

# The Limitations of Water Regulation: The Failure of the Cochabamba Concession in Bolivia

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This article examines the limitations of governmental capacity to regulate private sector participation in urban water supply in developing countries through an analysis of the most dramatic failure to date of a major franchise contract for supplying water and sanitation services to a large city – the 40-year concession awarded in September 1999 to Aguas del Tunari (AdT) in Cochabamba, Bolivia. Five months later, the population rioted against water tariff increases and the contract was cancelled. The paper analyses the background, context and factors that explain the failure of the concession and seeks to draw lessons for the regulation of future concessions.

Keywords: urban water supply; concession; Bolivia; regulation; private sector participation; poverty alleviation

## Introduction

Private sector participation (PSP) is expanding rapidly throughout the world in urban water supply (UWS). It has been strongly promoted by international financial institutions (IFIs) as a means to improve the dismal performance of state-owned water utilities, as measured in terms of efficiency, effectiveness and equity. PSP has also been welcomed by national governments keen to access the finance needed to expand water networks to meet the new demand arising from rapid peri-urban population growth. There is now a wide variety of experience around the world in the form that PSP is taking. The most common arrangement is the French-style franchise contract (lease, affermage or concession), under which the state relinquishes management control to the private sector while retaining ownership of the assets.

However, the franchise contract suffers from several disadvantages that cast doubt on the assumption that PSP necessarily results in improved productive and

allocative efficiency. First, there is the problem of *moral hazard* (i.e. where, after agreement of a contract the behaviour of one party alters opportunistically at the expense of the other, in the knowledge that the losing party is unlikely to cancel the agreement because of the heavy cost of doing so). Second, there is the problem of *asymmetric information* (i.e. where one party to a transaction has more information about the quality of the good or service exchanged than does the other). Third, there is the problem of *first mover advantage* (i.e. the advantage which the party winning a contract has in securing future contracts with the same customer).<sup>1</sup> Fourth, the high cost of making a bid deters competition, and these costs are ultimately passed on to the consumer. Fifth, the franchise is usually protected from market forces by an excessively long period, usually more than ten years.

This paper examines the issue of governmental capacity to regulate PSP in UWS through an analysis of the most dramatic failure to date of a major franchise contract for supplying water and sanitation services to a large city.<sup>2</sup> In September 1999, a 40-year concession was awarded to Aguas del Tunari (AdT), to provide water services in Cochabamba, Bolivia. The concession included operation of the existing water supply system and construction of the US\$214m Misicuni Multipurpose Project (MMP), a project involving the use of the water resources of the River Misicuni for electricity generation, irrigation and water supply to the city. Yet within five months, the population rioted against water tariff increases and the contract was cancelled.

The paper analyses the background, context and factors that explain the failure of the Cochabamba concession and seeks to draw lessons for the regulation of future concessions. Section one briefly describes the urban water sector in Bolivia. Section two covers the legal system and regulatory framework for water. Section three describes the UWS situation in Cochabamba prior to the concession. Section four examines the bidding procedure, awarding and content of the contract. Section five assesses the constellation of factors that led to the failure of the concession. Section six looks at the various stakeholders in the conflict and section seven critically evaluates the role of the water regulator. Section eight concludes with lessons from the Cochabamba experience for the regulation of water concessions.

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- 1 In practice, competition under the franchise arrangement is extremely limited, and there are hardly any known cases of an incumbent operator losing bids against contenders.
  - 2 The water conflict in Cochabamba was not the first case in which open opposition to PSP and a boycott of water tariffs led to cancellation of a concession contract. In the Province of Tucumán, Argentina (pop. 1.1m) consumer resistance to tariff increases forced the termination of a 30 year concession that had been awarded by a Peronist government in 1995 to Vivendi, the French global utility company. Shortly after, Vivendi doubled water tariffs and a new governor belonging to the Radical Party was elected. Service quality did not improve and in addition, water became 'inexplicably' brown. In protest, 80 per cent of residents stopped paying their bills. The new governor started a campaign that ended with the cancellation of the concession in October 1998 and the reassumption of water operations by the provincial government. Vivendi then filed a US\$100m suit against the government.

## 1. Urban water supply in Bolivia

Bolivia is a unitary state, divided into nine departments and 311 municipalities. It has a population of 8.1m (1999), of whom 62 per cent live in urban areas (World Bank, 2000: 276, 278). Access to UWS is among the lowest in Latin America. According to the 1992 census, only 75 per cent of the urban population had household water connections and only 36 per cent had sewerage connections. Even where water services exist, their provision is often seriously deficient. In urban areas, where access is far better than in rural areas, there are major problems of availability and quality. There is enormous variation between cities in terms of water availability. For instance, in Santa Cruz there is a 24-hour supply whereas in Oruro and Potosí the service is supplied for only 4-5 hours a day. The situation in Cochabamba is even worse.

Water quality is also poor. In 1985, the Bolivian government adopted the quality standards for drinking water recommended by the Panamerican Health Organization (PAHO) and the World Health Organization (WHO) and applied them to water utilities. Nevertheless, according to a National Audit Commission report ten year later, water companies in the three most important cities in the country (La Paz, Cochabamba and Santa Cruz) were still not complying with the minimum quality parameters (Contraloría General de la República, 1996).

In 1992 national regulations for water and sanitation services (*Reglamento Nacional de Prestación de Servicios de Agua Potable y Alcantarillado*) placed new obligations on formal water providers to improve the quality of water services, regarding pressure, metering, interruption of service, billing and handling complaints. Water providers were required to establish consumer service offices, to connect households within in a specified time limit and to resolve billing queries. But almost a decade later, many water utilities were only just beginning to implement these regulations.

The 1942 Municipal Law first recognised the primary responsibility of local government to provide water services, albeit restricted to urban areas. During a period of 'demunicipalization' in the 1960s and 1970s, local government was emasculated by authoritarian regimes. Responsibility for the provision of infrastructure for water services was transferred to newly-created regional offices of central government. The first water services companies were created by presidential decree from 1964 – SELA in Oruro (1964), ELAPAS in Sucre (1965), SAMAPA in La Paz (1966) and SEMAPA in Cochabamba (1967). They had the status of decentralised public companies, accountable to central government, with boards of directors headed by the mayor of each city.

