Water Supply of Phnom Penh: A Most Remarkable Transformation

by

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September, 2009

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

PREFACE

A major problem facing the water profession is the absence of comprehensive, independent, reliable and objective analyses of urban water management systems of the developing world. What is mostly available at present are analyses carried out by the staff members of the utility themselves, or by international funding institutions that have provided funds to the utilities for the construction, rehabilitation and/or strengthening. These analyses, at least to the independent observers, are suspect since the general perception often is that such analyses often exaggerate the successes and downplays the shortcomings. Thus, there is an urgent need for objective and independent analyses of such utilities in order to find out what aspects are working and why, what are not working and why not, and what are the constraints they are facing and if such constraints can be realistically overcome within a reasonable timeframe because of political, institutional, economic, legal and social reasons. Regrettably, such analyses are simply not available

Because of lack of such comprehensive analyses, it has been difficult even to identify which are the models of urban water management that are working well for a reasonable period of time, and what lessons other urban centres of developing countries, which are planning to improve their performance, can learn from such experiences. Based on their boundary conditions and specificities of good models analysed, other urban centres can decide upon their potential replicability, albeit with appropriate modifications to suit their own special conditions. In our view, no one single model of urban water management will be suitable for all developing countries. Developing countries are not homogenous, and are at different stages of economic, social, legal and institutional development. In addition, at least in terms of water supply, climatic conditions may vary quite significantly from one city to another, even within a single medium-to-large size country, and the availability of water infrastructure is seldom similar. Under these conditions, there is no question that one size does not fit all, and solution-in-search-of-a-problem approach will mostly fail, as has been the experience in throughout history.

Thus, what is needed at present are objective, accurate and critical analyses of several cases of urban water management in developing countries which are working reasonably well for a sustained period, and a clear understanding of the reasons behind their successes. If 8–10 such good case studies are available, other urban centres of the developing world could consider these different models and then they could decide which model, or mix of models, is likely to be most applicable to their cities. Having selected a specific model, or mixing the appropriate qualities of several good models, they could come out with solutions that could satisfy their own requirements. However, most unfortunately, independent and objective analyses of such good models that are working are not available at present.

We have been considering preparation of a portfolio of a community of good practices of urban water management from various developing countries, or former developing countries, which the world should take note of. However, because of paucity of time, we have not been able to develop such a portfolio. The present case study of Phnom Penh is our first attempt to analyse an urban water supply system in considerable depth.

In order to conduct this independent analysis, two visits were made to Phnom Penh. The first visit for a prolonged period was to understand the current and the past developments, both national and geopolitical, which influenced the functioning of the Phnom Penh Water Supply Authority (PPWSA). During the first visit, all the relevant personnel of PPWSA, including the Director General and all his senior staff, were intensively and extensively interviewed. We also interviewed the only person in the staff of the PPWSA who worked in the institution during the Khmer Rouge regime.

We further interviewed customers of PPWSA (especially the poor living in the slums, as well as industrial and commercial establishments) to obtain their views and perceptions of the quality of services they receive from the Authority. We also had intensive discussions with the staff members of the major development agencies like the Asian Development Bank, World Bank and Japan International Cooperation Agency, local and international NGOs and academic and research institutions. We further interviewed senior staff members of various Cambodian national and sub-national institutions dealing with water. All these gave us a good understanding of the past and the current situations.

The first visit was used to collect all the necessary data for analysis. We made it very clear to the PPWSA management during our first meeting with the General Director of PPWSA and his senior staff that the analysis would be scientific and objective based only on facts, figures and analyses. The objective of the study was neither to "praise or to bury" PPWSA but rather conduct an independent review of what they have achieved and what lessons, both positive and negative, can be learnt from the Phnom Penh experience which may be of interest to other urban centres of Asia as well as in other continents.

We were very pleasantly surprised by the reaction of the General Director who requested us to be as critical as possible in our analysis so that PPWSA can improve further. He also specifically instructed his staff not only to provide all the data which we may request but also any other data which we may not have requested but which in their view may be useful to us for a better understanding of the situation. We were very surprised to receive more than 90% of the data we requested within 24 hours, and the rest within 48 hours. In nearly five decades of development evaluation, we have never encountered such a situation before. It not only made clear the PPWSA has a remarkable management information system in place, but they are confident of what they are doing, and proud of the results they have produced.

After this first visit, the data we obtained were carefully analysed in terms of their intercomparability and reliability. As a result of this analysis, we are confident that the data we received were genuine and reliable. It should be noted that this analysis exclusively relied upon primary and up-to-date data. We did review available information on the Phnom Penh water supply from other sources, including the Asian Development Bank and the World Bank, but we found these data extremely limited, incomplete, mostly out-of-date and a few times, in our view, even erroneous. Thus, we decided to limit our entire analysis only on primary data sources.

After our analysis, we sent PPWSA our draft report, without conclusions, and requested them to review our work as critically as possible and give their comments. During our second visit to Phnom Penh, we reviewed these comments and the report with the PPWSA staff. During this visit, we received additional updated figures, and some factual corrections.

The analysis was finalised after this second visit. We have no doubt that this report is now the most updated, complete, objective, accurate and independent analysis of PPWSA available.

A comprehensive study like this could not have been prepared with the full support and cooperation of the PPWSA staff. We very much appreciate the confidence placed on us by the General Director who ensured that no data was confidential and we had access to the most sensitive information. We thus are most grateful to Mr. Ek Sonn Chan, the General Director, and Dr. Chea Visoth, Assistant General Director for their unstinted support during this entire study. Deputy General Directors Sem Bun Heng and Long Naro, Directors Ros Kim Leang, Sin Kheng Lin, Roeun Nary, Samreth Sovithia and Khut Vuthiarith, Chief of Training, Huot Sok Heng, and Chief of Laboratory Koa Heng generously gave their times to explain various issues and provide whatever information we requested. Sin Ham, only staff member still with PPWSA form the time Khmer Rouge gave us an excellent briefing as to how water supply of Phnom Penh was run at that time. We very much appreciate the time they spent with us for this study.

Three other people were very helpful for this study. They are Tan Sokchea, Director, Potable Water Supply Department of the Ministry of Industry, Mines and Energy, and Nhean Tola and Hayashi Eiichiro of the Japan International Cooperation Agency. Their views and insights of PPWSA were of fundamental importance to us.

We also met with numerous other individuals and institutions, among which were Neth Barom, Vice Rector of Royal University of Phnom Penh, Som Kunthir and Cheav Channy of the Seam Reap Water Supply Authority, Dararath Yem of the Cambodia Development Policy Institute, Eric Sidgwick and Nida Ouk of the Asian Development Bank, and Veasna Bun of the World Bank. All this assistance is gratefully acknowledged.

Dr. K. E. Seetharam and Mr. Tan Cheon Kheong, Institute of Water Policy, Lee Kuan Yew School of Public Policy, Singapore, were also most helpful for this study.

Ms. Thania Gomez of the Third World Centre for Water Management who drafted all the diagrams used in this report directly from the primary data sources.

Without the support of all these personalities and their institutions and countless other people that we talked with, this comprehensive analysis simply could not have been completed.

The analysis, however, is exclusively ours. We take full responsibility for the quality of the analysis as well as the opinions expressed in this report. It is based exclusively on

primary data sources. This is the first several objective and independent case study of urban water systems in the developing world that we plan to carry out in the future.

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INTRODUCTION

In terms of available water resources, Cambodia is very well endowed. It has a high annual rainfall (up to about 3,000 mm in the highlands), three major rivers (Mekong, Bassac and Tonle Sap) and their many tributaries, and excellent sources of groundwater both in terms of quantity and quality. Until the late 1960s, the urban water services in Cambodia were quite reasonable, certainly better than what existed then in many of its neighbouring countries. The residents of Phnom Penh had an uninterrupted 24 hour water supply of reasonable quality, which was better than many centres of its neighbouring countries.

The situation, however, changed dramatically by the late 1960s, when considerable political turmoil took place, and which continued unabated for the next two decades. The situation worsened during the 4-year rule of the Khmer Rouge, who captured Phnom Penh on April 17, 1975. Khmer Rouge attempted to make Cambodia a classless society by forcing people to work in agricultural communes. The radical ideology included isolating the country from all types of external influences. Among some of the changes they instituted were the following: all forms of banking, finance and currency were abolished; no religious practices were allowed; schools, factories and hospitals were closed, and all private properties were confiscated. Educated and trained people were openly discriminated against, and many such people were killed. It is now estimated that some 1.4 to 2.2 million people died because of the Khmer Rouge atrocities, nearly half were executed and the other half died due to starvation and diseases which resulted directly from its ill-conceived policies.

Khmer Rouge government was ultimately dislodged by the Vietnamese forces, and Phnom Penh was captured on January 7, 1979. Khmer Rouge retreated to the Western part of the country and continued to control some areas near the Thai border for about a decade. Despite its reversal in Cambodia, Khmer Rouge retained its UN seat until 1993, supported by most of the Western governments.

The social, political, economic and institutional turmoil took their toll on all the development sectors of Cambodia during the decades of the 1970s and the 1980s, and urban water management was no exception. The country started to recover from this prolonged nightmare, demographically, economically, and institutionally only from about the early 1990s. During the period of the Khmer Rouge government, the entire social-economic-institutional fabric of the country was destroyed.

All forms of social services in the country, ranging from education to health, became totally dysfunctional, and all urban infrastructures were grossly neglected during these two lost decades in the country. There were no new investments in water or another type of infrastructure, nor were they maintained and operated at minimally acceptable level. Skilled people were simply not available to properly maintain and operate the existing urban water system: they were either forced to relocate in rural areas for agricultural activities, or were killed. All available records of the urban utilities were destroyed. Because of such prolonged atrocities, the availability of skilled manpower declined very

dramatically. By the 1980s, urban water management practices in all Cambodian cities, including Phnom Penh, were in terrible shape.

DEVELOPMENTS UNTIL 1993

Even after the fall of the Khmer Rouge government and their well-documented atrocities which must have been well-known to the western intelligence services, the Khmer government managed to retain support from the West, even after they were ousted from power.

This is not surprising since the American President Gerald Ford declared on 23 April 1975 the end of the Vietnam War. Saigon was captured on 30 April 1975, and the fact that Vietnam moved into Cambodia to get rid of a murderous regime did not go well with the West. The geopolitics of the cold war, defeat in the Vietnam war, and the entire false logic of the Vietnam war in terms of the domino theory meant that the Western powers were sceptical of the real motive of Vietnam of its move into Cambodia, even though it was well-known that the Khmer Rouge was provoking Vietnam by its repeated border incursions and shelling of the border towns of Vietnam.

From a Cambodian perspective, after the nightmare of the Khmer Rouge regime was over, a major expectation of the people was that the world would help them after the genocides practiced on a massive scale. Instead of this help, Cambodia received double whammy in terms of trade sanctions which lasted well over a decade. This ensured that the people who had suffered on an immense scale continued to suffer because of the trade sanctions.

In retrospect, and most surprisingly, the Khmer Rouge continued to retain Cambodia's seat in the United Nations under the name of "Democratic Kampuchea" until 1982, and then under the "Coalition Government of Democratic Kampuchea" until 1993. The Khmer Rouge government was repeatedly supported by the Western powers to retain its UN seat. Margaret Thatcher, the British Prime Minister said that "there are amongst the Khmer Rouge some very reasonable people and they will have to take part in a future government in Cambodia". Sweden was one of the first Western countries to break rank and withdrew its support to the Khmer Rouge.

The water supply system of Phnom Penh was built over the years. The first treatment plant was built in 1895 under the French colonial rule at Chrouy Changwar peninsula, and had a capacity of 30,000 m^3/day. Water was abstracted from the Mekong River. Some six decades later, the second treatment plant was constructed at Chamcar Morn, with a capacity of 10,000 m^3/day, and it used water from the Bassac River. A decade later, in 1966, a major one was constructed on the banks of the Sap River at Phum Prek, with a capacity of 100,000 m^3/day.

In March 1960, after Cambodia gained independence from the French Colonial rule, *Régie des eaux* became a separate entity, compared to a combined earlier operation of

water and electricity as one institution. However, it remained a government-owned utility, and was placed under the authority of the Phnom Penh municipality.

When Khmer Rouge was in power during 1975 to 1979, the water utility, for all practical purposes was not operational. This was the darkest period in the history of PPWSA.

During the period 1980 to 1992, the company became operational again when people were allowed and able to return to the city. During the early stages of this transition, Phnom Penh municipality was responsible for providing water to its inhabitants, as was the case before the Khmer Rouge regime was in power. However, after 5-year's of total neglect, the water supply system simply could not cope with the demands, nor was the institution in a reasonable shape to provide requisite water services. Thus, the public did whatever was needed to obtain their daily water requirements. Thousands of public underground tanks (Photo 1) and unauthorized connections were made which further contributed to the steady deterioration of the performance of the water supply system.

With the destruction of the civil society of the Khmer Rouge, and the ensuring political turmoil and the resulting trade embargo that was imposed on Cambodia, the conditions of the urban water supply to the city declined precipitously because of destruction of facilities, neglected maintenance, lack of spare parts, equipment and other materials, shortage of electricity supply, absence of experienced personnel in all spheres, and funds. As a result, the total production capacity from the three treatment plants declined by some 55%, from 140,000 m^3/day to 63,000 m^3/day by 1992. These figures are shown in Table 1. Not only water supply deteriorated in terms of quantity but also quality of water provided left much to be desired. This erratic and unacceptable level of service delivery became a major social and health problem for the city.

Table 1. Status of Water Supply to Phnom Penh in 1993

Treatment Plant	**Phum Prek**	**Chamcar Morn**	**Chrouy Changwar**
Treatment Capacity (m^3/day)	100,000	10,000	30,000
Water Production in 1993 (m^3/day)	56,000	7,000	0
Water Source	Sap River	Bassac River	Mekong River
Year of Construction	1966	1953	1895

Photo 1. Situation of water supply in Phnom Penh in early 1980s

Of the three water treatment plants, Chrouy Changwar was destroyed in 1983 and Phum Prek and Chamcar Morn were well past their economic lives, and were deteriorating rapidly. By 1993, urgent rehabilitation of the treatment plants were needed, and the Cambodian Government requested the Japanese Government for assistance to rehabilitate systems.

Institutionally, PPWSA was in a limbo. From January 1988 to June 1991, Phnom Penh Water Supply Authority was supposed to be managed and administrated as an autonomous public enterprise. However, it lost significant amount of money each year continuously, as a result of which its autonomous status had to be suspended in June 1991. It was then placed again under the administrative and budgetary control of the Phnom Penh Municipal Authority.

Only in 1986, the necessary authorization was received by the Authority to collect fees for water consumed. By 1992, PPWSA was spending 1.3 billion riels[1] each year, out of which electricity costs took the lion's share, at 0.98 billion riels. The institution recorded an annual deficit of 809 million riels, which meant that nearly two-third of its expenditure had to be subsidized by the Phnom Penh municipality. This was not surprising since bill were issued to only about 24,000 households (about 43% of the total households). Only 2,800 of these bills were based on metered consumption (even the reliability of these metered readings left much to be desired because of widespread corruption), and the rest were somewhat crudely estimated. Furthermore, the bills issues were not even properly collected: bill collection ratio was around 19%. Domestic water tariff was 166 riels/m^3. Major public sector customers like the army and the various government departments, or influential people like the ministers never had to pay their water bills.

During this period, there was widespread reselling of water by the households that were fortunate enough to receive any water. The cost of water from such sales, and from the private vendors, was several times the price of water supplied by the PPWSA. It was well-known that even the then Director General of PPWSA also sold water to his neighbours for private benefit, even though such senior officers were not billed for any water.

The population of the city and its neighbouring suburban areas, and the area serviced by PPWSA during this period are shown in Table 2.

Table 2. Population serviced by PPWSA in 1993 (Source: PPWSA)

	Total	**Serviced**
City	402,070	215,000
Suburban areas	280.866	0
Total	682,936	215,000

[1] Exchange rate then was $1.00=2,500 riels

Under these conditions, and well after the Khmer Rouge government was deposed, only external assistance Cambodia received was of emergency relief type only to rehabilitate parts of its water supply system to a basic level. This was possible only to areas where roads and security conditions were considered reasonable. This was because of the trade embargo, and the then government of Cambodia was not a member of the United Nations. Not surprisingly, no attention could be given to the quality of the water services, or how these could be improved. Nor could there be any long-term development plans to improve the water services of the country.

The socio-political turmoil of the 1980s affected PPWSA in various direct and indirect ways. For example, the trade embargo imposed on Cambodia during the 1980s severely restricted the options available to it to obtain material and equipment from the international markets. The problem was especially severe since the country had no indigenous manufacturing capabilities like production of pipes to convey water. Because of the non-availability of materials and equipment, either essential rehabilitation of the urban water systems could not be done. Even when some rehabilitation could be carried out, the quality of work left much to be desired, lack of technical capacity and proper equipment made the problem worse. For example, leaks were plugged by driving wedge which needed a much bigger hole to be made in the pipes. Furthermore, no maps were available as to where the pipes were buried: they were lost during the Khmer Rouge rule. Knowledge and technology available to the staff to operate and managed the system were very primitive.

