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Jean Pierre Mahé

Building water utilities with local private entrepreneurs

The example of the Mirep program in Cambodia 2000-2010

Acknowledgments

This document was originally produced in French by Jean Pierre Mahé. In 2008, GRET and WSP agreed to work jointly on the production of an English version of the original MIREP report. Following the translation, a foreword was then added based on an interview with His Excellency Ek Sonn Chan, General Director of the Phnom Penh Water Supply Authority. Philippe Lavigne Delville of GRET added an "Afterword", while Clément Frenoux of GRET and Jan Willem Rosenboom of the Water and Sanitation Program added an update of the MIREP program and an overview of private water suppliers in Cambodia respectively.

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We realize that the fact that this report is translated from the French is noticeable to the attentive reader; however, we agreed that publication and dissemination was more important than editorial perfection, and we hope you will enjoy the read.

Disclaimers

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Building water utilities with local private entrepreneurs

The example of the MIREP program in Cambodia

Jean Pierre Mahé, December 2006

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FOREWORD:

H.E. Ek Sonn Chan (PPWSA)

AFTERWORD:

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Acronyms

AFD	French Development Agency
AMP	Arsenic Mitigation Project
BDR	Rural Development Bank
CC	Commune Council
D&D	Deconcentration and Decentralization
DWS	Department of Water Supply
Gret	Research and Technical Exchanges Group
MAE	Ministry of French Foreign Affairs
MDG	Millennium Development Goals
MIME	Ministry of Industry Mines and Energy
MIREP	Mini Réseaux d'Eau Potable (Small Scale Piped Water Supply System)
MOWRAM	Ministry of Water Resources and Meteorology
MRD	Ministry of Rural Development
PBC	Planning and Budgeting Committee
PDRD	Provincial Department of Rural Development
PPI	Private Participation in Infrastructure
PPWSA	Phnom Penh Water Supply Authority
PRDC	Provincial Rural Development Committee
PRDC Excom	Provincial Rural Development Committee, Executive Committee
PSP	Private Sector Participation
RGC	Royal Government of Cambodia
SEDIF	Syndicat des Eaux d'iles de France (French Public Water Utility)
SEILA	National Decentralization program
VDC	Village Development Committee
WSP	Water and Sanitation Program of the World Bank

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Foreword

Interview with H.E. Ek Sonn Chan

Edited by Jan Willem Rosenboom and Pierre Thevenot

February 2009

We spoke with H.E. Ek Sonn Chan -the General Director of the Phnom Penh Water Supply Authority- on January 14 2009 to ask about his vision for improving water supply in small towns in Cambodia. Ek Sonn Chan informed us that this subject is truly the responsibility of the Department of Water Supply at the Ministry of Industry, Mines and Energy, and that our discussion would just be based on his personal opinion. The foreword below is based on this discussion.

"There are a number of donors and organizations in Cambodia that try to help Cambodia to improve access to water supply for people, and I appreciate that very much. At the same time, if we talk about improving the situation further or faster, we need to ask how we can do that.

There are many secondary towns in all provinces that do not have a water supply, and the strategy of the ministry (MIME) is to encourage private suppliers to set up systems at the commune level. A number of private suppliers exist already, and let me give you an example of what is possible: One former PPWSA meter-reader who retired set up a small water supply business not so far from here. Only about 300 connections, and he is running it together with his son. He told me that the technology of his business is not so difficult and also not so important; the most important aspect is how to manage the business- how to control leaks, how to set up a billing and collections system that keeps his customers happy, how to keep good records. Those are all things he learned while working for us; he is quite successful and makes a reasonable profit from his business.

In my vision, it is really possible to bring many more people like that into this business as private providers. But to make that happen, we have to have improved regulation. The operator I just mentioned told me he is worried about the licensing term. The ministry issues licenses only for a short time (one to three years), which makes it easy to not renew it when the licensee does not respect the terms of the contract. But I think that is not really the way. The contract already states very clearly that if you violate the conditions, the government has the right to stop your business—there is no reason to enforce that through a short licensing period.

If you look at PPWSA, we use high quality pipes and materials, and we depreciate our materials over a period of 50 years; in some countries they use up to 70 years. Even if you take a small operator who uses low-quality, low-cost local materials, his system will still function for about 15 years. So giving a license for up to three years only makes no sense; investing in this business is for the long term. You need to provide an operator with a license long enough to give him the confidence he can recover his investment. And in this context, even ten years is still short; better would be fifteen years or longer. Once you do that, you get two advantages: First, there will be many more investors ready to come forward, and second, prices come down as the risk is less.

Step two is that the authority to issue licenses for these small systems needs to be decentralized. I believe that the Minister is supportive of having licensing authority at different levels, depending on the size of the system. Decentralizing authority in this way will bring a further two advantages. In the first place, it will bring forward local investors willing to set up small water supplies. Obviously the small towns will never attract big international investors, and the small supplies will bring opportunities for local people. In the second place, it will lead to more people taking responsibility for improving water supply. Having a very centralized licensing system is like you only have one head thinking about the problem of access to water. Once you give licensing authority to the commune level, commune chiefs will see it as their responsibility to improve service provision, and suddenly you have many heads thinking about access to water. We'll have a boom in water supply provision.

Once you have opened the door to more investment in the water business, of course there are further steps that need to be taken. First of all, it will be necessary to put in place clear and transparent procedures for the selection and bidding process to choose a provider in an area. Provincial and local authorities will need to develop an overall plan, to decide where to focus, what to do first and so on. The actual process for obtaining a license should be simple, and the contracting conditions should be appropriate to the local situation. Issuing a license should not take five or ten stamps from different departments; better to have one larger meeting with the person authorized to issue the license and the local department heads and community representatives. Once the meeting agrees to move forward, just one person signs and stamps the agreement. Being realistic about conditions is also important. Take water quality for example. We have very comprehensive national drinking water quality standards, but I would say they are unrealistic for small suppliers to meet. If you make it a condition that the provider meets the national standards, this represents a huge risk to the investor. Better to agree on a number of high priority water quality parameters (such as bacteriological quality and presence of arsenic) that can be controlled and measured by the simple instruments of the operator. Likewise, intermittent service should be acceptable; no need to specify 24 hours coverage. In this kind of regulation you cannot go too high, it needs to respond to the needs at each stage. In terms of the form of the contract, better not to talk about concessions, BOT or whatever, it will be for life. Let us acknowledge that the supply will stay private; the government will not get involved at the commune level.

In an environment like this, there are all kinds of things PPWSA is willing and able to do to support water supply development. The easiest starting point is to talk about training. We can set up training courses –and even have our own facilities to do so– especially when there are well defined problems like leak detection or chemical dosing. We know those are common issues for the small operators, and for example in leak detection and repair we have a few clever solutions that are low cost, and can be easily applied by them.

Then there is the water tariff, which is a sensitive issue for many people. To start with, the tariff should of course be based on a sound understanding of the costs of producing the water. However, many operators don't know how to determine their costs, and instead look at the prices charged by other utilities even if this is the incorrect way to go about things. There is a joke in Cambodia that goes something like this: "The money I get after I sell something is 100% profit, because everything I was going to spend, I spent already". Costs and profit are hard to understand, and at the end of the day, an investor may have money left over that he thinks is a profit, while actually it represents only depreciation and in the long run, he gets back less than he invested. I think we need to help them to know how to calculate their costs in a very simple way. This is where PPWSA can help as well, as our staff can assist in determining the cost to produce water. Tariff regulation should then leave room for tariffs to be set at full cost recovery level, with an acceptable level of performance, plus a reasonable profit margin. Some people say that in this case tariffs will become very high, but I don't think so. In some places, water tariffs are very high because of their bad performance: high water loss, low collection, too high profit margin etc. This reflects lack of experience, know-how and control. And the alternative is very risky; if investors cannot make a profit; this is dangerous for the future of the water business. So this another area for good regulation.

For the small investors, it is hard to pay for a consultant to design a system for them, but I like the countryside… if there is a promising commune that wants to work on a water supply, with a sound local investor, our staff can help with design and technical questions.

These small systems are of course very different from the sort of operation we run, but that does not mean we cannot help; as I said we just have to focus on what the actual problem is, and be clever about finding appropriate solutions, and we have the experience to do that. Copying our approach to using block tariffs to support poor households for example is not a good idea for small providers; administering a block tariff is difficult without a computerized billing system, and if you have a large proportion of low income customers it may be difficult to make a profit (because the lowest tariff does not make a profit, but is cross-subsidized by the tariffs in the higher blocks). However, subsidizing the connection for poor consumers –which is the other component of our social strategy– rather than subsidizing the consumption is the right way. We can even help operators access funds that are available from AIMF, World Bank and others to do this.

When we started the rehabilitation of the PPWSA water works, there was a lot of pressure to only consider private sector solutions, because there was a lot of negative experience globally with bad performance by public utilities. Now things are changing, people don't say public is bad anymore. Public or private, it is black cats or white ones. What is important is to catch the mouse. I think we can make something happen and show it. If the board allows us, we could even be co-investors in a small private system, and this would give some valuable pilot experience about supporting local sector investment."

Phnom Penh, 14 January, 2009

Introduction

The involvement of the rural private sector in water supply in Cambodia is unique to the country. The presence of this private sector allows other entities to respond to new demands from people living in the larger villages for household water supply, which the State is not yet able to address. These entrepreneurs operate on a merchant basis, lacking an institutional structure which is still being created. Their business is most often based on pushcart delivering water barrels at the house of villagers or more recently on small piped networks usually distributing raw surface water. Service is rough; the water quality is uncertain, but the users are satisfied with this service, because for them, it constitutes another alternative to the already considerable choice of water supplies available—ponds, wells, boreholes, and rivers. Their demands focus more on a practical objective (a supply in the household) than on a sanitary one, even if surveys show that villagers have a good understanding of health risks associated with water.

The MIREP[1] program, launched in 2001 to transform these very basic initiatives into basic services, began as a pilot project supporting one entrepreneur in the implementation of a small piped water system. Through the implementation of 14 small scale water supply systems, the goal was to enhance a qualitative improvement of the water service in some Cambodian small towns through the transformation of rough and informal merchant services to a basic water service supplying drinking water to an extended population under a formal institutional arrangement.

The MIREP program was designed as a pilot project, aiming simultaneously to:

- develop the main components of such a basic water service (designing technical options adapted to small piped water systems, proposing institutional arrangements to formalize the local public/private relationship, reinforcing the capacities and knowledge of local stakeholders including the users);
- analyze the potential for the professionalization of water supply entrepreneurs in the small towns;
- develop and make available technical and methodological references that were validated through project implementation and that could contribute to the reflection on a policy for water supply in Cambodian small towns.

The emphasis of the project was to promote, as much as possible, the participation of the local private sector, (understood in the widest sense of the term), with the constant aim of attaining a service which will meet national and international standards of water supply and quality.

In order to move forward, the MIREP program made a choice, in particular linked to its proximity to the Ministry of Rural Development, to assist the nascent involvement of communes in decentralization, to strengthen provincial power through the process of decentralization, and to respect the cultural heritage of those who devised and financed the project (the Syndicat des Eaux d'Ile de France), greatly influenced by the French model of contracting of water supply services by the communes. In this process, MIREP focused continuously on innovation and technology transfer, specifically regarding the creation of innovative treatment stations and the training of local builders and entrepreneurs.

It is this course of action which this document seeks to describe:

- firstly, the existing situation consisting of private initiatives offering rough services;
- the MIREP system of supervision based on the progressive support to the different stakeholders involved: the provinces, the communes, the private sector, the users;
- the technological and institutional options that were selected;
- and lastly, the reactions and transformations of these stakeholders to the program implementation.

[1] *Mini Réseaux d'Eau Potable (Small Scale Piped Water Supply System)*

Chapter 1 - Access to drinking water in small towns

The question of access to water in a recovering country

National background

Cambodia is a small country, 181,000 square kilometers and 13 million inhabitants, mostly rural (80%) that is recovering from 30 years of war, during which its infrastructure was neglected or destroyed. The rate of access to potable water, estimated at 41% in rural areas and at 76% in urban areas, remains one of the lowest in Asia.

The Millennium Development Goals (MDG), which aim to reduce by half the number of inhabitants having no access to potable water and to improved sanitation, present a challenge for the country. Cambodia will have to invest between 300 and 600 million US$[2,3] between 2005 and 2015 in order to reach this goal. In a country where public investment capacity is limited to the meager resources of the RGC and the good will of international donors, the presence of a dynamic local private sector, involved in a spontaneous way in the financing of the installation of informal water systems in both large and small rural towns, represents a potential which the country is trying to encourage. (See Table 1 next page).

The emergence of private rural infrastructures in Cambodia

The Cambodian background cannot be understood without considering the thirty years of strife that the country underwent, beginning in 1970, notably the Khmer Rouge regime (1975-1979) which lead to the death of about 25% of the population. From 1979 to 1989, the country was occupied by Vietnam, and subjected to an embargo by the international community. It was only in 1993 that hundreds of thousands of Cambodian refugees returned to the country. The war ended definitively only in 1998 with the death of Pol Pot and the end of the last pockets of Khmer Rouge resistance. During these many years, the country's infrastructures were destroyed or abandoned.

The return of 500,000 refugees from border zones was accompanied by an effort at emergency reconstruction in rural areas with the digging of boreholes and wells managed by the communities.

[2] *Draft Urban Water Supply Strategic Framework, MIME, November, 2004*

[3] *Infrastructure Constraints to Growth and Poverty Reduction, Oxford Policy Management, Jeremy Ockelford, August, 2005. This wide span is due to the lack of trustworthy statistics on the current state of water infrastructure and the difficulty in defining 'access to potable water.'*

Table 1 - Definition of the Millennium Development Goals (MDG) in Cambodia	
Global targets	**Cambodian targets**
Access to Drinking Water: Halve the proportion of people without sustainable access to safe drinking water by 2015	In rural areas: increase the rate of people with access to drinking water from 24% in 1998 to 50% in 2015. In urban areas: increase the rate of people with access to drinking water from 60% in 1998 to 80% in 2015.
Sanitation: Halve the proportion of people without access to improved sanitation by 2015.	In rural areas: increase the rate of people with access to improved sanitation from 8.6% in 1998 to 30% in 2015. In urban areas: increase the rate of people with access to improved sanitation from 49% in 1998 to 74% in 2015.

The network systems for electricity and drinking water supply were considered of secondary importance by international donors and public authorities, and thus became an opportunity for the local private sector, which, with the benevolence of local public authorities, began to provide these essential services to the population. The participation of the private sector in infrastructure came about in a spontaneous and unregulated way, given the absence of standards, institutional constraints and regulatory framework. The local demand prompted private entrepreneurs to invest in these services, and the replication of existing techniques helped developing capacities in this field. Two neighboring countries, Vietnam and Thailand are providers of cheap manufactured products which allowed the Cambodian entrepreneurs to offer solutions that were affordable for the local populations. At the present time, numerous Cambodian villages present several domestic private service providers in the field of water (small piped water systems) and energy (small electricity grids and battery chargers).

Table 2 - General indicators for water and sanitation infrastructure (2003)[4]	
Access to potable water in rural areas	30%
Access to water supply systems in rural areas	0.7%
Hours devoted to water collection each day	0.83 hours
Access to sanitation in rural areas	10%
Families having a septic pit available	5.6 %

Table 3 – Cost to families for access to services[5]	
Latrines : investment cost per family	40 US$ to 60 US$
Investment cost per family for access to drinkable community well water (groups of 25 / 30 families)	30 US$ to 50 US$
Investment cost for potable water supply per family (based on the MIREP system)	150 US$

[4] *World Bank report on infrastructure in Laos, Cambodia, and Mongolia, 2003*

[5] *MIREP Informations*

Water in Cambodia's small towns

A center of trade and barter for the sale of handicrafts and for small commercial services, the borough has been a component of rural Cambodian life for a long time. Indeed, this phenomenon of concentration in the rural population has been noted for more than a century in the Cambodian countryside[6]. These villages have always shown a strong commercial character, and were formerly known as "Chinese towns[7]". It is estimated that today, after several cross-checks, Cambodia includes from 200 to 400 of these small towns.

Though they are areas of concentrated housing, they cannot be described as urban, since they are small in size, the housing is mainly traditional, often grouped by family settlements, and their craft items and commerce are focused on products responding to the basic needs of rural life. These areas have grown since the 1980's, with the gradual cessation of fighting, the growth of income, the restoration of government services, and the presence of a dynamic local private sector has allowed the setting up of services: water, electricity, health, education.

Social and economic life is centered essentially on private or family initiatives. The pooling of the means of production or services in a cooperative or associative form is infrequent. It is not clear whether this is a traditional behavior or the consequence of the years of war and population displacement that Cambodia has undergone. The current rural exodus does not seem to benefit the development of these small towns. As the studies implemented by GRET or within the framework of a recent study by the AFD[8] show, their demographic growth is only slightly higher than the rural rate, on the order of 2% per year. This can be explained in particular by the fact that, with few exceptions, these small rural boroughs have no industrial activity, which is located almost entirely in the capital, Phnom Penh, or in provincial cities.

