Municipal water services in Guatemala: exploring official perceptions

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Abstract

In Guatemala, water services are frequently interrupted, water pressure is inadequate and tap water is often unsafe to drink. Water providers face the challenge of maintaining water systems and improving water services to provide reliable and safe drinking water. Understanding the perspectives of government officers may help in finding solutions to overcome this challenge. Semi-structured interviews were conducted to explore officers’ opinions and views on municipal water services. Interviews were complemented with content analysis of technical and official documents. Factors identified as determinants of the low quality of water services include low political will, lack of institutional development, low investment in water infrastructure, low household compliance with water systems, and low community participation in the water sector. Findings and policy implications are discussed.

Keywords: Drinking water; Municipal water services; Official opinion; Semi-structured interviews; Water institutions; Water policy; Water system reliability

1. Introduction

With provision of tap water gradually increasing worldwide (United Nations Development Programme (UNDP) 2006), the maintenance and improvement of water systems to provide reliable and safe drinking water arise as new challenges for water providers (World Health Organization (WHO) & United Nations Children’s Fund (UNICEF), 2006). Many cities in developing and less developed countries have a water delivery system in place. However, water systems are caught in a low-level equilibrium trap with low operational efficiency, low quality services, low revenues, and little incentive to change (Strand & Walker, 2005). System revenues are often not enough to cover the costs of system operation and adequate infrastructure maintenance. Water services are frequently

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interrupted, water pressure is inadequate, and tap water is often unsafe to drink (Gadgil, 1998; Satterthwaite, 2005; UNDP, 2006).

In such settings, households often adapt by using alternative water sources, privately investing in water infrastructure, and by treating water at home. Generally, alternative water sources and home water treatment are more costly and less efficient than tap water systems collectively provided (Briscoe, 1993; Goodrich et al., 1992). In addition, poor households are less able to afford and undertake adequate private investment in water infrastructure and storage facilities. Thus, unreliable water systems impose significant costs and distributional inefficiencies, particularly on poor households (Baisa et al., 2010; Briscoe, 1993). Under these circumstances, immediate action is required to improve current water systems and to prevent future water infrastructure falling into disrepair.

Governments can improve the provision of water services through operation of water systems, water legislation, water policies, regulation of water providers, and investment in water infrastructure (UNDP, 2006; Ward, 2007). The role of governments is very important in developing countries given that public companies provide water services to more than 97% of people in those countries (UNDP, 2006). For instance, in Guatemala, municipalities operate water systems that serve approximately 90% of the urban population and 60% of the rural population (Secretaría de Planificación y Programación de la Presidencia (SEGEPLAN), 2006). Unfortunately, municipal water services are frequently interrupted and tap water is unsafe to drink (Galindo & Molina, 2007; Instituto de Agricultura, Recursos Naturales y Ambiente (IARNA), 2005; Pan-American Health Organization (PAHO), 2001). Identifying factors behind the low quality of water services may help governments in undertaking action needed to improve water systems. DeLorme et al. (2003) argue that the perspectives of all stakeholders (e.g. users, interest groups, regulators, engineers, and government officers) must be considered carefully to find solutions to water crises. This paper focuses on the perspectives of government officers as they constantly face the challenge of improving municipal water services in Guatemala.

Several studies have explored users’ perspectives on water services (e.g. Jones et al., 2007; DeLorme et al., 2003). In contrast, the perception and views of government officers on water services have been scarcely documented. Two exceptions to this are provided by Hersh & Wernstedt (2002) and Parker (1999). Hersh & Wernstedt (2002) interviewed water utility operators in the northwestern USA to investigate vulnerabilities and responses of drinking water utilities to extreme events (e.g. droughts and floods). Their findings suggest that water rights, institutions, hazard management policy and fiscal conditions affect the vulnerability of water utilities to extreme events. Based on interviews with officers in four major cities of the Russian Federation, Parker (1999) presents evidence of deficiencies in water service provision due to lack of funding and ineffective management. These studies show that interviews with government officers are useful for identifying factors affecting the provision of water services.