PPWSA was also in bad shape in institutional terms. Years of centralized, top-down management had contributed to the development of a culture of inefficiency, bureaucratic mindset, corruption and conformity. The staff did the least possible work that was needed. It is estimated that 80% of the staff worked less than two hours per day. Salaries were very low and the working environment was poor, as a result of which there were no incentives for improving their performance. In a sense, most of the staff did what benefited them the most at personal levels, rather than what needed to be done for the benefit of the institutions and the citizens.

Institutional arrangements also left much to be desired. PPWSA was run as a government department with no administrative, operational and financial autonomy. It was an integral part of the Municipality of Phnom Penh, and thus was in total control of the Governor of the city. It needed continuous municipal authorization for all its operational expenditures. Getting any authorization was a time-consuming process, during which the situation deteriorated even further. Whatever revenues the PPWSA earned were consolidated with general municipal funds, and thus there was absolutely no incentive to run it on a business-like basis. It received no regular information on the income it generated (even though these were not substantial), or any pressure, or incentive, to become economically self-sufficient, at least in terms of operation and maintenance costs. Its budget came from the overall budget of the city of Phnom Penh. Nor were there any legal and regulatory frameworks available to carry out its function.

The capacity of PPWSA up to 1992 was very poor in all senses. For example, the institution had only three technicians who could connect water meters. Because of this inefficiency, the cost of connecting water meters was exceedingly high, around $150 per meter (compare this to the current cost of around $30 per meter). The meter readers and bill collectors were illiterate, and mostly kept the money they collected. In any event, many of the meters installed were deep underground, and were invariably flooded and thus never could be accurately read.

Most of the staff of PPWSA never paid their water bills. In fact, many often sold water to their neighbours. Some of the major public sector consumers of water, like the army, never agreed to have any water meter installed, nor pay their bills for water consumed. Thus, the government departments, ministers and the rich people seldom paid for water. A survey of who were its customers was initiated in 1994. This survey was initially expected to have been carried out by a French consulting company with French financial assistance. However, when the General Director realised that this 2-year contract would provide information only on ½ of one district, he requested the Mayor of Phnom Penh to give him 100 people to complete the task in one year. Since there were many people who were underemployed in the municipality, the Mayor promptly provided the requisite 100 people, who had to be trained to conduct the survey properly. To the great credit of the PPWSA, its management not only trained these people but also completed the survey within one year. The French company, when it realized that with only 10 people they could not compete with the PPWSA team in terms of completing the work they basically stopped their work.

The survey found out that there were 13,901 households in Phnom Penh who were getting water but receiving no bills. Equally, there were thousands of people who were receiving and paying their water bills, but they never received any water!

In other words, by the early 1990s, PPWSA as an institution and its overall management were dysfunctional, as a result of which the consumers received a very poor service and a low level of service delivery.

One of the first institutions to provide emergency assistance to the Cambodian water sector was Oxfam, a non-governmental organization. When the Khmer Rouge government finally lost its UN seat in 1993, certain Western governments and international institutions like the World Bank and the Asian Development Bank began to provide aid to Cambodia. The initial sizeable aids came from France and Japan, who together provided some $5.2 million, primarily in terms of grants, to rehabilitate Phnom Penh's water supply systems. It was followed by a Technical Assistance project by UNDP and World Bank to support capacity building in terms of training, skill development and conduct of some studies. This project also had some limited funds available to buy essential spare parts and equipment.

With external support, the PPWSA started to make rapid progress. To put the situation in a proper perspective, in 1992, it had only five engineers, and most of its staff members were even incapable of reading meters accurately. Situations were even worse in the

provincial towns, which could provide only very intermittent and unreliable water services. The quality of treated water was invariably poor, and some towns even distributed simply raw water, without any form of treatment, to the households. Not surprisingly, people had very little confidence on their prevailing water supply services, and many citizens opted for alternative options to secure their daily water needs (National Policy on Urban Water Supply and Sanitation and Rural Water Supply and Sanitation, 2003).

The lack of clean water and poor wastewater management practices, took a heavy toll on the people of Cambodia during this period. In the mid-1990s diarrheal-diseases were endemic in the country, infant mortality rates were some of the highest in the world (115 per 1,000 live births), as were the morbidity rates. Water-related diseases accounted for nearly 30% of all hospitalizations. Socio-economic conditions in provincial cities were even worse than those of Phnom Penh. Unaccounted for water in Phnom Penh routinely exceeded 80% during the late 1980s, and the pressure of water was simply too low to have any form of a half-decent, functional water supply system that could be used adequately by its residents.

A common practice during the early 1990s were for the staff to gather in front of the PPWSA building, and catch the consumers who came to obtain any type of service, or to complain about non-delivery of services. The staff members made private deals with the consumers, at the cost of institutional disorder as well as its credibility and reputation. A standard practice for the staff was to provide a connection from the main pipe since the pressure from the system was very low. Only a connection from the main pipe proved to have some value in terms of receiving some water. The going rate for providing an illegal connection from the main pipe was $5,000, equivalent to more than two years of salary of the staff member concerned. Thus, at a personal level such a practice was most beneficial. However, at a corporate level it was a disaster, no matter how it is viewed.

The pressure of the system was so low that most households received no supply of water, even though they were connected to the system. People collected the water from the “well” which was below the break (see Photo 1). Such leakages further reduced the pressure of the system and its efficiency deteriorated even further. The water supply situation was simply untenable and deplorable, not only in terms of quantity of water that could be provided to the customers of the PPWSA but also of their quality and the reliability of the system. Under these conditions, the city had serious health and environmental problems in its hands.

The situation in PPWSA in 1993 could not have been any worse! Not only did the institution did not have minimal technical, administrative and managerial capacities to provide basic water services, but also had no funds to even carry out the basic functions that are considered to be absolutely essential for any water utility. For example, it had no alum to treat water even to a minimum standard. Whatever alum was available, these were promptly stole by the staff and sold in the market. The institution had no money to pay its electricity bills. However, this was not really an important consideration since electricity was provided by the public sector, which did not have to be paid! The alum

had to be bought from the private sector, which would not sell it to PPWSA since they had no money to pay for it. The General Director had to go out and approach various donors if they could provide funds to buy alum. The Japanese Government finally agreed to provide $50,000 (for just the year 1993) so that PPWSA could buy alum and chlorine from the open market.

The institution, for all practical purposes, was bankrupt, morale of the staff were at rock bottom, and corruption was rife. Most of its staff was either demoralized and/or making money through corrupt practices since their salaries were exceedingly low, often about $15–$20 per month, which was simply inadequate to maintain a family in a reasonable manner.

Socio-economic Development Plan, 1996–2000 – In 1996, the Government of Cambodia published its first Socio-Economic Development Plan for the period 1996–2000. This first 5-year Plan gave high national priority to improve water supply and sanitation facilities. It explicitly recognized the importance of clean water supply and sanitation to alleviate poverty, improve health conditions, and provide a better quality of life for all the Cambodian people. This Plan allocated $83.2 million for water supply and $12.3 million for sanitation for Phnom Penh. This total allocation of $95.5 million for the city represented nearly 60% of the national funding for the water supply and sanitation sectors: the rest of the country received the balance of the allocation of 40%.

The Plan proposed that PPWSA should became a sustainable commercial entity, which should be financially self-sustaining and recover the full cost of providing water to its domestic and industrial customers. In other worlds, PPWSA would become an autonomous public entity, which would work on a commercial business-like basis. The initial objective of the Plan was to provide clean water to at least 70% of the domestic consumers of the city and most of the industrial and commercial concerns.

In terms of policy support for the Plan, a milestone law was passed on 17 June 1996 entitled Law on the General Status of Public Enterprises (No. 0696/13). This new Law provided for the very first time in the country, a new legal framework for operation, management and supervision of all public enterprises. Even though the institutions became legally independent and received financial autonomy, they were placed under a Government Ministry (*tutelle*), or an appropriate public authority, and were subject to various state controls. All public enterprises were controlled by the appropriate representatives of *tutelle* ministry, who were represented in their Board of Directors. In addition, they were further controlled by a State Controller, who was nominated by the Minister of Economy and Finance. The Controller reported to their ministry regularly to ensure that each public enterprise was complying with its legislative and regulatory obligations, and appropriateness of any transaction which could have financial implications. The Law, however, did not mention how differences of views between *tutelle* Ministry and MOEF could be resolved, should such a situation arose.

On 4th December 1996, the Cambodian Government promulgated a landmark Decree No. 52, which established PPWSA as a public enterprise which must operate according to

commercial norms. An unofficial translation of this Sub-Decree can be seen as Annex I. Among its important requirements were the following.

- PPWSA must organize, manage and operate all its activities independently in accordance with commercial business requirements (Article 4);
- It could have an independent financial compensation package for its staff, as long as it is approved by PPWSA's Board of Directors (Article 101);
- General Director has the authority to hire and fire staff (Article 14);
- General Director must submit to the Board of Directors an annual plan each year before 1st October, which must include (Article 20):
    - investment and financing plans;
    - operational budget;
    - price of water and other services to ensure the total revenue is adequate to cover its operational expenses; and
    - state support to PPWSA for the loss in its public services delivery.

The General Director is appointed for a 3-year period, but can be reappointed to any number of additional terms thereafter. The General Director is appointed by the Prime Minister, after receiving the nomination from its *tutelle* ministry.

On 4th April 1997, the Minister of Economy and Finance, in a letter to the World Bank, reconfirmed the views of the Cambodian Government on its new policies for the water supply and sanitation sector. Minister Keat Chhon reconfirmed the following:

- Water and sanitation would be managed as economic goods in the future.
- Increase in availability of all water and sanitation services would be dependent on the demand from the users. This demand-driven approach would contribute to economic efficiency and sustainability of the operations.
- PPWSA should become a financially self-standing commercial entity capable of supplying water that would meet WHO requirements for water quality.
- Level of tariffs would be critical for autonomous commercial operation of water utilities. Accordingly, tariffs would be set at level that would recover cost in order that water undertaking becomes commercially viable and cost-efficient. Tariffs would be revised periodically on the basis of rational commercial criteria.

PROGRESS SINCE 1994

National social and economic progress – Cambodia started to make progress since 1989, when private property rights were reintroduced, price control system was abolished, and the investment regime was liberalized. However, political and economic progress started only after January 1992, when President George Bush, Sr., lifted the 16-year trade embargo against Cambodia. The Paris Peace accord was signed in 1992, and this led to an UN-sponsored election in September 1993. These developments were most positive for Cambodia's future social and economic development.

As the country left behind its civil war and international trade embargo, transformed successfully from an one-party to multi-party politics, and made a successful transition from an isolated, subsistence economy to an open market economy, its economic and social performance improved as well. From 1994 to 2006, annual average growth in gross domestic product was 8.4%, a remarkable high figure. In fact, during 2004–2006, its annual GDP growth rate averaged 11.4%. By 2006, its external developments were positive. Its gross international reserves increased to record high of US$1.1 billion in 2006. Consumer price inflation the same year declined to 2.8%, and foreign direct investment increased to a record US$475 million. The improvements in per capita GDP in constant dollars are shown in Figure 1.

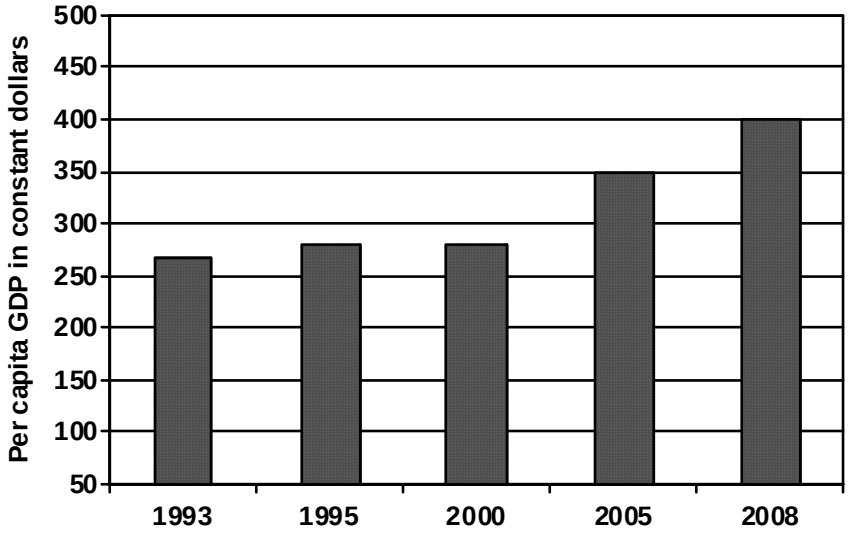

Figure 1. Per capita GDP for Cambodia in constant dollars, 1993–2008

Income and consumption levels of all Cambodians have increased since 1994. People living under the poverty line fell from 47% to 35% during the period of 1994 to 2004. Health indicators also improved. For example, infant mortality rates were reduced from 95 per 1000 live births in 2000 to 66 in 2005. Child mortality (under 5) decreased from 124 deaths per 1000 live births in 2000 to 83 in 2005. Viewed from any direction, improvements in such social and economic indicators were most positive.

On the negative side, such improvements were somewhat skewed: the wealthier part of the society benefited much more than their poorer counterparts. For example, between 1994–2004, per capita consumption in 1993/94 constant prices showed that it had risen by only 8% for the poorest fifth of the population, compared to 45% among the richest fifth. Such pronounced differences between the income and consumption levels in society may contribute to social and political instabilities in the future. There is also danger that such inequities may contribute to an institutional mindset that may systematically favour the rich over the poor in terms of privileges, protection of human and property rights and formulation and implementation of water policies. The progress in PPWSA should be viewed and judged within this overall social and economic and political development of

the country.

Phnom Penh Water Supply Authority – The United States lifted the trade embargo against Cambodia in 1992, and the Royal Government of Cambodia was established the following year after the successful election that was supervised by the United Nations. Shortly thereafter, the Cambodian Government could request help from the various multinational and bilateral aid institutions to rehabilitate its battered urban water systems and to formulate a future long term plan.

In 1992, immediately after the trade embargo on Cambodia was lifted, the French provided a grant aid to improve the distribution network. It was promptly followed with another French grant in 1993 to improve water supply facilities of the city. In 1993, UNDP provided a grant for technical assistance for the rehabilitation of the water utilities of Phnom Penh and Sihanoukville that was administered by the World Bank. These were the earliest foreign assistance to improve the water supply of Phnom Penh.

Among these early requests was one to the Japanese Government, in 1993, for technical assistance for the rehabilitation of the existing water supply system of Phnom Penh and draw up a future water development plan for the city. In response to this request, the Japanese Government agreed to carry out a study to develop a Master Plan and Feasibility Study of the Phnom Penh water supply system. This study was carried out by Tokyo Engineering Consultants in association with Nihon Suido Consultants on behalf of the Japan International Cooperation Agency. The study team arrived in Phnom Penh in February 1993, and within a short period of 10 months completed the final report and delivered it to PPWSA.

In retrospect, this study turned out to be a very important and useful study, which served as a road map for the next several years for the PPWSA. The plan was developed in close consultation and discussion with the Authority, and thus was acceptable to it. This plan became the “blue print” for development for the utility for the subsequent years. All the projects supported by the other donors had to fit in properly with this framework as well as comply with its overall philosophy. It thus provided an excellent basis for donor-coordination, albeit indirectly. JICA provided a grant of $25 million, in 1995, to improve the water supply facilities under Phase I and II, and, another $21.326 million grant in 1997 for the Phase II of this project. Other major donors who provided financial and technical support to PPWSA, from 1997, included the Asian Development Bank and the World Bank. However, these were loans to the Authority and not grants, as was the case for the initial financial support.

Based on our analysis, we believe that formulation of this Plan, and its subsequent implementation by PPWSA and all the other concerned donors, and the continuing association of JICA on a long-term basis (this continues even now) to provide assistance to PPWSA on different aspects of water supply, including infrastructure development and management and capacity building, have been an important ingredient for the subsequent success of PPWSA. However, as will be seen from the later part of our analysis, it was only one of the several other important components which have contributed to the

remarkable and steady improvements in the performance of the utility.