[6] *J. Delvert, 1961, Le paysan cambodgien, Mouton, Paris.*

[7] *The Chinese community in involved in commerce all over Asia. In Cambodia, to be Chinese is to be a merchant. Thus, "Chinese" villages are often synonymous with villages whose main activity is commerce.*

[8] *Agence Francaise de Developpement*

Spatial organization of small towns

Between rural areas, characterized by scattered houses across rice fields and the provincial or district capitals, Cambodian small towns lay out for a few hundred meters around a market or along the road. They are composed of houses side by side with rice fields behind them, sometimes beginning less than 50 meters from the market. The population varies from 1,000 to 10,000 inhabitants, and the area of these centers is small, ranging from 0.2 to 1 square kilometer. Density varies from 2,000 to 8,000 inhabitants per square kilometer[9] according to the type of small town, pre-urban or agrarian. The pre-urban small town is characterized by a relatively high proportion of merchants and shows signs of urbanization such as concrete houses or small service infrastructures (electricity, clinics, and petrol stations). The agrarian village is mostly composed of peasants, who live grouped together, each family in its traditional housing (wooden house).

Photo: Angkor Borey, Takeo Province

[9] *Information gathered in the villages of the MIREP program*

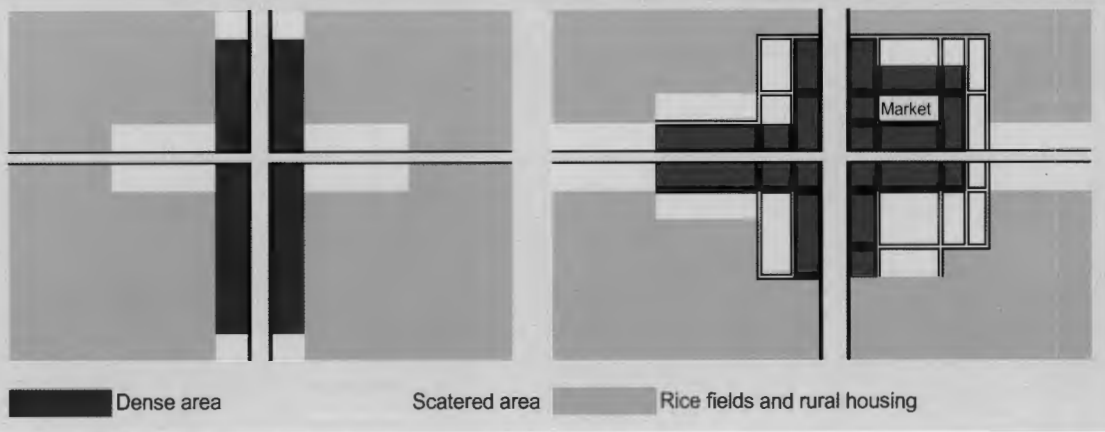
Table 4 - Distribution of settlements of the Cambodian population

The capital	Phnom Penh: 1.5 million inhabitants. Phnom Penh has a high quality of water utility provided by a public company, and electricity supply provided by a national company, Electricity of Cambodia.
Small and medium-sized cities.	Provincial or district capitals of 10,000 to 400,000 inhabitants with urban characteristics, electricity grid, piped water supply systems and asphalt roads. Public infrastructures, in place since the pre-war years, are for the most part in the process of renovation. Private solutions exist on the sidelines, or complement official services.
Small towns	From 1,000 to 10,000 inhabitants, with rural and pre-urban characteristics. These boroughs, for the most part, have no public infrastructure, streets, or systems. In these villages we find a large private participation in water and electricity supply systems.
Rural areas	Rural populations, along the roads and bordering on the rice fields. Private supply systems of little investment cost such as water deliverymen and battery charging stations are frequent.

The spatial organization of the small towns is generally one of two types: a "crossroads" structure, which presents an urbanized part along a main road which crosses another, usually secondary, road or a block shape located around the market and adjacent roads. The boroughs generally have three areas of settlement:

- A dense area, near the market or along the road; the habitat is concentrated, made of cement houses set at less than 10 meters apart10. It is mainly populated by merchants or artisans.
- A semi-dense area, located along the roads on the way out from the center; houses there are average standard, made of wood, about 10 to 20 meters apart. These zones are populated by craftsmen and peasants;
- A rural area, almost entirely populated by peasants, composed of traditional dwellings arranged in small groups in the middle of the rice fields.

Figure 1: Spatial patterns of small rural Cambodian towns-crossroads and market



[10] *What best characterizes the real population density of a village is the number of houses (or inhabitants) per km. along its inhabited zones. Thus, the empty space on the edges of the villages is not taken into account.*

Unlike non-commercial essential services (schools, public health centers) linked to the administrative status of the small town, , the presence of public service merchants (water, electricity, phone) is linked exclusively to the economic status of the borough, which depends mainly on its geographical location in relation to commercial axis.

The population may be classified according to three socio-economic levels[11]: the poorest, whose family income is less than $75 US per month, make up 10% to 20% of the population and survive in precarious conditions (small houses of wood or foliage). The intermediate level, which constitutes 60% to 70% of the population, has a family income of $75 to $150 US per month and lives in traditional dwellings of wood, on stilts, sometimes divided into rooms at ground level. The wealthiest, mainly merchants, have an income over $150/ month; make up 20% - 30% of the population.

Concrete houses in the center of a relatively well-off small town

Market street in one small town

Water supply in small towns

Water resources and -use in small towns

The Cambodian climate is two-phased, with one dry season and one wet, both approximately six months in length. The water supply during the dry season is problematic, as it is mainly based on the catchments of groundwater (wells, boreholes), a number of which are defective because of lack of appropriate maintenance or cannot be used due to natural contamination, such as the presence of arsenic, excessive salinity, or an overabundance of iron. The traditional systems (wells, rivers, household ponds) are still used by the population even when this water is unhealthy.

During the rainy, the situation is less drastic, since Cambodia benefits from a rainfall which is badly distributed but abundant on the whole (from 1,500 to 4000 mm according to the areas). Thus, almost all households depend directly on water which is collected during rainstorms from the roofs of houses. This water is stored in cement jars made locally, whose capacity varies from 200 to 800 liters.

Cambodians attach great importance to the taste of water for drinking and rice cooking, and this criterion takes precedence over the real quality of the water. Thus, pond water, usually turbid and polluted by the proximity of animals, is more often used than well water [pumped water] which is full of mineral elements such as carbonates or iron.

Besides the seasonal irregularity of water, the variability of resources and cultural factors motivate families to adopt multiple supply practices, depending upon use:

- In the dry season: surface water is used for drinking and preparation of meals; groundwater is used for all other domestic needs.
- In the rainy season: rainwater is used for all domestic needs—drinking, preparation of meals, laundry, and personal cleanliness. If there are shortages, water is kept for drinking. The 2005 Demographic and Health Survey indicates that rain water constitutes 32% of rural domestic water use in the wet season; in the dry season this goes down to around 2%.

[11] *Data from MIREP socio-economic surveys*

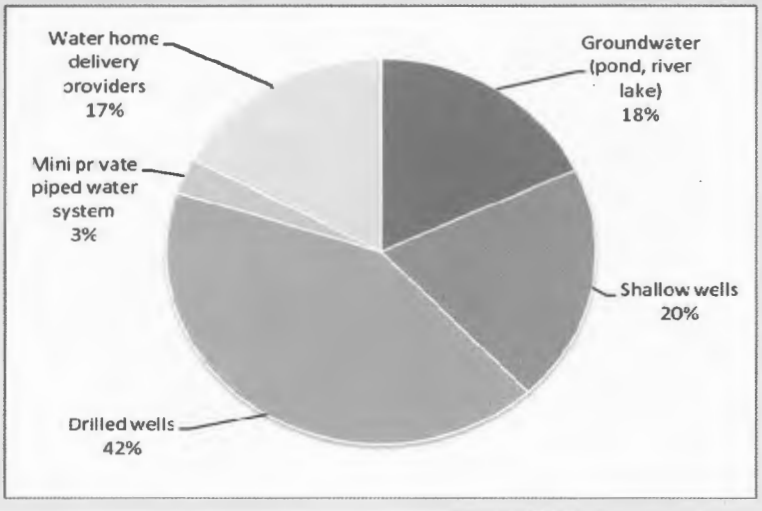
Just as the origins of water vary, so do the modalities of supply. Private systems require payment relating to the volume, from US$ 0.5 to US$ 3 per cubic meter according to the site and the type of supply.

Community systems involve modest collective investment contributions but the time for collecting water is often long[12], whereas family systems involve large purchases, from US$ 50 to 3000 for a well or a deep private pump, as opposed to US$ 8 – US$ 10 for a jar of 400L.

Table 5 - Real and perceived quality of water used in Cambodia

Type of water	Perceived Quality	Real quality	Uses
Rain water	Excellent, no bad taste, natural, healthy, and traditional	Risk of contamination from rooftop drainage and manual handling in the water jars.	All uses, depending upon availability
Pond water	Good: often perceived as identical in quality to rain water.	High turbidity, strong presence of pathogens from animal feces, contamination from human use	Drinking
Groundwater	Variable: the hardness of the water, the presence of manganese and soluble salts are factors discouraging the use of well water. Cambodians are very sensitive to taste.	Low pathogen presence, but excessive amounts of iron and manganese, or even arsenic in certain areas; contamination by human use.	Household cleaning

Figure 2 - A sample of water supply in three MIREP towns before creation of the water system



[12] *The policy of the Ministry of Rural Development allows for a maximum distance of 150 meters for community water access points.*

A growing demand for domestic water access; a decrease in water quality

The supply of potable water is becoming more and more precarious in the small towns, because, following to the increase in population density, both the availability and the quality of the water are worsening[13]:

- The traditional ponds in the village centers are filled in to make way for houses, or are polluted by human waste, garbage, seepage and plastic bags.
- Boreholes suffer contamination due to the proximity of latrines through the seepage of contaminated effluent in the groundwater
- The rainwater collection systems become rare because of lack of space for their installation.

The increase of the living standard and the decrease in availability for low-value added activities are generating a growing demand for services at home, which are incompatible with traditional rural solutions (community water points). However the low demand (between 50 and 300 m3 per day, varying with the villages) cannot justify the setting-up of complex supply systems of cities.

Thus, since the increasing density of housing prevents the installation of new traditional water sources and threatens the quality of existing ones, and since government services are not able to offer systems that would respond to the demand of the population, private initiatives have burgeoned, in the form of water sales from small trailers (pushcarts) or from mini networks, both mediocre quality services owing to bad water quality and intermittent service. These arrangements currently fulfill the needs of the local population seeking at home water services.

A low volume of water consumption but stable throughout the year

According to the surveys conducted by the MIREP program, the average domestic consumption from all water sources and at all economic levels combined is 44 liters per day per person. This figure corresponds more or less to the national level of minimal coverage of water needs (40 liters), but with variations according to economic status. The wealthiest consume more than 50 liters a day per person, while the most disadvantaged consume about 25 liters a day per person.

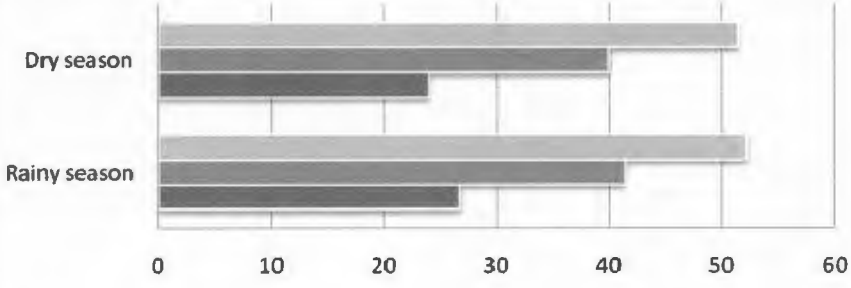
Table 6 - A comparison of water supply in villages, towns, and cities

	Characteristics of a rural village service	Characteristics of a town service	Characteristics of a city service
Population	Essentially peasant farmers	A mix of merchants, peasants, and artisans.	Civil servants, merchants, craftsmen and workers.
Water supply	Free water, family and community systems, wells, tube wells, ponds. Seasonal variations effect greatly on the use of water resources.	A diminishing number of traditional models; the presence of paying private services; offsetting-up of piped water system.	Exclusively relying on piped water supply system, no effect from seasonal variations.
Demand	Enough water in close proximity to household.	at home service Low volumes	At home service High volumes

[13] *The analyses show a substantial presence of coliform bacteria, in the larger towns, even in wells as deep as 30 meters.*

Surprisingly, the season and the type of resource used have little influence on the total volume consumed. Even where water is paid for during the dry season, there is no notable decrease in consumption, because, on one hand, the use of water seems relatively codified, and the abundance of water during the monsoon season is offset by uses outside the house such as bathing in ponds or streams. Professional use, notably the washing of vehicles or slaughterhouses, is more difficult to quantify, because these users have their own private water sources, and do not keep track of their consumption.

Figure 3 - Water consumption by socio-economic level (in liters per day per person)[14]

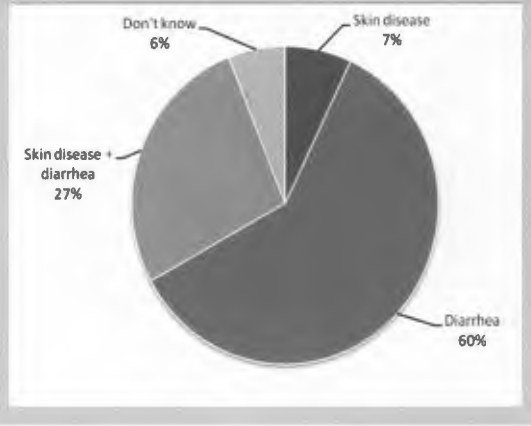


	Rainy season	Dry season
Well-off	52.2	51.4
Medium	41.4	40
Poor	26.7	24

Hygiene: sound knowledge but bad practices

According to 2008 census data, more than 25% of the population has no school education at all and only 27% have finished primary school. Although heads of families have little education, they are generally well informed on basic notions of water quality. Indeed, the percentage of heads of families who can name the common water borne diseases is around 90%. Such a high rate is due to the presence, in towns, of health center and its staff. Moreover, 75% of households have access to television, which transmits educational information on hygiene. The knowledge level of users is quite similar in the various social levels of the village. In theory, the rate of people who boil their water is high, nearly 70%, which also corresponds to traditional practices (the Cambodians drink a lot of tea), but the water boiling practice is conditional on the necessary means to do so: access to energy, or the possibility of buying charcoal. On the other hand, hygienic practices are weak, the use of soap is rare, the storing and handling of water are done without precautions, used water stagnates around the laundry areas, and the preparation of food is often done on the bare floor.

Figure 4 - Knowledge of water-borne diseases



[14] *Data from MIREP socio-economic surveys*

A willingness to pay for water supply at home

Public opinion surveys conducted in the small towns show a willingness to pay and a market for water based on the dual factors of (1) proximity and (2) the taste of the water. Thus, the harvesting of rainwater and the distribution of pond water to the household are the options for which a spontaneous response is found in the local private sector, in the form of water storage makers (jars), and of distribution to households, whether by water porters or mini-supply systems.

Contrarily, community wells, whose use is limited by the bad taste of groundwater from both wells and boreholes, along with the difficulty of pumping it, attract only a small proportion of the population and are essentially financed by international aid with a small contribution from the population (3% in the case of the national program of communal investment, Seila). As solutions for household delivery continue to grow, we witness a progressive decline of community wells in the small towns.

Table 7 - Willingness to pay in small towns

Water taste			
	Average willingness to pay	**Greater willingness to pay**	
Good-tasting water	Community ponds Pond, lake, or river water brought by deliverymen or small supply systems	Water collected in jars	
	Low willingness to pay	**Average willingness to pay**	
Bad-tasting water	Shallow wells or tube wells for the community.	Shallow wells or tube wells at the domicile.	
	Service outside the dwelling	**Service within the household**	**Proximity of service**

Private water utilities in the small towns

The large rural towns are areas where water supplying alternatives exist, with a variable degree of proximity, quality, and cost. Even if urbanization is steadily weakening the traditional solutions for access to potable water, the inhabitants rarely find themselves deprived of access to water, and the piped water systems often seem to be fairly evolved, even "luxurious." Thus piped water systems appear very infrequently in commune development plans, where schools and hospitals are given priority—for example, the Seila program, a commune investment planning scheme, lists only a few demands for piped water systems. For the local authorities, delivery of water to the household is generally considered a private family business, and for them, it is logical that such an investment be financed by entrepreneurs.

The local private sector in the water sector

The strong presence of the local private sector in Cambodian towns finds its origin in the local services furnished by Chinese merchants, who, for generations, have offered goods and credits with payments adapted to the seasonal variations, specifically variations of incomes from agriculture. Investment in water and electricity supply is however a recent phenomenon, coming after the stabilization of the country following a long period of war, and after the rise in rural incomes at the end of the 1990's, and because of the difficulties experienced by the public authorities to finance infrastructures for piped water systems.

Water services offered by the private sector cover a wide range of services, of varying price and quality, but in general responding to a basic demand on the part of the population: delivery to

the household. The criterion of quality (drinking water) is not foremost in the choice of water service, and thus does not enter into the consideration of private services, which are composed mainly of water porters who deliver drums by moto-trailers, small suppliers whose water is sold by jar or metered, all of whom distribute untreated water. The fees are essentially linked to the scale factor (number of customers served) and are inversely proportional to the investment required, with the mini-system offering the best prices (around 0.5 US$ per cubic meter), while the porters may charge relatively high prices ($2 to $3 US per cubic meter).