UWS in Bolivia is delivered by both public and private providers. Until recently the piped network for water services in major cities was operated by the above-mentioned municipal utilities. Small-scale providers such as truck vendors operate in poorer neighbourhoods where households are not connected to the network. In addition, over 150 water co-operatives operate in cities, small towns and rural areas, with each head of household owning one share in the water company (Superintendencia de Aguas, 1998). Co-operatives are managed by an

administrative board (*Consejo de Administración*) that is answerable to a supervisory board (*Consejo de Vigilancia*). The Cooperativa de Servicios Públicos 'Santa Cruz' Ltda (SAGUAPAC) is the largest water co-operative in the world. It has been supplying water to Santa Cruz (pop. 1m), Bolivia's second largest city, since 1979 (Nickson, 2000).

There is now a general global consensus that financial planning for urban water services should be based on the principle of cost-recovery (Nickson, 1997). This involves the application of tariffs sufficient to cover existing operations as well as service expansion, improvement and sustainability. Nevertheless, tariffs in most municipal-operated Bolivian water utilities barely cover operational costs, leaving no surplus available to finance the investment required for expanding the network. As a result, public investment in water services during the 1990s was irregular and very low in comparison to other sectors.

At the same time, there was a pressing requirement for new finance to expand coverage. According to one estimate, US\$ 853m was needed from 1995 – 2000 in order to achieve 100 per cent water coverage in urban areas and 75 per cent coverage in rural areas (Dirección Nacional de Saneamiento Básico, 1995). In the past, IFIs provided the bulk of the finance required for expanding facilities in the form of soft loans. However, in the framework of the structural adjustment program (SAP) introduced in 1984, the World Bank and IFIs began to promote PSP as an alternative. Even in the cases where financial resources were still available from IFIs, water companies encountered growing difficulties in complying with conditionality clauses and loan procedures. For instance, in 1997 SAGUAPAC, whose efficiency had been singled out for praise by the World Bank, could not obtain a guarantee from the Bolivian government to obtain a US\$25m World Bank loan in order to finance its investment programme. The decision was taken on the grounds that new investment in UWS should be carried out by the private sector (Nickson, 2000).

PSP was introduced to the water sector for the first time in July 1997 when Aguas de Illimani – a consortium led by the French multinational, Suez – Lyonnaise des Eaux – was awarded a 30-year concession contract to operate and expand the UWS system in the capital city, La Paz, and the adjoining municipality of El Alto. Investment for network expansion was urgently needed in El Alto, which is one of the poorest and fast-growing cities in Bolivia. The former operator, SAMAPA, had been unable to obtain new funding from IFIs because of its very poor performance in loan execution. As a result, it could not expand the network to satisfy the rapidly increasing demand for water services.<sup>3</sup>

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3 The concession contract was considered 'a central piece of the government's strategy to provide all households in the poor peri-urban neighbourhoods of La Paz and El Alto with access to high-quality water and sewer connections' (Komives, 1998). Total investment for the concession period is estimated at US\$ 360m. Under the terms of the contract, by 2001 Aguas de Illimani is required to provide 100 per cent water coverage in La Paz and to install 71,752 water connections in El Alto (Superintendencia de Aguas, 1997). According to demographic projections, the installation of this number of water connections would ensure 100 per cent water coverage in El Alto in 2001.

## 2. The legal and regulatory framework

Bolivian legislation related to water services is complex. The ever-changing legal framework that defines the competencies of different public sector institutions and tiers of government has led to considerable overlapping in relation to the provision of water services. The 1906 Water Law first dealt with rights over the use and allocation of water resources. It remains in force although many of its provisions have been superseded by subsequent legislation. The 1994 Constitution established the principle of state ownership of natural resources, including all water resources.<sup>4</sup>

Within the framework of a major institutional and socio-economic reform programme that encouraged PSP, a national system of public utility regulation, *Sistema de Regulación Sectorial* (SIRESE), was created in 1994, covering telecommunications, transport, hydrocarbons, electricity and water services. The Bolivian regulatory system is unipersonal, comprising separate superintendents for each sector and a general superintendent who heads SIRESE. The five sectoral regulatory offices are autonomous public sector institutions with managerial, technical and financial autonomy. Although not exercising authority over the sectoral offices, the general superintendent is in effect the 'regulator of regulators'. He acts as the 'appeal judge' against decisions by sector superintendents and evaluates their performance in terms of efficiency and effectiveness. The general superintendent also approves human resource policies, budgets and internal regulations within SIRESE.

The objectives of SIRESE are to ensure that activities under its regulatory jurisdiction are carried out efficiently, to protect the interests of consumers, the state and regulated companies, and to ensure that regulation is exercised according to the law (Gaceta Oficial de Bolivia, 1994b). Sector superintendents are appointed for a five-year term and the general superintendent is appointed for a seven-year term, all of which are non-renewable.<sup>5</sup>

In July 1997, the enabling legislation for the SIRESE Law (*Reglamento de Organización Institucional y de Concesiones del Sector Aguas*) was approved by presidential decree. This established the procedures for awarding concessions and spelled out the specific functions of the Office of Water Regulation (*Superintendencia de Aguas*). The 1999 Water Services Law (*Ley de Servicios de Agua Potable y Alcantarillado Sanitario*) for the first time provided comprehensive guidance for public policy in all aspects related to

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4 The constitution states that 'concessions for public services, when exceptionally awarded, cannot be granted for a period of more of forty years' (Gaceta Oficial de Bolivia, 1994a).

5 However, Article 26 of the 1994 SIRESE Law states that, 'The first sectoral superintendents will be designated for a ten-year period. However, every year with effect from 31 December 2000, one of the original superintendents will be substituted in a random selection process' (Gaceta Oficial de Bolivia, 1994b). This provision represented a threat to the stability and independence of SIRESE because the procedures for this selection process were not specified.

water services. The law established the rights and duties of water providers and consumers, as well as norms for tariff policy and for the granting of concessions and licenses.

The law also significantly altered the institutional framework for water regulation. The Office for Water Regulation (*Superintendencia de Aguas*) became the Sectoral Superintendency for Basic Sanitation (*Superintendencia Sectorial de Saneamiento Básico*, SSSB). The former had been empowered to regulate and grant concessions for the use of water resources in general. But according to Article 9 of the new Water Services Law, the regulatory competence of SSSB was restricted to the granting of concessions for drinking water and sewerage only (Gaceta Oficial de Bolivia, 1999).