URBANIZATION

In terms of urbanization, Phnom Penh is truly a unique case which has affected the provision of all types of services, including water. Up until late 1960s, it was a “normal” town, getting to grips with decades of French colonial rule and then independence. The population of the city was growing steadily, both due to natural causes as well as rural-urban migration. In contrast with the other ex-colonial capital cities of Asia and Africa, this growth rate was not spectacular. It was manageable. However, with Khmer Rouge in power, and its strict policy of forcing urban residents to relocate to rural areas for agricultural activities, it became the only city in recent memory, if not in the entire history of mankind, which became massively depopulated almost immediately because of ideological reasons. For example, due to the Khmer Rouge atrocities, the population of Phnom Penh in 1979 was estimated to have declined to about 122,800.

With the fall of the Khmer Rouge, the population started to trickle back to Phnom Penh. After a period of time, the rate of return of the former residents increased. When the situation stabilized, like all other Asia urban centres, urbanization process started and gradually accelerated. The increase in population of Phnom Penh is shown in Figure 2. However, there was an important difference in population increase of Phnom Penh after the Khmer Rouge era. Many people from Phnom Penh were killed and thus they did not come back. After the traumatic experience, many families decided not to return to Phnom Penh but settle elsewhere in the country. This loss of population was more than made up by the soldiers who were posted in Phnom Penh and who brought their families and extended families to the city from the interior of the country. These migrants had never lived in an urban context, and were more self-reliant. They managed to live without a regular supply of water as was the case when they were living in rural areas. They neither expected, nor received, water from the PPWSA in those years.

In terms of supplying water to the residents and the industrial users of Phnom Penh, PPWSA faced two critical challenges. First was to restore a reasonable service delivery to a limited geographical area, which initially was considerably smaller to what was the situation before the Khmer Rouge took place. As PPWSA started to succeed, especially after 1994, its service delivery area has constantly expanded and drinkable water delivered has increased. This is shown in Figure 3, which indicates the area to which water was be provided between 1993 to 2000 primarily by the pipe replacement and the rehabilitation of the overall supply system. This was for a rather limited geographical area. During the 2001–2008 period, and especially after the spectacular success of PPWSA in providing clean drinkable water supply on a 24-hour basis, its service area has constantly expanded to include new areas, including the suburbs of Phnom Penh. Its service is still expanding.

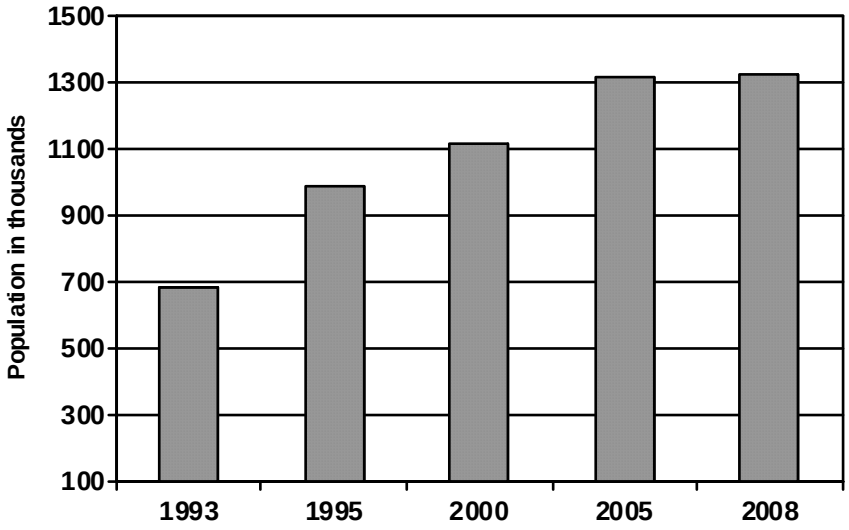

Figure 2. Population of Phnom Penh, 1993–2008

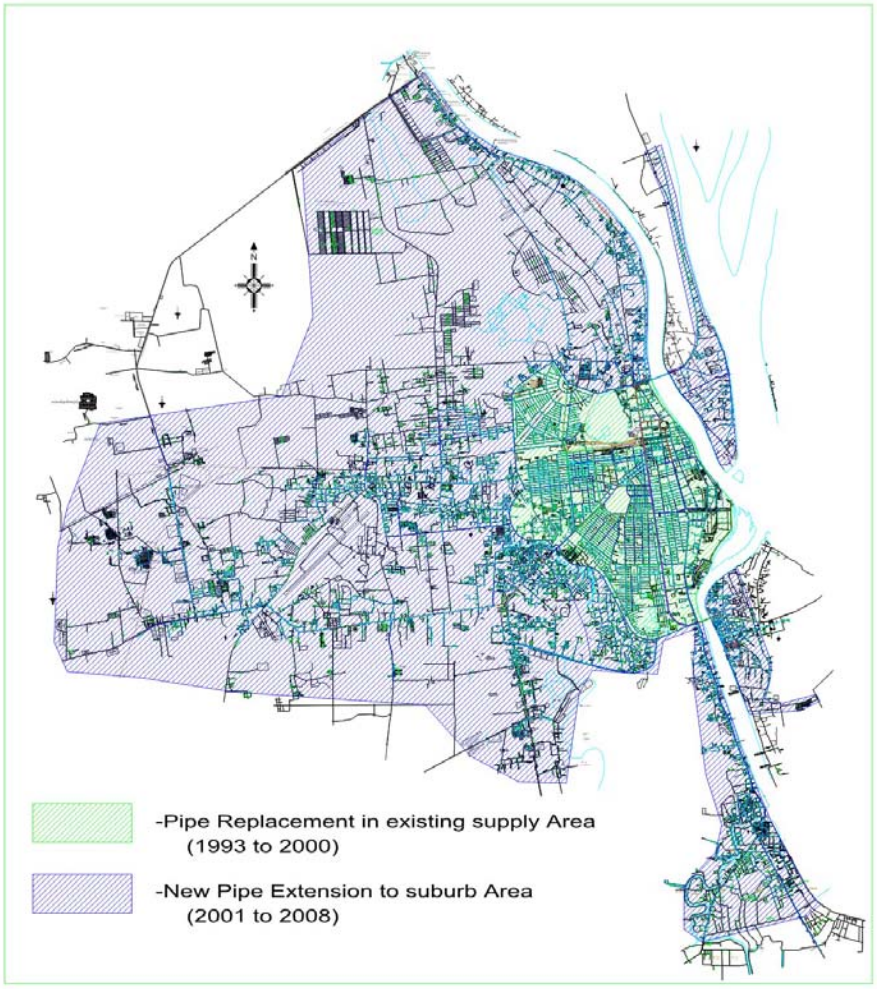

Figure 3. Expansion of area supplied with water, 1993–2008 (Source PPWSA records)

The current plan for a financially healthy and managerially capable PPWSA is to expand its water supply area even further progressively. This will mean not only expanding its existing pipe network more extensively, but also adding new water treatment plants in order that supply of water can be expanded to meet the growing demands. Along with these requirements, it will have to maintain, and wherever possible even enhance its efficiency of water delivery, have access to increasing investments funds, and still provide water to every household in Phnom Penh, rich or poor, and continue to be profitable. It will be a difficult task to achieve. However, on the basis of its recent performance, there is absolutely no reason why it should not be able to achieve all these objectives.

In 2008, the annual volume of treated water produced was a little over 85.5 million m^3, which was more than enough to meet PPWSA's needs. However, with increasing per capita water use from a somewhat lower base of the earlier years, and increase in its service area, the daily water production has to be increased to 300,000 m^3/day to meet the anticipated demands to 2013. This increase can be met by increasing the capacity of the Chrouy Changwar plant by 65,000 m^3/day by 2013. The steadily increasing annual treated water production of PPWSA between 1993 and 2008 is shown in Table 3.

Table 3. Average annual water production in m^3/day (Source: PPWSA records)

Year	Actual production (m^3)	Average Daily Production (m^3/day)	Max. daily Production (m^3/day)
1993	19,586,000	53,660	No data
1994	25,483,000	69,816	No data
1995	31,651,000	86,715	No data
1996	34,486,000	94,482	No data
1997	39,184,171	107,354	116,646
1998	39,983,794	109,545	113,116
1999	40,622,401	111,294	117,837
2000	39,801,167	109,044	117,586
2001	37,763,547	103,462	103,978
2002	41,793,679	114,503	115,362
2003	46,871,146	128,414	144,405
2004	56,775,305	155,549	182,124
2005	61,857,961	169,474	190,367
2006	79,623,204	193,488	211,605
2007	79,400,031	217,534	240,349
2008	85,513,649	234,284	258,571

Progressive increases in the daily per capita water use in the city of Phnom Penh are shown in Figure 4. Volumes of water produced and volume of water treated annually during the period of 1993 to 1998 are shown in Figure 5 and 6.

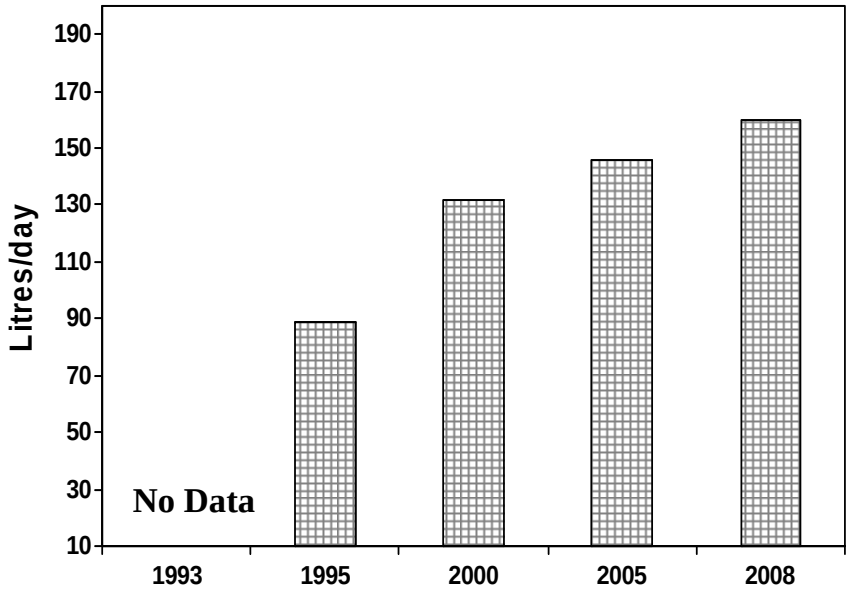

Figure 4. Per capita water use, 1993–2008 (Source: PPWSA records)

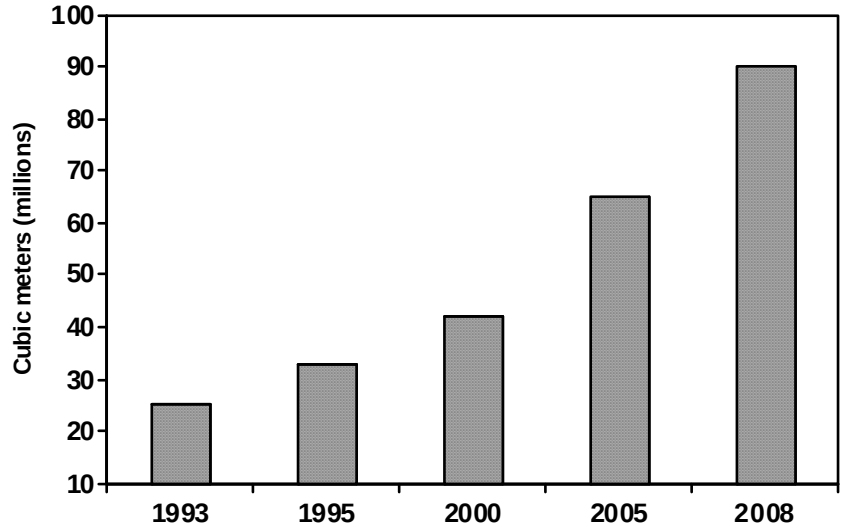

Figure 5. Volume of water produced at source (m^3), 1993–2008 (Source: PPWSA records)

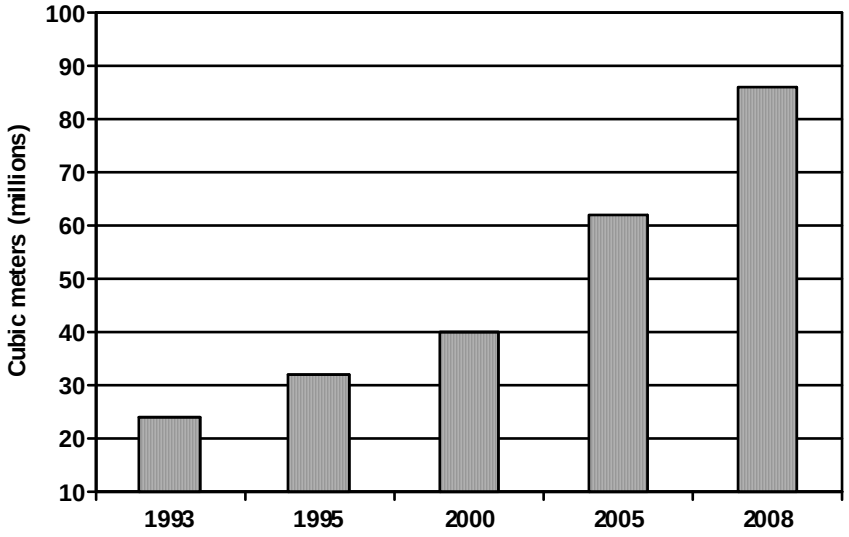

Figure 6. Volume of water treated in m^3, 1993–2008 (Source: PPWSA records)

UNACCOUNTED FOR WATER

A major problem in 1993 was very substantial losses due to unaccounted for water: it was well over 70%. Reducing unaccounted for water within a short timeframe where several tasks had to be done almost simultaneously required a strict system approach. No water supply can be kept at a reasonable and affordable level, if the income from the customers does not cover the costs of providing a good service, especially when nearly three-quarters of the water supplied yielded no revenue whatsoever. Thus, a strict regime was planned and implemented which had several interrelated components.

No significant unaccounted for water reduction is possible without the cooperation and support of a dedicated, competent, motivated and home staff. During the early 1990s, as noted earlier, the quality of staff in PPWSA left much to be desired. Not only the staff was demoralized, but they had good reasons to be demoralized, with poor governance, below subsistence pays, lack of discipline, absence of any incentives and pervasive corruption. Lethargy, poor working practices and "could not care less" attitudes to the fate of the water consumers were the prevailing norm. The work culture had to be changed by enforcing strict disciplines in a sensitive, fair and transparent manner. This was a difficult task since the rest of public sector employees in Cambodia were in a similar boat, and behaved in a very similar manner. In fact, most of the public sector companies still continue to behave in a somewhat similar way at present.

Changing institutional culture was not an easy task. It had to start with the senior officers who had to become the role models. Earlier, one of the perks of the job was that the employees of PPWSA received free supply of water. This practice was stopped promptly. Staff members not only had to install meters but also had to pay their water bills in full, like any other citizen, and within the stipulated time period. Otherwise, they were treated

the same way as those who were delinquent with their bills.

Ensuring discipline and honest behaviour from the PPWSA staff took some time, but with strict enforcement of rules and a "carrot and stick" approach proved remarkably successful. Initially, there were some stiff resistances. For example, some senior staff continued with corrupt behaviours, or were not interested in obeying the new rules and discipline. One staff member felt that since he came from a powerful family, and thus he was untouchable, and could do whatever he wanted to do. When he was dismissed for his consistent poor performance and corrupt behaviour, he threatened to sue and kick up a fuss. With overwhelming evidence against him, he finally backed down and was dismissed from PPWSA without any further incidence. The fact that a politically well-connected person could be dismissed for corrupt practices promptly, in a fair and transparent manner, sent an important message to the rest of the PPWSA staff. All the staff members realized that there were new working rules where if they abused their power, especially in terms of corrupt practices, like providing illegal connection, or incorrect meter readings, or for accepting financial contributions for any unofficial purpose, they would be dismissed immediately.

Simultaneously, other rules were also put into place, and were strictly and fairly enforced. For example, if a meter reader of an area did not, or could not, find an illegal connection, but one of his colleagues did, the colleague received a reward and the meter reader was penalized. Public was made aware of the problem of illegal connections. Those customers found to have illegal connections were heavily penalized, and anyone who reported an illegal connection was rewarded. Inspection teams were set up to search for, find and eliminate illegal connections.

As a result of these actions, the number of illegal connections discovered dropped from an average of one per day to less than five per year by 2002. At present it is highly unusual to find even one illegal connection.

All these efforts proved to be immensely successful in reducing unaccountable for water. The process was further helped by incentives for good performance. For example, between 1994 and 2004, salaries of PPWSA staff increased by more than 10 times. Since 2004, salaries for good performers have steadily been increased each year. Since it is now possible to have a good and reasonable lifestyle with the current PPWSA salary, and disciplines are strictly enforced in a fair and transparent manner, the corrupt practices of the past have now basically disappeared from the PPWSA as an institution. Viewed from any direction this has been a most remarkable achievement, especially in a developing country like Cambodia, where none of the other public sector institutions can even partially match the performance and efficiency of PPWSA.

