater control quasi-government WSEs (now serving over 60 million hectares) were established in the US during the 1800s and early 1900s. The urban water, sewerage and storm drainage of then existing cities were self-financed by similar WSEs.

State governments assumed a portion of the bond and loan payments for a limited number of local agricultural drainage WSEs during the severe economic depression of the 1930s to avoid a reduced bond rating for all special districts in the respective states. The special property taxes on the beneficiary farmers for repayment were fully restored in the 1940s and projects constructed since received no assistance with financing.

The USBR was created in 1906 to develop irrigated areas and assume some failed for-profit schemes within the seventeen western states. The Congressionally mandated USBR repayment, budget, and ownership policies were shaped to recover all capital and OM&R costs; fund adequate OM&R to ensure sustainable services under all conditions; require customer-owned WSE's to be structured with full self-financing capacity; and isolate its

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<sup>5</sup> Barnes, D. H. 1987. *The Greening of Paradise Valley Where the Land Owns the Water and the Power*, (Modesto Irrigation District) Fresno, Crown Printing.

service charges from subsidy/charge rate pressures. (Features of these policies would be appropriate for the transfer of government systems in the developing countries.)

The USBR proceeded to construct storage and bulk water delivery conveyance systems and constructed distribution facilities to those areas that sought the bulk services and would organize, before any construction started, as a quasi-governmental WSE with taxing powers under the appropriate laws of the state in which they were located. The USBR charges full cost of the bulk services, including capital, to the distribution WSEs. Congress did not require irrigation WSEs to pay interest on the capital investments, this being the only subsidy on USBR projects and services. Urban customers and power customers are charged interest as well as all other components. (Given the period of most construction, 1906 though 1970, interest rates on Federal borrowing were very low.)

OM&R of USBR-built distribution systems is entirely the responsibility of the farmer-owned WSEs which must charge customers to cover all associated costs including the USBR's capital costs of the WSE's distribution facilities and the USBR bulk service charges. The USBR monitors the adequacy of the WSE's OM&R with the right to remedy deficiencies and charge any incurred costs to the WSE. The USBR retains ownership of the WSE's USBR-built distribution facilities after capital cost payoff, but will negotiate a transfer of ownership of those facilities to the WSE if the WSE so desires.

All revenues from power and water-related services generated by the USBR are deposited in the federal general revenue fund. Independently, Congress appropriates bi-annual budgets to fund the USBR OM&R at levels to ensure sustainability and compensate for any subsidies or repayment delays that Congress may impose. The USBR retains ownership of all bulk service facilities after the capital costs have been paid off by service charges, with the exception of one facility that was transferred to the sole distribution WSE served by that facility. After capital cost payoff, the bulk charge rates are reduced to only OM&R costs.

During the depression of the 1930s, full repayment of USBR-built water supply facilities was postponed for their urban and irrigation WSE customers as were the charges for any Federal-constructed irrigation distribution schemes. But the repayment obligations remain and in the 1980s, rates were increased to full cost recovery.

Areas served by the Hoover Dam under the Boulder Canyon Project received special provisions forced by political, water rights and economic considerations. The three benefiting states, including the Southern California urban areas pay a nominal amount for water from this source. The 180,000 hectares Imperial Irrigation District does not pay for water passing Hoover Dam since it holds prior water rights on the Colorado River awarded before the dam was contemplated.

The California Water Project constructed in the 1960s through 1970s recovers all costs of services, including construction of facilities, for bulk deliveries to agricultural and urban WSEs in the Central Valley and Southern California. There are no subsidies provided for services from this immense system.

Beginning in the early 1900s, the US federal government launched 100 percent subsidized regional flood control in the US while later, local flood control projects received 75 percent Federal grants for construction, but none for O&M. In recent decades, Congress reduced grants to 25% of the cost for regional flood control and local projects, but ironically continued high subsidies for repeated storm damage to coastal second-home residential developments.