The general functions of the SSSB are common to other sectoral regulatory offices and are defined in the 1994 SIRESE Law. The most important function is to enforce compliance with regulatory rules related to water services. It is empowered to grant, revoke, extend or modify concessions and licenses, to approve tariff structures and price increases, to monitor water services performance, to intervene and sanction water companies, to promote competition and efficiency in the delivery of water services, and to act as a court of appeal in deciding on consumer complaints. Its activities are financed through a regulatory tax paid by all water services providers that operate concessions.<sup>6</sup>

Following the creation of the new regulatory structure, the normative functions for the water sector were transferred to two ministries. The Ministry of Housing and Basic Services is responsible for the development and sustainability of water services, annual planning for service expansion, sanitary education, information systems and the promotion of PSP. The normative functions of the Ministry of Sustainable Development relate to water resources management, the preservation of the quality of water sources, and environmental regulation (Gaceta Oficial de Bolivia, 1999). The responsibility of the nine offices of central government at the departmental level (*prefecturas*) is limited to planning the expansion of water services. They also share responsibility with municipalities and the Ministry of Housing and Basic Services for quality control of infrastructure works executed with public funds.

### 3. The water supply situation in Cochabamba

Water services in Cochabamba had been provided since 1967 by the municipal company, SEMAPA. By 1997, thirty years later, its poor performance was typical of that of many water utilities in Latin America. SEMAPA had 330 employees. There were 4.7 employees per 1000 connections, over twice the ratio of 2.0 employees per 1000 connections for best performing water utilities in the region. SEMAPA covered only 57 per cent of the population and had 50 per cent losses in

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6 The regulatory tax may not exceed 2 per cent of their net income minus taxes (VAT and profit tax) (Gaceta Oficial de Bolivia, 1999).

unaccounted for water because of leakages. Between 5-10 per cent of all connections were illegal, which together with non-payment by some of the largest consumers (the municipality and public sector companies), contributed to a considerable financial deficit (Ministerio de Capitalización, 1997).

In addition, SEMAPA had for long experienced serious problems of water availability, with an estimated unsatisfied demand of 39 per cent. There was a permanent situation of water rationing because of the shortage of water resources, which was compounded by the heavy losses through leakage. In many areas of the city, water was only available for a few hours once or twice a week. Water rationing was particularly acute during the dry season because of shortages in surface water. In 1997, the water resources of SEMAPA provided on average only 500 litres/second, well below the average production capacity of 645 litres/second (Barragan et al, 1998). The problem was so acute that many consumers with connection to the network had sunk their own wells and constructed their own water storage tanks. This growing reliance on groundwater to offset the shortage of surface water led to environmental health problems because of the contamination of aquifers.

The 43 per cent share of the population not served by the piped network of SEMAPA depended for their water supply on either wells or private vendors. Although the vast majority belonged to the lowest deciles of the household income distribution, they often paid more for their water, both as a share of household income and on a per litre basis, than households belonging to higher income deciles who were connected to the network.

A solution to the serious water problems facing Cochabamba had been a vociferous demand of its citizens for many years. There was widespread awareness of the need to resolve SEMAPA's financial deficit and its inefficiency in the provision of water services, as well as to resolve the shortage of water resources. One of the solutions proposed to increase water availability in the long-term was the construction of the Misicuni Multipurpose Project (MMP). This local initiative was first conceived in the 1960s, since when many technical design studies had been made. The Empresa Misicuni was established in 1987 as a public sector corporation in order to implement the MMP. It was jointly owned by the departmental government of Cochabamba, the Municipality of Cochabamba, SEMAPA and the central government. The MMP comprised the multiple use of water resources from the basin of the Misicuni, Viscachas and Putucuni rivers. It involved building a 120m dam, a reservoir to regulate the 6.6 cu.m/sec. flow of raw water, a 19.4km tunnel and a hydroelectric power plant. The project was expected to generate benefits in the form of drinking water to five municipalities in the Cochabamba valley, raw water for the irrigation of 10,000 ha. and 120 MW in new electricity generating capacity.

Following the successful negotiation of the concession contract for La Paz and El Alto with Aguas de Illimani, the government initiated a similar process in 1997 for water services in Cochabamba. The concession arrangement was chosen as the most viable strategic option because of the high investment cost involved.

When the tendering process began, the MMP was the preferred project to solve the water problems of the city. However, several feasibility studies carried out by the World Bank had concluded that the project was not viable because of its high costs, estimated at US\$300m (Superintendencia de Saneamiento Básico, 2000).<sup>7</sup> As a result, the MMP was replaced by a less costly option, the \$90m Corani project. The revised tender documents stated that the chosen concessionaire would have to sign a 'take or pay' contract to buy water from Corani S.A.<sup>8</sup> However, the concession process was aborted because of a successful legal challenge presented to the Supreme Court by the Municipality of Cochabamba. The mayor called for the cancellation of the proposed concession on the grounds of non-compliance with the procurement law.<sup>9</sup>

#### **4. The Cochabamba concession contract**

Following the aborted Corani concession, the Ministry of Investment made a second attempt in 1998 to attract PSP for the provision of water services in Cochabamba. This time companies were required to incorporate the MMP option in their bid. The bidding process was concluded in April 1999. Although ten companies had expressed an interest by purchasing the terms of reference, only one consortium, Aguas del Tunari (AdT) submitted a bid.<sup>10</sup> The bidding process was declared null and void because Bolivian law stipulated that there should be a minimum of three bids. Direct negotiations then ensued between a

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7 Nevertheless, in the mid-1990s the Italian government provided financial assistance for construction of the tunnel component of the project. An Italian company, Astaldi, began construction of the tunnel in 1997 under contract to Empresa Mísicuni.

8 Corani S.A. is a private hydro-electric company, part owned by Dominion Energy, that generates electricity in the Cochabamba Valley under a capitalization contract. In 1996 the company offered to build the Corani Project as part of the investment agreement in the contract. This would involve the construction of an 11 km tunnel to transport water to the city, as well as an expansion of the power generating capacity. The 'take or pay' contract is widely used in the hydro-electric sector. Under this arrangement, the buyer agrees to purchase a fixed volume of water at an agreed price. In the event that the buyer is unable to receive the stated volume, he must still pay for it at the agreed price.

9 However, it was widely believed that the real reason for the appeal was because the mayor supported the MMP option and wanted to exclude consideration of the Corani alternative. His support reflected pressure from politically influential Bolivian engineering and construction companies, who expected lucrative contracts from the MMP. For example, the owner of ICE Agua y Energía S.A., a member of the Aguas del Tunari consortium, is one of the richest persons in Bolivia.