Elimination of underground tanks also received considerable attention. Most of these tanks had been connected to the distribution networks after the fall of the Khmer Rouge regime since the supply was erratic and the pressure was too low to supply water to numerous households. People returning to Phnom Penh after the Khmer Rouge atrocities had no option but to construct such tanks because it was the only way to obtain their daily

supply of water. There were 1,945 such underground tanks in Phnom Penh, on which the PPWSA had no control on the water consumption of the people who used such tanks. Equally, it was also very difficult to control the quality of water in such tanks, which numerous households were using.

After the PPWSA decided to determine the magnitude of the problem posed by these underground tanks by a survey conducted in 1994**,** it took a policy decision to close all such tanks as quickly as possible, and provide every household that depended on such tanks to draw water through individual house connections. When this was not possible for a few specific cases, a caretaker was nominated for each such tank, and was provided with a meter. The caretaker was considered to be a local vendor-cum-retailer, and had to pay the PPWSA for the total water consumption from the tank at the prevailing domestic rate. He then collected the funds from the consumers, which gave him some net income after paying for the water to the PPWSA. All these underground tanks have now been closed.

In 1996, the PPWSA started to rehabilitate its network with funding support from the Asian Development Bank, World Bank and the Governments of France and Japan. The rehabilitation process was completed by 2002. It included construction of a new 16-km water transmission line with the support of the Asian Development Bank. In addition, a maintenance and repair team was organized on a 24-hour standby basis. The public was encouraged to report all leaks, which were promptly repaired.

With all these ameliorative measures in place, the PPWSA started to progressively control and manage its unaccounted for water. By 2008, it had successfully managed to reduce the unaccountable for water to only about 6.2%. This represented a phenomenal decline from 72% losses in 1993. This meant that Phnom Penh's unaccounted for water declined by 91% in only 15 years. It has been one of the most remarkable achievements of Phnom Penh (Figure 7), a level of improvement that no developed or developing country has managed to achieve in recent history. This level of current loss is many times better than London, which has been exclusively private hand for over two decades and also Barcelona, Paris, New York or Los Angeles. The steady decline in the level of unaccounted for water for Phnom Penh between 1993 and 2008 is shown in Figure 7.

WATER PRICING AND COST RECOVERY

The uniform global experience has been that if the consumers have to receive a 24-hour, uninterrupted, and reliable water service, they have to pay for this service. Water is mostly considered to be a human right, even though no convention exists at present that stipulate such a right. There is no universal agreement that water is a human right, since some important countries have opposed this concept. Be that as it may, currently there is a global convention that stipulates explicitly that food is a human right. Even then, food is not free: people must pay for it. Thus, irrespective of whether water is considered to be a human right or not, there is no question that consumers will have to pay for a good and reliable service: otherwise free water will invariably lead to a third-grade and

unacceptable service. What is needed is that the tariffs paid and the social support systems that are in place in each country must ensure that poor have access to adequate quantity and proper quality of water (Biswas, Rached and Tortajada, 2008).

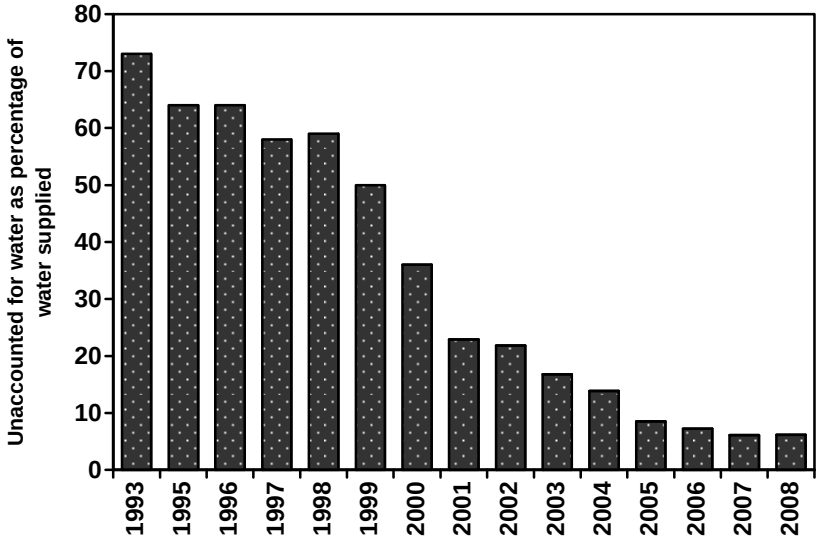

Figure 7. Unaccounted for water, Phnom Penh, 1993–2008 (Source: PPWSA records)

The Government of Cambodia decided in the 1990s that water was an economic and social good, and thus a responsible, financially viable and socially sensitive tariff structure should be in place so that the PPWSA could have adequate income to be financially self-sufficient: the institution would have to be run in a business-like way. The Government explicitly made this financial commitment to both the Asian Development Bank and the World Bank when it sought loans from these two institutions for modernizing and restructuring PPWSA, and for rehabilitation of its old infrastructure and construction of new ones. This commitment has been noted earlier.

While many other countries have made similar commitments earlier, the difference in the case of Cambodia was the actual implementations of this commitment. In many other countries, once the loan is received by the governments concerned, they often have ignored, or backslided on their earlier commitments for mostly flimsy reasons. The real reason often is very short term political gains, at the cost of long-term serious damage to the financial health of the utilities concerned and its efficient management.

To the credit of the Cambodia Government, the PPWSA has been left to operate as an independent business-like institution without any political interference, within the checks and the balances that were stipulated in the landmark Decree No. 52 of 1996 (See Annex I). This does not mean that this Decree is perfect (in fact it needs updating and resolution of several anomalies), but by and large the Cambodian Government has kept its commitments, which in the field of water supply within the context of any developing country has been somewhat unusual.

With its autonomous structure and dynamic leadership of the present General Director,

PPWSA has operated as an independent, business-like institution, with a social conscience, since 1994. Since no institution can remain independent and autonomous, unless it is financially self-reliant, very correctly the PPWSA decided to maximize its income by:

- Reducing unaccounted for water very significantly so that much of the water produced can be sold to the consumers (discussed before);
- Fixing a tariff structure and implementing it fully with a social conscience;
- Prepare and continually update a roster of customers on a reliable basis;
- Completely restructuring the billing system so that that the bills can be produced and delivered on time;
- Improve the bill collection ratio with appropriate incentives, with disincentives of late or no payment; and
- Increase the annual profits of the PPWSA by becoming increasingly more and more efficient on a progressive basis.

Since all the above requirements have been accomplished at present, the PPWSA has undergone a remarkable metamorphosis to become a new, efficient and functional institution that is very different from the institution it used to be in 1993. From a near-bankrupt and totally demoralized institution, it has transformed itself to a viable and vibrant institution that can be compared very favourably with most of world's best performing water utilities, in developed or developing countries. It has developed a new mindset, modus operandi and a team spirit that sets it apart from most of the world's other utilities, especially in the developing world. The fact that this was accomplished within only one decade indicates, as we have argued earlier, that providing clean and drinkable water supply to everyone in all the cities of the third world having more than 500,000 inhabitants is not a rocket science. The knowledge, experience and technology have been available for years: what has been missing is dynamic leadership and political will, especially in terms of support and non-interference in the policies and day-to-day management of the utilities.

In order to achieve higher revenues and thus financial self-sufficiency, PPWSA embarked upon a five-prong concurrent strategy. One of the most difficult components of this strategy to implement was to increase the tariff of water so that all costs could be recovered without generating any social or political unrest. This was done by ensuring that its customers first witnessed and appreciated a much better quality of reliable service before the tariffs were increased.

The initial tariff plan that was proposed by the Asian Development Bank and subsequently adopted by PPWSA, proposed three increases in 7 years, along with continuous improvements in service delivery. This process was designed to ensure there was no sudden huge jump in tariffs which the consumers would find economically difficult and thus reluctant to pay. This could even have become counterproductive on a long-term basis and could have made future tariff increases socio-politically difficult.

With the enthusiastic endorsement of the higher tariff by the Asian Development Bank who conducted a socio-economic survey of Phnom Penh in terms of the consumers willingness and capability to pay higher tariffs, and equally strong support from all donors like the World Bank, and equally strong political backing from the Prime Minister, the Finance Minister and the Governor of Phnom Penh, the first increase in the tariff was introduced from 1st June 1997. This increase along with other steps concurrently taken by PPWSA to improve the efficiency of its operation practices, immediately doubled the income of the PPWSA.

The increase in the tariff was very carefully planned. First, a socio-economic survey of the water supply situation was carried out for the city of Phnom Penh. This survey included collecting information on how much consumers were paying for water from private vendors, and what where likely to be their reactions if these vendors were replaced by the supply from the PPWSA. This survey showed the willingness and capability of the consumers to pay a higher tariff than the one they were charged by PPWSA before, provided the consumers received a significantly improved service. The results of this survey are shown in Table 4.

Increasing tariff was also a difficult and complex process in political and institutional terms. The PPWSA had to initiate a request for tariff revision through its *tutelle* ministry. However, in order for it to be implemented, it ultimately requires the approval of the Prime Minister.

Table 4. Socioeconomic survey of water supply in Phnom Penh (ADB, 1996)

Items	**Category I**	**Category II**	**Category III**
	Households connected	Water sold by neighbour	Water sold by vendors, and collected directly from rivers and wells
Percentage of households	42%	16%	42% (16% from vendors)
Average income (riels/month)	1,375,000	325,000	1,020,000
Average consumption (m^3/month)	37	14	20
Average cost/m^3 (riels)	280	2,652	2,124
Total water cost riels/month	10,360	37,128	42,480
Water cost as % of income	0.8%	11.4%	4.2%
Proposed average tariff (riels/m^3)	575	400	450
Total monthly water expenditure (riels/month)	21,275	5,600	9,000
Water cost as % of income	1.5%	1.7%	0.9%
Proposed average tariff (riels/m^3)	575	400	450
Total monthly water expenditure (riels/month)	21,275	5,600	9,000
Water cost as % of income	1.5%	1.7%	0.9%

The tariff was calculated on the basis of the guidelines provided in the National Water Policy. It was calculated after considering the total expenses of the PPWSA, including

operation and maintenance costs and the depreciation of all its assets. Under the National Water Policy, the utility is expected to recover all its operating costs with tariffs, as well as the depreciation of all its assets, except land which generally increase in value over time. The value of its assets has to be revised every five years. The second increase in tariff was introduced in 2001. The changes in the tariff structure from 1983 are shown in Table 5.

Table 5. Progressive tariff structure of PPWSA, in riels m^3 (Source: PPWSA records)

Until 1983: Free water for every household
1984: 166 riels/m^3 (domestic and commercial)

1993- June 1994: 166 riels/m^3 (domestic)
515 riels/m^3 (industrial)

July 1994-May 1997: 250 riels/m^3 (domestic)
700 riels/m^3 (industrial)

June 1997: Block tariff rates were introduced. All connections were metered

Domestic tariffs (m^3/month)

0–15:	300 riels
16–30:	620 riels
31–100:	940 riels
>100 :	1,260 riels

Industrial tariffs (m^3/month)

0–100:	940 riels
101–200:	1,260 riels
201–500:	1,580 riels
> 500:	1,900 riels

Governmental institutions (m^3)

Flat rate:	940 riels

2001: Domestic tariffs (m^3/month)

0–7:	550 riels
8–15:	770 riels
16–50:	1,010 riels
>50:	1,270 riels

Commercial tariffs (m^3/month)

0–100:	950 riels
101–200:	1,150 riels
201–500:	1,350 riels
>500:	1,450 riels

Government institutions (m^3)

Flat rate:	1,030 riels

The third increase in tariff that was recommended by ADB was not necessary within the 7-year period. This was because ADB grossly underestimated the improvements in the efficiency that PPWSA had managed to achieve continually up to now. PPWSA has become a far more an efficient organization than ADB had expected, as a result of which further increases in tariffs was considered simply not necessary. The ADB recommendation was based on its actual experience in other Asian cities. However, the PPWSA vastly exceeded the potential historical efficiency improvement anywhere in the world. To our knowledge this feat has not been repeated by any country during the past decade.

It was not such a difficult choice for the public, who witnessed significant improvements in water delivery, including quality of water, to pay for the vastly improved service, especially as they considered the increase very reasonable, and this within their capacity to pay. This included the poor, whose water bill actually declined by a factor of 5 to 6, for a vastly improved service. As a result, for all practical purposes, the private water vendors have disappeared from the PPWSA area. Vast majority of the people, including the poor, had no objection to pay a higher tariff for a significantly improved service that was safe and reliable.

By 1995, there was a 24-hour uninterrupted service available in Phnom Penh (Figure 8) which has remained the same in spite of increasingly average water demand per capita (Figure 4), and also higher number of customers (Figure 9). This also meant that the average monthly household bills in Phnom Penh increased significantly between 1995 and 2000, and thereafter have increased only incrementally (Figure 10).

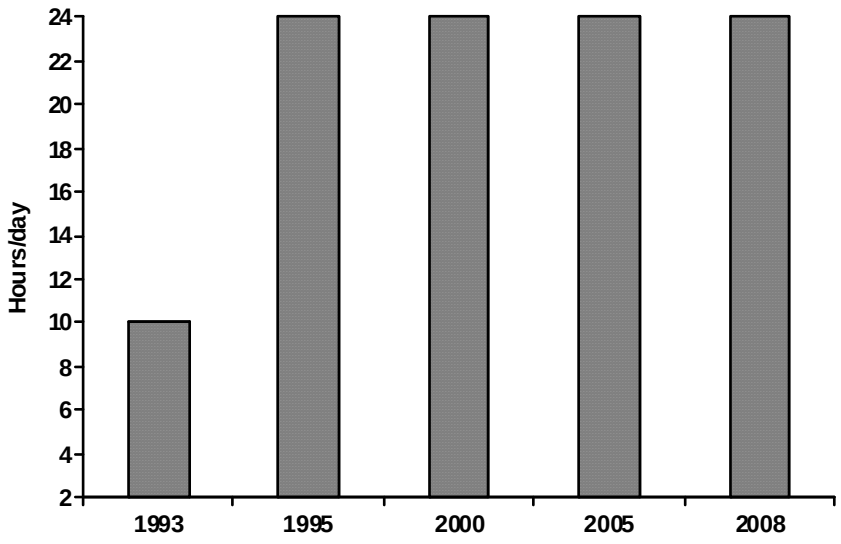

Figure 8. Availability of water in hours per day, 1993–2008 (Source: PPWSA records)

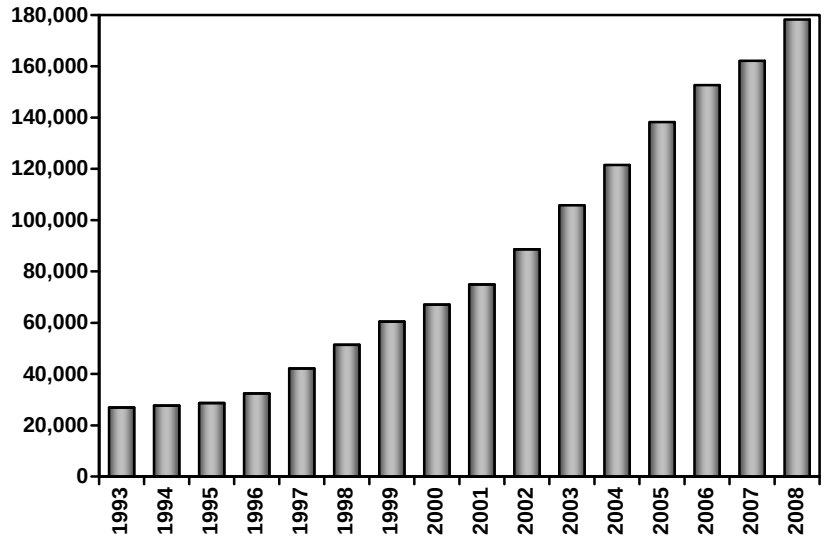

Figure 9. Number of customers, 1993–2008 (Source: PPWSA records)

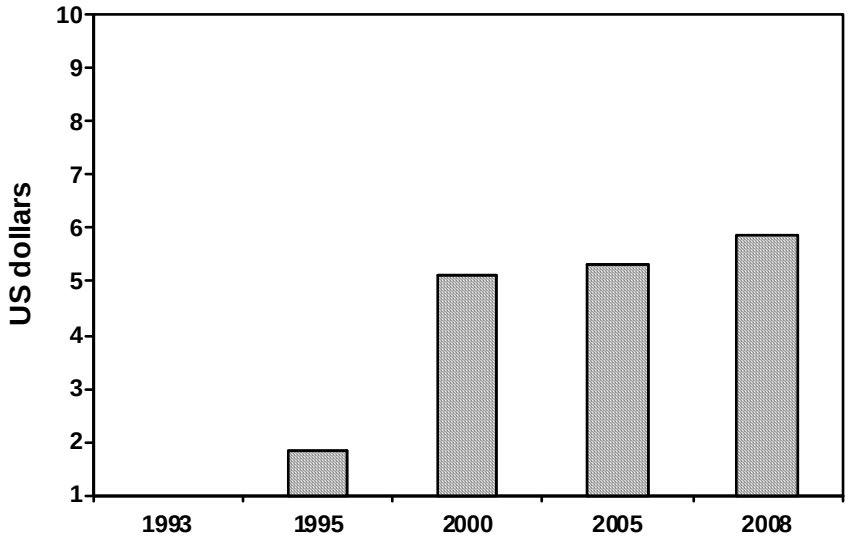

Figure 10. Average household water bill per month, USD, 1993–2008 (Source: PPWSA records)

While it was comparatively easy to convince the general public to pay a higher tariff, it was a different situation with respect to the army installations, government offices and senior officials of the government and the army. They had not historically paid any water bill and not surprisingly, they wanted this free service to continue indefinitely. The army initially refused to have any meter installed to measure its actual water consumption and then billed for it. However, with strong support from the Prime Minister who publicly proclaimed in 1997 that every person and institution must pay their water bills promptly to ensure good service delivery. This transition process, however, was not without

incidents. For example, an army officer even put a gun at the General Director's head and asked him to back off. Fortunately, he did not, and the army officer blinked first. It was unquestionably a most harrowing experience at a personal level, but ultimately it firmly established the elementary principle that every one must pay water bills.