This paper uses semi-structured interviews to probe the views and opinions of relevant government officers in order to identify factors behind the low quality of water services in Guatemala. The interviews

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1 Ferrier (2001) reports that the price per unit of bottled water is typically 500–1,000 times more expensive than tap water. Part of the marketing success can be ascribed to consumers’ strong perception that bottled water is safer than tap water, which is not necessarily the case (Ferrier, 2001). Briscoe (1993) reports that water from vendors is 4–100 times more expensive than tap water. Treating water at home is not cost-effective (Goodrich et al., 1992), and leads to high energy consumption, deforestation, and air pollution (Briscoe, 1993).
are complemented by an analysis of official and technical documents. Findings indicate that water services are commonly interrupted, water pressure is low and tap water is often unsafe for drinking purposes. Five factors are identified as impediments to improving municipal water services: (1) lack of institutional development; (2) low political will; (3) low investment in water infrastructure; (4) low household compliance with water systems; and (5) low community participation in the water sector.

The rest of this paper is organized as follows. Section 2 describes the current situation of water services in Guatemala. Section 3 presents the methods used to investigate factors behind the low quality of water services. Section 4 presents the results. Section 5 concludes the paper with a discussion of the results and policy implications.

2. Water services in Guatemala

Guatemala has gradually advanced towards universal provision of improved water services. SEGEPLAN (2006) reports that the percentage of Guatemalans with access to improved water services (i.e. private connections to piped water and public standpipes) increased from 63% in 1990 to 75% in 2002. Access to improved water services is higher in urban centers (89.5%) than in rural areas (59.5%).

Water services are decentralized at the municipal level. Water systems are operated by the 331 municipalities with the exception of the two major cities, Guatemala City and Quetzaltenango. In these cities, water systems are administered and operated by a municipal water utility. High-quality water services are expected from decentralization as local governments have a better knowledge of local water demand and have political incentives to use available resources efficiently (Asthana, 2003). IARNA (2005) reports that 70% of the municipalities use surface sources to provide tap water and 30% use groundwater sources. Approximately 66% of water systems use gravity as an energy source for water flows, 18.5% use water pumps, and 15.2% use a combination of gravity and water pumps.

IARNA (2005) estimates that households pay US$0.25 to US$2.00 for 30 cubic meters of water. PAHO (1995) and SEGEPLAN (2006) report that water tariffs are below the full-cost of water supply. For instance, the cost of water supply in Guatemala City is US$0.25 to US$0.30 per cubic meter of water (IARNA, 2005). According to ESA Consultores (Economía, Sociedad, Ambiente, Ingeniería) (2005), system operation costs are higher in urban centers that depend on groundwater, due to the use of energy for water pumping. Financial deficits are expected since the costs of water supply surpass water tariffs. However, assessing the economic performance of water systems is difficult given that many municipalities do not keep updated records of water users, ignore the amount of water produced and consumed, and usually aggregate water system revenues and costs into their general accounting systems (IARNA, 2005).

Urban water systems are under pressure due to population growth and migration from rural areas to urban centers. Instituto Nacional de Estadística (INE) (2006) reports a population of almost 13 million in 2006, with 48.1% of the population living in urban areas. On average, the general population grew at an annual rate of 2.4% in the period 1990–2006. The urban population grew more rapidly at an annual rate of 3.3%. According to Lindstrom & Muñoz-Franco (2005), rural–urban migration is a key component of the growth of urban centers in Guatemala. Urban water systems are unable to satisfy the increased demand for drinking water caused by the rapid urban population growth, as shown by frequent interruptions and rationing of water services (Galindo & Molina, 2007; IARNA, 2005). According to PAHO (2001), tap water services are provided during an average of 6 to 12 hours per day.
In addition, fresh water sources are being diminished as a result of environmental degradation (PAHO, 1995), which imposes further pressure on water systems. Environmental degradation is partially caused by a lack of sanitation services and inadequate water practices. In 2002, only 46.9% of households had access to sanitation services, 76.7% in urban centers and 16.8% in rural areas (SEGEPLAN, 2006). These indicators may be overestimated given that the existence of a toilet at home is used as proxy for sanitation services rather than access to a drainage system. Access to drainage systems does not guarantee an appropriate disposal of residual water given that the number of plants installed to treat residual water is minimal (Galindo & Molina, 2007). PAHO (2001) estimate than only 1% of residual waters are treated before disposal into water bodies.

