By the end of 2008, half of the world’s 6.7 billion people will live in urban areas. The UN predicts that future growth of the world’s urban population will be concentrated in Asia and Africa. Despite growing urbanization, 2/3 of urban population still lacks access to basic services, such as safe and clean water and sanitation. This shows that rapid urbanization and increasing demand is causing conflicts around water service delivery.

This first SID Briefing Paper explores the linkages between access to potable water, distribution and growing demand in 4 fast urbanizing settings across 4 continents: Dar Es Salam (Tanzania), Bogota (Colombia), Bangalore (India) and Las Vegas (United States of America). In these cities demand for water at current tariff levels greatly outstrips supply, resulting in poor delivery especially to low-income families at the urban fringe.

The paper highlights common trends and disparities of water supply services in the four cities, analyzing the increased tendency for the commercialization of public-sector water system operators, the increased involvement of private sector in areas previously restricted to or dominated by the public, tensions created by rising demand and the quality of water supply, and finally some challenges and alternative solutions to the improvement of safe and equitable water supply.
Dar-Es-Salaam is one of the fastest growing cities in Africa. The city is urbanizing at a rate of 8 per cent per annum with 70 per cent of its population living in informal settlements, characterized by middle income residents as well as poor migrants from rural areas.

Dar-Es Salaam water infrastructure was constructed mostly during the 1950s. Later extensions of the piped water supplies have, however, rendered the distribution system completely incapable of servicing the population, with wide locational difference. Problems affecting governance and organization have also caused the Dar-Es-Salaam Water Supply and Sewerage Authority (DAWASA) to be constantly underfinanced. In fact, by the early 90s, half of the domestic water users were illegally connected and access to water for most households was gained indirectly by collection water at a fee from those households who have a piped connection.

In this context, the fast pace of the city expansion and the rising luxury business and tourism centers have not been coupled with an equitable distribution and provision of basic social services. By the end of the 90s, fewer than 100,000 households - in a city of 3.5 million people - had running water.

In order to improve efficiency and investments of the water sector, Tanzania embarked, in 1999, on a privatization process, pushed by the WB and IMF in return for much needed debt relief. The water service was handed to Biwater subsidiary City Water Services (CWS) in 2003, which benefited from a non-competitive contract process and financial backing from the World Bank. Under this contract it was agreed that the public authority DAWASA would still own the infrastructure, while City Water would operate the system. However, rising water supply problems led the government to seize control back from CWS in 2005, since when both parties have been involved in complex legal disputes.

Not only was the company unable to meet revenue collection targets agreed in the contract - which were crucial to attain if it was to make a profit – but City Water was also collecting less money than its state-run predecessor. At the same time, though, the people of the capital saw their water bills rising.

In order to respond to the water crisis, the government of Tanzania launched for the first time the formal claim to the International Centre for Settlement of Investments Disputes. The Tribunal found that water and sewerage services had deteriorated under CWS’s management and it awarded £3m in damages to DAWASA, the Tanzanian water utility. The government of Tanzania is the first Government to win a dispute over a controversial contract to run the water system in the city of Dar.

Despite this success, water distribution in Dar is still critical. Problems are far from being resolved. The rising demand of fresh water (from 240 million liters per day to 410 million liters) and the lack of a functioning piped distribution leads residents to continue to rely on water vendors for their daily supply. In fact, most of the poor continue to collect their water from open access sources or resell it to neighbors, while the informal redistribution market, characterized by private operators delivering water without public sector regulation, contribute to the deterioration of the infrastructure. Finally, systematic price differences, which depend on mode of delivery, favoring better off households (who have piped system) exacerbate conditions of slum dwellers.

The case of Dar-Es-Salaam shows that under-investments and short-term solutions become expensive and ineffective in the long run. It also provides further evidence that, when policies are
forced on poor countries by the World Bank and other donors without appropriate citizens participation in the decision-making, the distribution system turns chaotic, water being steered by individual demands, rather than collective goals or coordinated planning. Finally, the lack of transparency around the privatization process, coupled with the mix of different international models in the institutional framework, contributed to the privatization failure.