10 The consortium members were: International Water Limited (UK) (55%), Abengoa Servicios Urbanos (Spain) (25%), ICE Agua y Energía S.A (Bolivia) (5%), Constructora Petricevic (COPESA) (Bolivia) (5%), Sociedad Boliviana de Cemento (SOBOCE) (Bolivia) (5%), and Compañía Boliviana de Ingeniería (Bolivia) (5%). International Water is a UK-based company, jointly-owned by the US company, Bechtel (50%) and the UK company, United Utilities (50%).

government team and AdT.<sup>11</sup> These were successfully concluded in June and AdT was granted the concession for water services on 3 September 1999.<sup>12</sup>

The concession contract contemplated an initial average tariff increase in water services of 35 per cent as well as a further tariff increase of 20 per cent in 2002, when water would be delivered from MMP. Modifications in the original design of MMP were also agreed, reducing its estimated cost to US\$214m.<sup>13</sup> The concession area for water services was limited to the Municipality of Cochabamba, excluding surrounding municipalities (Superintendencia de Saneamiento Básico, 2000). AdT signed three other contracts: a property system contract with the Misticuni Company for the lease of its main tunnel; a system contract with SEMAPA for the lease of its assets, the transfer of liabilities and the change of employer; and a license contract with the electricity regulator to generate electricity.

Under the concession contract, which came into force on 1 November 1999, AdT was granted the exclusive use of water resources in Cochabamba as well as any future sources needed for supply to consumers in the city. It was also granted the exclusive right to provide water services and to require potential consumers to connect to its system. Mandatory expansion targets for water services were established in the contract and were subject to a revision procedure every five years (Table 1 and Table 2).

**Table 1** AdT: network expansion targets, 2000–2004

Year-end	2000	2001	2002	2004
New water connections	3,850	11,800	33,600*	57,600*
New sewerage connections	4,150	12,150	34,150	58,200

\* Subject to water availability from Misticuni

Source: Concession Contract with AdT, Annex 6

**Table 2** AdT: network coverage targets, 2004–2039

Year-end	2004	2009	2014	2019	2024	2029	2034	2039
Water	90%	91%	93%	95%	97%	99%	100%	100%
Supply								
Sewerage	88%	90%	91.5%	93%	95%	97%	100%	100%

Source: Concession Contract with AdT, Annex 6

11 The government negotiating team was made up of the deputy minister of privatization, the mayor of Cochabamba, the electricity regulator, the water regulator, the president of the Misticuni Company, the departmental governor of Cochabamba and the general manager of SEMAPA.

12 In accordance with the unusual Bolivian regulatory legislation, the concession contract was signed between AdT and the water services regulator (SSSB), and not the Bolivian government.

13 The original 120m dam was reduced to 90m, producing 2 cu.m./sec. of raw water. As a result, electricity generation was also reduced, from 120 MW to 40 MW.

A new increasing block tariff (IBT) structure for charging water services was agreed in the concession contract and was published in September 1999. Water consumers were classified in nine groups. Residential consumers were divided into four 'socially defined' bands. Residential 1 covered empty lots, houses under litigation, and houses being demolished. Residential 2 covered 'precarious' constructions (i.e. basic two-room buildings). Residential 3 covered 'economic dwellings' and functional apartments. Residential 4 covered luxury housing constructed of high quality building materials (International Water, 2000). The new tariff structure was socially progressive. It incorporated differential rates within the fixed charge, with high-income householders (residential 4) paying nearly three times as much as low-income householders (residential 2) for the first 12m<sup>3</sup>. The progressive IBT ensured that in addition they would pay around twice the amount per cubic metre for consumption above 12m<sup>3</sup> than low-income householders (Table 3).

## 5. The reasons for the water conflict

The 'water conflict' was the term used by the Bolivian media to describe the six-month long conflict that erupted virtually as soon as AdT began to operate water services in November 1999 and that ended in the cancellation of the concession in April 2000 (Table 4). *The Coordinadora del Agua y la Vida*, a broad alliance of professional associations and civil society organisations, led the protest, which involved a series of road blocks, strikes and public demonstrations. In spite of police repression that led to six deaths, the population continued to riot against the contract in general, and against the increase in the water services tariff in particular. The conflict coincided with a situation of social unrest in the country at large that led the government to declare a state of emergency in early April 2000. Shortly after, SSSB informed AdT that the concession contract had been cancelled because of the widespread civil disorder and public protest (Superintendencia de Saneamiento Básico, 2000). Responsibility for water services provision was returned to the former operator, SEMAPA.

A range of factors combined to produce the water conflict in Cochabamba. Although the introduction of the concession contract was the immediate cause that detonated the protest, the emergence of such social conflicts cannot be divorced from the wider macro-economic context in which they erupt. At the time there was growing opposition to the prevailing neo-liberal economic strategy. A pioneering structural adjustment programme had been introduced in 1984 and a major state reform programme was undertaken from 1993, involving decentralisation and the capitalization of state-owned enterprises. But the upsurge in domestic and foreign investment generated by this strategy was less than expected. As a result, economic growth grew at an average annual rate of only 4.2 per cent from 1990-99, little above the 2.4 per cent population growth rate over the same period (World Bank, 2000: 278, 294). GNP per capita in 1999 was still only US\$1,010 (World Bank, 2000: 274). Despite a range of poverty

**Table 3** AdT: Tariff structure for metered water by monthly consumption range (in US\$)

Residential Categories	Fixed charge – including first 12 m <sup>3</sup> (US\$)	Variable charge in US\$				
		13–25 m <sup>3</sup>	26–50 m <sup>3</sup>	51–100 m <sup>3</sup>	101–150 m <sup>3</sup>	> 150 m <sup>3</sup>
Residential 1	1.80	0.153	0.180	0.271	0.361	0.379
Residential 2	3.02	0.288	0.307	0.326	0.361	0.379
Residential 3	4.85	0.394	0.422	0.432	0.538	0.541
Residential 4	8.64	0.518	0.557	0.624	0.768	0.768

  