Water systems are inefficient in treating water for drinking purposes. PAHO (2001) reports that Guatemala has the second lowest percentage (only 25%) of urban systems with water treatment for drinking purposes among Latin American nations, being only above Haiti. Galindo & Molina (2007) report that only 24 (out of 331) municipalities have a treatment plant to clean water, and only 15 of these plants work appropriately. In a recent evaluation of tap water, across the nation, 80% of the samples were contaminated with coliforms. Water cloudiness, iron, and nitrates were also found (Galindo & Molina, 2007). PAHO (1995) reports that five of the top ten reasons for the prevalence of diseases are related to low quality water, and that diarrhea (also related to low quality water) accounts for 30% of infant mortality.

Tap water is also contaminated in municipalities that treat water with chlorine. In these cases, the water infrastructure is outdated and allows bacteria, cloudiness and metal residuals into the tap water. Water losses are also significant as a result of outdated systems (PAHO, 1995). This suggests that maintenance of water systems is inadequate. Government officers recommend boiling tap water and treating it with chlorine at home in order to prevent water-borne diseases. In such settings, households respond by treating water at home and purchasing bottled water, which is more costly and less efficient than drinking water provided collectively (Briscoe, 1993; Ferrier, 2001; Goodrich et al., 1992).

Unreliable water systems have a negative impact on household welfare and impose significant costs, particularly on poor households (Baisa et al., 2010; Briscoe, 1993). When compared to other Latin American nations, Guatemala ranks very low in terms of the impact of water availability on household welfare, according to the Water Poverty Index (WPI) constructed by Lawrence et al. (2002). Only Trinidad and Tobago, Nicaragua, Jamaica, Mexico, El Salvador, and Paraguay rank below Guatemala. Given the impact of water services on household welfare, it is important to identify the factors behind deficiencies of water systems in order to design and implement public policies aimed at improving water services. The policy process may benefit significantly from considering the views and opinions of government officers on the underlying reasons behind the low quality of water services (DeLorme et al., 2003).

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2 The media has also reported the low quality of tap water. For example, Prensa Libre, a newspaper of national circulation, reported on 12 July 2004 that 45% of municipalities did not treat tap water with chlorine, and that 48% of the tap water was contaminated with fecal coliforms. On 25 February 2005, Prensa Libre reported that 28% of municipalities (93 out of 331) did not treat water with chlorine. For other examples, see the electronic version of Prensa Libre published on 8/1/2007, 19/1/2008, 5/5/2008, 28/5/2008, 30/8/2008, 31/8/2008, 15/12/2008 at www.prensalibre.com.


4 Lawrence et al. (2002) describe the WPI as an interdisciplinary measure that indicates the degree to which water scarcity impacts human populations. This index includes measures of water resources, access, capacity, use and environment.
3. Method

The data used in this study were gathered through document analysis and one-to-one interviews with relevant government officers at national and local levels. A purposeful sample of twelve government officers directly associated with the provision of drinking water was interviewed in June and July 2008. These participants were chosen because of the positions they occupy and their access to specific information needed for this study. Nine of these officers were involved in providing drinking water at the municipal level. The other three officers were responsible for designing and implementing drinking water policies at the national level.