Despite this, the dispute is far from being resolved. In fact, in a separate legal case following the collapse of this water privatization project, Biwater has lodged a case at the International Centre for the Settlement of Investment Disputes (ICSID) against Tanzania. The case is being held in secret at The Hague and is thought to involve a claim for approximately $20m. The ruling is expected during 2008 and could even come within weeks.

In the meantime, water supply and distribution in Dar-Es-Salaam remains the biggest challenge.

Bogota

Bogota, spread across a plateau 2600 m above the sea level in the Andes, is a city of 8 million people, with a population increasing by 180,000 a year. Two fifths of its people are classified as living in poverty, most of them migrants and internationally displaced people who are fleeing the countryside to escape the 40-year old internal conflict between the army, the guerrillas and paramilitary forces. This, alongside posing problems in terms of security, violence and poverty, stretches the capacity of local authorities to provide basic services such as water and sanitation. Although Bogota does not have problems of water scarcity, as the wetlands around the city provide a large reservoir of freshwater, increasing demand will pose more and more problems for water delivery. Currently the Empresa de Acueducto y Alcantarillado de Bogota (EAAB) has sufficient capacity to provide water to the growing population of the capital and to even sell surpluses to surrounding areas in the region. However, the effects of climate change will soon be felt, as mountain lakes and wetlands in the Andes dry up, water will become scarcer and scarcer in the Bogota area.

Although an expanding metropolis, Bogota has managed to avoid some of the worst traits of urban megacities in the South. Architects and planners regard it as a success story and even a model city due to the enlightened policies of urban renewal adopted by its former mayors Antanas Mockus and Enrique Penalosa. This also applies to water provision, especially when compared to the standards of other Latin American capitals. Despite repeated calls for privatization by the World Bank, the EAAB has remained public and managed to transform itself from an almost bankrupt entity in the early 90s in a service provider achieving almost complete coverage in water provision. The company was rescued from mismanagement and corruption in 1994 and massive loans of US$145 million from the World Bank for the period 1995-2004 were used to restructure it and turn it into what is now considered the best water provider in the country. Not only almost complete access to water was achieved, but its quality was also greatly improved. Furthermore, conservation plans for the wetlands around the city were part of the scheme and biodiversity has been preserved.

Even though the company has remained public, privatization has been subtly introduced through subcontracting. The city has been divided into five zones that have been assigned to three different private companies in charge of billing and delivery services. Privatization was also introduced in water treatment through the concession of the Tibitoc plant to a consortium linked to the multinational Vivendi in 1997. The concession proved disastrous and the EAAB has now cancelled the contract.
Furthermore, the EAAB is based on a system of tariffs whereby all users pay for the service they receive. Through a sophisticated system of cross-subsidization, the richer strata of the population pay higher tariffs than the poor. The differential between tariffs for different strata has been lowered over the years, and it now stands at about 1-5.

Despite all its achievements, the EAAB is the object of sharp criticism. Prices are still considered too high, especially for the poorer sectors of the population. Even with the tariffs’ differentials in place, in proportion the poor end up paying more than the rich when their consumption levels are taken into account. Due to the economic recession that has hit the country in 1997 and very high unemployment rates, the capacity of the poorer sectors to pay has been eroded. As a consequence, consumption among the poor has also decreased with 5.6 per cent of all accounts suspended every month due to non-payment and about one million people badly served by the system. Loss of water due to damages and leaks is also a problem, especially as they most often happen in poorer areas where the infrastructure is less well maintained. It is estimated that about 49 per cent of water is lost, even though it is treated and its cost ends up in the bills.