Increased and higher per capita water consumption has meant that average household water bill has also increased with time. This is shown in Figure 10. However, since the first $7m^3$ of water is highly subsidized, and the next $8m^3$ are subsidized, the poor households, could economize their water use, and stay easily within the WHO guideline which that recommends that water bills should not exceed 5% of their incomes. The implications for the poor will be discussed later.

The payment process was helped by some disincentives for not paying the bills or for late payments. If the customers do not pay their bills within the stipulated time, they first receive a warning note which advises payment within a 15-days deadline. If they still do not, they receive a final warning note informing them the date on which their water supply would be disconnected, if they still do not pay, initially by locking up the supply valve. If still they do not pay, on the stipulated date, they are disconnected, and asked to come to PPWSA to discuss their problems. Nearly 70% of the households come, discuss the problem and a solution is found. Reconnection to the water supply is an expensive process, since they have to pay first their outstanding water bill, plus a penalty of 1% per day for their delinquent bills, and a reconnection fee, at this stage which is 60,000 riels. About 30% of the delinquent accounts have their pipe connection cut because of non-payment of the bills. After this stage, the reconnection fee increase to 100,000 riels.

The customers receive their water bills every two months. The bill collectors receive an incentive for collecting higher percentage of the bills. For example, higher the percentage of bills collected, higher the bill collectors get paid. However, if a bill collector collects less than 97% of the bills for three consecutive periods, the person is either penalized, or even dismissed. This system is working quite well because of its transparency and the system of incentive and disincentives that are in place, which are strictly enforced.

Figure 11 shows the billing ratio in terms of quantity of water that was billed as a percentage ratio of total volume of water that was produced between 1993 and 2008. It shows that in 1993, less than 30% of water produced was billed. By 2005, with very significant reduction in unaccounted for water, over 90% of the volume produced was billed. The situation now is even better. Now, over 93% of water produced is billed.

Figure 12 shows the bill collection ratios in terms of number of bills collected, compared to the total number of bills produced, between1993 and 2008. Figure 13 shows bill collection ratios in terms of the amount collected and the amount billed. Both shows bill collection is close to 100% from about 1999, more than double of the rate at what it was in 1993, only six years earlier. This again is a most remarkable achievement.

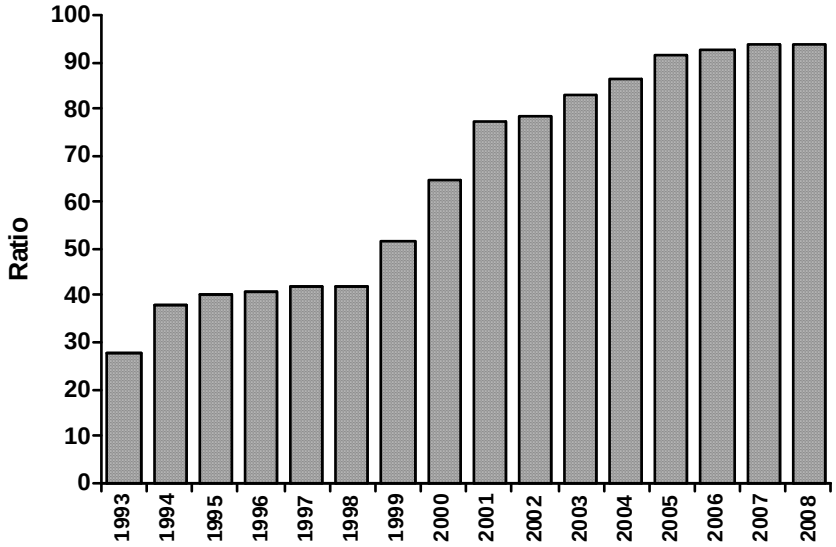

Figure 11. Billing ratio, quantity billed/total production in percentage (Source: PPWSA records)

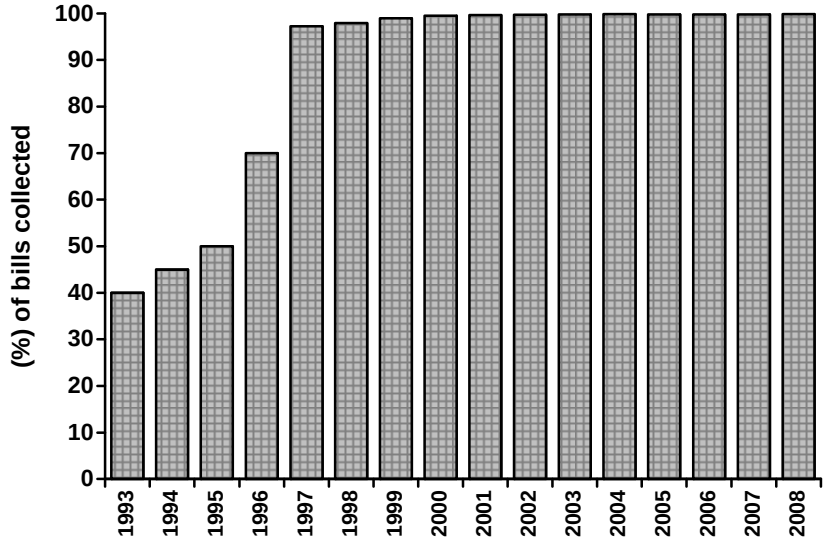

Figure 12. Bill collection ratio, number of bills collected/total bills, in percentage, 1993–2008 (Source: PPWSA records)

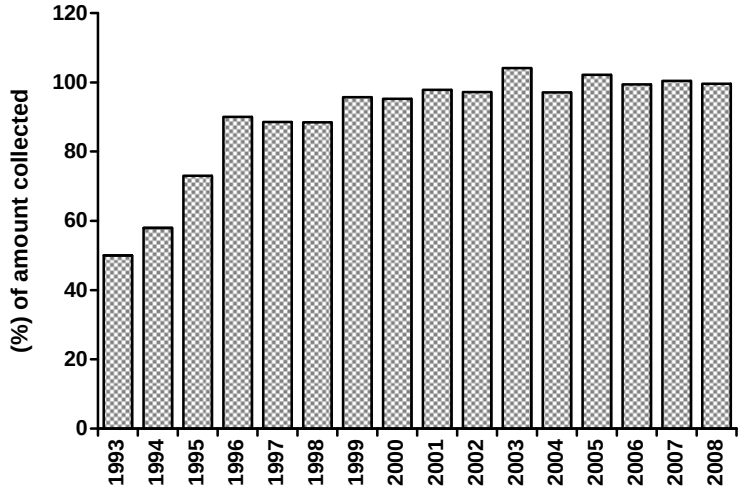

Figure 13. Bill collection ratio, amount collected/amount billed, in percentage, 1993–2008 (Source: PPWSA)

ACCURATE DATA ON WATER CONSUMERS

For any functional and efficient water utility, it is essential to have a data base of its current users of water which must be accurate. Without such an accurate data base of the consumers, it is simply not possible to collect revenue from the water users. In addition, this data base need to be kept continually updated, which means keeping relevant information on the people who move into the city, people who move houses within the city, and also people who leave the city. Such a list is always dynamic, and needs to be continually updated to ensure correct and appropriate billing.

During the Khmer Rouge regime, as noted earlier in this report, all the information on the PPWSA customers and other relevant appropriate information were destroyed. After the fall of the Khmer Rouge government, no accurate data base was established as to who were the actual consumers of the water supplied by PPWSA. In order to establish a proper data base in 1994, nearly 100 PPWSA members visited all the houses of the city to record if they were receiving water or not. The process took one year to complete.

The results were revealing. The survey found that 12,980 households which were ostensibly connected to the system but were not. They were being billed for the phantom water, and surprisingly many were paying their bills even though they never received any water. In contrast, they were 13,901 customers who were connected and receiving water, but were not in the list and thus were not being billed. They were receiving free water.

The French Government gave a grant which enabled PPWSA to establish a fully computerized up-to-date data base, which became fully operational in 1996. The computerized system was further improved in 2001 to handle all financial transactions and operations at PPWSA. By 2003, a comprehensive financial management information

system was in place which enabled PPWSA to have immediate access to the latest and historical financial data and its revenue collection status in real time. An indirect benefit of this automated system has been that corruption and abuse of power were, for all practical purposes, eliminated. In addition, the Authority has continued to improve its overall financial management practices steadily with time.

The increased in the number of customers between 1993 and 2008 are shown in Figure 9. The growth and also the reduction of the different categories of customers are shown in Table 6.

METERING

In order to ensure that a transparent and fair system exists, it is essential that all the connections should be measured in terms of their water consumption. Only after each connection is metered, the consumers can be sent an accurate bill which directly reflects the amount of water they consumed during a specific period.

In 1993, only 3,391 connections, out of a total of 26,881 connections, were metered. In other words, more than 87% of the connections received an estimated bill, which often had no linkage to the quantity of water that was actually consumed. With a policy decision to move to a system of all metered connections as soon as possible, the number of meters installed increased steadily, and the number of unmetered connection started to decline. By 2001, all the connections were metered. The annual progress in terms of metering is shown in Table 7. In addition, overtime, more accurate Class C meters replaced less reliable Class B meters, which further increased the credibility and income of PPWSA.

The steady increases in the number of metered connections are shown in Figure 14. As the geographical areas within which the PPWSA provides water have increased steadily in recent years, so have the number of the metered connection. The number of functional meters is shown in Figure 15, and the numbers of defective meters reported and replaced annually is shown in Figure 16.

WATER FOR THE ABSOLUTELY POOR

As should be evident from the earlier discussion, the issue of providing clean water to the poor or the rich simply could not be considered prior to the 1994 period. There were simply no reliable water services available, either for the rich or for the poor. Thus, the first task of the new management of the PPWSA was to ensure a reasonably reliable water supply system which could be provided to the people, irrespective of whether they were rich, middle class or absolutely poor. Hence, the primary focus and concern of the PPWSA at this initial stage had to be the rehabilitation of the water system in order to ensure a functional supply system which could then be distributed to the people.

Table 6. Categories of customers, 1997 to 2008 (Source: PPWSA records)

Categories	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Domestics	34,621	43,777	51,938	57,117	64,168	76,755	92,148	105,981	121,426	132,287	140,728	152,972
Commercial	6,791	6,983	7,952	9,313	10,229	11,279	13,040	14,947	16,175	18,738	20,690	24,486
Government	407	374	373	417	427	466	528	559	614	635	659	693
Wholesaler	234	199	156	111	73	45	33	17	34	47	54	36
RDE-wholesaler	60	74	60	58	48	26	28	18	17	17	20	13
Total	42,113	51,407	60,479	67,016	74,945	88,571	105,777	121,522	138,266	151,724	162,151	178,200

Table 7. Status of metering, 1993 to 2008 (Source: PPWSA records)

Description	1993	1994	1995	1996	1997	1998	1999	2000
Total connections	26,881	27,623	28,654	32,404	42,113	51,407	60,479	67,016
Metered connections	3,391	5,370	15,203	27,724	39,639	49,162	60,096	66,905
Non-metered connections	23,490	22,253	13,451	4,680	2,474	2,245	383	111

Description	2001	2002	2003	2004	2005	2006	2007	2008
Total connections	74,945	88,571	105,777	121,522	138,266	151,724	162,151	178,200
Metered connections	74,945	88,571	105,777	121,522	138,266	151,724	162,151	178,200
Non-metered connections	0	0	0	0	0	0	0	0

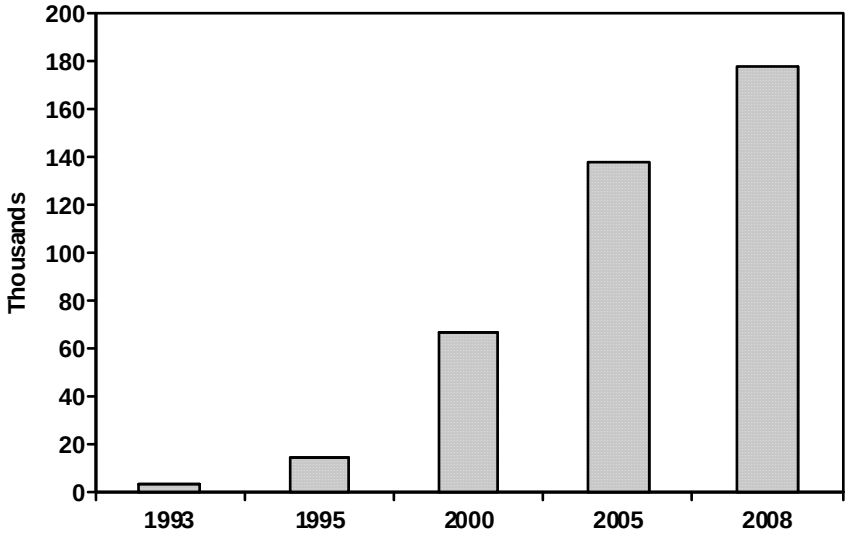

Figure 14. Number of metered connections, 1993–2008 (Source: PPWSA records)

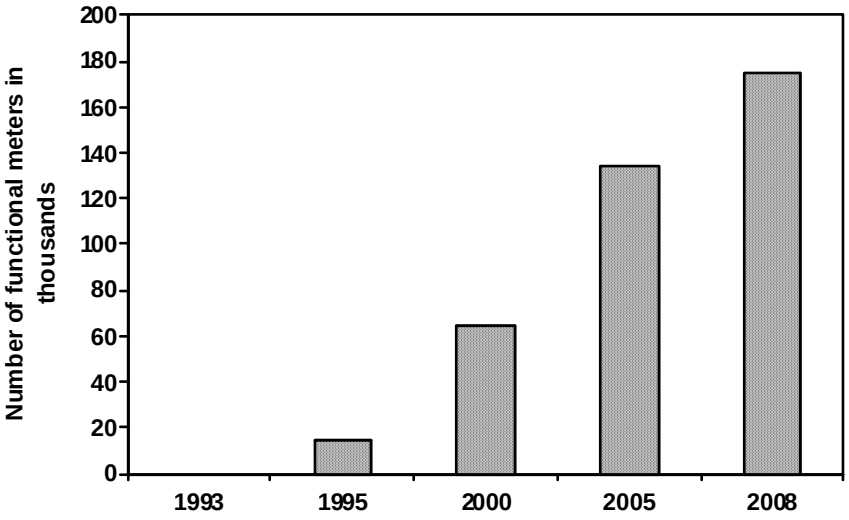

Figure 15. Number of functional meters, 1993–2008 (Source: PPWSA records)

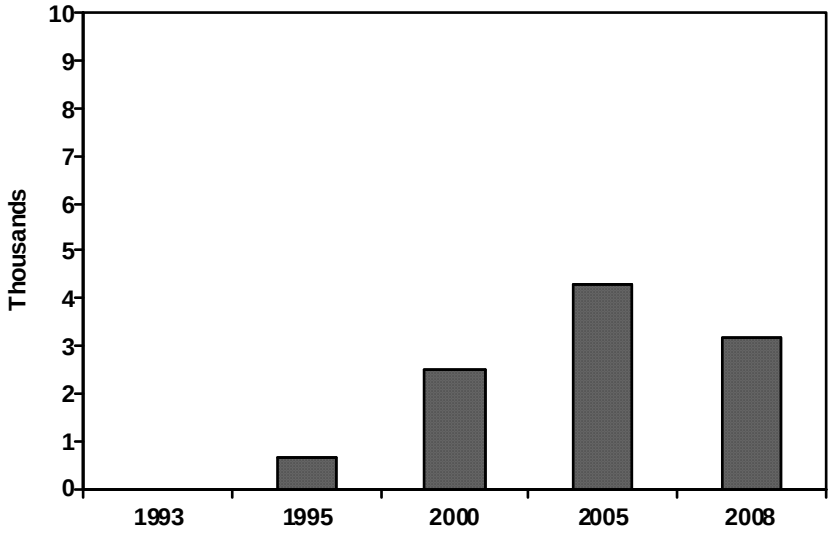

Figure 16. Number of defective meters reported, 1993-2008 (Source: PPWSA records)

Once the supply was restored to a reasonable level, the issue arose how can water be supplied to the absolutely poor which the PPWSA could justify economically and the poor could afford the services they received. The first approach was to determine specific communities of the poor people, who would then elect community representatives to whom PPWSA would sell water, and who, in turn, were expected to resell water to their respective communities at a recommended tariff which was considered appropriate for the poor in terms of affordability. The installation of the community water pipes were initially funded mostly by the NGOs. Hence, during 1995–2000 community representatives were supplied with water. By the end of 1998, there were 53 representatives of the poor communities, with an average total consumption of 15,500 m^3/month, representing slightly over 1% of the total volume of water sales of the PPWSA.