The interviews were semi-structured, that is, a set of key themes was structured to be used as an interview guide but questions were spontaneously worded to generate a conversation on the predetermined key themes (David & Sutton, 2004; Patton, 2002). The sequencing of themes was also flexible, determined by the interview flow, and probing questions were used as needed to encourage elaboration. According to Patton (2002), semi-structured interviews increase the comprehensiveness of the data while following a fairly conversational and situational approach, which was deemed adequate to probe the perspectives of government officers on municipal water services. Themes for the interviews included: a description of water systems; aspects that impede solving water problems, with emphasis on institutions, financial resources, and political will; potential solutions to system problems; households’ compliance with water systems; and community participation in the water sector.

In each interview, the first question was about the current conditions of water services in the municipality. To encourage elaboration, sub-questions on specific characteristics such as service interruptions, water quality, and water pressure were asked as needed. Reasons for low quality services were also investigated using questions such as: “In your opinion, what are the underlying factors behind the current condition of water services? How would you improve the water services?” Sub-questions were asked to probe official perspectives on financial resources available to improve water services, institutional support from other government agencies, and existence of technical and managerial capabilities within the municipality. Interviewees were also asked about user records, water tariffs, payment vehicles, users’ compliance, and community participation.

The interviews were conducted, recorded and analyzed by the same researcher to avoid problems related to inter-coder reliability (Babbie, 2009), and were transcribed verbatim to maximize data capture. Each transcript was examined line by line, and pertinent material that consistently appeared in the transcripts was identified, coded, and organized by categories (Babbie, 2009; David & Sutton, 2004). The relevance of identified themes was verified based on the number of interviews in which a theme was addressed. In addition to identifying the core consistencies of interview data, official and technical documents on drinking water provision were reviewed (i.e., Aguilar Rojas, 2004; Ballestero et al., 2005; ESA Consultores, 2005; Galindo & Molina, 2007; IARNA, 2005; PAHO, 1995; SEGEPLAN, 2006; and Water Office, 2008). The joint analysis of interviews and documents allows for a more comprehensive identification of factors behind the low quality of water services, as it compares and contrasts official perspectives with findings and opinions of researchers, government agencies, and international organizations.

Direct quotations from interviewees are used for support and illustrative purposes. Quotations were translated into English as interviews were conducted in Spanish. Quotations that needed a clarifying context were supplemented with additional text within square brackets.

Patton (2002) also notes that semi-structured interviews can inadvertently omit important topics. Themes in the interview guide were revised after each interview to minimize the possibility of omitting salient topics in following interviews.
4. Results

Local officers were initially asked to describe the water system in their jurisdiction. Local officers reported several deficiencies in water systems including service interruptions, low water pressure, and outdated and damaged water infrastructure. In terms of water quality, most local officers indicated that tap water was disinfected with chlorine before its distribution, with the exception of an interviewee who indicated that tap water was not treated because the ground water was safe for drinking purposes according to water quality tests conducted when wells were drilled. In almost all interviewed municipalities, tap water was not systematically tested and therefore it was difficult to assure that tap water was safe for drinking purposes. The exception was a municipal utility that implemented a professional laboratory for tap water testing. Officers at the national level agreed that water systems were inefficient in terms of continuity, pressure, and quality. Previous studies have also documented that water services were unreliable and that tap water is unsafe for drinking purposes (e.g., Galindo & Molina, 2007; IARNA, 2005; PAHO, 1995, 2001). This consensus suggests that system deficiencies are common across municipalities and are well known at all levels.

National and municipal officers had different opinions as to the factors behind the deficiencies of the water systems. At the national level, officers pointed to the lack of institutional development and low political willingness as underlying factors behind the low quality of water services. When asked about the reasons for the current status of water services, an officer responded: “the primary factor is that there has not been an institutional development of the water and sanitation sector”. Hersh & Wernstedt (2002) and Parker (1999) also found that water institutions may affect water service provision in the US and the Russian Federation, respectively. Government officers also indicated that low community participation contributes to deficiencies of water systems. For municipal officers, however, the low public investment in water infrastructure and low compliance with water systems were the primary reasons for the low quality of water services.