Non residential categories	Fixed Charge including first 12 m <sup>3</sup> (US\$)	Variable charge in US\$					
		13–50 m <sup>3</sup>	51–100 m <sup>3</sup>	101–150 m <sup>3</sup>	151–250 m <sup>3</sup>	251–400 m <sup>3</sup>	> 400 m <sup>3</sup> m <sup>3</sup>
Commercial	11.73	0.812	0.902	0.993	1.083	1.274	1.403
Special Commercial	13.54	0.812	0.902	0.993	1.083	1.274	1.403
Industrial	9.75	0.713	0.812	0.857	0.895	0.983	1.080
Preferential	5.05	0.226	0.271	0.316	0.361	0.406	0.406
Public	8.12	0.361	0.451	0.541	0.632	0.722	0.794

Source: Concession Contract with AdT, Annex 5

**Table 4** Chronology of the Cochabamba water conflict

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1999	
3 September	Concession contract signed between AdT and SSSB.
1 November	AdT begins operations.
4–5 November	Road blocks by small farmers associations.
15 November	<i>Coordinadora del Agua</i> is created.
6 December	Municipal elections in Cochabamba. Candidates of six political parties sign an agreement against water tariff increase.
2000	
1 January	Water tariff increased by an average of 35%.
12 January	Road blocks and strikes in the city, leading to sixteen arrests. Central government ministers sign agreement with the Civic Committee for revision of the contract.
3 February	Tariff increase is reduced to 20%.
4 February	Shut-down of city ( <i>Toma de Cochabamba</i> ).
5 February	Police repression results in 22 injured, and 135 imprisoned. Signing of <i>Acuerdo por Cochabamba</i> to freeze tariff increases during revision of contract.
24 March	<i>Coordinadora</i> calls public meetings to discuss contract. Some 90,000 vote in favour of cancellation.
3 April	SSSB sends contract re-negotiation proposal to AdT.
4 April	<i>Coordinadora</i> calls for ‘final battle’ against the contract.
8 April	State of emergency declared in Bolivia, lasting 13 days. Riots in Cochabamba end in six dead and 38 injured.
10 April	SSSB announces cancellation of concession contract.

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alleviation programmes, towards the end of the decade 70 per cent of the population remained below the poverty line.

By late 1999, this growing economic crisis was giving rise to widespread protests in many parts of the country, spearheaded by teachers and police demanding pay rises. In the case of Cochabamba, there was the additional factor of an escalating protest by coca-leaf farmers (*cocaleros*) opposed to the US-financed programme to eradicate coca-leaf farming as part of its global anti-narcotics campaign. The success of this eradication programme led to a dramatic increase in migration to the city as *cocaleros* searched for alternative sources of employment. In turn, this had a major impact on the local unemployment rate and growth of the informal sector.

As described earlier, the Water Services Law and the concession contract with AdT, both approved in October 1989, had been formulated within the framework of a national policy to promote PSP in the water sector. Private sector investment was perceived as a long-term solution to the chronic problem of water scarcity in Cochabamba, by radically improving the overall efficiency and effectiveness of water services. Yet for many Bolivians, the new law and concession contract together symbolised all that was wrong with the neo-liberal development strategy – its alleged lack of concern for equity, its rejection of the role of the state, and, in country with a long tradition of ‘anti-imperialist’ rhetoric, its preferential attitude to foreign capital over the national interest.

Several provisions in the concession contract and the Water Services Law that jeopardised powerful vested interests in the concession area and surrounding municipalities, had the effect of galvanising this wider discontent and so triggering the 'water conflict' in Cochabamba. The three immediate causes of the conflict were: a tariff increase that was introduced through a new increasing block tariff (IBT) structure; the alleged threat of charging for small farmer irrigation; and exclusivity rights granted to AdT over water resources and water provision.

### *The tariff increase and new increasing block tariff*

A tariff increase of 35 per cent was agreed during contractual negotiations. It was approved by SSSB in September 1999 and introduced in January 2000. The increase brought water tariffs in Cochabamba up to the levels in force in La Paz, Santa Cruz and Sucre, but they did not become the highest in the country (Superintendencia de Saneamiento Básico, 2000). The increase reflected the large investment required to finance the MMP, as well as the need to pay off the accumulated US\$30m debt of SEMAPA. The tariff increase also incorporated the need to guarantee a 16 per cent rate of return on capital to AdT. When asked whether this factor contributed to the tariff increase, an International Water representative stated, 'This amount is reasonable to guarantee equity for partners. In our projects in the Philippines the rate of return is 17 per cent. This is a common practice in developing countries with no long history of foreign investment'.<sup>14</sup>

Although the average tariff increase was 35 per cent, the actual increase varied enormously between consumers, for three reasons. First, small and lower-income consumer benefited from the introduction of the new IBT, with increases of as little as 10 per cent. On the other hand, large and higher-income consumers experienced tariff increases as high as 106 per cent as they began to pay more per cubic metre under the IBT (rather than less as before) for their high levels of consumption.<sup>15</sup> Second, improved billing administration led to considerable re-categorisation of consumers, both within the residential category, and between categories (i.e. from residential to industrial or commercial). Broadly speaking, such re-categorisation was socially progressive. Some water bills showed increases of as much as 200 per cent as a consequence of this re-categorisation (Superintendencia de Saneamiento Básico, 2000). Third, the rapid fall in leakage rates achieved by AdT led to a

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14 Interview with Patrick Jeantet, Chief Operating Officer, International Water Ltd (18 October 2000).

15 The increasing block tariff (IBT) is based on the concept of productive efficiency (through full cost recovery) combined with equity (through cross-subsidisation). This revenue-neutral cross-subsidisation involves a rising price per cubic metre for each consumer category as the volume of consumption increases. This represented a socially progressive change from the former SEMAPA tariff structure that had greatly favoured large consumers in residential and industrial categories. Under the new IBT, these large residential and industrial consumers would have to bear most of the cost of the tariff increase.

reduction in the need for water rationing. In a context of suppressed demand, this greater water availability led many consumers to increase their consumption. Hence, to some extent, water bills increased not only because of an increase in price but also because of an increase in volume consumed.

### *Charging for small farmer irrigation*

The 'water problem' had created social conflicts for many years in Cochabamba. The scarcity of water together with the inefficient allocation of the existing water resources generated a rivalry between UWS and agriculture. Small farmers in four municipalities that surround the concession area (Quillacollo, Sacaba, Vinto and Tiquipaya) irrigate their crops using underground water resources. In these municipalities an informal market for water based on a traditional system of property rights had existed outside the legal framework for countless generations and were 'completely autonomous and independent in their management' (Barragan et al, 1998).