The current debate on whether prices should be lowered needs to balance issues of inequality with those of future efficiency and capacity to reach an expanding population. The former approach was adopted by the ex mayor Luis Eduardo Garzon who lowered tariffs in 2006, while others argue that if prices are lowered, the company’s profits will be reduced and will not be reinvested in improving and expanding the system. On the other hand, 60 organizations are currently promoting a referendum on water to include the universal right to water in the Colombian constitution, guarantee free access to those who cannot afford to pay and oppose privatization of water services.

What will the future look like? Will the EAAB manage to achieve its set target of reaching 100 per cent of the Bogota population by 2010? Will universal access be guaranteed in the face of the mushrooming of informal settlements in the south of the city? Ciudad Bolivar is the biggest slum in Bogota and the third biggest slum in the world. Its population, varying between 800,000 and 2 million people depending on the estimates, hugely increased in the space of 10 years due to the influx of IDPs and migrants from all over Colombia. This vast influx of population from rural areas not only poses constraints in terms of service delivery and access to resources, but it also tends to replicate the very violence that the displaced are fleeing from. Demobilised paramilitaries and victims of their violence end up living side by side. So far, Bogota has managed to lessen the problems caused by overcrowding and poverty in huge cities though a set of enlightened policies in the sphere of public mobility, citizen participation and access to basic services. Will the consequences of conflict undo all the gains made in service delivery and urban renewal? Or conversely, will the incapacity to provide adequate services hinder peace?

“The price of water in Bogota is the highest in the country and more expensive than other Latin American capitals such as Lima, Quito and Santiago de Chile’— Proexport
Bangalore

The first few things that come up when we hear about Bangalore are the 24x7 work and leisure culture of the bubbling city, the modern IT work stations and the booming economy, which makes it a major economic centre in India. The so called “Silicon Valley of India” is the third-largest hub for high net worth individuals, after Mumbai and Delhi.

However, Bangalore has about 40 officially notified slums, which co-exist with well-developed areas. In addition to recognized slums, a large number of poor households live in mixed and un-recognized low-income settlements. Most of these areas face deficiencies in water, environmental and sanitation infrastructure services posing a major challenge to sustainable water supply.

Water shortages are common in Bangalore. The city is located on a plateau 900 meters above sea level. With no perennial river flowing within it, the city now has to come to terms with protecting its water resource and ensure sustainability. The Bangalore Water Supply and Sewerage Board (BWSSB) is responsible for providing water supply and wastewater disposal services within the Metropolitan area. BWSSB currently supplies approximately 900 million liters of water to the city per day, despite a municipal demand of 1.3 billion liters.

Water for India’s fifth largest city (with a population of about 6.5 million) comes from a number of sources, with 80 per cent of it coming from the Cauvery River, over 100 kilometers south of the city. The waters of the river Cauvery has been the bone of contention of a serious conflict between Karnataka and the state of Tamil Nadu that has lasted for centuries. Over the years, the dispute has become increasingly complex due to the stubborn stances of both parties involved.

Not only the conflict over this precious resource has caused water shortages, but also rapid urbanization in and around Bangalore has destroyed many wetlands areas (of the 51 lakes in the city in 1973, only 17 remain in 2007), contributing to the decrease in the water table. Finally, groundwater extraction to meet the high demands has caused the water table to drop.

However, service management issues are seen as the main cause for water provision shortages. Amongst the main challenges and problems for BWSSB are unauthorized / illegal tap connections, which lead to loss of revenue; damage to the water supply system, leaks (30-50 per cent) and contamination of water; run-off of sewage in open places, all of which lead to serious public health concerns and pose environmental hazards. Additionally, huge energy costs are required to transport the water, accounting for 75 per cent of the agency’s revenues.

Water shortages, groundwater contamination, and competition over limited resources have also threatened and, in some cases, shut down major industrial facilities. The over appropriation of water has already affected specific companies and the industrial sectors. The city is loosing its firms because of worries about water scarcity and reliability.

In this context, pressure groups — citizens, resident welfare associations, civil society, apartment owners and associations have in fact demanded that water utilities become accountable and deliver a certain standard of water supply. Quantity, quality, pressure and time are four important parameters that need to be maintained by water supply providers.