Water institutions are based on constitutional human rights to health, food and nutrition, and a water legislation that is fragmented into civil, municipal, and health codes, as well as into other regulations (Aguilar Rojas, 2004). An interviewee said “managing water resources is quite complicated because we have the problem at the national level that there is no legislation on water issues”. Aguilar Rojas (2004), Ballesteros et al. (2005), and PAHO (1995) also indicate that Guatemala does not have a comprehensive water law to clearly assign functions and responsibilities to all public agencies managing water resources, and to specifically define relations between these institutions. Fragmented legislation and uncoordinated policy are also reported to be a problem with water institutions in other countries (see Livingston, 2005).

According to the water legislation, the municipalities are responsible for administrating and operating drinking water systems, the Ministry of Public Health and Social Assistance (MSPAS) is mandated to regulate the quality of water and sanitation services, and the Institute of Municipal Promotion (INFOM) implements the water policies designed by MSPAS (IARNA, 2005; SEGEPLAN, 2006). Investments in water infrastructure are undertaken by the Social Investment Fund (FIS), INFOM, and international donors. Ballesteros et al. (2005), ESA Consultores (2005), Galindo & Molina (2007), and SEGEPLAN

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6 According to IARNA (2005), at least 15 institutions participate in planning and administering water resources. For instance, the Ministry of Environment and Natural Resources (MARN) is responsible for preserving and improving environmental resources including fresh water sources. The Ministry of Agriculture (MAGA) serves as a facilitator of irrigation projects, and the Ministry of Energy and Mines (MEM) authorizes the use of water resources to produce energy.
argue that the water sector is inefficient due to institutional fragmentation and lack of inter-institutional coordination. An interviewee said “[the water sector] is a chaos at all levels”, and another officer commented that “the functions of actors [in the water sector] is unclear”.

Guatemala lacks water policies and regulations on service standards, and incentives and enforcement mechanisms for reliable provision of safe drinking water. SEGEPLAN (2006) argues that water policies and planning procedures are confusing. Municipalities have no general guidelines for water use, water treatment for drinking purposes, systematic water testing, or for system maintenance. Guidelines to develop local budgets for water system operation are also missing. An interviewee indicated that “there are no guidelines to elaborate municipal budgets and prioritize projects at the municipal level”. In addition, PAHO (1995) and SEGEPLAN (2006) argue that municipalities lack the technical and administrative capacities needed to operate and maintain water systems efficiently. An officer at the national level commented that “the [municipal] personnel are not prepared to operate a water system”. Guidelines may be more useful when operators and administrators lack technical and managerial capacities.

Further evidence of low institutional development is provided by the fact that municipalities are not completely autonomous in their role of water providers, although water services are decentralized to the municipal level. The municipalities are financially dependent on central government transfers to subsidize water services because system revenues are not enough to cover the full-cost of supply (ESA Consultores, 2005; IARNA, 2005; Galindo & Molina, 2007). One officer said that “it is not a secret that most municipalities that use water pumps [to provide water services] are highly indebted to the electric utility since water tariffs do not cover the costs”. Consequently, municipalities operate and maintain water systems according to financial resources received from the central government rather than responding to local water demand, as is supposed to happen in decentralized services.

Officers at the national level also identified low political will as an important factor behind low quality water services. One officer explained that “the last three governments (that account for the last 12 years) did not have a national policy on drinking water and sanitation”. A local officer also pointed to “the lack of will of people who have been in charge of the municipality” as a reason for the low quality of water services. Galindo & Molina (2007) reported that the water and sanitation sector was not included in the national development agenda, which is inconsistent with the relevance of water and sanitation services for social and economic development. The current government seems to recognize the importance of water and sanitation, as an interviewee reported that “the plan for drinking water and sanitation approved in March [2008] aims to contribute to improving the conditions of human development”.