The growing demand for urban water had led SEMAPA to drill new wells in these municipalities. As recently as 1997, drilling in Vinto led to conflict between SEMAPA and the small farmers associations of this area (Crespo, 1999). In this context, the 1999 Water Services Law caused great anxiety among small farmers. In fact, modifications were made to acknowledge the pre-existing rights of irrigation farmers (*regantes*) in the provision of water services. Nevertheless, small farmers thought that the law represented a threat to their established rights and that water for irrigation would henceforth be charged, despite government assurances to the contrary. Hence, farmers in the municipalities surrounding Cochabamba joined the protests against AdT and carried out road blocks around the city. According to the Bolivian water regulator, 'Participation of farmers and *cocaleros* in the protests demonstrates that the water supply problem was not the only one that generated social mobilisations' (Superintendencia de Saneamiento Básico, 2000).

### *Exclusive rights over water resources*

The concession contract granted exclusive rights to AdT for the provision of water services as well as over water resources. Exclusivity is normally justified in concession contracts on the grounds that it reduces revenue risk and so encourages PSP in projects with a high capital cost and long amortization period (Komives, 1998). This was the case in the Cochabamba concession, where exclusivity was granted in order to guarantee a strong revenue basis for AdT and thereby ensure the feasibility of the high-cost MMP.

In natural monopolies such as water supply, such exclusive rights usually make little or no difference to the potential for competition (Kerf et al, 1998; Brook & Tynan, 2000). However, this was not the case in Cochabamba, where the long-standing water scarcity had encouraged the development of well-established alternative sources of supply – wells and storage tanks for the rich and tanker-based vendors for the poor. The concession contract was to the

detriment of richer consumers who had resolved their water supply problems by constructing their own wells and storage tanks. The exclusivity clause meant that they were no longer permitted to benefit from the cheaper supply from their own wells. In the short-term exclusivity also reduced supply options for low-income households. They stood to benefit most from the contract requirement that AdT should extend the network into poorer communities. But in the meantime low-income households wanted other options such as water vendors to remain available until they were connected to the network.

The granting of exclusive rights to AdT consolidated its dominant market position as principal water services provider. Hence, the concession contract threatened the vested interests of other provider groups in the concession area. In order to implement the exclusivity clause in the contract, the informal network of small-scale providers (truck vendors, small co-operatives and neighbourhood associations) were expected to disappear as AdT expanded water services. Companies involved in drilling private wells were also opposed to the concession because exclusivity and the obligation on consumers to connect to the AdT network threatened their livelihood.

## **6. Stakeholders involved in the conflict**

Several major stakeholders were involved in the water conflict – the national government, the municipal government, consumer rights groups, Aguas del Tunari and small irrigation farmers – as well as minor ones such as the Church and the ombudsman. The national government was a major stakeholder. During the 1997 presidential election campaign, the victorious candidate, Hugo Banzer, promised to solve the water problem in Cochabamba by implementing the MMP. As mentioned above, the MMP was exclusively a government initiative and lacked donor support. The government had negotiated the concession and had approved the contract. As the conflict developed, it became concerned both to protect the favourable image of the country in order to attract foreign investment and to engage in consensus-building with a disaffected civil society.

The long-standing high profile of the issue of water scarcity in Cochabamba drove all political parties to become involved with proposals for solving the water conflict. The national government had to contend with differences over the issue with its allies in the ruling coalition. One of these, the *Nueva Fuerza Revolucionaria* (NFR) that controlled the Municipality of Cochabamba, held an ambivalent position with regard to the tariff increase. On the one hand, during the contract negotiations Manfred Reyes Villa, the mayor of Cochabamba and leader of the NFR, had approved the 35 per cent tariff increase. On the other hand, once it had been implemented the municipality supported the consumer opposition to the tariff increase. The December 1999 municipal elections highlighted the tensions in central-local relations that arose during the search for a political solution to the water conflict. Although the political discourse of their respective parties supported execution of the MMP, local candidates from six

political parties signed a joint agreement against the tariff increase. The NFR resigned from the coalition shortly after the tariff increase was applied in January 2000. This reduced the credibility of the government and heightened political instability in the country.

The water conflict brought together an array of pressure groups concerned with changing government policy in order to solve the water conflict. The concession contract was widely perceived as a measure against the public interest. The inadequate participation of professional associations in the early stages of its design led to the demand for revision of the contract once it was approved. Two groups rapidly assumed the role of consumer advocate. The long-established Civic Committee (*Comité Cívico*), an association that tended to represent local business interests in each department, called for modifications in the contract and a freeze on tariffs. The other, more radical group, the *Coordinadora del Agua y de la Vida*, which included professional associations and pressure groups such as the *cocaleros* and *regantes*, demanded the outright cancellation of the contract. The *Coordinadora* soon became the most pro-active stakeholder in the conflict. Although the government sought to deny its legitimacy as a pressure group, its demands were consistent and it gained legitimacy among consumers through its use of public consultation exercises. In addition to issues of affordability, the *Coordinadora* argued that several provisions of the contract were likely to adversely affect the overall development of the region. One of its main arguments was that the contract did not guarantee the execution of all three components of the MMP – water supply, electricity and irrigation – and that AdT did not have sufficient capital to finance such a large project (Los Tiempos, 2000).

As a major stakeholder, AdT was primarily concerned with issues of service delivery as well as to fulfil the obligations set out in the contract. During the first months of operation, it managed to significantly reduce the leakage rate. But it failed to develop a pro-active stance to the growing conflict and displayed a striking lack of understanding of the local political and social scene. It appears that it soon lost interest in building a relationship of trust with consumers. According to International Water, ‘The company felt trapped between the government and the *Coordinadora*. We had to assume a passive attitude in order to avoid more conflicts’.<sup>16</sup>

## 7. The role of the regulator

In a natural monopoly such as UWS, continued and effective public regulation will always be necessary and PSP inevitably creates extra regulatory problems. Transaction costs (the costs of arranging a contract *ex ante* and monitoring and enforcing it *ex post*) will necessarily increase. Hence PSP changes the form but

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<sup>16</sup> Interview with Patrick Jeantet, Chief Operating Officer, International Water Ltd (18 October 2000).

**Table 5** Decisions taken by the water regulator during the water conflict

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November 1999	Agreement with Small Farmers Associations in five surrounding municipalities.
December 1999	SSSB calls public hearing in Cochabamba, but it is cancelled due to social conflicts.
10 February 2000	Resolution overrules 35% tariff increase by AdT.
1 March 2000	Resolution freezes tariff increase during March.
31 March 2000	Resolution extends freeze on tariff increase to April.
3 April 2000	SSSB sends proposal for contract renegotiation to AdT.
10 April 2000	Regulator notifies AdT of cancellation of concession contract.
11 April 2000	Resolution returns water services provision to SEMAPA.