The system did not perform as was initially expected because of two reasons. First, the community representatives mostly sold water to the poor people at 10 to 20 times the subsidized rate PPWSA sold water to them. Second, PPWSA received very little income for the water sold through the community representatives. The main beneficiaries of the system turned out to be the community representatives themselves, who pocketed the difference between the two prices.

During the experimental period, the PPWSA also realized another important factor. Initially, it expected that the poor may steal water as a result of which its net UFW rate would remain high. Accordingly, meters were installed far from the poor households, which increased the installation costs. In 1999, PPWSA realized that even if the poor stole water, which they did not, their individual consumption rate was so low that the resulting losses were unlikely to be significant.

In March 1998, PPWSA received a soft loan from the World Bank, a part of which was explicitly earmarked for the provision of clean water for the poor. In order to comply with both the World Bank loan covenants and the Royal Government's policy for poverty alleviation, PPWSA decided to stop using the community representatives and supply water to the poor households directly. However, the poor households had to fulfill three requirements:

1. They must have clear and identifiable address and must be registered at the municipality;
2. They must pay 10% of the total connection fee and a refundable deposit with the application; and
3. They must pay the rest of the connection fee through favourable installments, over a period of 10, 15 and 20 months, at an annual interest rate of 8.5%.

A task force was created very specifically for the implementation of this pro-poor scheme, which was also charged with the responsibility of processing and approving the applicants, and also implementing the installment payments for the connection charges. This arrangement did not work very well, primarily because the necessary information was not properly disseminated to the poor households. Thus, in 1999, only 101 house connections to the poor could be made under this scheme. In contrast, for the city as a whole, 12, 059 house connections were given that year.

In 2000, two work teams were formed for better dissemination of information to the poor households of Phnom Penh. They were also responsible for implementing the entire programme. It improved the number of water connections to the poor families to 474 that year, an improvement over the previous year, but the numbers were not considered satisfactory.

Accordingly, in 2001, the PPWSA carried out a survey of the views of the households that had received the connections and also those that did not about its "water supply for the poor" programme. This survey identified two fundamental problems:

1. Poor families found it financially difficult to pay connection fees in 10 monthly installments, and
2. People were still not aware of the programme and its potential benefits.

At present, because of a grant by the International Development Association (IDA) and also an annual grant of 50,000 Euros from the City of Paris, PPWSA has a much more generous and affordable programme for the absolute poor. Depending on the poverty levels, poor households are entitled to receive subsidies of 30%, 50%, 70% or 100% of the connection fee, depending upon their financial conditions. These conditions are jointly evaluated by a committee of PPWSA, with direct help from the local communities. In addition, those households that consume a maximum of 7 m^3/month, had to pay only 60% of the real cost of providing water. This new policy helped the poor households to save 130,000 to 380,000 riels each year.

As a result of these improvements in the pro-poor policies, the number of poor households that were connected to the system has steadily increased each year. Figure 17 shows the number of poor households (both cumulative and annual) that have been connected each year, from 1999, to the Phnom Penh Water Supply System.

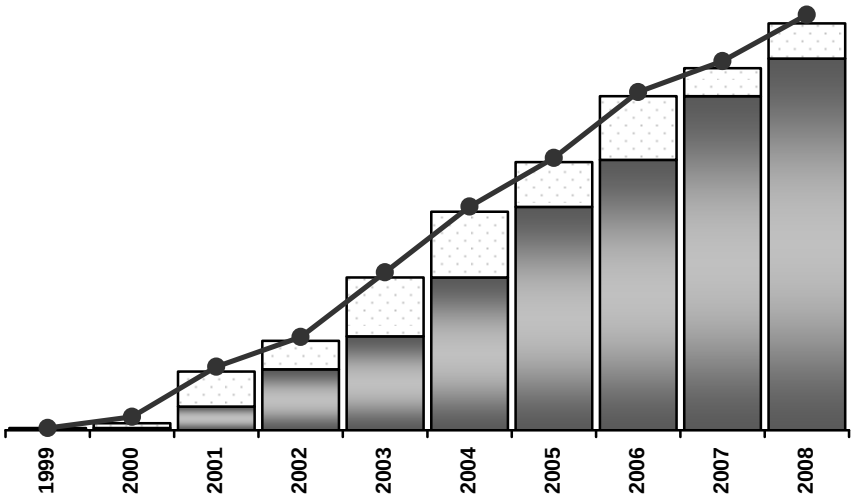

Figure 17. Annual and cumulative water connections to poor households, 1999–2008 (Source: PPWSA)

During the study period, we visited several very poor households in a slum area of Phnom Penh who started to receive water from the PPWSA less than two years ago. Their memories of the situation that prevailed before they began to receive water from PPWSA were fresh. We interviewed them directly and asked them detailed questions on the benefits and the costs of receiving water from the PPWSA.

Earlier they bought water from private sector vendors. The vendors were primarily neighbours who had some land, and used a pump to extract groundwater and then sell to whoever needed water without any treatment. The four very poor households we interviewed, we estimated their monthly water expenditures before they started to receive 24-hour piped water through direct house connections. In all the four cases, their average monthly household water expenditure has declined by nearly 80%. In addition, all the four households felt that the quality of water they are receiving now is much better than when they obtained the supply from the vendors. Also, earlier the supply was not reliable in the sense that the vendors were not always available when water was needed. Thus, many times they had to wait hours before they could receive any water.

When the PPWSA started supplying water to this very poor area, they not only reduced their water bill by an average of 80% but also provided an uninterrupted 24-hour supply to the houses of good quality water. All the households interviewed expressed their full satisfaction with the services provided by PPWSA, the financial benefits they received because of a cheaper, reliable water supply of better quality and also the overall

convenience. They feel that the price they are being charged for water by the PPWSA is "very reasonable".

We also interviewed the water vendors who could no longer sell water. The pumps are still there but they are not being used. They were somewhat philosophical about their loss of business. However, paradoxically, they felt water price of the PPWSA was on the high side, and thus should be reduced. This is in spite of the fact that used to sell water to their former customers 4 to 5 times the current price.

FINANCIAL SUSTAINABILITY

On the basis of the current evidence, the financial sustainability of the PPWSA can be summarized by one word: excellent! There is no question that it is in rude health in financial terms. According the latest audited statement from its auditors, Price, Waterhouse Coopers (2009), its operating revenue for the 2008 financial year was 91,587.65 million riels, on which it made a profit of 30,577.58 million riels. After paying income tax of 6,141.35 million riels (20% of the profit) to the Government of Cambodia, it made a net profit of 24,436.24 million riels. To our knowledge, it is the only publicly managed water utility in the developing world which has consistently increased its net profit since 1993, and also has paid consistently higher income taxes every year to the government. In fact, according to the audited report of 2008, the PPWSA had actually made a loan of 2 million dollars (equivalent to about 80 million riels), in 2005, to the *Electricité du Cambodge*, which was fully repaid in 2007. In 2008, the PPWSA gave another loan to the Pursat Water Supply Authority for 675.44 million riels to finance the construction of the main water supply network in the Kandiang district of the Pursat Province. The unsecured loan is subject to a 5% interest per year, and would be reimbursed to the PPWSA in 120 monthly instalments, after the construction of the network is completed in 2009. The financial and technical performance indicators of certain selected parameters, between 2003 and 2008, are shown in Table 8. This table indicates the remarkable transformation that PPWSA has achieved during the 15-year period between 1993 and 2008.

The main components of the operating costs of the PPWSA at present are for electricity (44.97%) and chemicals needed for water treatment (10.73%), on which it has no control (Figure 18). The electricity costs are dictated by the *Electricité du Cambodge*, and the chemical costs are determined by the world market prices. Salaries, wages and allowances for the staff account for another 32.16% of the annual expenditure. While the Authority is becoming increasingly efficient in terms of its staff performance (for example, the number of accounts served per employee has dramatically improved between 1993 and 2008, as shown in Figure 19), the Authority must pay decent financial packages to its staff in the future to recruit and retain a highly motivated staff.

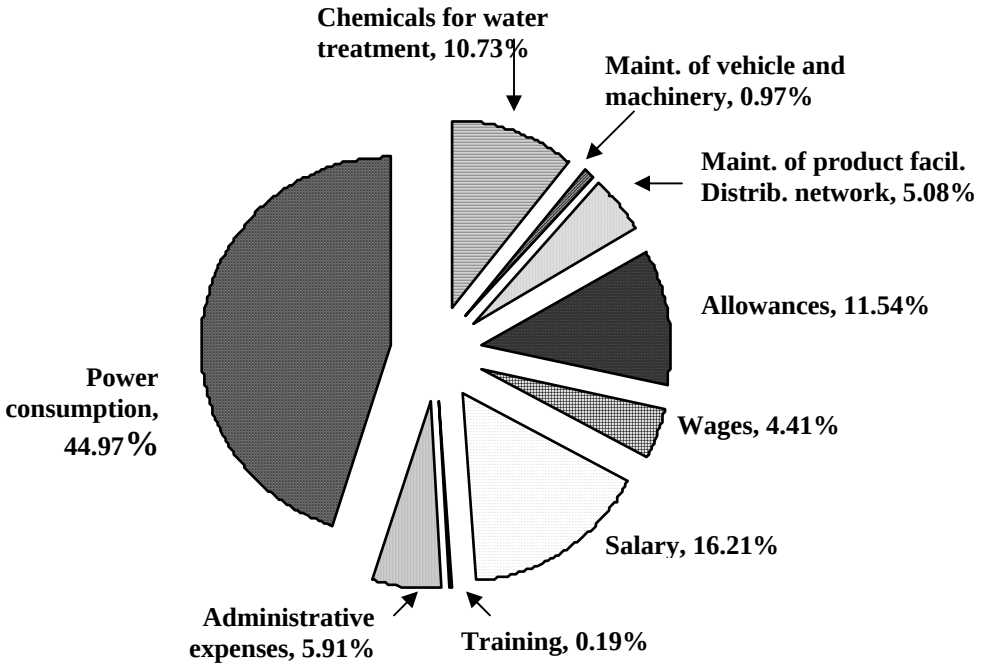

Figure 18. Distribution of annual operating expenses (Source: PPWSA records)

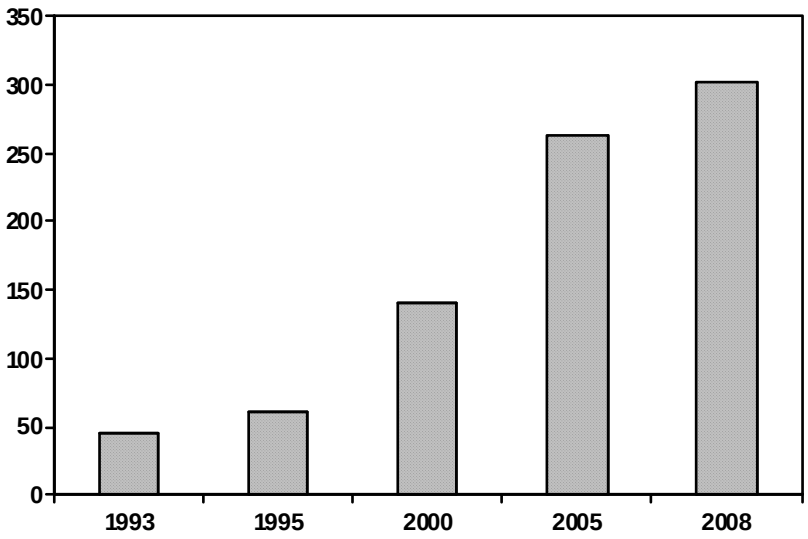

Figure 19. Number of accounts served per employee, 1993-2008 (Source: PPWSA records)

We thus expect that the average cost of per m^3 of treated water sold will continue on its upward path, as has been the case between 1995 and 2008 (Figure 20). While there is no question that PPWSA will continue to make efficiency gains through the use of improved

technology, continuous staff training and improved financial management and technical practices, these gains are likely to be limited in the future. However, we have every reason to believe that the PPWSA will be able to keep its tariff structure under control, certainly well below the national inflation levels because of continuous efficiency improvements in all fronts.

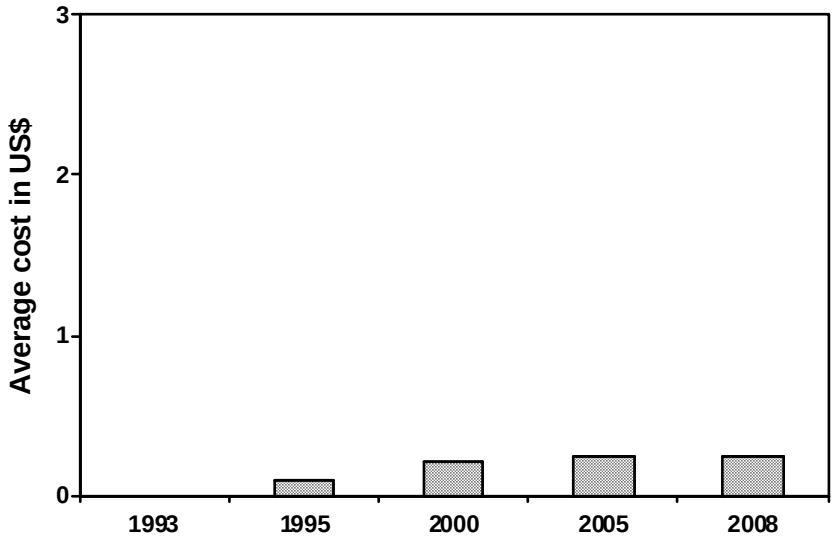

Figure 20. Average cost per m^3 of water sold, USD, 1993–2008 (Source: PPWSA records)

In terms of billing ratio (consumption/production), this has increased from an estimated 28% in 1993 to consistently over 90% from 2005 (Table 9). The percentages of bills collected, both in terms of number of bills and the total amount, are also now over 99.5% (Table 9). Similarly, unaccounted for water has progressively declined from nearly 72% in 1993 to slightly over 6% in 2007 and 2008 (Table 9). It may be difficult for PPWSA to go much below this level, especially as in the future the network will become older and thus maintenance complexities and expenditures are likely to increase steadily to maintain UFW to around 5 to 6% level. Even it manages to maintain its UFW levels to around 6%, which is the current level, it will still be a remarkable achievement, since we are not aware of even a single city anywhere in the developing world which has managed to reduce, let alone maintain, UFW at 6% level. In fact, it is currently assumed that if such urban centres can keep their UFW levels at around 20%, they are considered to be performing quite well. The UFW levels of the PPWSA are already at 1/3rd of this co-called “good practice” level.