Small piped water systems

According to various estimates, there are about 300 small private piped water systems in Cambodia. They consist usually of a diesel pump on the bank of a pond or a river, a slightly elevated reservoir (2 to 4 meters) and a piped distribution network; buried PVC for metered systems or a hose for distribution in jars. The customers pay according to the volume of water in a jar, 400 liters about every other day, depending upon their needs and resources.

Traditional water tower

Private water push cart providers

These systems almost never have water treatment facilities, because, on one hand, such an infrastructure constitutes additional costs that neither the users nor the entrepreneurs are capable of assuming, and on the other hand it requires technical know-how and engineering competencies which are unavailable in rural areas. Moreover, since the use of a coagulant (aluminum sulfate) is widespread in Cambodia, it is not rare for villagers to treat the water they collect or buy themselves, without knowing the exact amount of the dose, which may, in the long term, be harmful to their health[15].

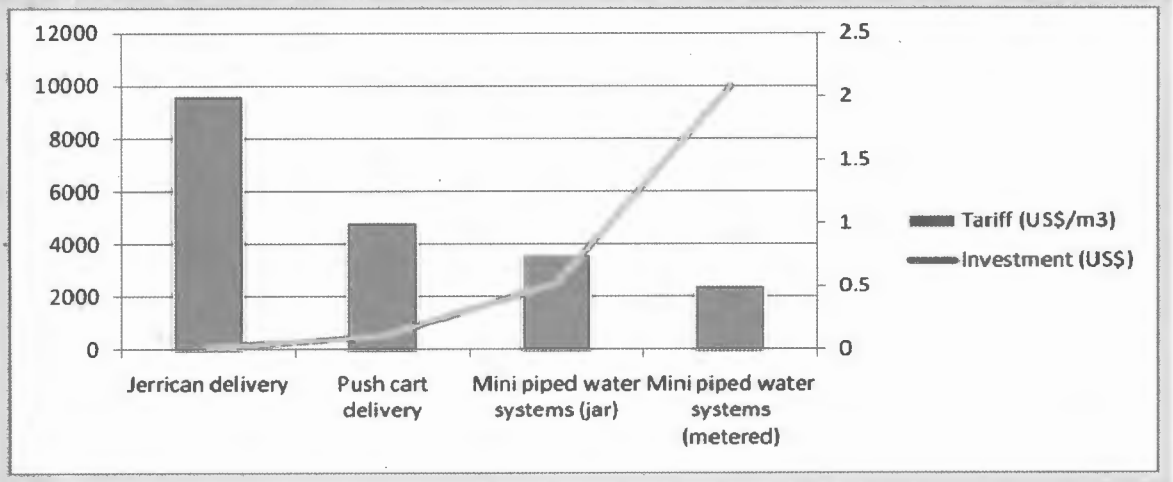
Small piped water systems coverage is generally limited to areas with denser populations (around the markets). The relatively high investment required (a few thousand US dollars) for setting-up a small piped water supply system makes it an activity often unique in a given geographical area, but it is not rare to find that two or three systems are necessary to cover the area of a town, and that sometimes several piped water systems are supplying the same area. The technology of these spontaneous systems is often primitive; they are constructed from second-hand materials and cheap equipment, which allows them to serve a population at a relatively low cost.

Profiling entrepreneurs

Investment in a "at home water supply system" is generally done by micro-entrepreneurs or merchants who are responding to a demand, and to other local opportunities. They then progressively build distribution systems from family savings and self-financing. These entrepreneurs have little financial and technical capacities, and invest only in the places where they live and have contact with the population, whose usages and capacities are well known by the entrepreneur. In general, their systems are managed by the family, and in addition, they manage other activities connected to service or to water, such as a small ice factory, a small electric system, a vehicle-washing service, etc. Their self-interest in investing in a local water system is partially explained by the logic of profit. Given the low consumption features and the economy of scale, return on investment is quite long in arriving, around 7 to 10 years. The mobilization of funding is difficult and costly—interest rates are high, on the order of 20% per year, and institutional risks are not negligible. The certainty of a constant and increasing income, the creation of work opportunities for the whole family, and the assurance of a retirement income are the motivating factors for these private entrepreneurs.

[15] *Aluminum in large amounts is neuro-toxic, and may be the source of bone and blood diseases. Aluminum allegedly has a role in the development of Alzheimer's disease.*

Figure 5 - Level of investment and average fees of private water service systems



A risky informal sector for investors

Most entrepreneurs work on an informal basis, paying for commercial licenses, and obtaining exploitation agreements from the local authorities—the head of the commune or of the district. Some of them operate simply by means of collective agreement consisting of a list of signatures—or fingerprints—of the local population. Such a service, limited to its most basic operation, does not conform to the standards of water quality as recently defined by the Cambodian government (in 2004), and the risk of eviction without compensation is not negligible, sometimes even by projects financed by international aid[16]. Sometimes subject to the arbitrary decisions of unscrupulous government officials, to the uncertainty of centrally-planned projects, the entrepreneurs voluntarily limit their investment and pass off to their customers the price of this uncertainty.

[16] *In the electricity sector, recent projects financed by lenders from international funds led to the eviction without compensation of local private entrepreneurs.*

Box 1 - How a water entrepreneur started

The former village chief, M. Sokhom decided at the end of the 1990's to respond to the needs of his fellow citizens by launching the small water and electricity system. His installation was more or less jerry-built; his water tower was a cistern collected from a old truck.

The source of the pond was in a embankment area (marsh) and the system was made up of second-hand pipes. M. Srey Sokhom served his clients with the help of a watering pipe (hose) at 0.25 US$ per 400 liter jar, or 0.625 US$/m3.

An institutional environment under construction

The relative liberty and spontaneity that characterize private initiatives in the water sector can be explained by the absence of a clear legal framework for the water sector and by the evolution of institutions since the opening up of the country in 1991.

Administrative structure of Cambodia

The administrative structure of Cambodia is divided into 5 strata: national, provincial, district, commune and village, the latter being an informal division of the commune. The country counts 1,417 communes, whose commune councils were elected for the first time in February, 2002. There are 23 provinces, whose officials, the governors, are appointed by the government. The law on decentralization and deconcentration was passed, but the implementation has not yet started, and

many of the practical implications of the law remain unclear. In the meantime, the provincial departments operate by delegation from their ministry, with the exception of the provincial rural development committee, an interdisciplinary structure responsible for the establishment of decentralization, which enjoys a relative autonomy of decision and operation.

The ongoing process of decentralization will hand over increasing responsibility to the provinces. Indeed, recent laws are intended to authorize the delegation of power over productive investments (less than $2 million US) and the modalities of delegation of service to the private sector will supposedly be allocated by the promulgation of a law on concessions. Provincial development committees[17], that will include commune representatives, will be responsible for assisting the governors with provincial decisions. Meanwhile the national ministries are being asked to withdraw themselves from operational functions in order to devote themselves to the supervision and orientation of their sectors.

Communes: recent decentralization without sufficient means

Cambodia, like numerous developing countries, has undertaken a decentralization process. This effort, which led to the election of commune councils by the population in 2002, is slow in showing any effectiveness. If the law on communes gives the commune councils responsibility for public services, the sector legal framework for applying them has not been set-up; the electoral system has not allowed the replacement of commune chiefs who were formerly civil servants—1,610 out of 1,621 were re-elected—and are finding it difficult to change their paternalistic or directive methods; the commune councils have only meager means to justify their competence to their citizens, since their responsibility and investment capacity is limited to $6,000 to $10,000 USD per year granted by the government[18], no system of taxation or of local credit has as yet been given to the communes. Proposals are currently being prepared which would grant the communes the right to tax only locally.

[17] *These committees will certainly replace the provincial committees on rural development.*

[18] *The State gives, through the framework of a program entitled Seila, an investment grant intended to finance public service infrastructure.*

Box 2 – Responsibilities of the communes

According to the administrative law of the communes of January 12, 2001, art. 43, the communes shall improve the state of sanitation and the well-being of their populations, organize and manage public services and assure the good functioning of these services. Excluded from this communal field (art. 45) are the post and communications, forests, the national aspects of defense, of security, of taxation, of currency, and foreign policy. (unofficial translation)

Any autonomy of decision for the communal council members is limited by the stranglehold on the communes by the administrative and political systems. The councils' weak technical, financial, and legal means cannot bring changes which are eagerly awaited by the population. Since they are condemned in advance to disappoint, they take only relatively limited risks, sometimes even assuming being a spectator by playing a passive role in local development.

Box 3– Communes: a very politicized mode of election

The election of commune councils by villagers was brought about by the decentralization law of 2002.The commune councils are designated and elected from a party list. If the party dominating in the commune is not that of the government, it has little chance of obtaining support from superior authorities for development and even for the village to be considered (that is, no chance for funding). Indeed, we notice that non-membership in the CPP (the Cambodian People Party), which is the most widespread in Cambodia, brings about difficulties for elected official from the opposition in being taken into consideration. The leeway for these elected officials is limited. 1,610 commune heads out of 1621 communes in Cambodia are CPP members, and almost all these commune heads are those who exercised the same functions in the past. The mechanism has therefore not created the renewal and the opening up which was expected, but has confirmed the strong hand of the party in power (which includes the majority of administration top executives who were in place during the Vietnamese occupation) on election campaigns.

The population knows this very well, and they elect a political party—usually the government party—that will give them as little trouble as possible. Even bringing up this subject bothers the villagers. They tend to whisper, never mentioning the names of the parties, for fear of being overheard, or of their words being repeated to their disfavor. The ideologies and programs of a party do not enter into the choice of a party list, and neither therefore of an elected person.

(Excerpt from the internship report by Janie Boursin and Caroline Billard, IFU/GRET 2006)

Table 8 - The actual levels of decentralization in Cambodia

Legality of decentralized levels.	The laws regulating administration in the communes have been passed, but their enforcement and the transfer of sectoral responsibilities are slow in coming.
Autonomy of decision-making	Mechanisms of decision-making are still too often "top-down", an inheritance from the period when heads of communes were civil servants. Decisions made go down to the local level through the administrative structure or through the authorities of the political party in power (upon whom the majority of village heads depend). All local partnerships must be approved by the Ministry of the Interior.
Financial autonomy	Financial autonomy is limited to a budget investment of $6,000 to $10,000 per year, and the expenditure is closely supervised by the provincial authorities. The communes do not have the right to open bank accounts or to request for loan. Studies aiming to authorize communes to raise taxes for services are ongoing.

The water sector: a lack of legal uniformity

The institutional context in which the water sector has evolved lacks a uniform legal basis at the national level, and has been the subject of various legislations, sometimes contradictory, coming from various ministries. On the other hand, water supply policy produced in 2003 clearly established the withdrawal of the State from the construction and management of water supply utilities, and expressed the necessity of appealing to the private sector, and the right of users to choose their services, thus covering the costs of their operation.

Because it is difficult to distinguish between what are rural and what are urban services, the small piped water supply systems end up in a vague institutional situation between two ministries[19].

The governance of piped waters systems becomes the object of power struggles between the supporters of centralized solutions (management by means of licensing) and decentralized solutions (management by means of local contracts). Currently, the regulation of this sector is limited to a quarterly inspection of the water quality of a small number of water systems (about thirty). The establishment of a regulatory authority for the water sector is under study, but is coming up against the lack of precision concerning responsibilities for this sector and the antagonism between the central and decentralized levels.

Box 4– Institutional framework of the water sector

Three ministries are involved within the framework of the water sector:

- The **Ministry of Water Resources Agriculture and Meteorology** (MoWRAM), which has responsibility for water resources, but its role is limited to the supervision of irrigation.
- The **Ministry of Rural Development** (MRD), responsible for water and sanitation in rural areas. Its role until now has centered on the development of community works (drilled wells), managed collectively and without profit.
- The **Ministry of Industry, Mines and Energy** (MIME), responsible for water supply in urban areas outside of Phnom Penh. Within small towns, MIME has essentially taken charge of granting licenses to private entrepreneurs. The MIME claims the responsibility, in large rural towns, for all the systems managed by private individuals, without consultation with village or communal authorities which nonetheless have, according to laws on the administration of communes, the responsibility for public water services on their territory.

The distribution of tasks between MRD and MIME comes out of an agreement made in March, 2005; almost at the end of MIREP, which had started up under MRDs responsibility. The tardy clarification of responsibilities and fields of intervention between these different ministries, the conflict between the partisans of decentralization (essentially, the provinces), and centralization (the ministries based in the capital) has an influence on the granting of responsibilities in the sector.

[19] *Ministry of Rural Development (MRD) and Ministry of Industry Mines and Energy (MIME). A march 2005 Memorandum of Understanding put private sector managed water network under MIME responsibility and community ones under MRD.*

The National Water Supply Policy: allocating responsibilities and setting-up a regulatory authority

The national politics of water supply, then, is divided into two domains: the urban, under the administrative supervision of MIME, and the rural area under that of MRD. Whether the urban or the rural sector is concerned, the proposed water supply law, drafted with assistance from the World Bank, has brought forward four main points:

- The informed choice of populations ("Demand responsive approach"), which consists of intervening according to the expression of local needs;
- The participation of the private sector, in the investment and management of water supply;
- Fees reflecting the real costs (in rural areas this only includes operational costs, whereas in urban areas the fees should cover operation, amortization and return on investment);
- Creation of a national independent regulatory authority, for the supervision of piped water systems.

As for this regulatory authority, whose role it would be to protect access to service for all, its greater functions are the following:

- contribute to the extension and improvement of the quality of water and sanitation utilities;
- improve public health related to water use;
- strengthen the financial viability of public utilities;
- protect the interests of the consumers;
- favor competition for the supply of services and warn of abuses on the issue of monopoly or of cornering of the market;
- deliver authorizations for the implementation water and sanitation utilities;
- respect the policy of the government on these implementations.

The regulator will have available to it the following extended competencies:

- To propose required regulations to the effective operation of its above-mentioned authorities and powers;
- To hold hearings or public consultations with the users, the managers, and any other persons with a prior concern about the introduction of new regulations or the revision of existing regulations. The regulations promulgated will take effect two weeks after the date of publication in the official Gazette or in a national daily newspaper of the Kingdom of Cambodia.
- To define the principles for the approval of fees on the basis of a certain number of criteria such as the recovery of investment costs and of renovations, the encouragement of performance, etc; and to approve or modify the service fees.
- To deliver, modify, suspend and revoke the authorization of the supply of service on the basis of the technical and financial capacity of the managers or in the public interest;
- The oversight of the service providers;
- To describe and publicize the comparative performances among these service providers ;
- To set-up specifications and standards for service delivery, particularly regarding water pressure, the treatment and quality of the water, minimum flow, objectives for connections, and procedures for billing and metering, etc.
- To set up a set of procedures for solving complaints and litigation between the service providers and the consumers;
- Communicate, inform and providing support to national and local authorities;
- To impose fines in the case of breaches, and to decide on measures to be taken in this respect.

This authority has still not been formally established. Therefore, there currently exists no regulatory authority for water services in Cambodia.

(extract from the internship report of Caroline Billard and Janie Boursin, IFU/GRET 2006)

Table 9 : Summary of functions of the water sector in small towns

Functions	The legal context concerning small water supply services in Cambodia
Service delivery	The operation of water supply services in small rural villages is essentially run by the local private sector.
The equipment and property of the facilities	The equipment and the property of the small town facilities are mainly private, but the communes, thanks to the improvement of local public resources and the establishment of a local system of taxation, will soon be able to invest in the water supply systems.
Selecting and competition	Local demand was the basis for the arrival of private water supply services, but its formalization is being driven particularly through the example of outside projects, and through the setting up of procurement procedures at local level.
Defining service and contracting	Service and fees are determined on a market basis between the entrepreneur and his clients. The MIREP program, among others, has encouraged the local decision-makers to reflect upon the notion of public service. Meanwhile, the Ministry of Industry, Mines and Energy has been working on the regulation of fees and levels of service.
Observation and supervision of services	The control of services is currently limited to quarterly water analyses from some 30 supply systems.
Respecting and enforcing the decisions made	These responsibilities are still not well defined in Cambodia. In practice, these powers rest with the governor of the province.
Supervision; public information	This role does not yet exist; it should be assigned to a future water regulation authority.
Definition of policies	The two ministries involved, the Ministry of Rural Development (rural water supply) and the Ministry of Industry, Mines and Energy (urban water supply),are responsible, depending on the domain of their responsibilities.

PPI[20] : Building an operating procedure

Until now, the only legal document for drawing up public-private contracts is summed up in a decree concerning the BOT of 1997, whose complex and strongly centralized functioning is applicable only to large contracts. In reality, public-private contracts are done on an *ad hoc* basis by the ministries of that sector, and at the local and provincial level, delegated management of services to the private sector are made by administrative authorization, with no legal basis. In both cases, there is an absence of systematized process for competitive bidding.

Since 2004, an institutional workspace has been open, with the preparation of a law on concessions (broadly understood to include all forms of delegated service management to the private sector) and laws relating to the participation of the private sector in infrastructure. The first steps of this process show the willingness of the authorities to open up and to simplify delegated management to the private sector at the local level, beneath a certain financial threshold[21], on the basis of decisions and project ownership by the provincial authorities, with the participation of the communes concerned.