PAHO (1995) pointed to the lack of administrative and financial support to undertake significant investments in water infrastructure as evidence of low political will. Public expenditure on water and sanitation has been below 0.25% of GDP since the 1980s (Galindo & Molina, 2007). In 2000–2009, annual expenditure on water and sanitation accounted for an average of 2.8% of total public expenditure. As an interesting point of comparison, ESA Consultores (2005) estimated that an annual public investment of 0.62% of GDP is required to achieve the Millennium Development Goal of providing access to improved water services to 82% of the population by 2015.

7 In 2008, the government developed a national plan that included six programs: (1) extending water services; (2) improving and monitoring water quality for human consumption; (3) promoting education and social development on water issues; (4) improving operation, administration, and maintenance of water services; (5) promoting knowledge of water issues; and (6) monitoring and evaluating water systems. In terms of improving tap water quality, the program includes treating tap water at least with chlorine, monitoring residual chlorine, and bacteria testing (Water Office, 2008).
Local officers rank low investment in water systems as the primary reason for the low quality of water services in their jurisdiction. Officers in high-altitude cities said that they would need more financial support to drill other wells in order to continuously provide water services. In order to improve the water system in their jurisdiction, two local officers in low-altitude cities said that they needed (respectively) “economic support to purchase [legal] rights to more water sources” and “economic resources to build a retention tank”. Ballestero et al. (2005) and Galindo & Molina (2007) agree that the water sector lacks financial resources to invest in water infrastructure. While water services are decentralized to the municipal level, central government is the principal investor in the water sector. Galindo & Molina (2007) reported that only 519 water projects were implemented in response to a demand for 1,300 projects in 2006 (less than 50%).

Municipal officers also indicated that low compliance with water systems is an impediment to improve water services. This low compliance takes the form of a low willingness to pay for services, avoidance of tariff payments, and illegal connections. Several officers reported that households pay for other goods and services (e.g., cable services, soft drinks and bottled water) but are reluctant to pay more for tap water. The low willingness to pay may be a household response to low quality services (Anwandter & Ozuna, 2002). Officers also indicate that water tariffs are not enough to cover the full-cost of water supply and, consequently, water systems are subsidized with municipal transfers from the central government. An officer explained that “the municipality is subsidizing a significant share [of the full-cost of water supply], approximately 60%”. SEGEPLAN (2006) argued that water projects are unsustainable because water tariffs are below the full-cost of water supply. Municipalities that have attempted to increase water tariffs have experienced strong opposition from individuals who are not willing to pay higher tariffs for current water services. Some mayors have had to resign due to public protests against increases in water tariffs (Galindo & Molina, 2007).

Some households are illegally connected to water systems presumably to avoid paying connection fees and water tariffs. An officer indicated that “there are many ghost, illegal connections that may be affecting [the system]”. In addition, many households that are legally connected to water systems do not pay for water use; others pay a small fixed tariff due to the absence of water meters (ESA Consultores, 2005). One officer reported that “out of the people who use the [water] services, only 25% is on time [in their payments]”. IARNA (2005) estimated that up to 70% of water users were late in their payments. Strong community opposition is faced when water operators attempt to suspend water services to households that are late in their payments. Due to the high political cost of increasing water tariffs and enforcing payments for water use, municipalities opt for keeping the water system in a low-level equilibrium.

Officers also reported a low community participation in the water sector. Only two local officers reported having periodic meetings with local committees. However, these officers indicated that water projects are rarely addressed by the community. Other officers reported that the communication between municipalities and communities was limited to announcements on radio and local cable channels, public meetings with the mayor, and complaints about water issues received by the water office. PAHO (1995) indicated that community participation was limited to providing labor to build water systems. ESA Consultores (2005) also found low community participation in the water sector in other Latin American countries (i.e., Belize, Costa Rica, El Salvador, Haiti, Honduras, Nicaragua, Panama, Dominican Republic, and Mexico). SEGEPLAN (2006) argued that low community participation leads to a low understanding of water issues and low willingness to pay for water services. In general, interviewees suggested that communities are not informed about the costs and benefits of drinking water services.
5. Discussion and policy implications

The perception and views of government officers and the content of official and technical documents were explored to identify factors behind the low quality of municipal water services in Guatemala. Officers reported that municipal water services are commonly interrupted, water pressure is low, and tap water is often unsafe for drinking purposes. Officers also indicate that, in general, water infrastructure is outdated and damaged. Similar problems with water systems are also found in other developing countries (see e.g. Anthony, 2007; Briscoe, 1993; Parker, 1999; Seneviratne, 2000; UNDP, 2006).