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Source: elaborated by the authors

not the fact of regulation and raises the question of whether the public sector is likely to be any better as regulator than it was as direct provider (Batley, 1994).

The regulatory decisions taken during the short implementation period of the Cochabamba concession contract were directed exclusively to solving problems generated by the water conflict itself (Table 5). Factors internal and external to the organisation undermined the regulatory capacity of the SSSB during the water conflict. Weak regulatory capacity, in the form of budget constraints and lack of trained human resources, hampered the effectiveness of SSSB intervention in the conflict. As Batley & Larbi (1999) have pointed out, 'A major constraint in the capacity of regulatory bodies is the limited level of funding'. SSSB budget constraints reflected the difficult financial situation of the water companies in Bolivia. This restricted its capacity to carry out a public relations campaign about the terms of the concession.

External political pressure is another major threat to regulatory independence, especially in developing countries. Whether it is possible for regulators to maintain an arm's length relationship with political authorities remains the subject of much debate (Kerf et al, 1998; Myers, 1998). In this respect, the Cochabamba case presents an extreme example of almost constant political interference by the government from the moment that the water conflict erupted. A major reason for such overt pressure was that water services provision in Cochabamba was bound up with the politically sensitive issue of the implementation of the MMP. There is little doubt that this intervention led to regulatory capture by the government, in the process tarnishing the image of the SSSB. According to a former water regulator, 'Regulatory decisions had to confirm agreements already made by the government'.<sup>17</sup>

Negotiations and decisions over tariff-setting were dealt with by central government and not by the water regulator. The February 2000 decision to reduce the tariff increase by 11 per cent was taken by the cabinet (La Opinión, 2000). Re-negotiation of the contract and tariff freezes were also agreed between the central government and the Civic Committee. The cancellation of the

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17 Written communication from Luís Uzin (30 August 2000).

concession itself was a product of political pressure to halt the growing social conflict and the decision was taken without reference to the termination clauses and procedures established in the contract.

The lack of consumer participation in the regulatory process was another factor that emasculated the legitimacy of decisions by the SSSB. As most regulatory decisions were determined by government pressure, consumers did not feel that their interests were being safeguarded by the regulator. Ironically, it was precisely because there was no recognised association of water consumers in Cochabamba that the *Coordinadora* was able so easily to assume the mantle of defending consumer rights in opposition to the SSSB.

Lack of clarity in the legal powers for water services regulation also adversely affected SSSB performance as the following three examples demonstrate. First, from 1997 the water regulator was designated on a temporary basis and thus lacked protection from arbitrary dismissal by the executive. The interim nature of the appointment greatly increased the threat of regulatory capture by politicians and it soon politicised the regulatory office. Second, in December 1998, nearly a year before the signing of the contract, the regulator had approved a 20 per cent tariff increase that was designed to improve the financial viability of the future concession. But legal imprecision nullified the enforcement of this regulatory decision. When SEMAPA simply refused to apply the increase, SSSB lacked the legal powers to sanction the company.

Third, at the time that the contract was signed, the regulatory functions of SSSB included the granting of concessions for the use of water for irrigation purposes and for electricity generation. Yet the new Water Services Law enacted shortly after the concession contract was signed restricted these competencies to water services only. These abrupt modifications in its regulatory scope generated a degree of discretion in the regulator and reduced its overall efficiency. At the same time, it generated uncertainty for the private operator concerning its legal rights over the use of water resources granted in the concession.

## 8. Conclusion

The rapid demise of the Cochabamba water services concession has been heralded by some observers as a major popular victory in the struggle against the forces of globalisation (Lobina, 2000). This analysis suggests that such an interpretation is mistaken. The evidence suggests that the lowest five deciles of the urban population stood to gain most from the successful implementation of the contract – both in the short term (i.e. the introduction of cross-subsidisation through the IBT and reduction in leakage rate) and over the longer-term (i.e. the extension of the pipe network to poor neighbourhoods currently dependent on high-cost water vendors).

Rather, the failure of the Cochabamba concession was due to a combination of complex political, social and economic factors. The January 2000 tariff increase was the major catalyst for the opposition of consumers towards the

contract. The change from the previous SEMAPA tariff to a progressive IBT negatively affected powerful vested interests who were long versed in whipping up populist discontent for their own ends. Exclusivity in the contract challenged the interests of water vendors and well-drillers in the city. However, weak regulatory capacity by SSSB was another reason for the failure of the concession.

The Cochabamba experience shows that regulation is particularly challenging in developing countries where regulators have to deal not only with technical issues such as pricing and the quality of services but also with pressing social demands. Compared to many Latin American countries, Bolivia had made great strides in creating an appropriate system for utility regulation. The challenge has been particularly great in the case of urban water supply because this sector had different types of providers and had never been regulated before. Opening up to private sector operators in water services with the participation of international companies demanded sophisticated technical skills from regulators. The SSSB is still building this capacity and is learning to forge a relationship of with and between both private operators and consumers.

Finally, several lessons for regulatory bodies can be drawn from the Cochabamba experience, as follows:

### *Independence from political pressure*

Independence from politicians is advocated as a general principle of fair regulation. Yet in developing countries it is still a major challenge to insulate regulatory bodies from political pressure. Such pressure is particularly strong in the case of large infrastructure projects such as the MMP because of their vote – winning potential. In Bolivia, as in most developing countries, utility regulators have a strong mandate to increase access to services. But this mandate is not possible to achieve if political intervention in tariff setting continues. The Cochabamba case shows that cost–recovery in water services provision will remain difficult to achieve so long as low prices are maintained for political purposes. Political intervention in tariff setting also constitutes a disincentive for PSP in water services. Reducing the degree of regulatory discretion can help to guarantee independence and avoid regulatory capture. On the one hand, it can ensure that decisions are taken within the framework of legal regulations and concession contracts, thereby promoting greater security for the private sector. On the other hand, it can reduce flexibility in the regulatory process. Avoiding irregular situations such as temporary appointments and providing clear protection from arbitrary removal are other measures to reduce the risk of capture.