Box 5 – Conclusion of the chapter

Cambodia boasts a rather remarkable private sector dynamism, which is also found in other countries of Southeast Asia. The services delivered are the response to a basic demand from the population of the small towns. However the institutional framework in which these businesses operate is almost non-existent, and the supervision of quality is weak. As well, there are "unknowns" with respect to the ability of entrepreneurs to professionalize themselves. It is on this basis that the MIREP program started up. It aimed to set up a framework for improvement, professionalization, and regulation of these water systems. This is the subject of the next chapter.

[20] *Private sector Participation in Infrastructure*

[21] *At the time this document is written the expected amount is 2 millions US$.*

Chapter 2 – The MIREP program: choices and modalities of intervention

The framework for intervention

Historical landmarks

Since 1989 GRET has been present in Cambodia and active in various development sectors, including water supply. Involved in rural water supply operations until 1999, GRET then progressively got interested in a growing phenomenon in this country: the spontaneous emergence of private small-scale piped water supply systems.

Setting up a treatment facility

After conducting a study on this matter, and following the orientation of the water policy reform in favor of the participation of the private sector toward water supply service delivery, GRET and KOSAN Engineering, a Cambodian consulting agency, launched a pilot project aiming at supporting one dynamic informal private water supplier in order to improve the quality of his service by setting up a treatment facility.

This pilot helped gain experience and build references in order to serve as a basis to define procedures, guidelines and specific methodologies, which then led to the design of the MIREP program. From 2001 to 2005 MIREP then supported the setting up of 13 additional piped water supply systems, all managed by private entrepreneurs within the framework of local private-public contracts.

Box 6 – A brief report on MIREP

- **Years:** 2000 – 2005.
- **Zones of activity:** Cambodia, provinces of Kampot, Takéo, and Kandal.
- **14 water systems set up** in small towns consisting of 250 – 900 households.
- **Direct beneficiaries:** 25,000 people.
- **Total budget**: about 820,000 Euros.
- **Implementer:** Established by GRET (Groupe de Recherches et d'Echanges Technologiques) and Kosan Engineering.

Table 10 - A chronology of the MIREP program

	Genesis of the MIREP program	Cambodian context
1989 - 1999	GRET is involved in rural water supply projects, such as the construction of circular and tubular dug wells in the south of the country.	Conflicts end; the reconstruction of the country begins.
1999 - 2001	GRET conducts a survey on small-scale private piped water supply systems.	The Ministry of Rural Development prepares a policy on water supply.
2000 -2001	GRET and KOSAN Engineering initiate a pilot project to support one private water supply system in Pech Changva.	The beginnings of the preparation of the water policy. Three major axes are promoted: informed choice, the cessation of operational involvement by the Ministry, and the participation of the private sector.
2001	GRET launches the MIREP program with financing from SEDIF and the French Ministry of Foreign Affairs.	The Ministry of Rural Development launches the project for support of the professionalization of the water sector (APSER), in which GRET participates (support for the training of well water enterprises).
2002	Setting up of the operational framework for the MIREP program.	Decentralization reform : first commune elections in Cambodia, programs to support communes and the decentralization process are launched.
2003 -2004	Setting up of the piped water supply system in Takeo province, and its extension into Kampot and Kandal provinces with the support of GTZ and UNICEF, respectively.	Cambodia adopts a new policy on water and water quality standards.
2005	End of the MIREP program, start of dissemination activities to make the results and the lessons learned available to all actors involved in the water supply sector.	The government elaborates its strategy on devolution of centralized power to the provinces.

Our ambition: towards a basic service of drinking water supply

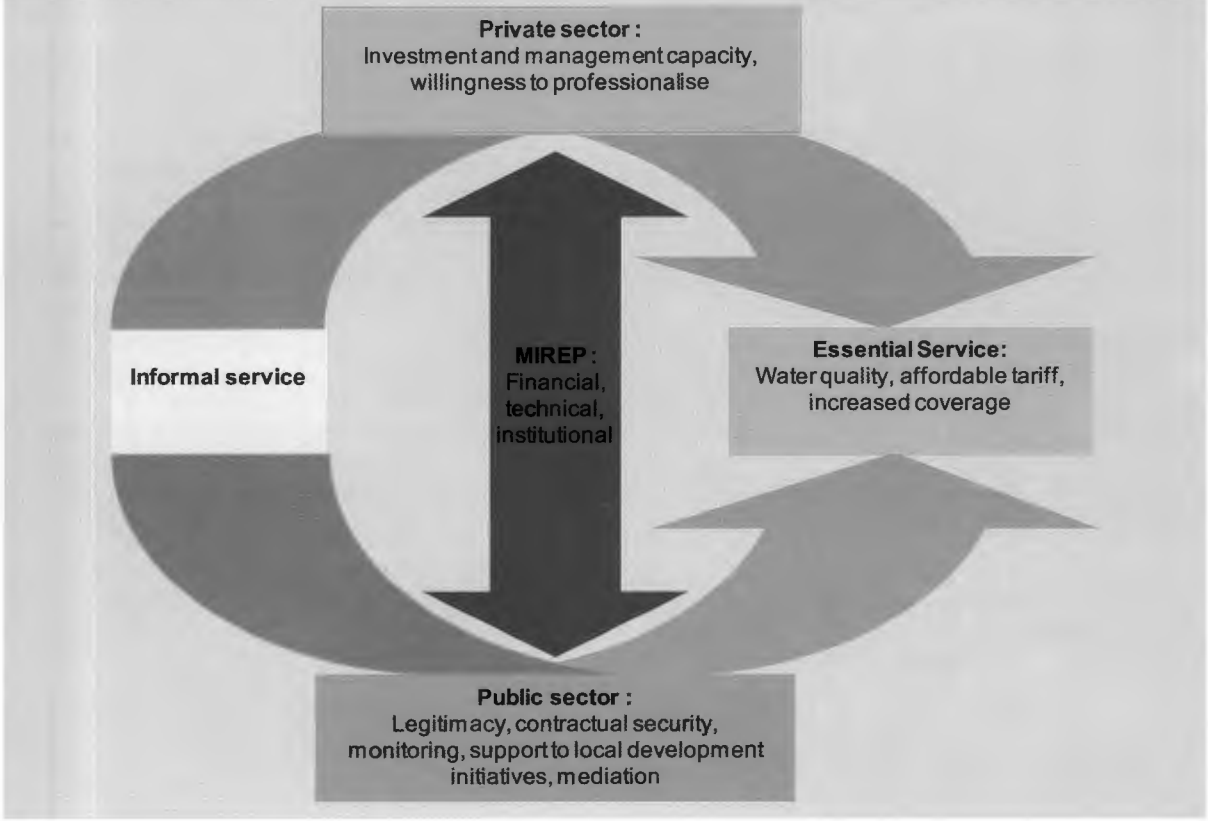
The MIREP program was born from the idea of transforming informal local private initiatives into proper basic services of drinking water supply. Such services would meet internationally recognized quality standards, including a coverage corresponding to the population of those towns affected by the scarcity and pollution of traditional water supplies, and individual connections to the water service for the greatest number of households, but with adapted alternatives for the poorest, and the establishment of a regulatory framework, by which service conditions and delivery modalities would be defined by common agreement between the customers, the public authorities, and the local private suppliers (See table 11).

The MIREP program was designed to generate efforts toward additional private investments and to encourage professionalization of the private suppliers as a response to the setting up of a sound local regulatory framework involving the public sector (See figure 2).

Table 11 - From informal service to basic service

Features of the water service	Informal service	"Essential" service
Water quality	Good tasting water at home	Water of international quality standards.
Service Coverage	Small area around the service provider.	The denser population zone of the towns, likely to be affected by scarcity and by the pollution found in traditional sources.
Access to service	A variety of modalities, with no guarantee of availability of supply or of quality.	Maximizing the rate of individual connections and availability of service.
Tariff and fees	Based on supply and demand.	Regulated fees.
Pro-poor considerations	Non-existent.	Alternatives for the poorest.
Regulatory framework	Almost non-existent.	Framework regulated by local contract, by participation of local authorities in the definition and control of service.

Figure 6 - A synopsis of the MIREP Intervention



Toward the normalization of the private-public relationship

Supporting national reforms

The MIREP program evolved, from 2000 to 2005, within an institutional framework, which was rapidly changing. In 2001, when the program was starting up, a reform[22] of the water supply and sanitation sector was undertaken which encouraged the participation of the private sector in the financing, construction and management of water supply services. Also, in 2002, the country launched a process of decentralization, whose primary accomplishment was the election of the commune councils by direct voting. In 2004 came the renovation of the institutional tools of the PPI including new rules on concessions and bidding processes, together with the delegation of decision-making power at the provincial level[23]. In 2005, the preparation of an organic law foresaw the decentralization of additional national power in favor of the provinces. Even though these laws and policy reforms set the general framework for intervention, the modalities of enforcement and of the decentralization of these sectors are still lacking. Since it was designed basically as a pilot program for the reform of rural water supply[24], MIREP's aim was to support and inspire the evolution of the institutional context of the water sector in relation to decentralization—to set up models capable of bringing about texts and legislation in these domains.

Making the local public-private relationship evolve

Before the MIREP program started, an entrepreneur investing in a water supply system was operating in the absence of regulation. Although water belongs to the public domain, public authorities, whether at the local level or the national level, had very limited influence over the service provided by the private entrepreneurs. Technical departments from ministries or other state administrators are even continuing to drill wells without taking into account the private initiatives, which are growing rapidly and having some success among the local population, particularly in small towns.

The preparation of a water policy in 2001 put the spotlight on the growing presence of these private systems, as well as on the crucial need for professionalization. This realization of the importance of the private sector coincided with the withdrawal process of the State in its role of supplier of basic services, and the progressive delegation to the communes of the responsibility and the ownership of the works related to community wells and other water systems.

By being based on this communal responsibility, the subordination of private systems to the communes (and its corollary, the delegation of water supply service to the private sector), becomes an option that is institutionally possible and realistic, since private operators generally have informal arrangements with heads of communes.

In the absence of a clear legal and regulatory framework, local contract development becomes a learning process through which the public and the private stakeholders progressively build a common understanding of their respective roles and responsibilities. In this respect, the role of MIREP program consisted of promoting the existing relationships between these two parties, and formalizing the roles of each through the contractualization process, the promotion of participation (attracting users, clarifying and keeping track of their demand), and finally the mediation (creating a space of mutual confidence among elected officials, users, and private sellers, facilitating dialogue).

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[22] *Through the National Policy on Water Supply and Sanitation, adopted in 2003.*

[23] *The provinces were allowed to delegate projects costing less than US$2 million.*

[24] *In the context of the establishment of the new water policy, the MIREP program had to validate the possibility of professionalizing and formalizing private water systems. The MIREP program supported the work of the PSCU (Policy Support and Coordination Unit - Ministry of Rural Development) in order to achieve the support of the new water policy.*

Supporting the sense of ownership at commune level

Following Cambodia's evolution toward 'D&D'[25] the institutional set-up of MIREP was based on a preponderant role for the provincial and communal public authorities. The project's ownership was therefore divided between the provinces, via the Provincial Rural Development Committees (PRDC) (see the text box), and the communes. During MIREP implementation the provincial councils gave assistance to the commune councils, in order to : a) identify the communes that needed to be targeted as a priority, b) elaborate the public-private contracts, c) select the entrepreneurs/supplier, d) manage the subsidies and e) support to the communes in the supervision of the contracts.

Under the overall supervision of these committees, the provincial departments of rural development, finances, and planning have provided technical support and have monitored the various stages of the start-up of the systems. The commune councils have been involved at all stages of the project's preparation and the contracting process, with various degrees of technical and financial participation. For certain systems, several communes have even grouped together in order to contract with a private entrepreneur. The users participated in the definition of the water services through consultation meetings, through the intermediary representatives previously elected or appointed according to their status in the community.

Box 7 – The PRDC Excom in brief

The Provincial Rural Development Committees are the inter-ministerial structures (Interior, Planning, Rural Development, Women, Health, Agriculture, Finance), which are responsible, at the provincial level, for supporting the communes in the starting up of infrastructure and public services (schools, road, water sources).

The provincial committees, which have their own budgets, foresee a future provincial investment scheme, as planned by the new organic law on decentralization expected in 2006.

The decision to delegate the management of the water services to the private sector is jointly taken by the commune and the province. While the decision at commune level is essential due to its close proximity to the private provider, the decision at provincial level aims to provide the legal validation[26] and support for regulation. In certain cases[27] a committee of local management, composed of elected officials and representatives of the users, and presided over by the leader(s) of the commune, was put in place in order to help the commune council in the preparation and the overseeing of the contract.

Box 8 – Roles and responsibilities of PRDC

The main roles of the decentralized public institutions.

The Provincial Rural Development Committees (PRDC) are in charge of:

- The selection of the target sites.
- The management of subsidies for the construction of the treatment facilities.
- The procedures for granting and managing provincial funding.
- Technical and institutional support to communes involved in the project, across sectoral departments grouped together with the PRDC framework (particularly finances, rural development and planning).
- Support to communes with respect to contractual regulation.

The commune as the local project owner is the immediate interlocutor for private entrepreneurs and the users for:

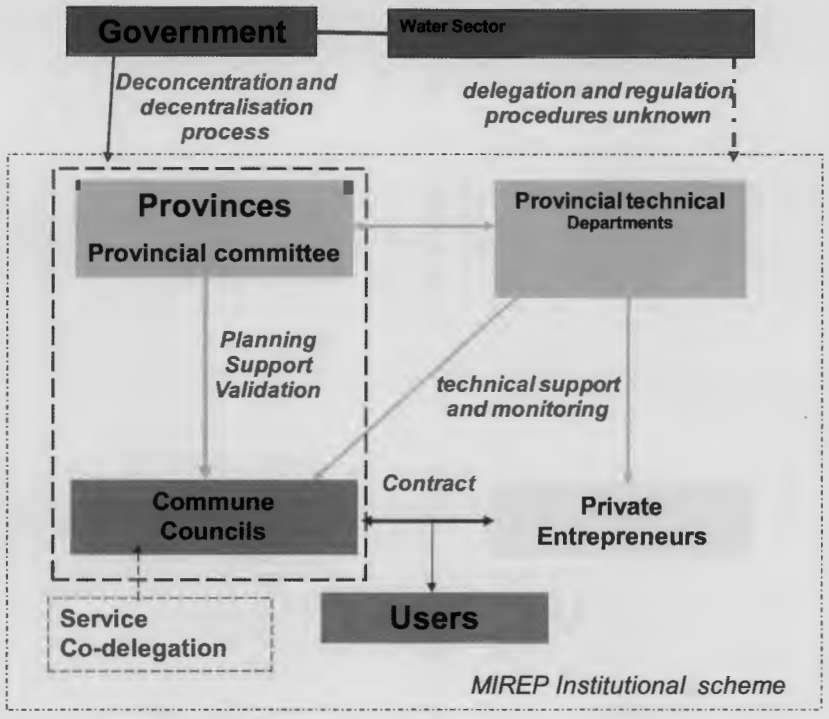
- The investors' choice.
- The conditions of service.
- The management of the contract.

[25] *Decentralisation and Deconcentration.*

[26] *According to the legal provisions of communal administration, the contracts between a commune and a private business must be approved by an entity of the Ministry of the Interior (district or province).*

[27] *If financial or funding participation on the part of the communes is involved (concession contracts, rental or leasing), in the case of the pooling or consolidation of communes or in the case of local management of subsidies .*

Figure 7 - The institutional arrangement scheme of MIREP



Provide a wide range of contractual arrangements

MIREP has sought to formalize some contracts, tailored to meet the local demand and respond to the local constraints and opportunities, with at the end the aim of providing an informed choice within a range of the contractual possibilities, which would be available for all Cambodian communes.

Models of the MIREP contract

Four types of contractual arrangements were implemented within the MIREP framework—several BOO-type contracts (Build Operate and Own) , one concession/BOT contract (Build Operate and Transfer), one affermage-type contract and finally one leasing-type contract. The most widespread, the BOO contract is the most similar to the situation of the informal systems[28].

The other contractual arrangements have gone along with the investment capacities and land tenure opportunities of three communes. All together these different types of contractual arrangements represent a wide range of institutional choices, which are now available to Cambodian communes and provinces, and constitute a component of the informed choice of a population[29].

Signature of a contract,Takeo.

[28] *The informal systems correspond to infrastructure which are wholly private, and which, in the case of transfer of activity, are sold on a market basis, and are re-sold to entirely private entities, with no intervention from the public sector.*

[29] *A brochure on the participation models of the local private sector has been created for the attention of the local powers.*

BOO-type contracts: introducing public responsibility without discouraging private investment

In BOO-type arrangements, the public authorities disengage themselves from all responsibility associated with the service delivery, with the exception of regulation of the service. It leaves to the private sector the ownership of the investments, the responsibility to finance the investments and to operate and manage the service. The installations must therefore be supplied for sale when the contract expires. This model is similar to the spontaneous investment in Cambodia's private sector, as it does not require any financial or funding contribution from the public authorities. Due to the private ownership status of the investments, this model is relatively safe for private entrepreneurs, especially considering the quite loose legal framework that exists in Cambodia. In contrast, this contract is the most difficult to regulate for the local authorities: as the private supplier owns the installations, there are few ways to hold them to a good level of service, except through expropriation, which is a long procedure and beyond the reach of local power.