Privatizations or at least public-private partnerships, which are now widely seen as the way to open up essential infrastructure to competition and new investment in many developing countries, have always been strongly opposed by the Indian government. In fact, there are legitimate fears that the cost of water would go up with such a system, turning water unaffordable for the poor, especially affecting women, who are in charge of the provision of water.
However, in order to respond to increasing demand and extend water supply and underground services to the slums, the City has engaged in improving water conservation and efficiency, through the so called ‘Package Programme’. According to this programme, residents in slums are given incentives to legally connect to BWSSB water supply system and are actively discouraged from resorting to illegal means. BWSSB has offered a rationalized price reduction in the connection rates. Further, the connection procedures have been simplified so that a slum dweller can apply for a connection just by providing any proof of residence.

The service levels being offered to the different categories of slums are:

a) Individual household connections for those with land ownership and having adequate space

b) Community level services such as shared metered connections on payment for those communities having land ownership but not adequate space and communities without security of ownership.

The culture of user charges is very well accepted, results are positive, proving that the poor are willing to pay for improved services. Slum inhabitants, after having been through the drudgery of collecting water from public taps are happy in the encouraging atmosphere created for availing individual household connections.

"The beauty of rainwater harvesting is that every individual can get involved in the solution mode rather than be part of the problem" Rainwater Club

Finally, the recently introduced Right to Information Bill, which allows citizens to participate and be informed on municipal services and operations, also states that openness and transparency in the water sector is needed, to promote accountability and help in bringing the dysfunctional system into the public discussion domain. It also underlines that, by taking a distinct pro-poor stance and removing the misdirected subsidies to the rich, utilities need to win public support for reform.

Without well functioning and democratically accountable institutions, the booming urban areas of India could easily disintegrate into chaos with regard to water supply and sewage management.

To further address water supply issues, BWSSB has implemented comprehensive measures, such as the enforcement of rainwater harvesting (RWH) techniques and the desilting of tanks and drains. In addition, the BWSSB is also considering implementing a mandatory water rationing programme in order to evenly distribute what water supplies exist.

All this means that it is necessary to look at water resources holistically and draw up an integrated plan for sustainable management of this precious natural resource.

Las Vegas

With a population of 1.8 millions, Las Vegas is the fastest growing city in the United States. Although not a huge population when compared to other metropolitan areas in the USA, the number appears striking considering that in the early 1990s the city had only half the number of people. With a thriving economy based on the gambling and leisure sectors, Las Vegas is swamped with about 600,000 new people every month and attracts 40 million visitors a year. Population growth is expected to be sustained in the future and it is estimated to reach 3 millions in 2020.

Such a huge influx of people requires an ever increasing amount of resources; more so given the nature of the city, where nightlife and leisure activities play a central role. Electricity and water are used in ever greater quantities, in a way that does not appear sustainable in a city that lies in the desert and that only receives 4 inches of rainfall a year. Although water officials state that casinos and hotels only use 3 per cent of the city’s water, one cannot help wonder whether a replica of Venice’s Grand Canal and
an artificial lake big enough to allow for jet-skiing are appropriate choices.

Water in Las Vegas is running out. The city is entirely dependent on the Colorado River for its water supply, which it accesses through Lake Mead. Because of the sustained droughts that have affected the seven states served by the Colorado River in recent years, Lake Mead currently stands at half its normal level. To alleviate water scarcity, the South Nevada Water Authority (SNWA) is buying rights to get water from surrounding areas. Not without problems. Plans to drain groundwater from north-eastern Nevada are causing conflicts between the city’s needs and those of the rural population who rely on scarce water for their livelihoods. The need for increasing amounts of water also poses a risk of conflicts with the neighboring states, as Nevada possesses rights on the smallest part of the Colorado River.