Five factors were identified as determinants of the low quality of municipal water services: (1) lack of institutional development; (2) low political will; (3) low investment in water infrastructure; (4) low household compliance with water systems; and (5) low community participation in the water sector. These findings suggest that public investments in water infrastructure are necessary but not sufficient to improve water systems. Meeting basic water needs also depends on how public policy shapes access to infrastructure through water policies and legislation which govern providers (UNDP, 2006). Therefore, sound water policies and institutional development of the water sector are needed if water systems are to be improved.

The first step towards improving water systems is promoting political will and a political culture of service provision (Briscoe, 1993; UNDP, 2006). If the government is not committed to improve water systems, water institutions will not be reformed, and public investments will remain below the level required to expand coverage of water services and to maintain existing infrastructure in optimal conditions. In September 2000, Guatemala, like many other nations, made a political commitment to halve the proportion of people without sustainable access to safe drinking water by 2015, as part of the Millennium Development Goals (MDGs). Political will is expected to increase as a result of this official commitment. Anand (2007) argued that the MDGs may justify increased investments in water infrastructure while diverting attention from operation and maintenance of the existing infrastructure. As indicated by WHO & UNICEF (2006), maintenance of existing infrastructure and sound management practices are also critical in achieving the MDG for water and sanitation. The government of Guatemala seems to understand the importance of maintaining the current water infrastructure, as the national water plan includes improving the operation, administration, and maintenance of water systems (Water Office, 2008).

In addition to political commitment, findings suggest that an institutional reform is needed in order to improve water services. In a recent evaluation of water legislations in Central American nations, Aguilar Rojas (2004) found that these countries do not have comprehensive water laws and that existing sectorial regulations are outdated for facing the challenge of efficient management of water resources. Without an adequate institutional framework, the functions of providers, regulators and policymakers are not clearly identified, water providers and regulators are not accountable, regulatory instruments do not exist, and water operators do not have incentives to provide reliable drinking water services (Foster, 2005). Additionally, building administrative and technical capacity may be difficult without developing institutions.

Livingston (2005) emphasizes that reforming water institutions includes changes in water law, water policy and water administration, in that order. The Harvard Law Review (2007) argued that an affirmative right to water should be explicitly recognized in the constitution rather than being an implied right to water, as is the case in Guatemala. Integrated water legislation is required to make water providers accountable to all citizens. According to MacDonnell & Grigg (2007), a comprehensive legal framework for water needs to consider four primary elements: the hydrological cycle, human uses, physical and ecological functions,
and institutional arrangements. Due to the absence of comprehensive water legislation in Guatemala, actors in the water sector are not accountable for their functions as providers of reliable safe drinking water and lack the institutional coordination needed to implement integrated water management practices (Aguilar Rojas, 2004; Ballester et al., 2005; Galindo & Molina, 2007).

The decentralization of water services at the municipal level may help in improving water services, as a remarkable consensus exists that management of water systems should be at the lowest appropriate level (Briscoe, 1993). However, a regulatory framework is also needed to make municipalities accountable in their role of water providers. Foster (2005) recommends separating regulators from water providers while maintaining compatibility over political and geographical jurisdictions. Both regulators and providers should be financially and politically autonomous to make them independent and accountable (UNDP, 2006). In addition, UNDP (2006) recommended providing regulators with investigative authority and penalty power.