Concessions/BOT: the issue of investment as the project goes forward

A concession model means making available to a private party some 'space of service' (a place and a length of time) for which the party must guarantee financing, construction and management of the infrastructure while finding remuneration from the service. From a legal point of view, infrastructure ownership remains public, and it is the contract, which guarantees the entrepreneur the legal right to use the property of the infrastructure. For the private party, this contract offers the advantage of providing "free" land but implies an investment risk if the contract is thrown into question, particularly in the event of change or political unrest. The restitution of installations when the contract expires involves the depreciation of the investments over the period of the contract, which may increase the tariff of water, compared to the privatized contract, in which the infrastructures are offered for re-sale. Also, it is a reason for under-investing in service extensions, which may be reduced through a process of compensation for the non-depreciated investments when the contract expires.

Within the framework of the MIREP program, a concession contract was drawn up in Angkor Borey, where private land was unaffordable, and where the district authorities could provide a piece of land in a good location which was made available to the commune.

Affermage and leasing contracts: the issue of public resources

Affermage and leasing contracts, which are both based on public investment, usually with minor participation by the leaser or the farmer, differ from one another with respect to the modality of rental fees in the commune. These fees are fixed in the case of affermage contracts and indexed according to the amount of sales in the case of leasing contract. Affermage arrangements, then, involve a greater commercial risk than leasing arrangements for the private party, who must be well supported if no precise information on the local water supply market exists.

These two types of contract illustrate the difficulties for local public authorities in accessing public finances, since (as long as they cannot levy funds from local taxation or count on widespread community participation) they are dependent upon the central powers or on international aid. The absence of financial capacity for extensions or renewals often lets the contracts slide into *de facto* concessions.

The MIREP affermage contract in Phnom Den works in step with a commune owning a pond that it did not want to put into concession. The commune and the communities (see below) have financed the rehabilitation of the pond; the province has financed the water tower; the water treatment facility was subsidized by the project; and the private party took charge of the water network system.

Box 9 – Difficulties with community participation in private systems

In Phnom Den, direct participation by the communities in the form of a contribution generated resistance on the part of local populations, who did not understand the reasons for financing an installation which was intended to generate a profit by a private person. This attitude is reinforced in Cambodia by the fact that unscrupulous private persons have sometimes collected contributions from villagers without completing the promised infrastructure.

The leasing contract for Prey Pkhoam was piloted in the poorest of the small towns targeted by the MIREP program. In this settlement no local private entrepreneur was willing to invest. The commune therefore decided to allocate its annual investment fund[30] in order to dig a pond. The province on its side financed a water tower, and the water

[30] *In Cambodia each commune receives on a yearly basis a communal fund to make public investments (from US$6,000 to US$10,000, according to communal needs).*

treatment facility was subsidized by MIREP program. The private sector paid only for the pumping system. The water supply system will be turned over to the commune (with an 80% level of participation) at the expiry of the contract.

Table 12 - Public-private contracts experimented within the MIREP framework

Contract	Num	Investment	Ownership	Operation, Maintenance	Commercial risk	Contract duration
Leasing	1	Public	Public	Private	Shared	5 years
Affermage	1	Public (with minority participation of the private sector)	Public	Private	Private	10 years
Concession	1	Private	Public	Private	Private	30 years
Divestiture	11	Private	Private	Private	Private	10 years

Box 10 - Describing the MIREP contract

Contracts are tripartite contracts, involving:

- The delegating authority (public or community): the one which entrusts the service (in most cases, the commune with support from the Province);
- The private operator;
- Users, through users' representatives.

Contracting the water service allows formalizing responsibilities of all parties:

- Protecting the investor in the long term by:
  - the official commitment of official authority representatives (provincial governor) who validates and acknowledges the delegated service;
  - a monopoly within the coverage area defined in the contract.
- Protecting the users by:
  - Setting-up rules and procedures for rising water tariff and connection cost;
  - Setting-up credit schemes for connection;
  - Tax schemes collected from the operator by the communes in order to maintain public water points, notably stand pipes.
- Formalizing the control by public authorities:
  - On water quality;
  - On service quality.

Commitments from the operator depend on the type of contract. For "full private" (BOO) contracts, investors have several responsibilities and commit themselves to maintain a continuous and good quality service delivery to the users (continuous supply, drinking water, respect of water tariffs set-up in the contracts signed between investors and users).

The investor is particularly obliged to:

- Finance and build the main components of the piped water system, supply it with raw water and to distribute treated water;
- Ensure the water quality with respect to the criterion promulgated by the Cambodian government and undertake, at his own expense, at least two water analyses per year;
- Cover all operation and maintenance costs at his own expense;
- Keep an updated accounting book that is accessible to users' representatives;
- Pay a yearly tax to the commune authorities;
- Hold a meeting with the three contract parties every 6 months and provide a progress report;
- Request the license from the national authority in charge.

(Extract from the internship report of Caroline Billard and Janie Boursin, IFU/GRET 2006)

A focus on the fees and tariff setting

For all MIREP projects, the water tariffs are set up within the range of US$0.45 to US$0.55 per cubic meter. Either set at will or by bids, they are calculated according to the water policy in order to cover expenses of maintenance, operations and capital; as well as financing charges, taxes, and a return on investment. The subsidy allocated by MIREP to finance the treatment facilities also appear in the water tariff under the form of a fee that is paid annually to the commune and set up at 2% of the subsidized amount.

These water tariffs allow families with average means (earning US$75 - US$150 per month) to have access to about 40 liters per person per day for about 4.5% of their monthly income[31] during the dry season (during the rainy season, this budget is cut in half). The principle of flat rate tariff was preferred to the Increasing Block Tariff (IBT)[32]. Indeed the low level and the limited variation of water consumptions (40 liters per day) does not justify a cross-subsidy mechanism between small and large consumers.

In addition, with the IBT, the poorest, who generally get their water supply from their neighbors who are connected, end up paying for water at a higher rate. Encouragement of entrepreneurs to connect poorer zones and households is weak, and would not be compensated in any systematic way by local regulation. The MIREP contracts foresee a revision of the water tariff, based on the variation of the energy costs, the labor costs, and the currency exchange rates—the three main factors, which most heavily influence the tariff .

Main steps in the setting-up of systems

Selecting the sites and designing the systems

The starting point for setting up a water supply system was relying on a local expression of interest, either by private entrepreneurs willing to extend or upgrade their existing system, or by communes eager to install a new water supply system. There was an information-gathering stage prior to launching of expressions of interest, through the intermediary of various administrative echelons and through announcements in the local media (newspaper, radio, etc.).

After a technical and socio-economic pre-assessment of the small town (implemented jointly by the members of the provincial committee and the MIREP engineers), the definitive choice of targeted sites was decided, project by project, essentially taking into consideration the suitability of the choice of piped water supply system as a technical solution, and the presence of an existing or a potential market for water.

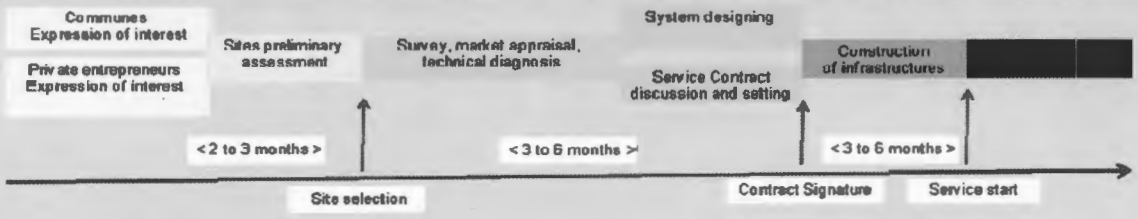
The households' willingness and ability to pay for improved water service were determined by surveying a significant part of the population (from 35% to 50%) on the analysis of their water consumption, their water budget, and their perception of the conditions of the future service (water tariffs and connection cost in particular).

Following this socio-economic study and an analysis of local water resource conditions, the MIREP engineers, together with the employees of the provincial committee, designed the technical solutions most appropriate to the site and the volume desired.

[31] *The costs for access to sufficient water (40 liters per day in Cambodia) should ideally be set so as not to exceed 5% of income, and ideally should be situated at around 3%.*

[32] *The 'Increasing Block Tariff' plans that the 'top slice' of consumption (the first m^3) should be billed at a fee below the cost price, and that subsequent consumption (the m^3 following) should be billed at a greater rate to cover the difference. In reality, increasing rates are difficult to administer without a computerized billing system, as neter reading may be irregular, and the average consumption over a fixed period may need to be computed.*

Figure 8 - Process for setting up a system



Selecting the entrepreneurs

The selection process of the entrepreneurs, the future supplier of the water service, was organized in various ways, depending upon whether a private system already existed, or if it was necessary to start from scratch. When the existing entrepreneur seemed to possess a solid level of legitimacy among the local population, and had sufficient technical and financial abilities and no potential competitor, the choice was made by mutual agreement (this was the case in 4 out of 14 projects). In the other cases, the selection went through a bidding process. Either the bidding awarded the existing entrepreneur or contributed to identifying other local or regional entrepreneurs able to invest. If the selection process put several existing entrepreneurs into competition, a negotiation procedure was defined together with compensation among the commune, the existing entrepreneur and the potential investors. This took place before the bidding process. Thus, in the three cases where existing entrepreneurs had to cede their place, they were given an indemnity of between US$1,000 and US$2,500[33]. It should be noted that, although this measure had varying degrees of acceptance, the three entrepreneurs nonetheless did give up their business activity[34].

Formalizing the public-private relationship

Formalizing the public-private relationship came about gradually as each project went forward. The succeeding water service was conducted on the basis of discussions among the three principal actors; the commune (supported by the provincial committee), the users and the potential entrepreneurs.

The process of formalization was limited to the relationship between the public and private sectors and did not include the formalization of private businesses. Thus, the contracts were drawn up with the private business people, in their own names, to avoid reluctance linked to the costly legal registration of businesses (about US$1,000).

The contracts drawn up within the MIREP framework are short and written in the common local language so that they can be discussed easily by the entrepreneurs and the locally elected representatives. Their duration is adapted to ensure investment security according to the contractual arrangement.

The contract specifies both the obligations of means and resources (minimal infrastructure level, definition of the geographical coverage of the system, necessity of expansion of the installations according to demand) and the results (the number of families to connect based on their desire to be connected, and the level of service expected).

To ensure contractual legitimacy, considering the immature state of the legal context in this area in Cambodia, the contracts were validated by all the local public agents involved, particularly the provincial governor, whose signature was the essential guarantee of security for private entrepreneurs.

The process for the formalization of the public-private relationship also included different licenses and authorizations provided by the central ministries, even though these are often considered as impediments by the local entrepreneurs because they are of short duration (2 to 3 years) and require large expenditures both for travel and transaction costs.

The implementation process

The infrastructure facilities were all designed by the engineers from the MIREP program. In places where the existing water facilities were in acceptable working condition, they were integrated into the new system so as to avoid extra investment on the part of private entrepreneurs.

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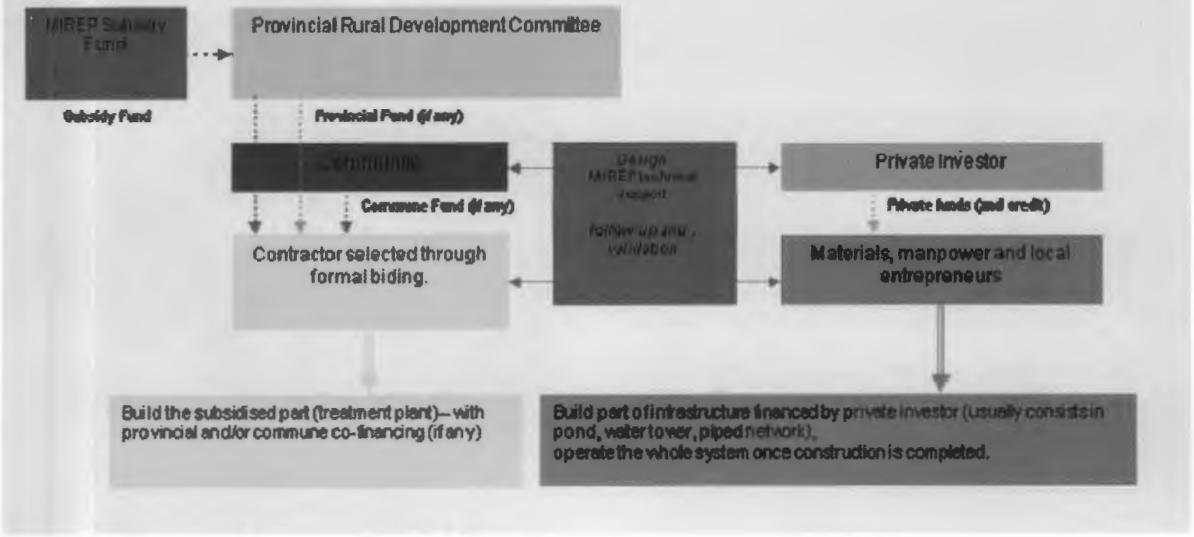
[33] *These amounts were based on the residual value of the installations and the lack of profit for 6 months.*

[34] *These three outgoing entrepreneurs have gone back to their bases as nurse, restaurant owner and farmer, respectively, in Ang Roca, Koh Thum Ka and Kbal Po.*

The construction process, which was relatively short (from 3 to 6 months)[35], was conducted in two parallel stages: the facilities subsidized by MIREP program (in this case, the treatment facilities) and the facilities funded by the provincial committee or the commune were the subject of bidding for a local contractor, while the rest of the facilities were built at the direct expense and responsibilities of the private entrepreneurs who recruited their own construction teams.

The technical teams from MIREP provided support, supervision, and validated the two processes.

Figure 9 - Work construction and supervision process



Commissioning and monitoring of water utilities

The start-up of the water service included the training of the staff in charge of the technical and the managerial works. This means essentially the private investor himself and some of his workers.

- Training on treatment process for drinking water, the use of chemical products, system operation, maintenance, etc.
- Training on management issues based on the use of formatted documents: bills, forms and client contracts, amounts of individual consumption, follow-up of inputs, and costs.

This background information was followed up by regular site visits and prompt support when requested during the first year of the establishment of service. The outcome of this training program was quite limited because of the turnover of personnel employed by the investors who do not manage the system by themselves.

As far as follow-up on water quality is concerned, Cambodia has had, since 2004, drinking water quality standards that are close to the recommendations of the WHO. The exception is arsenic, whose level for the next 10 years was set at 50 ppb[36] compared to a provisional guideline of 10 ppb set by the WHO.

Each entrepreneur has a contractual obligation to check the water quality and to have physico-chemical and bacteriological tests carried out every 3 months at a minimum, with the results posted so as to be accessible to the commune and the users. To this end, a completely equipped laboratory with trained staff was established in

[35] *According to the case, and especially for small existing entrepreneurs, 2-year investment plan has been negotiated.*

[36] *parts per billion, which in water is equivalent to micrograms per liter.*

Takeo province in the Department of Health in order to carry out these types of tests.

The regulation of the water service at the local level is the dual responsibility of the commune councils, supported by representatives from the users, and the provincial authorities. The contracts call for biennial meetings between the communes, the private supplier, and representatives from the users in order to exchange data relative to following the terms of the contract and the service, eventual changes in tariff, or to discuss certain issues related to the contract.

The provinces often provide some support to the communes in their relations with private entrepreneurs, particularly when water tariffs are to be reviewed, or when decisions are made that must be enforced in order to ensure respect for the contract, for example, respect for a monopoly.

Training among the people

In spite of its regulated nature, the water supply "system" is not exclusive and often overlaps with other water service offers also present within the towns. Even in places where connection rates to the water supply service are high, our experience shows that water supply systems only partially cover the water needs of the population, and that the bad quality services, such as those coming from pond water, do find a clientele, particularly because of their low price or the taste of the water.

Therefore, MIREP has sought to increase and maximize the use of the water supply service as opposed to other water sources through a marketing strategy. Information meetings about the water supply system (see picture above) and various promotional techniques such as T-shirts, lotteries and brochures have accompanied traditional hygiene education campaign on water quality. MIREP's techniques have also reinforced the marketing abilities of entrepreneurs to promote their service, speed up the connection process, and above all, try to overcome the reluctance of customers to use water because of the chlorine odor.

The assistance and support scheme

The originality of the assistance mechanism provided by the MIREP program resides in its duality of support: on the one hand, assistance was granted to the public sector (the communes and provinces), and on the other, support was given to the private sector (assistance to the contractors and to the private suppliers of services), which guarantees a balance between the two parties in the public-private relationship. MIREP has ensured constant dialog and if necessary, has been there to smooth out any difficulties.

MIREP's intervention rests on three components:

- institutional support for the selection, the preparation and the enforcement of the local contracts;
- technical assistance for the design, the construction, and the operations of the water systems, and;
- financial aid in the form of available credit and subsidy schemes.

Box 11 – The MIREP team

The MIREP program was implemented through a partnership between GRET (an NGO) and Kosan engineering, a Cambodian consulting firm. GRET was in charge of project management and brought in its institutional experience and competence while Kosan Engineering allocated a team of local technicians. Two French engineers and three Cambodian engineers were involved in the project management. In addition to the project ownership, the Provincial Rural Development Committees have also allocated provincial staff to the project implementation.