### *Transparency and accountability to consumers*

In reform processes that involve PSP, consumers should be kept well informed about the changes in objectives in water services provision. Private sector

involvement is intended to bring about service improvements and efficiency gains. However, the primary concern of the private operator is to recover investment costs and make profit. This change is often reflected in tariff increases. Regulatory bodies have to reconcile consumer interests with these private sector objectives. Consumer involvement through a consultation process when selecting a PSP option could help to minimise social conflicts once the private company starts to operate the service. In the Cochabamba case, the content of the concession contract was only divulged to the public after the contract had been awarded. For future concessions, it is important that regulators adopt a 'bottom-up' approach and enhance transparency in concession design. Regulatory bodies should encourage the formation of consumer associations with oversight responsibilities over regulatory performance. Information concerning regulatory decisions, in particular tariff increases, should be made available to the general public in an accessible format.

### *Consistency and timing of regulatory decisions*

In developing countries with no tradition of independent regulation, it takes time for consumers to gradually acknowledge its importance and viability. A new regulatory regime needs to gain the trust of both consumers and private companies. Therefore, regulatory decisions need to be consistent and sustainable over time. Regulatory decisions can be challenged through the legal system but in some cases amendments may be necessary in order to incorporate consumer demands. The timing of decision-making is also relevant. In the case of Cochabamba, the delay and eventual cancellation of the public hearing on tariffs created mistrust among consumers and called into question the legitimacy of regulatory decisions.

### *Exclusivity*

Regulators should be careful when including exclusivity clauses in concession contracts because they empower the private operator as the dominant provider in the market. This could represent a threat for regulatory independence. At the same time, the supply options for consumers without network connection are reduced. Incentives for efficiency are also reduced because of the lack of competition. Where exclusivity is justified in order to guarantee a revenue base as in Cochabamba, it may be preferable to establish a temporary period of non-exclusivity at the beginning of the contract.

### *Regulation of small-scale providers*

Regulatory bodies should develop a detailed and comprehensive understanding of how the urban water market operates. A register of current providers in the jurisdiction of the concession should be approved before the contract is implemented. The Cochabamba case illustrates the need to integrate small-scale

providers such as truck vendors over time with the principal provider. Concession contracts should include transitional clauses covering the changing relationship between such small-scale providers and the formal network system.

### *Tariff setting*

Tariff increases in concession contracts should be implemented gradually. Despite the need to finance large-scale investments such as MMP, a gradual increase of tariffs could have greatly reduced social tensions in the Cochabamba case. Where possible, tariff increases should be implemented before the concession begins. In order to gain the trust of consumers, the increases thereafter should follow visible improvements in service delivery, and not precede them as in the case of Cochabamba.

### *Capacity building*

Specialised training of human resources in regulatory institutions is essential in order to regulate a powerful private company in an effective manner. In addition to traditional technical and legal disciplines, regulatory bodies need to be endowed with skills in public education and communications. Where they lack such specialised human resources, regulatory bodies should consider the alternative of contracting out particular services needed for the regulation of private providers.

## References

- Barragán, J., Crespo, C., Donoso, G., and Escobar, J. (1998) *Mercados e instituciones de aguas en Bolivia*. UDAPE: La Paz.
- Batley, R. (1994) The consolidation of adjustment: implications for public administration. *Public Administration and Development* 14 (5): 489–506.
- Batley, R. and Larbi, G. (1999) *A summary of research findings*. International Development Department, School of Public Policy, The University of Birmingham (The Role of Government in Adjusting Economies, Paper 41): Birmingham.
- Brook, P. and Tynan, N. (2000) *Reaching the urban poor with private infrastructure*. World Bank (Viewpoint No. 188): Washington DC.
- Contraloría General de la República (1996) *Informe de auditoría sobre el desempeño ambiental de empresas que suministran agua en las ciudades de La Paz, Cochabamba y Santa Cruz*. La Paz.
- Crespo, C. (1999) *La guerra de los pozos*. CERES: Cochabamba.
- Dirección Nacional de Saneamiento Básico (1995) *Actualización del plan nacional de saneamiento básico, 1995–2000*. La Paz.
- Gaceta Oficial de Bolivia (1994a) *Constitución política del Estado*. La Paz.
- Gaceta Oficial de Bolivia (1994b) *Ley del sistema de regulación sectorial No. 1600*. La Paz.
- Gaceta Oficial de Bolivia (1999) *Ley de Servicios de Agua Potable y Alcantarillado Sanitario*. La Paz.
- International Water (2000) *Concession contract for use of water, public potable water and sewer service in the city of Cochabamba*. London.

- Kerf, M., Gray, D., Irwin, T., Levesque, C., and Taylor, R. (1998) *Concessions for infrastructure: A guide to their design and award*. World Bank (Technical Paper No. 399): Washington DC.
- Komives, K. (1998) *Designing pro-poor water and sewer concessions: Early lessons from the Aguas del Illimani Concession in Bolivia*. University of North Carolina: Chapel Hill.
- La Opinión (2000) *El Gobierno propone modificación de tarifas a Cochabamba*. Cochabamba (February 3).
- Lobina, E. (2000) *Cochabamba – water war*. Public Services International Research Unit, University of Greenwich: London.
- Los Tiempos (2000) *Entrevista a la Coordinadora del Agua*. Cochabamba (March 6).
- Ministerio de Capitalización (1997) *Report on the legal feasibility of private sector participation in SEMAPA*. La Paz.
- Myers, S. D. (1998) *Water services management: A public- private partnership*. Financial Times Energy: London.
- Nickson, A. (1997) The public-private mix in urban water supply. *International Review of Administrative Sciences* 63 (2): 165–186.
- Nickson, A. (2000) *Organisational structure and performance in urban water supply: The case of the SAGUAPAC co-operative in Santa Cruz, Bolivia*. International Development Department, School of Public Policy, The University of Birmingham (The Role of Government in Adjusting Economies, Paper 38): Birmingham.
- Superintendencia de Aguas (1997) *Contrato de concesión de aprovechamiento de aguas y concesión del servicio público de agua potable y alcantarillado en las ciudades de La Paz, El Alto y sus alrededores*. La Paz.
- Superintendencia de Aguas (1998) *Informe annual, 1998*. La Paz.
- Superintendencia de Saneamiento Básico (2000) *Informe sobre el contrato de concesión para el aprovechamiento de agua y los servicios de agua potable y alcantarillado sanitario de la ciudad de Cochabamba*. La Paz.
- World Bank (2000) *World Development Report 2000/2001*. Oxford University Press: New York.