From the 1970s until today, significant Federal assistance programs fund certain urban and village service expansion. These have focused on pollution and waste treatment, but even

supply systems for smaller towns have received loans or grant subsidies. However, the vast majority of all urban water-related services are funded by the customers through the usual mechanisms of property taxes and service charges.

Except for a few situations in the Western USA, there are limited examples found where adjacent non-farmers contribute to the cost of the irrigation service. Some cities formed as part of the land development schemes were included in the WSE district from the onset and the property is assessed for services, which also includes low cost electricity generated by WSE facilities. In others, the WSE provides the city's water and electrical service, but follows the usual utilities principles.

A related situation is found when common facilities provide service to a variety of classes of beneficiary. Often, non-irrigation users pay far higher charges because they receive a more reliable and higher priority service. This is not a cross-subsidy among beneficiaries, but reflects services that can support different economic activities or serve domestic uses.

Though water deliveries are closely managed due to the limited water rights available to the WSEs, particularly with the government's reallocation to environmental uses, only one example was found where pricing was used over a period of time to influence water use. The Button Willow district in California's San Joaquin Valley has serious drainage-related problems caused by the leached salts from the soil profile. To reduce excess applications and hence drainage, the farmers agreed on the quantity of water adequate for each crop grown in the service area. Their WSE set the charge rate for these quantities of water to a level for full-cost recovery. However, they raised the normal crop charge rate substantially for water delivered in excess of the agreed quantities to a crop. This seems to have worked well with good control of drainage since the policy was adopted over ten years ago.

One of the conditions of quantifying water use rights is the appropriateness and reasonableness of the use and that includes unit use. This, together with the government's issuance of use rights to return flows to downstream users has provided the high basin 'efficiencies' without introducing the complicating and costly administration of price incentives in a highly diversified cropping often variable soil types.

## **2.6 Experiences with Creating Financially Self-sufficient WSEs Responsible for Schemes Transferred from Governments**

The transfer of varying levels of responsibilities for system operation and maintenance for government-constructed systems, and hence service charges, has been underway for several years in a number of countries. Unfortunately, in many instances, the transfer of responsibilities for these complex services that form the foundation of the agricultural economy to newly created local WSEs are treated in a rather simplistic manner. The objectives of transfers may include increased operational efficiency, reduced costs to government, improved services or just removal of government responsibilities for such services. Sometimes it results from the popular view that stakeholder involvement is 'good'. Unfortunately, the steps required for sustainability of the transferred services and responsible WSE are seldom fully rationalized. An array of approaches has been applied. Experience shows varying results depending on government policies, condition of the system, service potential, customer organization, financing powers of the WSE, reliability of water rights, politics and other factors. In a majority, basic proven principles have been ignored and several of the many essential prerequisite actions were not taken. Some examples were noted earlier. Several studies have been conducted and for the purposes of

exploring the extent and adequacy of pricing services under transfer programs. The findings of one will be cited (Frederiksen and Vissia, 1998<sup>6</sup>).

Selected transfers in six countries were examined at length to assess results and note causes of any inadequacies: Sri Lanka, Indonesia, Nepal, Mexico, Turkey and USA. (This study also reviewed results provided in a number of other reports by various international organizations and individuals.)

In all cases, water charges to the extent levied were based on the costs of some portion of the service. The results were mixed. One recovered no costs; two were inadequate in all categories of costs; one was adequate to cover most of O&M only; one was adequate in O&M and rehabilitation, and one was adequate in all categories of costs.

The referenced study includes a detailed guideline of policy, legislative, bureaucratic and social conditions that must be in place before a transfer can be successful. The transfer failures can be attributed to the absence of one or more of the listed mandatory conditions that include basic data programs on the country's resources so that it can establish and affect a water rights program and ensure a reliable supply.