Table 13 - Tasks of the operational aspects of MIREP

	Assistance to the public sector	Support to the private sector
Institutional assistance	▪ Assistance for the preparation of the contracts, the selection of the entrepreneurs, and the enforcement of the contracts.	▪ Assistance to the preparation of public-private contracts.
Financial assistance	▪ The setting up of subsidy scheme for the water supply systems.	▪ Subsidies. ▪ Credit refinancing and guarantee scheme.
Technical support	▪ Technical and hydraulic assessment. ▪ Assistance in the bidding process for construction. ▪ Technical validation of the systems.	▪ The contribution of technology, particularly in water treatment. ▪ Conception of the systems, support for their construction, and support for start-up.

Support for credit through commercial banks

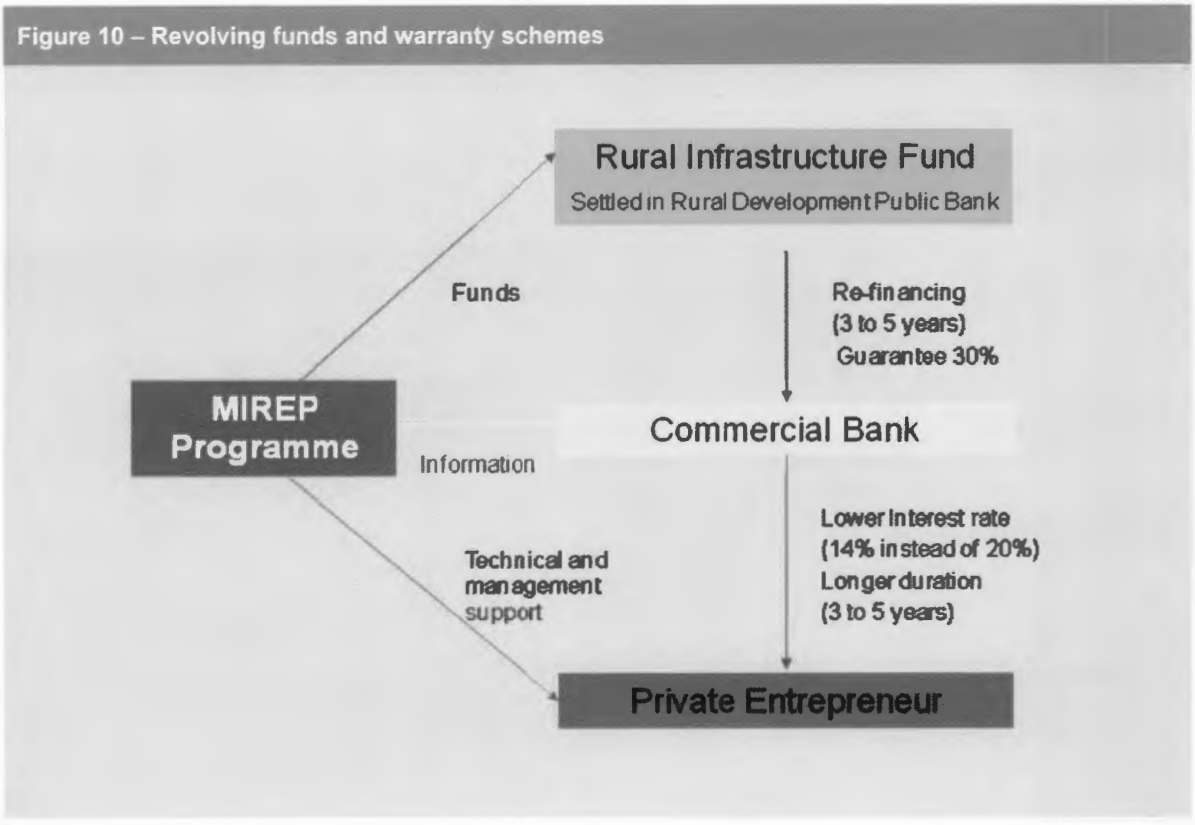
Rural infrastructure funds

The absence or the inappropriate uses of credit are factors in the difficulty of investing in the rural private sector in Cambodia. The use of credit for investment[37] is not widespread; Debt financing is expensive—interest varies from 18% to 36% per year; of short duration—1 to 2 years; and bound to strong guarantees—at a minimum, 3 times the amount of the loan requested. Banks are often unable to evaluate the investment projects submitted to them, and lack experience about service infrastructure projects. At the time, the absence of a bankruptcy law increased the risks of lending for the banks.

Thus, MIREP has voluntarily chosen to not create a means of outright credit but to encourage a local commercial bank to finance the entrepreneurs involved in the water business, and to create links with the entrepreneurs.

MIREP's assistance consisted of proposing to a commercial bank a refinancing fund (The Rural Infrastructure Fund, RIF) of 3 to 5 years[38], and a guarantee of 30% in the case of a default of payment by the investors[39]. These funds were placed in a public bank, the RDB (Rural Development Bank). At the time of each request for investment loans, on the good faith of the water contract, the commercial bank borrowed from RIF at the rate of 7% per year (of which 3% applied to RDB expenses and 4% to increase RIF provisions). These funds were used to provide loans to MIREP investors at 14% per year (the bank's profit was then 7%). The MIREP teams facilitated this relationship by helping the entrepreneurs realize their business plans.

Figure 10 – Revolving funds and warranty schemes



[37] *Binding credit, such as that practiced by micro-finance institutions, is not compatible with investment in water supply systems because of the small amounts, the short span of time and the high rates.*

[38] *Commercial banks have difficulty in getting access to medium- or long-term financing. They work mainly with private capital on a short-term basis.*

[39] *This system of guarantees has been kept secret so as not to cause hedging effects on the part of the borrowers.*

A limited commitment from the banking sector

The commercial bank[40] that agreed to partner with the MIREP program (this bank was created at the time of the launching of MIREP with a strategy to promote small and medium-sized businesses), accepted conditions that were quite exceptional at that time —an extension of credit term from 1 to 5 years, and the lowering of rates from 20% to 14% per year—essentially on the criterion of refinancing and the involvement of MIREP to provide the entrepreneurs some support with the management and exploitation of the water systems.

When the bank got the evidence that all the entrepreneurs had repaid their loans—the bank had never needed to take recourse to the financial guarantee—it increasingly limited its recourse to the RIF and began to finance loans from its own funds, either wholly, for confirmed entrepreneurs, or by limiting its refinancing to the agreed-upon financial guarantee, 30% of the amount of the loan.

While the confidence increased progressively between the water entrepreneurs and the bank, the duration of the loans were nonetheless reduced to a maximum of 3 years by the end of the program, in anticipation of the end of technical assistance provided by MIREP.

The MIREP credit scheme, involving financial guarantees, made it possible to officially lower the amount of the collateral real estate or land requested of the investors in relation to the amount of the loan, but the under-valuing of the real estate put up as collateral has often wiped out this advantage.

In addition, the learning process of the bank in relation to the financing of water service entrepreneurs has been limited due to the great turnover of its personnel.

Subsidies

Water quality and the participation of local private entrepreneurs

The two major social issues of the water systems launched by MIREP concerned the potability of the water sold, and to a lesser extent, the accessibility of the service, since in the great majority of zones there already existed other alternatives to the water supply system, in the form of ponds, boreholes or wells.

The MIREP program thus prioritized the choice to subsidize water quality, taking into account the limited willingness of providers to address water quality issues and the absence of legal means of enforcement, in order to pressure entrepreneurs to provide acceptable quality water.

The project has completely assured the financing, design and construction of treatment facilities, in exchange for a contractual obligation from the entrepreneur to use these facilities for public interest and to provide potable water treated in a well-defined coverage zone to an agreed-upon number of families who have expressed a willingness to be connected. These families were determined through prior surveys.

Taking charge of the treatment facilities was done in a deliberate attempt to support local private entrepreneurs, by keeping them out of debt or from financing themselves entirely (the treatment facility represents between 20% and 30% of the total cost of the system), and to better enable them to finance further facilities (systems, water towers, ponds).

The amount of the subsidy, which represents about 30% of the total financing of the water system, was based on the cost of the treatment facilities, but the amount was capped at US$40 US per household connection (this amount represents the average level of subsidy for rural systems, wells or community boreholes) and the entrepreneurs were asked to make up the difference if this amount was exceeded (which in fact never happened).

The subsidies were administered by the provincial rural development committees (PRDC), which asked for bids for the construction of treatment facilities and disbursed the amounts, using the national procedures of the Seila program (the national system for communal investment). Since at that time it was impossible for the communes to manage bank accounts, the subsidies did not usually pass through the communes, with the exception of the last site (Tany, in Kampot), where the subsidy funds were managed by an intercommunal[41] committee for water management created to assist two commune councils in their relationship with the private sector.

Promote access to the poorest

Under the MIREP contracts, the communes must ensure, by using the entrepreneurs' annual fees, the upkeep of the traditional water sources for the poorest, who cannot afford to connect to the water service. Depending on the site, the figures show that the poorest 10% have no access to a service, because of both the cost of connection and the

[40] *Peng Heng SME Bank.*

[41] *In order to get around the impossibility of communes to open bank accounts, the inter-communal committee on water management opens an account.*

price of the water. The difficulty of transferring to the communes the burden of taking charge of this system led us to introduce extra subsidies in order to allow access to the poorest.

MIREP therefore adopted two approaches: one extra subsidy intended to pay for water stand pipes in the poor areas of Kandal; and free individual connections for the poorest households in Tany in Kampot Province.

- Subsidy for Individual Connections

In order to supply connections at no cost for the poorest families in the zone of Tany, a list of these families was prepared and approved by persons of social importance in the village—village heads, religious representatives, and the head of the development committee—verified by on-site visits, and then validated publicly during village meetings. This rather long process was intended to diminish controversy and jealousy, and to avoid damaging the social cohesion of the local population (this process was set up by teams from GTZ[42] that followed the project in collaboration with the MIREP teams). It is interesting to note that in this town, the local authorities who were in charge of the selection preferred to limit to 5% the number of those initially identified (10%) rather than having to put up with possible lawsuits. To allow poor families access to a minimum amount of water, a free supply during the dry season was given to them. The cost of this free supply is then recouped from the annual fee that the entrepreneur must pay to the commune.

- Stand pipes

A system of local water stand pipes (see photo) was set up in the province of Kandal. The tariff is normally the same as with a water meter, because the stand pipe owner buys water at a preferential price to the manager of the water supply system, and the owner's profit is set by the contract made with the commune. This formula was relatively successful, with an average of 60 customers a day during the dry season, but the regulation of water tariff at the stand pipes poses a problem—regulated prices, even when posted near the fountain, were not systematically respected. Also, the standpipe does not allow the poorest their free amount of water. Therefore, they are spared only the cost of connection.

Table 14 - Modalities of the disbursement of subsidies

	Treatment stations	Access to service for the poorest
Grants and amounts	Subsidy for all systems (amount varies between US$10,000 and US$23,000 depending on the system.	Extra subsidy for only three systems (amount varies from US$1,200 to US$1,500 depending on the system.
Service objective	Good quality water according to the norms.	Access to service for the greatest number.
Purpose of the subsidy	Financing the treatment station.	Financing of connections / fire hydrants (fountains) intended for the poorest zones.
Modalities of disbursement	To the builder of the station, according to the progress of the work	To the service provider according to the access to service of the poorest households.

[42] *A German international cooperative public enterprise.*

The effectiveness of the subsidies

Evaluating the effectiveness of subsidies comes down to analyzing their importance in attaining social goals (potability and accessibility) and measuring them against the requirements of financing (participation of the local private sector and the optimizing of subsidies).

- An immediate impact on water quality

The subsidy of the treatment facilities brought about an automatic impact to the quality of water provided by the entrepreneurs, because all of them used it. Had these facilities not been made available, it is doubtful that the local entrepreneurs could have acquired both the technical ability and the finances necessary for water treatment. Indeed, prior surveys showed that the population in general assigned little *a priori* importance to water quality, and that water quality did not figure as a form of extra value for the entrepreneurs. It should be noted that the systematization of treatment facilities in the MIREP systems was a factor in the adoption of water treatment in rural systems even outside the MIREP framework, because this facility is replicated more and more often.

- Improved access

Without these subsidies, and given the strong institutional constraints, some entrepreneurs might have been able to set up treatment facilities (that would perhaps be less effective), but to the detriment of three service factors: the fees, which would have been about 10% higher (up-front costs and return on investment); the coverage zone, since the investment put into the facility would have reduced its extension capacity; and the rate of connection, since the rise in fees would have eliminated access for some families. Furthermore, the profitability of the treatment facility would demand a greater scale of use in order to increase coverage rates.

- The situation of the indigent

Even when bound to a contractual process, the subsidizing of an input (in MIREP's case, the treatment facility) requires a high level of regulation in order to guarantee a good social outcome for the entire population. To ensure a positive social goal, the OBA[43], which consists of paying out subsidies on the basis of an imposed social outcome, such as a certain number of families connected, is becoming more and more important. All the same, this way of subsidizing calls for precautions in the definition and implementation of social objectives. Experience proves that the selection of poor families is a delicate exercise indeed, and that incorrect methods of selection of poor families—a lack of transparency or of participation, preferential treatment and nepotism—can have a lasting and nefarious effect on the social cohesion of populations.

- Financial involvement

The provision of subsidized input has a positive impact on the financing situation. By reducing the need for capital, it in fact authorizes the presence of entrepreneurs with weaker financial capacity. However, it does not guarantee optimal effectiveness for the amount of the subsidy, since this amount is not subject to competition.

In the OBA model, optimization through bidding is the rule. If it allows for—in a theoretical way—an adjustment for subsidies to the market, its effectiveness can be limited by the technical capacity of the private sector to offer a bid (related to its ability to risk an amount corresponding to the expected subsidies). This means a *de facto* elimination of small entrepreneurs.

The design logic

A true estimate of the needs

The MIREP water systems are designed with estimated consumption in mind. A prior study, conducted among 33% to 50% of the population depending on the size of the site, makes it possible to determine the number of households who are willing and able to pay for the water service. This last factor is calculated by averaging equally the total amount of water consumed per season, the budgets allocated to water expenses per season, and the volume of water purchased. The willingness to connect and to pay for water was estimated based on a descending scale of affordability. The coverage area is defined considering the level of density of households[44]. When the houses are too far apart, the viability of the system is not certain, and it is better to adopt a community system. The standard for water pressure is based on local topography and on the type of dwelling (the absence of two-storey houses), and on the modalities of use. Almost all households use a tap in the yard, but the water quality is never compromised, since it is determined by national standards.

[43] *Output-Based Aid.*

[44] *A distance of less than 15 meters from the entrance of one house to another.*

A system of gradual investment

The initial facilities to be built by the entrepreneurs are designed on the basis of the existing market and considering an increase in the demand for the following 10 years[45]. A short-term extension calendar, as well as middle-term modalities for adapting the resources and the system according to need, allow us to 'custom-design' an infrastructure, and thus also the investment needs and the costs of operation, according to demand, and to authorize the enlargement of a system through self-financing. These modalities are made easier within the framework of BOO scheme, which allows for the resale of infrastructure at the end of the contractual period.

This system differs from public financing schemes and from international aid, both of which are designed according to standards or of sizing for long-term operation, which generates inaccessible investment costs for the local private sector and also generates additional costs which these small entrepreneurs find difficult to deal with.

Intermediary technical materials

Cambodia is located near some countries—China, Vietnam and Thailand—known for their industrial dynamism, especially in the production of manufactured goods. It is possible to have access to water meters made in China at US$4 per unit, and from Thailand for US$8 per unit. These products have a relatively short life span (about 3 years) but are available at all local markets because the need for their rapid renewal assures the retailers a viable and constant market. The same is true for PVC valves, cement, etc. Conversely, more expensive products like western water meters, which last much longer (10 years), are not accessible because of their initial cost. They do not need to be replaced as often, and therefore are not viable for the local retail market. MIREP Low-cost technologies have permitted affordable investment costs (about $150 per household) and a very low connection cost (about US$15 to US$18), allowing access to the water service for the townspeople.

Technologies specific to towns

Because of the small volume treated (between 50 and 300 m^3 per day, depending on the site), and the characteristics of local private investment, MIREP has had to develop technical solutions based on the lowest cost, ease of use and maintenance, that also meet international quality standards.

The treatment facilities were designed in this spirit, and they have been replicated in numerous Cambodian towns because of the simplicity of their construction and their low cost. The program has also designed water towers, floating pumping systems and PVC distribution networks, adapted to each small town, while always trying to provide the most affordable solution for local entrepreneurs. Likewise, MIREP has designed maintenance and testing tools (a jar test) that have spread around Cambodia on a commercial basis[46].

Box 12 – Water treatment stations

The MIREP treatment stations are of the rapid aeration-flocculation-sedimentation type. The standard models developed ($10m^3$, $l5m^3$, $30m^3$) per hour cost around US$10,000, US$14,000, and US$25,000, respectively.

A model of batch stations was also developed for very small volumes. Slow filtration system was not used because of maintenance difficulties.