In its search for new water sources, in 2003 the SNWA signed an agreement with Arizona to acquire part of this state’s share of the river and it is currently devising a trading scheme whereby it would pay for a desalination plant on the Pacific Coast that would transform seawater into potable water for use in California in exchange for a portion of the Colorado River. However, the most controversial plan is the building of a $2 million pipeline that would provide Las Vegas with underground water coming from as far north as the state of Utah. Ranchers and farmers in the areas affected are seriously concerned that the project might be disastrous for their livelihoods and for the whole region. As aquifers in the north of the state are interconnected, a change in just one region could have far reaching consequences on the whole eco-system. Environmentalists fear that the biodiversity of the Great Basin National Park could be compromised by the project. Indian tribes could be affected as well; the Goshute Tribe in the Great Basin is totally reliant on the springs that bubble up from the aquifer for their drinking water.

Pat Mulroy, the SNWA’s Chief Executive, answers these concerns with sound economic rationale. Nevada’s agricultural sector uses 90 per cent of the state’s water resources; however, it only generates 6,000 jobs, less than a single hotel in Las Vegas. On the other hand, the city’s hotels and casinos generate 70 per cent of the gross domestic product. Similarly, casino executives, developers and union representatives warn of an economic downturn affecting the entire state if the city is not provided with enough water.

However, it is exactly the economic model underpinning the city’s development that looks more and more unsustainable, not only in terms of its natural resources’ endowment. The city has become polarized, with crime and homelessness on the rise. House prices have doubled since 2000, while in the same period the average income has only increased from $41,657 to $47,741. Poverty rate increased one point between 2003 and 2004 and child poverty now amounts to 19 percent, one point higher than the average figure for the US. Polarization is also physical with poverty concentrated in the centre, while luxury and walled off condominiums are sprawling at the margins. Latino immigration keeps providing a pool of cheap labour for the gambling industry.

Las Vegas is also the city that consumes most water in the whole nation. Its consumption per person per day amounts to 360 gallons, compared to 211 in Los Angeles and 110 in Oakland. Conservation efforts have been made including encouraging people to replace turf with gravel lawns, cactus and other desert vegetation. However, only $19 per resident are spent on water conservation, compared to $103 to develop new water supplies. Recycling water is also encouraged. A successful example is the basement of the Treasure Island casino which is home to a water recycling plant that cleans 100,000 gallons of water from its rooms and restaurants every day and reuses it for outdoor landscaping.

Water and electricity are used in a way that does not appear sustainable in a city that lies in the desert and that only receives 4 inches of rainfall a year.

‘We’ll never run out of water as long as we can pay for it’ –Oscar Goodman, Mayor of Las Vegas

The South Nevada Water Authority (SNWA) is a not-for-profit regional entity whose members are the water providers of six different districts in the area. Its mission is to manage the region’s water resources and develop solutions that will ensure adequate future water supplies for the
Las Vegas Valley’. The SNWA sells water to its member agencies which then sell it to consumers. The price of water is cheap, something that does not help conservation efforts. In summer, an average Las Vegas household uses 17,000 gallons per month and pays $36.64 (or about 2 cents per 10 gallons), and 11,000 gallons in winter for $21. Environmentalists argue that higher prices would force people to consume less, an opinion not shared by the SNWA officials.

This is a clash between two different ideas of water. The idea of water as a common good and its preservation will require that the city’s growth will be somehow limited, while water as a commodity relies on that very economic growth which will provide financial resources to buy water from far. As expressed by Las Vegas’ Mayor Oscar Goodman ‘we’ll never run out of water as long as we can pay for it’.

**Conclusions:**

This paper aims to tackle some of the most pressing questions around growing urbanization and the delivery of water services. It focused on water management in its totality, including social, economic and institutional dimensions through a series of case studies from 4 different cities of the world.

The 4 cities, even if widely drawn from different continents, were chosen because of the common denominator of a rapid urbanizing context, where rising demand is coupled with water scarcity. Persistent poverty, ineffective governance and rapid urban growth are the underlying factors of the problematic situation of water services in these low income urban areas.