Table 8. Indicators, 2003–2008

Description	2003	2004	2005	2006	2007	2008
Production capacity	46,884,806	56,876,980	61,409,719	70,623,204	71,319,197	85,386,803
Water invoiced	39,015,489	48,996.980	56,170,008	65,479,777	66,935,386	80,101,498
Unaccounted for water	16.78%	13.85%	8.53%	7.28%	6.15%	6.19%
Average tariff per m^3	987.01	965.00	976.18	990.52	997.69	1002.14
Average cost per m^3	896.93	849.23	863.08	903.93	781.63	746.37
Number of bills	102,193	121,252	138,266	151,724	162,151	178,200
Acct. receivable (day)	24	26.04	27.07	25.61	22.82	28.67
Debt service ratio	0.73	2.19	2.29	2.66	3.04	3.18
Return on revenue	17.31%	16.46%	17.85%	26.62%	24.66%	23.88%
Return on net asset	4.23%	4.57%	5.50%	4.69%	6.06%	6.96%

Table 9. Billing and collection ratio, Average for the year, 1993–2008 (Source: PPWSA records)

Description	1993	1994	1995	1996	1997	1998	1999	2000
Billing ratio (consumption/production)	28*	38*	40*	41	42.23	41.87	51.50	64.53
UFW (%)	72*	62*	60*	59	57.77	58.13	48.50	35.47
Percentage of bills collected	40*	45*	50*	70	97.24	97.92	98.94	99.47
Percentage of amount collected	50*	58*	73*	90	88.51	88.45	95.76	95.23

Description	2001	2002	2003	2004	2005	2006	2007	2008
Billing ratio (consumption/production)	77.15	78.48	82.99	86.14	91.47	92.72	93.85	93.81
UFW (%)	22.85	21.52	17.01	13.86	8.53	7.28	6.15	6.19
Percentage of bills collected	99.64	99.72	99.77	99.80	99.78	99.76	99.79	99.85
Percentage of amount collected	97.82	97.20	104.13	97.10	102.20	99.38	100.43	99.58

*estimated

With such efficiency gains, amounts billed (Figure 21) and amounts collected (Figure. 22) have become almost the same during the post-2000 period. This has meant that net profit of the Authority has progressively increased every year since 1998 (Figure 23). As the PPWSA increases its geographical area of coverage, more and more consumers join the system. Per capita consumption has also increased. If the Authority improves its current level of performance, there is absolutely no reason why it would not increase its net profit steadily. Possible political interference can of course quickly reduce its performance levels. At the current stage of development, however, it is highly unlikely that there would be political interference in its management, especially as it is the only public sector utility that has been consistently delivering good services to the people and also has been concurrently increasing its profit each year.

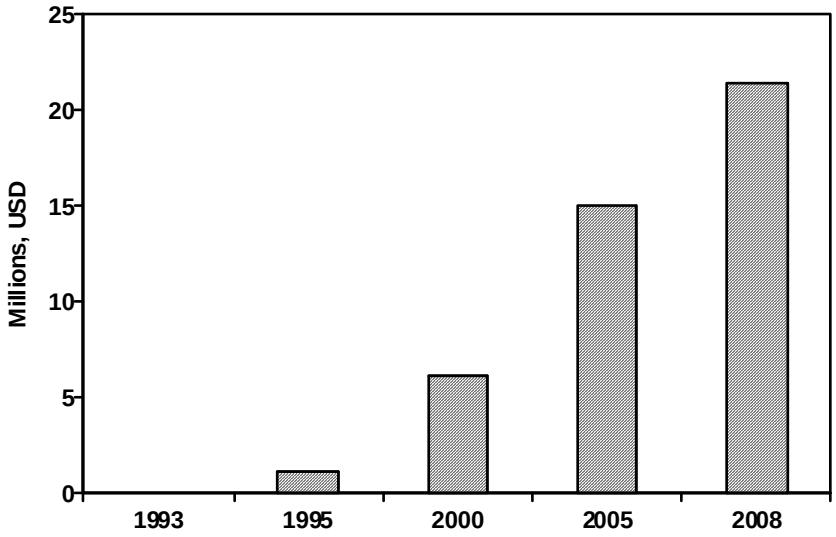

Figure 21. Amount billed in US dollars, 1993–2008

PPWSA: AN OVERALL PERFORMANCE ASSESSMENT

In retrospect, if any independent and objective observer had been asked to make a realistic forecast on the future prospect of a near bankrupt, demoralised and a corrupt institution like the PPWSA, in 1993, the most optimistic individual would probably have said “not very much”. At best, the Authority would be able to improve its performance incrementally, and would manage to provide water of uncertain quality to some of the inhabitants of Phnom Penh, for a few hours every day. In 1993, the most optimistic prognosis would have been to expect PPWSA to become an average south or south-eastern Asian water utility in one decade, whose performance would still continue to be dismal but somehow manage to provide basic water services to its people. In other words, the best one could have anticipated was that, by 2003, PPWSA would become an average water utility of the region, with a mediocre, or even less than mediocre, performance.

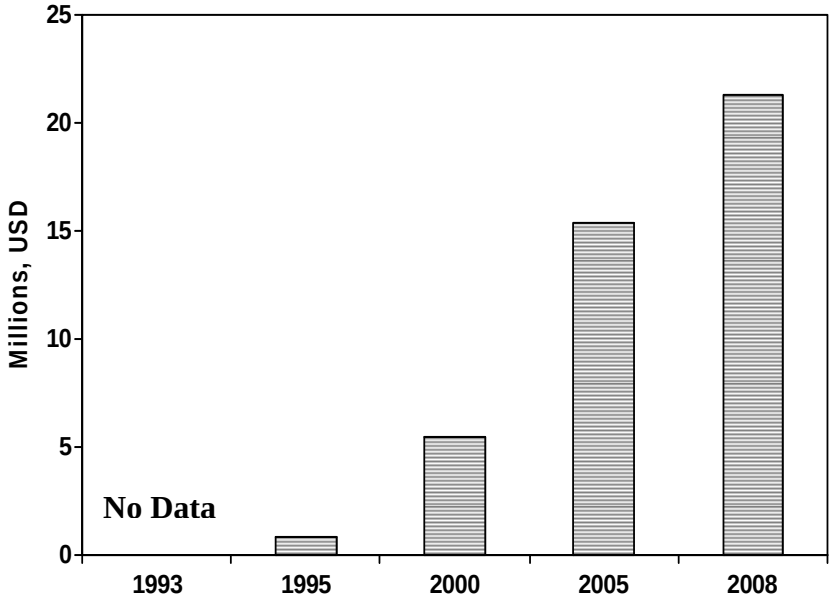

Figure 22. Amount collected, US dollars, 1993–2008 (Source: PPWSA records)

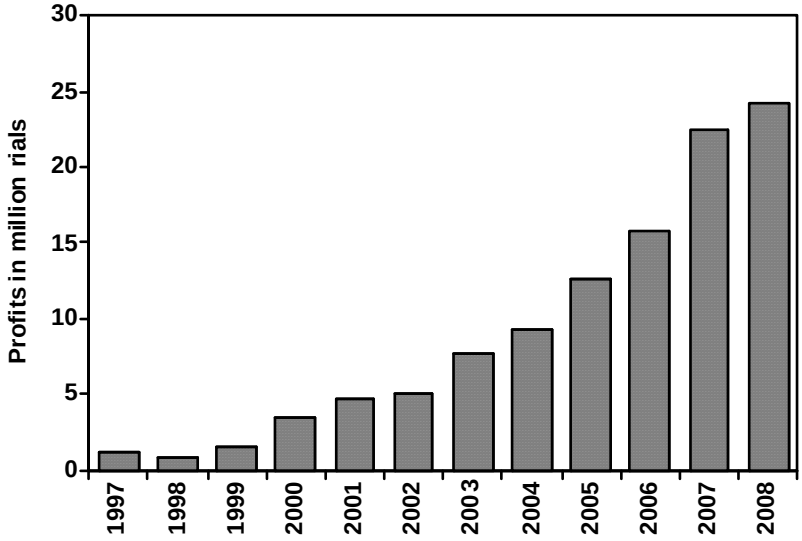

Figure 23. Net profits of PPWSA, 1997–2008 (Source: PPWSA records)

Instead, the actual achievements of the PPWSA have confounded everyone, including its most ardent supporters and the donors. In only one decade, the institution has turned around 180 degrees, with a completely different mindset, a team spirit that is seldom observed in any utility (water, gas or electricity) in any developing country, and a "can do" attitude which is very refreshing to observe. From 1994, and in every year since that time, the Authority has made very significant progress, year after year, in all the

indicators of technical, managerial and financial performance. It has continuously expanded its network (Figure 24), improved its management and operating efficiency, and has become financially self-sufficient, and has progressively increased its net annual profit after paying appropriate income taxes to the Cambodian Government like any private sector institution.

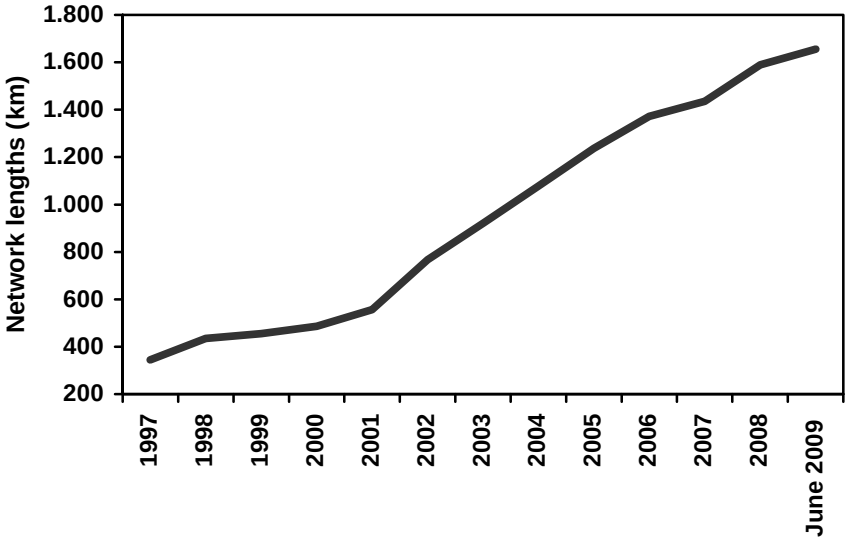

Figure 24. Total pipe network lengths in km, 1997–2009

Year to year improvements in its production, distribution and financial indicators are shown in Table 10. This table indicates that within the 15-year timeframe, PPWSA has increased its annual water production by 437%, distribution network by 557%, pressure of the system by 1260%, and customer base by 662%. During the same period, it has reduced unaccounted for water losses, from 72% of treated water produced in 1993 to only 6.19% at present. By judicious use of incentives and sanctions for its staff with transparent policies that were consistently implemented, and a strong and determined focus on capacity building for all its staff, the number of accounts served per employee has increased by 671% during the same period.

Table 11 shows periodic improvements in relevant economic and financial indicators during the 1993 to 2008 period. It shows that during this period, the number of metered connections has gone up by nearly 5255%, and the number of accounts handled per employee has increased by 671%. Even though people are now paying for the water they actually consume, per capita daily water consumption has nearly doubled. This must have improved the health and the environmental conditions of the people very significantly.

Viewed from any direction and from any perspectives, it is indeed a sterling improvement in overall performance by any modern utility in only 15 years. This record of improvements in such a short period, to the best of our knowledge, is unrivalled by any utility anywhere in the world, either in a developed or a developing country.

It is essential that the success of Phnom Penh be replicated in other urban areas of Cambodia. The economic and social costs to other Cambodian urban centres because they are not receiving clean and drinkable water supply are now quite high. Table 12 shows the various health and social indicators for Phnom Penh and 5 other major urban centres of the country (Cambodia Socio-Economic Survey, 2004). It shows that the situation in Phnom Penh is very significantly better than other urban areas, often very significantly. This does not mean that there is one-to-one relationship between availability of clean water and many social and health-related indicators, as many have claimed. For example, inhabitants of Phnom Penh are richer and more educated than in other parts of Cambodia, which could partly explain as to why the indicators for Phnom Penh are better. However, there is no question that an important reason for this difference is because Phnom Penh now has a good and reliable water supply system, which other Cambodian cities do not. By improving the current situations in terms of water supply in other urban areas of the country, the quality of life of life of the Cambodian people could be improved very significantly.

LESSONS LEARNED

The three important questions that arise from this outstanding transformation that took place within less than a decade are the following:

1. What were the enabling conditions that allowed the PPWSA to make this remarkable transformation?
2. Can the PPWSA continue to improve its performance over the long-term?
3. Can the performance of the PPWSA be replicated in the rest of the urban areas of Cambodia, and also in other developing, or even developed, countries?

In our view, the main reasons as to why the PPWSA succeeded are two. First, the Cambodian Primer Minister had the good sense to select a competent and charismatic leader for the PPWSA. Second, there has been absolutely no political interference as to how the General Director decided to perform his tasks. On the contrary, when at difficult moments the PPWSA needed strong political support, the Prime Minister unhesitatingly provided this support. For example, when it was necessary to establish the principle that the rich and the powerful people and the governmental institutions must pay their water bills, the PPWSA received strong political support from the Prime Minister. The Prime Minister made it clear that unless water bills are paid promptly, irrespective of the power and/or richness of a person, or an institution, water supply would be cut off. Thus, leadership of the utility, as well as political non-interference in running the utility, with strong political support whenever needed, in our view, have been the most important reasons for the success of the PPWSA.

By selecting a good and competent leader, by giving him a free hand to carry on with his tasks, by allowing the leader time to understand the problems of the Authority, and then plan and implement a realistic strategy to improve the system, were the most important conditions that have contributed to the remarkable success of the PPWSA.

As we have noted earlier, providing clean and drinkable water to an urban areas is not a rocket science: knowledge, experience and technology have been available for years. Availability of adequate technical, management and administrative capacity is not an issue. These can be developed within a limited period of time, as the PPWSA has shown Availability of funds is not an insurmountable issue. In fact, donors are competing with each other to provide the PPWSA with whatever funds it needs. All donors want to be a part of a success story, especially as so few of them have been truly successful in the area of urban water supply from anywhere in the developing world. The competition between donors to provide funds has ensured that PPWSA can negotiate the best loan conditions that it can receive from a donor which would be the most favourable to Cambodia.

The current General Director had a vision, which was not only correct but also he could implement. First, he got rid of the corrupt and the incompetent people from the Authority. Second, with the good people left over and recruitment of new and younger staff, he made continuing investments in building and updating capacities in all areas and also at all levels. This has been a continuing process. All staff members were provided with good financial packages so that they could have a decent standard of living. These financial packages have allowed PPWSA to attract and retain good staff members. Simultaneously, there have been serious and immediate sanctions for the staff for engaging in corrupt behaviour, including speedy dismissals after a transparent, fair and quick review of individual cases. This practice has ensured that corruption in the Authority has become history.

Third, the unaccounted for water was reduced very significantly as soon as possible in order that water that was “lost” before could be used the people and also generate income for the Authority.

Fourth, the consumer base was increased as rapidly as possible, along with an accurate data base of all the households that had connections. This has been consistently kept up-to-date. Metering, accurate billing and prompt bill collection were made essential requirements.

Fifth, the poor consumers were looked after so that they could afford to pay their water consumption. WHO recommends that the water bill for the poor should not exceed 5% of their income. For the PPWSA, the average water bill for the poor is well below this 5% ceiling. In fact, the water expenditure of the poor declined by nearly 80% compared to what they were paying to private water vendors before they were connected to the city’s water system.

Table 10. Production and distribution data, 1993–2008 (Source: PPWSA records)

Indicator	1993	1994	1995	1996	1997	1998	1999
Annual Production (m^3)	19,586,000	25,483,000	31,651,000	34,486,000	39,184,171	39,983,794	40,622,401
Distribution Network (km)	280	296	309	321	344	435	455
Supply Duration (hours/day)	10	10	24	24	24	24	24
Supply Pressure (bar)	0.20	0.50	1.00	1.00	1.50	1.50	1.50
Number of Customers	26,881	27,623	28,654	32,404	42,113	51,407	60,479
Bill Collection Ratio (%)	40	45	50	70	97	98	99
UFW (%)	72	62	60	59	58	58	48

Indicator	2000	2001	2002	2003	2004	2005	2006	2007	2008
Annual Production (m^3)	39,801,167	37,763,547	41,793,679	46,871,146	56,775,305	61,857,961	70,623,204	79,400,031	85,513,649
Distribution Network (km)	496	555	766	921	1,077	1,237	1,370	1,460	1,556
Supply Duration (hours/day)	24	24	24	24	24	24	24	24	24
Supply Pressure (bar)	1.50	1.50	2.00	2.00	2.00	2.00	2.00	2.00	2.50
Number of Customers	67,016	74,945	88,571	105,777	121,522	138,266	152,696	162,151	178,200
Bill Collection Ratio (%)	99.50	99.60	99.70	99.80	99.80	99.80	99.80	99.90	99.90
UFW (%)	35	23	22	17	14	8.53	7.28	6.15	6.19

Table 11. Economic and performance indicators of PPWSA, 1993–2008 (Source: PPWSA records)

Indicator	1993	1995	2000	2005	2008
Population of Phnom Penh	941,876	985,701	1,114,479	1,313,851	1,325,681
Per capita GDP for Cambodia (constant dollars)	267	280	280	350	400
Average cost of water sold (m^3 in USD)	---	0.093	0.217	0.245	0.251
Number of metered connections	3,391	15,203	66,905	138,266	178,200
Per capita water use (1/day)	---	89	132	146	160
Average household water bill (USD/month)	---	1.82	5.14	5.31	5.87
Unaccounted for water (%)	73	60	35.47	8.53	6.19
Amount billed (1000 USD)	---	1,181	6,184	15,114	21,406
Amount collected (1000 USD)	---	862	5,509	15,446	21,317
No. of accounts served per employee	45	61	140	264	302

Table 12. Access to water and health indicators for Cambodian urban centres (Source: Cambodia Socio-Economic Survey, 2004)

Urban centres	Access to piped water (% of population)	Diarrheal incidence (% of population)	Infant mortality (per 1000 live births)	Child mortality (per 1000 live births)	Poverty incidence (% of population)
Battambang	8.0	2.4	68	40	33.7
Kandal	6.7	4.2	35	27	22.2
Pailin	6.3	2.9	33	26	No data
Phnom Penh	83.7	2.2	16	13	4.6
Siem Reap	0.9	3.8	41	30	51.8
Sihanoukville/Kep/Koh Kong	15.2	10.7	48	15	23.2

Finally, continuous planning for the future was made mandatory, from increasing production of treated water to enlarging the network progressively, in order to account for a higher number of customers, both domestic and industrial.