[45] *An increase of 2% per year in the population and an increase of 2% per year in consumption. Experience shows that the latter figure is 4% for the first systems installed. The percentage is based on three years of service.*

[46] *All technologies developed within the MIREP framework are available on CD, in French, English and Khmer from GRET, or from www.gret.org.*

Box 13 - Two methods of system design

Chambak and Smau Kney are two small towns 4 kilometers apart that have the same characteristics of urbanization, with a dense area consisting of about 300 houses. The investment by the private sector in order to cover the demand in Smau Kney is in the order of US$35,000, while the amount calculated for a project financed by international aid is US$220,000 for Chambak. The difference in cost is largely explained by the criteria selected for designing the piped water supply system:

System	Chambak	Smau Kney
Investment in the system	US$220,000	US$35,000
Financing	Public (through international aid) 90%, private entrepreneur 10%.	Private entrepreneur 70%, MIREP subsidy 30%.
Investment logic	Basis for sizing : 15 years	Basis for sizing : 10 years
Sizing	A standard of 60 lcd for production, 100 lcd for the distribution system	Based on average demand (about 35 lcd)
Coverage	Zone extending outside the center, for a total of 1,000 connections, minimal base of investment.	Only for the village (280 houses)
Level of service	Pressure of 4 meters of water height, over the entire coverage zone (surrounding area of about 3 km	Pressure of 4 meters of water height at the center (area of about 1 km)
Materials	Pumps, pipes and high quality imported meters	Materials of middling quality, purchased locally.
Water quality	National standards (close to WHO guidelines)	National standards (close to WHO guidelines)

Table 15 - Technical and financial information about the MIREP systems

Technical information	Data
Average investment cost per household connected (US$/HH)	US$150
Cost of connection	US$15 – US$18
Average pipe network size (km of the system)	4.65 km
Average water production capacity (in m3 / day)	150 – 300
Hours of service	12 / 24 hours
Pressure (height of water at the threshold of houses)	4 meters

The key to the MIREP program lies in the continuous support given to local stakeholders toward institutional, technical, and financial improvements. These local stakeholders, inexperienced for the most part, had to learn the methods and techniques in order to progress towards the creation of a public service utility.

The following chapter explains the changing process about the setting up of a water service, which assumed 1) growing participation by the local private sector, intensification of local investment in the form of a mobilization of fund son the part of existing entrepreneurs or outside entrepreneurs, and the improvement of performance techniques; 2) the drawing up of regulations for local service, an acceptance of responsibility on the part of local authorities to transform a marketing relationship between customers and the private sector into a regulated service; and 3) access for the population to the service with the correlating social benefits.

Chapter 3 – Transformations: the first project outcomes on the main stakeholders

Participation of the local private sector

MIREP program's main ambition was to enhance and formalize the participation of local entrepreneurs in the water supply sector through an increase of their own financial investment capacity, and an improvement of their technical competence. This process naturally started by involving the existing entrepreneurs, the ones who were already engaged in the construction and the management of small-scale informal water supply systems. Nevertheless, the MIREP program progressively started attracting outside investors, whose motives were essentially financial.

The financial and technical involvement of local entrepreneurs was verified: micro-entrepreneurs and local investors with no relevant background in the water business became good practitioners, certainly with limited theoretical knowledge, but hard-working enough to supply drinking water service to the population. One noteworthy motivating factor for these local investors is their belief in the social dimension of the water service. For example, this can be illustrated by their reluctance to raise fees, which was nonetheless a possibility under their contractual arrangements.

In average, the investment costs per project reached US$50,000, for sites of between 300 and 500 households, with an average cost of investment in the order of US$150/per household. This has restricted the local private sector to systems of modest size.

Local entrepreneurs

Existing entrepreneurs

The existing entrepreneurs were usually local traders and small businesspeople with a modest amount of capital available to them, but enough to finance the construction of a pond or a water tower. As they were responding to the local demand, they invested little by little, with family savings and self-financing, in order to respond in priority to the needs of their families and their neighbors, and then to a fraction of the community, or in some cases to the whole population of the small town.

These existing entrepreneurs usually have some knowledge of the place where they perform the water activity, and experienced a proximity to it which gave them a natural legitimacy as a service provider to the population[47]. Spontaneous entrepreneurs manage the water system by themselves, often with help from some members of their family.

[47] *This proximity can sometimes cause the entrepreneurs to exclude people or zones from their service, either for personal reasons or out of a fear of insolvency.*

Table 16 - Main characteristics of local private sector in the MIREP framework

Criteria	Potential
Typology	Existing entrepreneurs, involved in informal systems or local investors
Investment costs	Between US$25,000 and US$100,000
Service Coverage	Between 250 and 750 households
Geographical mobilization	Systems located in geographical proximity
Technical capacities	Low cost technology and practical learning.

Their financial capacities, including their own funds and their ability to mobilize family savings, or bank loans, are generally low, in the order of a few thousand US dollars.

Two key factors have enhanced the potential of existing entrepreneurs to transform their informal water supply service in a proper basic service:

- Their investment capacity, which can be estimated by their level of commercial and craft activities before the modernization of their systems.
- Their level of education and skill in the management of a local service or business (water or anything else).

The MIREP experience shows that only the existing entrepreneurs with a solid prior financial ability have managed to extend and upgrade their service in a satisfactory manner, and are now providing a good quality water supply service.

Existing entrepreneurs with limited investment capacity, even those with an acceptable level of competence, did not make it through the stages of selection.

New entrepreneurs

In some cases, the water supply system was implemented by new entrepreneurs. This was the case for "green-field projects" (where there was no pre-existing water system)and for some already equipped sites, whenever the technical or financial capacities of the existing entrepreneur seemed incompatible with the requirements associated with a functional and reliable system.

These new entrepreneurs had more financial resources available to them than existing entrepreneurs, and were interested in the prospect of a long-term activity. They operated by buying up existing systems or by responding to bids organized by the MIREP program. These investors usually brought in larger amounts of funds than the spontaneous entrepreneurs, and mobilized their funds in a more formal way relying sometimes on credit. For the most part they were natives of the target area, and their close ties to the region, as well as their family ties in the zone, assured them the benevolence of local authorities and the population. Their absence of prejudice towards the population allowed them to serve the whole population without discrimination. On the other hand, in the majority of cases, these new entrepreneurs delegated the technical management to employees, which caused problems in passing on information and continuity, owing to a large turnover among the employees, who were often badly paid.

Box 14 – Behavior of the entrepreneurs

The demonstrator, who, starting from a pragmatic base, sets out on the path to modernization by investing and by accepting formalization of the service. The MIREP entrepreneurs fall into this category.

The opportunist, who takes benefit from favorable situation, such as easy access to a water source, and his competences, in order to serve the local population. The opportunist's system is generally integrated into other activities linked to water, such as vehicle washing or an ice factory.

The profiteer, relatively rare, who essentially seeks rapid income from a population dependent on his/her services because of a lack of any other existing solutions. Heedless of the service and its duration, profiteers' fees are generally high, as are their profits, and support from politicians guarantees their immunity from pressure. They are often found in the families of former military members.

(Extract from the AFD study "Small Towns' Water Supply", 2005)

Their investment decisions were usually made with three strategies in mind:

- A strategy of long-term business diversification: water supply delivery is considered as a safe business and a growing industry in the small towns, compared to short term activities like trading.
- A strategy to secure personal wealth: infrastructure such as water facilities are considered better value compared to

savings accounts, which are poorly perceived48.

- The simplicity of system operation: water supply is seen as an activity that is relatively simple to start up in comparison with other more complex activities like food processing, and for which competition is rare in Cambodia.

Box 15 – Bidding process in Koh Thum Kah: privileging the outgoing provider.

In this commune, the local authorities wanted to organize a competitive bidding process, but one that granted an "advantage" to the existing entrepreneur, as well as giving some weight to local experience in the bidding criteria. In spite of this, the existing entrepreneur lost the bid, but this method, which seems fair and transparent while at the same time privileging the existing actors, is now in favor in the communes.

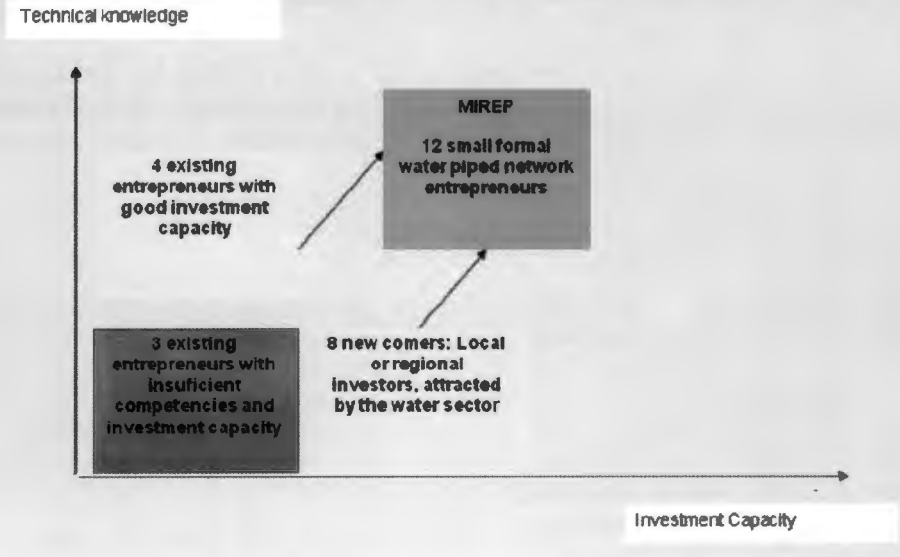
Box 16 –The case of Kbal Po's system, an entirely private contract, Mr Sok Touch, "local" investor

In Kbal Po, the investor works jointly with his wife, who manages the accounts. He has a good local reputation (management of a crafts business), and has been involved in village life for several years because of an irrigation system which he also manages. Mr. Sok Touch was in this particular case, selected because he was the only one able to invest in the system. He was therefore approached by the commune and asked to invest. Mr. Sok Touch used his local influence to organize the setting up of his water system. He approached the wealthiest families in order to assure his investment. These families (who are sometimes working for the investor) re-sell almost all the water to the poorest families.

Mr. Sok Touch is easily identified by the families, and maintains friendly relations with some. He is always present on the site. He speaks with interest of his work, claiming he hopes the setting up of the water supply system will contribute to raising the economy for the village and will favor its development. He is ready, at harvest time, to grant some leeway to the families that cannot pay immediately.

(Excerpt from the internship report of Boursin/Billard, IFU/GRET 2006)

Figure 11 - The Evolution of Knowledge and Capacity among the MIREP Entrepreneurs



[48] *In Cambodia, between 1996 and 2002, before and during the restructuring of the banking sector, three banks closed their doors after liquidating all the savings of their clients.*

Competition has opened up access to local investment

While the MIREP program was in first instance intended to give technical and financial assistance to existing entrepreneurs, the introduction of competition (through procurement based on water tariff and technical skill) allowed it to overcome both the lack of competence and investment capacity, as well as the unequal geographical distribution of investment from the informal local private sector: indeed some small towns could have three informal water supply systems, whereas there were none in neighboring villages. Competition introduced entrepreneurs with a limited local basis who were willing and able to invest, but could not have gained access to the sector because of a lack of organization.

Thus, two thirds of MIREP entrepreneurs are in fact new entrepreneurs.

MIREP has therefore adapted its policies to the two different profiles encountered: (1) providing existing entrepreneurs with technical and financial assistance, intended to upgrade the existing system; and (2) providing "ready to build" projects for new entrepreneurs.

Table 17- Technical assistance to the existing entrepreneurs and new entrepreneurs

	Existing local entrepreneurs	New entrepreneurs (local or regional investors)
Involvement	Adaptation of an existing system to the requirement of formalizing.	Bidding to replace an incompetent local entrepreneur or to construct a new system.
Process of improvement	Progressive evolution in the level of investment and technical expertise.	Mobilization of investment and competencies.
MIREP technical assistance	Technical assistance for transforming the existing system, as well as financial support.	A "ready to build" project along with adequate technical assistance.

Local private investment

The program strategy, consisting of promoting appropriate and affordable technologies has resulted in a reduction of average investment costs to US$150 US per household[49]. Sixty-six percent of these investment costs of were financed by the entrepreneurs, either with their own funds or by relying on credit. The financial contribution of the public sector has been limited, which is due to the lack of public funds[50] and land. Subsidies account for 31% of the investments costs, which at the end yields a "leverage effect" ratio of about 2/1 (twice as much money mobilized than from the subsidies).

Table 18- Financial information about the MIREP systems[51]

Financial Data	Values
Total investments costs	US$ 620,000
Average investments costs per system	US$ 44,000
Investments financed through private equity	57%
Investments financed through credit	9%
Investments financed by public funds (province, commune)	3%
Subsidy	31%

The conditions for building-up confidence

The total amount of private investment mobilized during the MIREP program, both for new systems and for existing systems, is very revealing. Indeed, the investment supplied by local entrepreneurs represents ten times the amount existing before MIREP program started. In the four existing systems, the investment was quadrupled.

The amount invested in systems installed by new entrepreneurs makes up almost two-thirds of the total investment mobilized. This performance indicates that the technical assistance and the

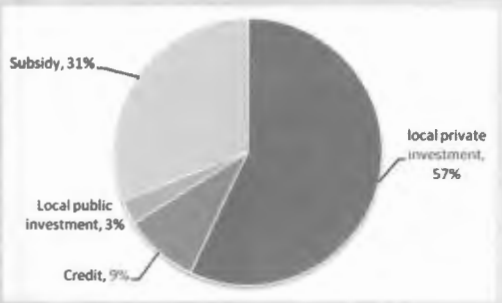
[49] *In comparison, the amount paid for projects financed by the World Bank in the provinces of Bantey Meanchey, Svay Rieng and Prey Veng comes to US$360 on average for each household connected.*

[50] *MIREP includes only two projects where the commune and the province made an investment, within the framework of a rental contract (Phnom Den) and leasing (Prey Pkhoam).*

[51] *Beyond the connection cost for consumers.*

continuous support allow building-up confidence among local investors in the water sector, since they invested relatively high amounts while they had no prior experience in this type of service.

Figure 12 –Investment breakdown of MIREP water utilities

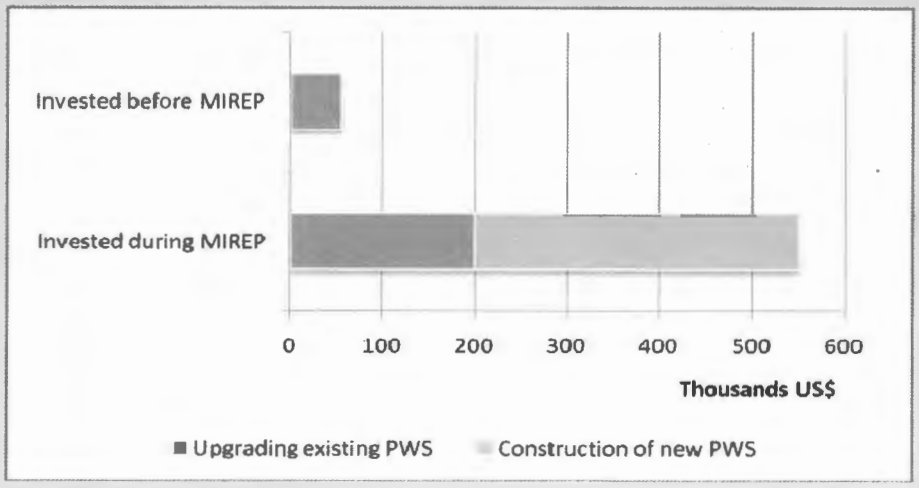


The analysis of the incentive factors that may explain this mobilization of funds is complex, but what comes out from discussions with the entrepreneurs is that their confidence is based on four factors:

- Confidence in the financial procedure. The entrepreneurs have perceived the subsidy as a way to share risk, and at the same time, as a reduction of their financial burden.
- Confidence in the technical assistance, with the certainty of obtaining technical answers about the design, construction and operation of the system.
- Confidence in the institutional guarantees (medium to long term contracts and monopoly).
- Confidence in the process of public-private mediation supported by the MIREP team.

Less tangible, but not unrelated to this mobilization is the official recognition of the role played by the private sector toward the delivery of the water service. Formerly on the margins, criticized for high fees and subject to administrative red tape, the entrepreneurs managed to find recognition for their activities, became aware of their social role and reacted with increasing participation.

Figure 13 - The level of private investment mobilized by local entrepreneurs

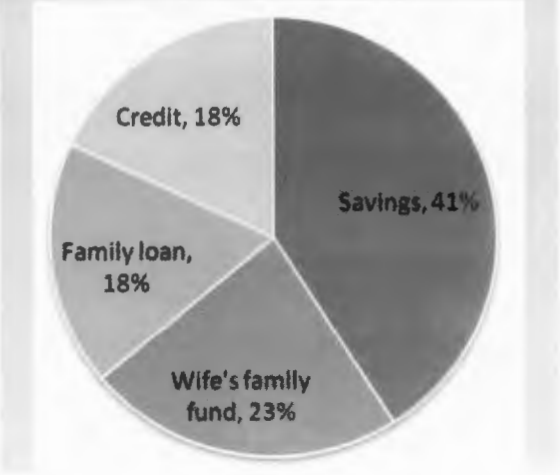


Sources of financing that are largely informal

Capital utilized by local entrepreneurs came essentially from personal sources (savings and self-financing), from family money or from close friends who were often assimilated into the family. Family money does not have remuneration as its objective. Co-financing agreements were made essentially on the basis of mutual trust. Indeed, with the framework of MIREP, only one entrepreneur set up a financing structure on a formal entrepreneurial basis (SARL), while all the others worked on an informal basis.

The graph below shows the financing structure of the US$107,000 invested by Mr. Kol Boal of Tram Knar in Takeo Province. In addition to his personal savings, he mobilized funding from his wife's family (which came from an ice factory belonging to his mother-in-law), a loan from an adopted brother, and also obtained credit—with this latter being the only money for which he paid interest—from the commercial bank involved in the MIREP project.