As part of the regulatory framework, municipalities should be provided with standards and guidelines for water resources management, water treatment and testing, system operation and maintenance, and financial administration. While standards will inform on what is expected from water providers, guidelines will instruct municipalities on how to achieve those standards. This is particularly important when water providers lack the technical and administrative capacities needed to manage water systems efficiently, which seems to be the case with municipalities in Guatemala (PAHO, 1995; SEGEPLAN, 2006). Managerial incentives and penalties should be attached to standards and guidelines to affect institutional behavior (Briscoe, 1993). Foster (2005) advocated choosing regulatory instruments suitably adapted to the managerial incentives of water operators.

Pricing policies are also needed, given that municipalities lack financial resources to improve water systems and current water tariffs are insufficient to recover the full-cost of water supply. Financial deficits are expected to increase if water tariffs remain at current levels, given that marginal costs of water uses may increase as the demand for water continues to rise in urban centers and fresh water sources are depleted (Freebairn, 2008). System revenues are often not enough to adequately maintain water infrastructure, treat water for drinking purposes, and extend water services to the poor (Olmstead, 2003). While governments intend to provide affordable water services through low water tariffs, infrastructure deterioration and low quality services impose significant costs and distributional inefficiencies particularly on poor households (Baisa et al., 2010; Briscoe, 1993; Ward, 2007).

Water pricing may be used to promote equity, efficiency and sustainability in the water sector (Rogers et al., 2002; UNDP, 2006). Rogers et al. (2002) explained that equity is achieved through water pricing because improved water services may be extended to the poor due to increases in system revenues brought about by increased water tariffs. More system revenues are expected when water tariffs are increased, given that the demand for drinking water is usually inelastic in developing countries (e.g. Strand & Walker, 2005). Water prices also promote economic efficiency as water resources are allocated to uses that are more valuable for the society when prices reflect the full cost of water supply (Ayoo & Horbulyk, 2008; Ward, 2007). System sustainability may also be achieved through water pricing when increased revenues are used to improve system maintenance and, in turn, extend the useful life of water systems. However, as UNDP & World Bank (1999) indicated, governments are unwilling to charge consumers for water services even though there is growing evidence that many urban and rural communities are willing to pay higher prices for improved water services (e.g. Casey et al., 2006; Genius et al., 2008).

Legal, regulatory and pricing reforms are politically difficult to implement because the public may initially oppose changes in water legislation and prices, given that the benefits of water reforms may not be
immediate and perceptible (Saleth & Dinar, 2005). Livingston (2005) pointed to technology, physical environment, and individuals’ values and ideologies as elements that can increase the public perception for changes needed in the water sector. Thus, increases in public investment in water infrastructure and community participation may help in changing public opinion to favor water reforms.

Bingham (2006) indicated that communities can participate in the policy process by identifying policy preferences, choosing priorities, implementing decisions, and enforcing law. Several forms of collaborative governance may be used to engage citizens in the policy process, such as public conversations, participatory budgeting, citizen juries, study circles, focus groups, roundtables and cooperative management bodies, amongst others (Bingham, 2006). DeLorme et al. (2003) proposed community education campaigns to raise consumers’ awareness and personal involvement. Satterthwaite (2005) also showed that local organizations can improve water services by influencing the actions of municipalities and by undertaking innovative projects in their own capacity.

Guatemala needs to reform its water institutions in order to improve existing water systems and to make future infrastructure sustainable. Comprehensive water legislation is required to regulate the use of water resources, make municipalities accountable for their role as water providers, and coordinate public offices involved in the water sector. Galindo & Molina (2007) and PAHO (1995) recommended the implementation of a water office aimed at proposing water policies, promoting inter-institution coordination, regulating and supervising water providers, promoting investment in water projects, building administrative and technical capacities at the municipal level, and proposing pricing policies to recover the full-cost of supply. Institutional reform should be accompanied by public investment in water infrastructure and community participation to reduce public opposition to reforms and to change public opinion in favor of implementing water policies, including water pricing. Investigating the perspectives of other stakeholders (e.g. water consumers) is a logical extension to this study given that such information would be useful in shaping effective water policies, promoting community participation, and thus improving municipal water services in Guatemala.

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