By concurrently focusing on all these issues, the PPWSA has managed to achieve its vision, which mostly all urban centres of the developing world have found impossible to reach. While conceptually there is no reason as to why other urban centres cannot make such rapid progress, they all face significant governance constraints. For example, in countries like Mexico, the average stay of a utility manager is around 18 months. It is impossible for any new manager to understand the system and then develop and implement a plan within such a short period. In India, for all major cities, the heads of the utilities are officers belonging to the Indian Administrative Service, who basically keep the chairs warm for next 2-3 years. Unless a competent utility manager is selected on the basis of merit, and the person is given adequate time to show results, countries like India or Mexico will be able to solve the water problems of their major cities in the foreseeable future. The constraints are mostly institutional and governance-related issues, including regular political interference in the work of the water utilities. Thus, there is absolutely no reason as to why the Phnom Penh experience cannot be replicated in different parts of the world, assuming the governance practices of the utilities can be dramatically changed.

As to the sustainability of the PPWSA in terms of continuation of its outstanding performance, only time can tell. The choice of the leader of the PPWSA is a political process. If the next leader of the PPWSA will be carefully and properly selected, sustainability of its success would not be an issue. In our view, there are at least two good "leaders in waiting" within the organisation who can easily sustain the current results of the present General Director. However, it is always difficult, if not impossible, to predict the results of any political process which would select the next General Director.

Our guess is that since the PPWSA is only functional, efficient and profitable public sector enterprise in Cambodia, its political masters will think twice before selecting the next leader. Our experience consistently all over the world has been that it takes a long time to build a successful institution like PPWSA with a good, dynamic and charismatic leader. However, destroying a functional and efficient institution is an easy task: it can effortlessly accomplished in about two years! Thus, the future sustainability of the PPWSA will depend on the selection of its next leader. If a good leader is chosen, sustainability of PPWSA should not be an issue. We are reasonably optimistic that this will be the case.

CONCLUDING REMARKS

The experience of PPWSA has been a salutary example for the urban centres of the developing world in terms of good governance. Many reasons are given by the water utility managers, political leaders and many members of the water profession at present as to why it has not been possible to provide clean, drinkable water to the urban centres of the developing world. Among these have been physical scarcities of water, lack of

availability of investment funds, inability of the poor to pay for water, lack of expertise, and many more. In our view, all these are only excuses to hide the real and fundamental reason of this shortcoming, which is very poor leadership and governance of the urban water sector nearly all over the developing world. Phnom Penh has very clearly shown how it can be achieved under the most difficult circumstances within less than one decade.

Unless the urban water governance practices are improved very significantly, as it has been the case of Phnom Penh, universal access to clean drinking water will remain an unachievable dream, even if hundreds of billions of dollars are made available to this sector each year with no strings attached. One is reminded of William Shakespeare:

> "The fault, dear Brutus, is not in our stars,
> But in ourselves, that we are underlings."

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ACKNOWLEDGEMENTS

The funding for this independent evaluation came from the Institute of Water Policy, Lee Kuan Yew of Public Policy, Singapore.

ANNEX – I

Unofficial Translation
Royal Government of Cambodia
No. 52
Sub-Decree
On
Establishment of Phnom Penh Water Supply Authority (PPWSA)

Royal Government of Cambodia has seen

- The Constitution of the Kingdom of Cambodia
- The Royal Decree dated September 24, 1993 on the Appointments of the First and Second Prime Ministers
- The Royal Decree dated November 1, 1993 on the Establishment of the Royal Government of Cambodia
- Royal Kram No. 02 xx 94 dated July 20, 1994 on the Arrangement and Functions of the Cabinet of the Government of Cambodia
- Royal Decree No. 1094-83 dated October 24, 1994 and Royal Decree No. 1094-90 dated October 31, 1994 on the Re-arrangement of the Composition of the Royal Government of Cambodia
- Royal Kram No. 0196-08 dated January 24, 1996 on the Establishment of the Ministry of Interior
- Royal Kram No. 0196-18 dated January 24, 1996 on the Establishment of the Ministry of Economy and Finance
- Royal Kram No. 0696/03 dated June 17, 1996 on the General Guideline for the Establishment of the Public Enterprises
- Request of the Senior Minister and Minster of Economy and Finance
- Consent of the Cabinet of the Minister

Deciding

Chapter 1: General Provision

Article 1: PPWSA is the public economic enterprise defined in article 26 of Royal Kram No. 0696/03 dated June 17, 1996 on the General Guideline on the Establishment of the Public Enterprises. PPWSA is the legal entity with financial and administrative autonomy. PPWSA is under the management of the Phnom Penh Municipality and has its headquarters in Phnom Penh.

PPWSA must implement all the articles of this sub-decree. For the necessary activity that is not stipulated in this sub-decree, the management of PPWSA must follow the Royal Kram No. 0696/03 dated June 17, 1996 on the General Guidelines for the Public Enterprises and other existing commercial laws and regulations.

Article 2: PPWSA has the mission to produce and distribute the water for general and public uses in the Phnom Penh Municipality.

To achieve this mission, PPWSA will allow making all necessary commercial and financial operations and fixed assets as following.

- Production and distribution of the water in the Phnom Penh Municipality and downtowns areas surrounding Phnom Penh
- Expansion, increase and rehabilitation of the production and distribution system
- Commercial operation of the existing water or produced water

Article 3: The agents of PPWSA have the rights to access to the public places or private residents as needed for the installation and repairing of the water pipes, technical controlling of the production and distribution facilities and the recording of the quantities of the water usage.

The agents must dress in clear organizational uniforms and show their organizational identification cards during their missions.

Article 4: In its operation, PPWSA must follow the same principles and practices legally applied for the commercial entities. In this context, PPWSA must have the great autonomy to manage its activities for the efficiency and development.

Article 5: PPWSA must pay all taxes defined in the existing laws and regulations.

Article 6: The initial capital of PPWSA should be defined by the initial balance sheet jointly agreed by the Ministry of Economy and Finance, Phnom Penh Municipality and PPWSA.

When this sub-decree comes to effect, PPWSA has exclusive rights on behalf of the state on all recorded properties in its inventory list.

Article 7: The employees of PPWSA must be managed by a separate regulation approved by the Board of Directors.

In the transitional period, the Board of Directors of PPWSA will decide the measures for such management by its first meeting.

When the separate regulation is in place, all PPWSA employees will not be longer the civil servants of the state.

Chapter 2: Administrative Management

Article 8: PPWSA must be governed by the Board of Directors composing of the following members:

- Representative of the Phnom Penh Municipality 1 person
- Representative of the Ministry of Economy and Finance 1 person
- Representative of the Ministry of Interior 1 person
- Representative of the Ministry of Industry, Mine and Energy 1 person
- Representative of the Ministry of Public Work and Transport 1 person
- PPWSA's Employee Representative 1 person
- General Director of PPWSA 1 person

The representative of the Phnom Penh Municipality needs to serve as the president of the Board of Directors.

All the members of the Board of Directors must be appointed by the sub-decrees in accordance with the proposals of the member-related line ministries/agencies.

The PPWSA's Employee Representative must be elected by votes of the PPWSA's employee.

Article 9: All the members of the Board of Directors must be Cambodian nationality (Khmer), have the full civic rights and are not used to be the substantial punishment by the law and court. Moreover, the members of the Board of Directors must be selected from the active officials of the government who have at least five years of working experience or the non-civil-servant citizen with the age not more than 65 and with sufficient experience and high skills in economics or law. The tenure of the members of the Board of Directors is three years and this duration can be renewed.

Within their tenures, the members of the Board of Directors are not individually or commonly liable. In case a member commits the serious mistake, he/she will be removed any time by the sub-decree.

Article 10: The Board of Directors has the full rights to decide all matters of PPWSA and the rights to submit or approve all legal documents subjective to the existing laws relating to public enterprises.

The Board of Directors has the following duties:

- Approve the enterprise's plan as stipulated in article 19 of this sub-decree
- Regularly evaluate the planned results and recommend the correcting measures
- Approve the annual balance sheet and activities report of the enterprise
- Approve, on the proposal of the General Director, the organizational chart, internal regulation of the enterprise, guideline, and salary scale of the employee in accordance to the existing laws and regulations
- Provide the agreement on the contacts and treaties in which PPWSA is legally the party in accordance to the related existing laws and regulations
- Approve sales, purchases and rents of all kinds of fixed assets or shareholders and approve the medium to long-term liabilities of PPWSA in accordance to the existing laws and regulations
- Approve the establishment, opening and closing of the PPWSA's offices and agencies everywhere based on its judgment

Article 11: The meeting of the Board of Directors can be called by the president or the proposal of at least four members. Such meeting should be held at least one per three months.

The acting president can be selected from the members of the Board of Directors.

The Board of Directors will discuss all the issues in its jurisdiction. The agenda of the meeting and the related documents must be informed to all members of the Board of Directors and the state observer in 10 days in advance of the meeting.

The meeting of the Board of Directors can only be held with the presences of at least 50% of the total number of the board members. In the case the quorum for such meeting is not met, the president needs to re-call for the meeting at least in next 15 days to discuss the same agenda. The latter meeting will not require the quorum.

All decisions of the Board of Directors can be considered valid only it is made with the majority of the approval of the members at the meeting. In the case the equal voice between the approval and disapproval exists, the vote of the president is used for the decision.

Article 12: All the decision of the Board of Directors must be recorded in a report that will be shared with the parental line ministries/agencies, the state observer and other related institutions within 15 days after the meeting as stipulated in article 25.

The report of the meeting must be approved officially by the next meeting of the Board of Directors and must be copied and kept in archive of the organization in accordance to the administrative procedure. The original version must bear the signatures of the president of the meeting and a participating member.

Article 13: The General Director manages the daily operation of PPWSA. The tenure of the General Director is three years defined by the sub-decree of his/her parental line ministry/agency.

Article 14: The Board of Directors transfers all the necessary authority to the General Directors for the daily operation of the enterprise in accordance to the existing law and guideline of the Board of Directors.

In this context, the General Director:

- Prepares all the documents for the approval of the Board of Directors and implement all decisions of the Board of Directors. The General Director will report regularly to the Board of Directors about the activities of PPWSA
- Has the responsibility for the technical, administrative and financial management of PPWSA
- Represents the PPWSA to all third parties in the civil, administrative and court letter in accordance to the existing laws and the decision of the Board of Directors
- Has the rights to select, appoint, remove or fire and the rights to order the agents or employee of PPWSA in accordance to the existing laws and the decision of the Board of Directors
- Has the rights to transfer part or whole of his responsibility to his subordinates for signing in accordance to the guideline of the Board of Directors
- Implement all tasks assigned by the Board of Directors.

Article 15: Financial dividend for the General Director and the honorable allowance for the members of the Board of Directors must be defined by the related parental line ministries/agencies and the Ministry of Economy and Finance based on the proposal of the Board of Directors.

Article 16: The engagement in and implementation of the contracts of PPWSA must be in accordance to the existing laws and procedures.

Chapter 3: Financial Management

Article 17: PPWSA has its own account using Riel currency in accordance to the accounting regulations of Cambodia and following the Generally Accepted Accounting Standard (GAAS). The annual financial fiscal year starts from January 1 and finish in December 31.

Balances and the management of the accounts are verified by the Board of Directors before March 30 of the next fiscal year using financial reports submitted by the specialized accountant who is the financial inspector.

Balances and the management of the accounts as well as the financial reports of the financial inspectors must be submitted for the approval of the Ministry of Economy and Finance within 15 days from the date the Board of Directors reviews the documents. Those documents will be sent further to the parental line ministries/agencies for their comments in accordance to article 16 of the Royal Kram No. 0696/03 dated June 17, 1996 on the Guideline on the Establishment of Public Enterprises.

Article 18: The financial inspector must be appointed by the Board of Directors for two-year tenure. This period can be extended. The financial allowance for the financial inspector must be defined by the Board of Directors and is considered as the operational cost of PPWSA.

The financial inspector must produce the report providing the opinion on the transparency and regularity of the accounts in every fiscal year. The report reflects the realities of the financial and asset situation of PPWSA.

All the time, the financial inspector can check and control the accounts and can ask for all necessary documents and financial reports for such purpose. When the financial fraud or irregularities is found, the financial inspector must report immediately to the president of the Board of Directors.

The financial inspector can attend the Boad's meeting based on the invitation of the president of the Board of Directors.

Article 19: Every year before October 1, the Board of Directors must provide the approval on the enterprise's plan based on the proposal of the General Director. After the approval of the Board of Directors, the proposal will be sent for the approval of the parental line ministries/agencies and the Ministry of Economy and Finance.

The enterprise's plan must consist of:

- Investment plan and its financing plan
- Operational budget of the enterprise
- Prices of the water and other services of PPWSA to ensure the revenue of the enterprise sufficient for covering its operational expenses (excluding the depreciations) and ensuring its financial balance
- Criteria for measuring the economic and financial results of PPWSA
- Subsidy by the state to PPWSA in order to support the loss in its public service delivery

Article 20: The source of financial inflow of PPWSA can include

- Principal capital provided by the state
- Contribution or state subsidy or contribution from other public entities
- Gifts or private contribution with the primary agreement of the Board of Directors
- Liabilities
- Revenues from the operation of the enterprise
- Revenues from sales or rent of the current and fixed assets

Article 21: Expenditures of PPWSA include

- Current expenditures
- Investment expenditures
- Payment of the liabilities
- Other expenses occurred to PPWSA in its operation

Article 22: PPWSA can have the current account at the commercial bank and use this account based on its need.

Article 23: When there is the decision of the Minister of Economy and Finance, within and not more than five year period, the net profit of PPWSA must be transferred to the reserve account for the strengthening of the financial ability of PPWSA.

Article 24: The medium to long-term liability transactions of PPWSA for its operation or investments must be agreed in advance by the Minister of Economy and Finance.

Chapter 5: Relationship with the Government

Article 25: Within 15 days after the approval of the Board of Directors, PPWSA must send to the minister in charge of the Council of Ministers and the ministers of the parental line ministries/agencies and the Minister of Economy and Finance the following documents:

- Meeting report of the Board of Directors
- Enterprise's plan as stipulated in article 19 of this sub-decree
- Operational report, balances and account management of PPWSA
- Controlling report of the financial inspector

Article 26: The Minister of Economy and Finance can suggest the government to appoint one state observer to PPWSA. That official can participate in the Board's meeting and can provide comments on all points in the agenda of the meeting but does not have the rights to vote. The state observer must perform his/her mission in accordance to the article 20 to 25 of the Royal Kram No. 0696/03 dated June 17, 1996 on the Guideline on the Establishment of Public Enterprises.

Article 27: PPWSA has the rights to disconnect the supply of the water or other services of its private customers and public institutions that fail to pay the water bills to PPWSA on time.

Chapter 5: Final Provision

Article 28: The unfair relationship of the PPWSA and its customers and all unlawful activities of the customers that damage the enterprise particularly the loss of the water, illegal connections etc., must be dealt by the existing laws and regulations.

Article 29: The co-ministers of the Council of Ministers, the co-ministers of the Ministry of Interior, the Minister of Economy and Finance, the Government Delegate for Phnom Penh Municipality must implement this sub-decree effectively from the date it is singed.

Phnom Penh, December 19, 1996

First Prime Minister
Prince Norodom Ranarith

Second Prime Minister
Hun Sen

[Signatures]

Proposed by H.E. Keat Chhon, Senior Minister, Minister of Economy and Finance

[Signature]

CC: -Royal cabinet
-Secretariat of National Assembly
-Secretariat of Royal Palace
-Cabinet of First Prime Minister
-Cabinet of Second Prime Minister
-As stipulated in Article 29
-Archive