Transferred farmer/ system water rights were inadequate for all countries but one. Of the six, only one had a fully adequate legal form of organization for the WSEs that would allow it to become financially self-sufficient. Other gaps in the preparation and implementation of the transfers were also evident. Thus, there were logical reasons why charges had not or could not be increased to the level of full cost of services. The permitted financing means and capacity is a key issue coupled with government constraints on pricing by the WSE – usually for political reasons. In these cases, the WSEs are doomed to failure or to be subsidized by others.

## **2.7 Findings**

An attempt has been made to describe example methods that are currently used for charging for services in irrigation, drainage and flood control. The primary focus was to determine policies and mechanisms for charging that have been successfully used over a long period by self-sufficient WSEs.

The experiences from this investigation indicate that:

1. Irrigation and drainage systems constructed by farmers or local villagers prior to the era of major government involvement and where an informal or formal water rights system existed, remain physically and financially self-sufficient.
2. Users of both the very small informal WSEs and the larger formal WSEs devised and funded the construction of the facilities and their operation, maintenance and replacement.
3. One characteristic of physically and financially self-sufficient WSEs is that service charges are levied to all beneficiaries/customers at a rate that recovers all financial costs of service – construction, operation, maintenance, management, replacement and borrowing -- and nothing more. The only excluded cost may be recovery of investment if it did not remain with the WSE. None include a component to provide for 'profits' nor any representation of the opportunity cost of the water

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<sup>6</sup> Frederiksen, H and R. Vissia, 1998. Considerations in Formulating the Transfer of Services in the Water Sector, International Water Management Institute, Colombo, IWMI.

4.Charges for bulk water supply provided by another WSE are incorporated together with the distribution WSE's costs into the charges that the WSE levies to its individual customers.

5.There are no example WSEs of any type that base service charges upon the free market, opportunity costs, marginal costs, economic costs or assessments against bordering properties. This is also true of urban services except for a few cases where WSEs charge a modified marginal cost to urban areas located outside of the WSE's legal service area.

6.A characteristic of the vast majority of the world's WSEs proven to be physically and financially self-sustainable is that they are directly or indirectly owned and governed by local customers/beneficiaries of the service(s).

7.The vast majority are formally organized as quasi-governmental WSEs or local government subunits governed by elected representatives of the customers/beneficiaries.

8.Proven, successful, for-profit, irrigation WSEs in developing countries are almost exclusively small, serving a cluster of farmers with well supply or low lift pumps from open channels. Usually they have no formal rights to the water.

9.Successful, farmer-owned WSEs for irrigation created as a part of government construction programs were simultaneously created at the time of or before the major works were constructed and are of the quasi-government form of organization. These receive bulk supply that may be subsidized or at full cost from a government system, and in addition, cover all internal distribution system costs of service.

10.Irrigation WSEs recently created by the transfer of responsibility from government for government-built systems usually levy charges based on some component of the cost of services; however, results are mixed and the vast majority are heavily subsidized or their facilities and services are deteriorating from lack of adequate funds.

11.Central or provincial government-operated irrigation WSEs in developing countries base charge rates on the recovery of some component of service costs, however, with few exceptions, political influence introduces various subsidies or underfunding.

12.Successful, self-sustaining drainage WSEs continue to be constructed in developed countries that have legislation providing for quasi-governmental forms of organization, but they receive no government financial support and in developing countries, use forms of WSE similar to the irrigation WSE.

13.Local and regional flood control has a mixed history with government increasingly carrying all costs as the protected area increases.

All factors in a given situation affecting the quality of the services must be considered and fully addressed by the government to ensure the financial and physical sustainability of a scheme. The actions must be within the payment capacity for the customers and the ongoing subsidy commitments government can guarantee in the future. The physical factors affecting quality and cost of services and the life of the scheme include:

1. the specific provisions of present and future water rights and access to supply,
2. the reliability and nature of services within the scheme adopted where water is insufficient for the total scheme as constructed
3. the existing condition of facilities, quality of construction (original and rehabilitation), and anticipated life.