Water is a political issue in an increasing urbanizing context. Growing water scarcities is due to increasing complications over its ownership, poor management and depleting quality. As Kuntala Lahiri-Dutt argues in the Guest Editorial of issue 51.1 of *Development* water scarcity is a fuzzy concept which differs between countries and regions and is often associated with the concept of “security”. In order to respond to growing water demand cities’ governments have turned towards high technological solutions to improve supplies.

As these case studies show, urban planners have stressed on “hardware” –physical control structure of water- rather than “softwares” – rules and procedures that govern the operation of water systems. In fact, large scale, private, technologically driven projects versus community based paradigms for water resource management (ex. Dar)

This analysis allowed us to draw similar tendencies:

**At the institutional level:**

- the diminishing role of the public sector in direct water provisioning and the consequent delegation of water distribution to private hands. Interesting examples are illustrated in the case studies, where roles of the public and private sectors, and the tensions between collectively organized and individually devised solutions to access water, have given rise to alternative forms of water supply.

- the relevant influence of International financial institutions, such as the World Bank and the IMF, as drivers of privatization in developing countries. In Dar Es Salam for example, requirements of privatization or commercialization were tied to the granting of financial assistance. Funds and loans for all the 4 cities for water infrastructural investments came from the WB.

- supply and distribution failures have forced some municipal governments to improve accountability due to civil society pressure groups and protest of the poor (see Bangalore, Dar)

- local delivery depends on the quality of local leadership and its willingness to cut back its own powers. Governance is the greatest water challenge

**At the social level:**

- where piped water services are lacking, water access tends to be characterized by diversity, inadequacy and high levels of sharing. In the cities analyzed, the urban poor are confronted with lower quality and more expensive water services (except for Las Vegas). However the key concern for the urban poor is not price but access.

- the 4 cities are characterized by an increasing number of poor, who settle in slums, where the majority is not connected to the piped water network. In this context, there is an increased role of small scale independent private water providers, since the system fail to reach the city dwellers.
At the economic level:

- in some cases presented, such as Dar and Bogotà, private companies were present, mainly as system operators. Although competition is advocated for, the water supply is characterized by competition not “within” the market but “for” the market. The failure of the Public-Private-Partnership in these 2 cities was due to the lack of transparency from authorities managing this process and the power imbalances of a state tied with conditionalities.

- the use of available water sources is mainly restricted by the economic ability to invest in infrastructure. This is a very real constraint for low-income cities, which lack the resources to invest in water abstraction, conveyance and distribution. Also the existing facilities are typically underutilized and poorly maintained, resulting in continued low service standards and inadequate cost recovery. Such vicious circles may be further exacerbated by corruption and the misuse of water business for personal or political ends.

Finally, it is to be noted that the main challenge faced by the 4 cities is the rapid urban growth which causes urban policies and plans to constantly be overtaken by actual changes on the ground.

Actions taken by pressure groups, civil society and governments have also brought to some alternatives being explored below:

Alternatives and solutions:

In this context it is necessary to rethink water and water scarcity and illuminate the alternative ways of managing it, looking at the demand side and change its patterns, focusing on reducing consumption.

- the use of indigenous sources of water management, which have evolved with the local environment and are specifically adapted to local conditions. For example the city of Bangalore has implemented rainwater harvesting and other water conservation programmes. One more example would be the storage of monsoon water in the underground aquifers

- holistic and all comprehensive measures are necessary in order to increase efficiency in water services (ex. Las Vegas and Bangalore)

- community participation is essential in the decision making and in the improvement of public service delivery, as a way to internalizing civil societies alternatives into mainstream policy Ex. Dar Es Salam. For India it would be necessary to implement small efficient hydropower projects

- decentralized water treatment

Finally, some question to keep exploring solutions for increasing efficiency, equity and sustainability: how is it possible to establish institutional arrangements for negotiated water resource management at the meso level? Are techno fix solutions ideal for urban contexts? How can the demand side be managed improving distribution to slums and at the same time changing consumption patterns? The debate is still open.
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