Figure 14 - The nature of system financing for the tram knar system



The use of credit limited by guarantees

The use of MIREP credit scheme to finance the investments has remained relatively limited, reaching only 9% of the total funding of the MIREP systems. This can be explained by the fact that the credit conditions are not yet optimal, considering the average internal rate of return on a water business (7% to 10% per year maximum). However, the greatest impediment to accessing credit comes from the guarantees required by the banks as security for loans. These guarantees essentially compensate for the inability of banks to correctly evaluate the financial feasibility of the projects (due to a lack of experience, qualified personnel and predecessors in the domain of water services), and the weakness of legal means of recovery in the case of failure of investors, which obliges the banks to seek recourse in the local judicial system, whose procedures are long and well known for their lack of transparency. The phenomenon of real estate guarantees is even more excessive in rural areas, where there is no formal property market , which drives the banks to underestimate the value of property offered as a guarantee (see text box).

The improvement of the guarantee system for loan, training of bankers, the improvement of legal procedures for recovering money in case of failure, and the possibility of pledging support for the water delivery systems are all means by which access to credit would be enhanced.

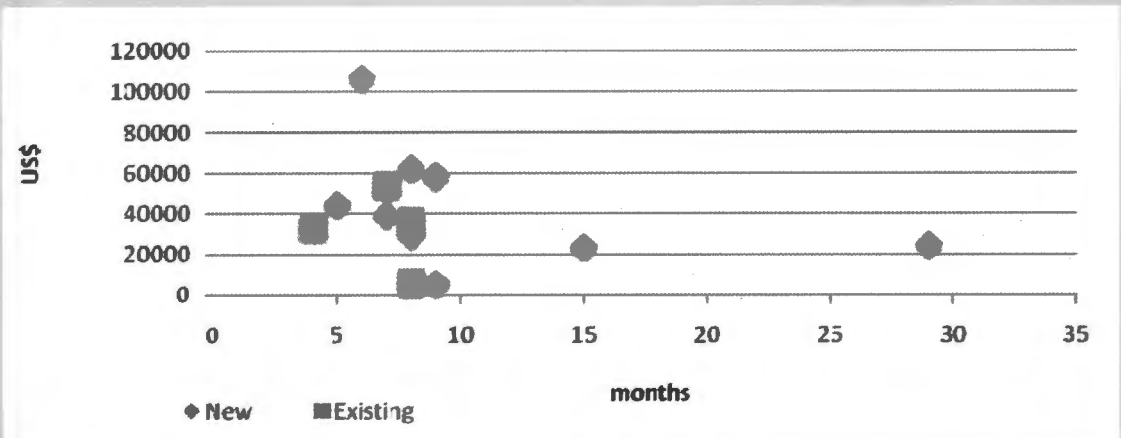
Box 16 - The problem of guarantees

To cover a bank loan, Mr. K. owned a house whose value he estimated at US$40,000, since it was located at the roadside, and offered the possibility of setting up several boutiques. However, the bank he asked for a loan of US$10,000 estimated his house at a value of US$5,000, taking into account only the construction value of the house. To assure the bank of his good faith, Mr. K. put his house up for sale and found a buyer at US$40,000 who signed a sale commitment which Mr. K. presented to his bank. The bank finally agreed to give him the loan of US$10,000, which is nonetheless four times less than the value of the real estate offered as a guarantee. The bank argues that real estate in rural zones is not a sure investment, or a clear market, and that property titles in rural zones are not always genuine.

Moderate investment but with rapid mobilization

The average investment cost of the MIREP water systems is very moderate (US$33,000 on the average for existing entrepreneurs and US$45,000 for new entrepreneurs), but the mobilization of the funding is quick, in 9 months on average from signing the contract to the beginning of operations. While the investments are performed progressively among the existing entrepreneurs, since they use the cash flow generated by their systems, it is generally faster for the new entrepreneurs, who invest when they have sufficient savings. The table below shows the duration and levels of investment per system. The faster start-up of operations can be explained by the fact that part of the investment mobilization has been conducted before signing the contract.

Figure 15- Investment and length of the start-up of operations for MIREP systems



Extensions and upgrading

Investment to extend the network or to upgrade the system was a contractual obligation for any of the MIREP entrepreneurs. Thus, during periods of drought, two entrepreneurs decided to drill additional boreholes in order to ensure sufficient quantity of water to the users. In contrast, some entrepreneurs have still not carried out all of the short-term extensions works called for in their contracts. Besides the unequal nature of local regulation of this issue, the features of the contracts themselves has the following implication: the Divestiture/BOO contractual arrangements seem to encourage investments, since for this type of contract the entrepreneurs know that they will be able to recover their investment at the end of the contract period when they will sell their infrastructures. On the other hand, the entrepreneurs who are engaged in concession arrangement (without compensation at the end of the contract period) will probably limit their investment[52]. Leasing and affermage contractual arrangements do not include private sector extension clauses, since the investments are financed by public institutions. To get around this, one affermage-system manager negotiated with the local authorities to obtain a reduction of his rental fees in exchange for an extension of the system.

The example below shows how a MIREP entrepreneur, Mr. Srey Sokhom in Smau Kney, has been progressively investing in the water system for 10 years. The largest advance, in 2002, corresponds to the signing of the contract, at which time he invested in a new pond and a water tower, and also financed half of the water system. In 2005, he extended the available resources by digging two boreholes to cover the water needs during the dry season. In fact, a third of the total investment was supplied at the time the contract came into force, half of which was used for the extension of the system, and the other half for the extension of the resource.

Box 17 - The three investment phases

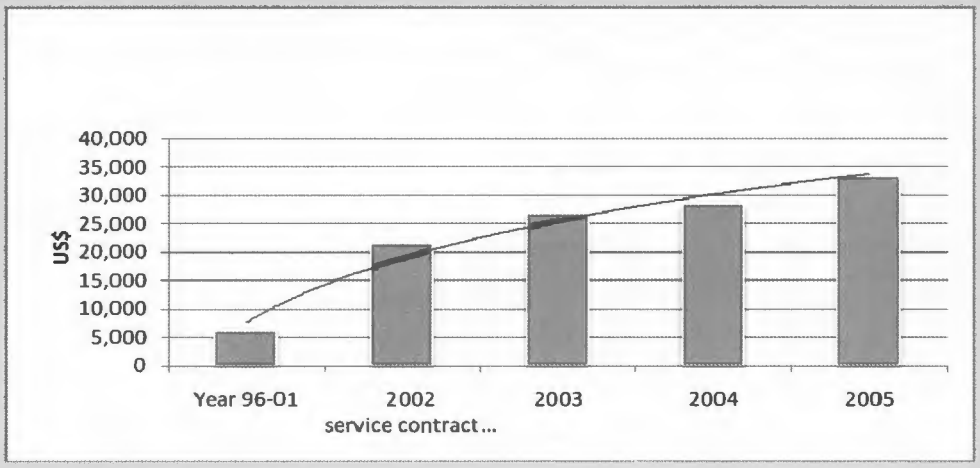
The informal phase: this phase in investment, in the existing systems, involves very small amounts and an elementary level of service.

The formalization phase: with the drawing up of a contract, the entrepreneurs understand that they are under obligation to upgrade or set up new installations, which encourages them to appeal to outside financing sources, notably bank credit.

The expansion phase: after the signature of the contract: the entrepreneurs invest little by little, on a self-financing basis, to adapt their water production installations and extend their systems according to demand, or because the contracts require them to do it.

[52] *This is, incidentally, the reason why the contracts that GRET is now developing in Laos include clauses of compensation for investments made during the course of the contract.*

Figure 16- Total investment curve for the Smau Kney system



Business expansion in various rural infrastructures

Although the MIREP water systems were developed one by one in order to support the principle of "local" management, in the course of program we have also observed some cases of entrepreneurs conducting several water investments. This "expansion phenomenon" can also be seen with other basic service activities, such as electricity. Indeed investing in different basic services allows for economies of scope and is one way for the entrepreneur to adjust the seasonal income from water sales.

This "expansion phenomenon" is happening for the most part in neighboring areas, allowing for economies of scale, especially in monitoring activities, the collection of water fees and negotiation with local authorities. By mid-2006, the 12 MIREP entrepreneurs accounted for a total of 20 investments in rural infrastructures, comprising of 14 water supply systems supported by MIREP, 2 water supply systems being not supported by MIREP program, 3 electric systems and 1 irrigation system. Together, the investments totaled approximately US$1 million.

On the other hand, it is unlikely that these entrepreneurs will be interested in business expansion on a national scale, as it would require them to move to a higher threshold of financing, technical and management capacities. Cambodia has only one such example: the local entrepreneur, Mr. Tith Voeun, who, with the financial help of a Singaporean company, manages the largest water supply company in Cambodia.

Box 18 - The water-electricity duality

This is an interesting option for local entrepreneurs who manage basic services, since it engenders economies of scale, especially for the management of customers. From the energy point of view, the water treatment station can function during the hours that the system is running, without necessitating the use of a specific generator.

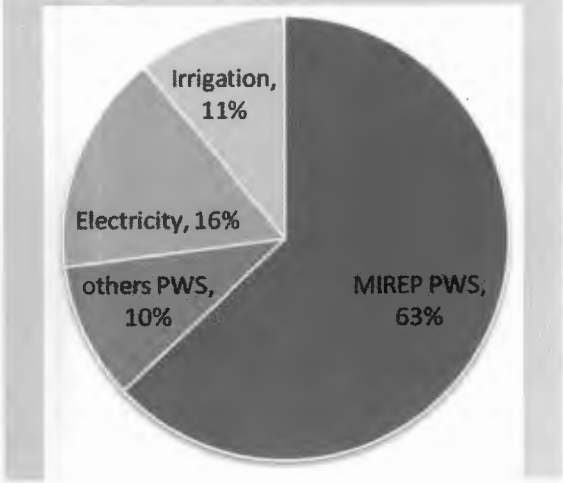
Learning-by-doing professionalization process

Technical know-how: a good practical level

Generally, local entrepreneurs have learned rapidly the techniques introduced by the program to treat raw water, to store and supply it through piped networks and water connections. Today they supply very acceptable quality water as 80% of the quarterly inspections report good results. The table below shows the level of water quality performance reached by the entrepreneurs: an average rate of pH compliance of 98% (pH ranging within the standards, between 6.6 and 8.2), and an average rate of turbidity compliance of 80% (turbidity lower than 5 NTU[53]).

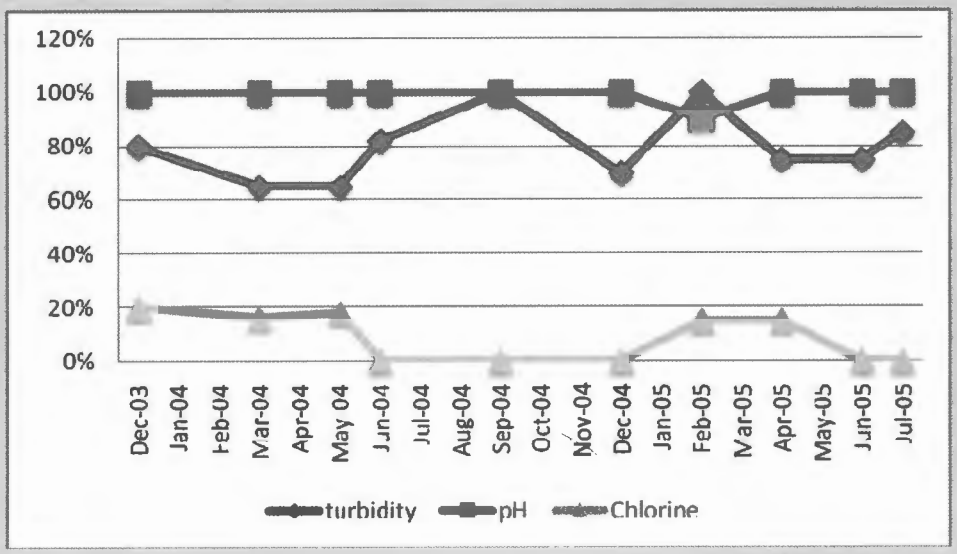
[53] *Nephelometric Turbidity Units*

Figure 17- The water-electricity duality



There have been, however, poor results in relation to residual chlorine —with only 20% of compliance, with chlorine level of 0.1 mg/l). We remind that chlorine is used to disinfect the water and protect it against pollution inside the networks. The low level of success obtained with the chlorine parameter is due not to technical failure but to the rejection of the treated water by the consumer due to the taste of chlorine .This forces the entrepreneurs to limit the amount of chlorine or to increase it progressively so that customers will get used to the taste.

Figure 18 - Results of water quality tests



The levels of service continuity are good, even if numerous systems close at night in order to avoid pirating on the meters (see text box below). Technical losses are held in check (less than 10% on the totality of the sites) and leaks are, in general, rapidly located and repaired.

Entrepreneurs who manage their systems themselves show, in general, a higher level of performance than the local employees or staff to whom this task is delegated. Indeed, in the great majority of cases, employees are hired within the wider family circle[54], without consideration of qualifications and competency. These employees are often ill-paid, unmotivated and frequently replaced. Rural employees often return home during busy periods for agricultural work, temporarily leaving management to an inexperienced person. The idea that the entrepreneurs would impart their knowledge to their employees is erroneous, for some prefer to leave their employees in a state of ignorance in order to keep the control of the system, especially over financial matters. Conversely, the competence of close family members, especially children, who have often gone farther in school than their parents, can sometimes be beneficial, particularly regarding the theoretical aspects of the basics of water treatment technologies.

Wives are usually in charge of the commercial and financial management, carrying out the collection of water bills at the end of the month, not only because this is an unpleasant task, but also because women generally take care of household financial management, which can cause difficulties related to formalizing the management of the water systems, since the domestic and professional budgets are mixed together.

Box 19 - High starting flows in meters

The volumetric meters made in Thailand and China are known to start metering at higher flow rates than better quality meters The meter can allow a small flow to pass through without it being accounted for. Thus, certain customers let their tap leak slowly into a receptacle overnight in order to collect a few dozen liters for free.

Table 19 - Differences in levels of competence of system managers

System managed by :	Advantages	Disadvantages
The entrepreneurs themselves	The entrepreneurs are in direct contact with their clientele; they are quick to set up techniques that will improve service.	They are often busy with other tasks, and the water system, for them, is of secondary importance, something they do in their free time.
Employees	Professionalizing these salary workers, who are dedicated to their jobs, could definitely be an advantage.	Badly-paid salary workers or those recruited from the agricultural sector account for a considerable turnover.

[54] *A common practice in Asia, especially because of concerns over trust and confidence.*

Generally, the improvement of technical knowledge among the entrepreneurs has remained limited. Rare are those who can understand the theoretical aspects of the water treatment process or the design of the facilities. In a situation where new technologies are being used, and without alternatives for education, the local entrepreneurs have had to rely on the MIREP engineers. Nevertheless, with experience, some of them have brought about sensible changes to their systems, or have invented simple techniques for maintenance.

In addition, the low level of income brought by the water business does not allow the entrepreneurs to hire sufficiently qualified personnel, such as technicians graduated from the Institute of Technology of Cambodia[55]. Therefore, placing in common the financial means intended for the payment of outside experts, is the only way for these entrepreneurs to have access to continuous technical support. The MIREP entrepreneurs are in the process of creating an association for this purpose, which will allow them to continue meetings to exchange information among themselves.

Financial management

The variability of income

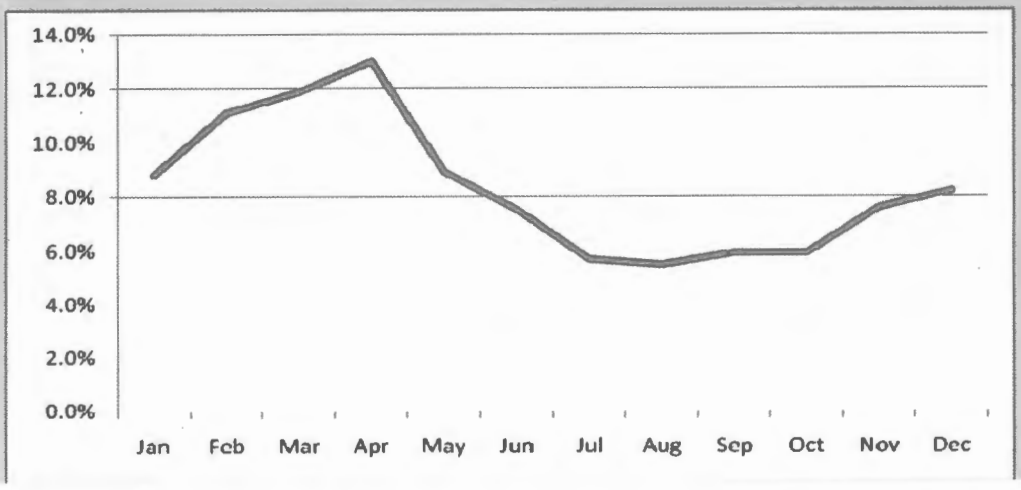
Yearly turnovers vary between US$5,000 US and US$20,000, depending upon the site. These sales progress according to connection curves and average consumption (about 4% per year), but are strongly affected by the season. In the monsoon season, the level of sales is at its lowest, because people prefer to use rainwater collected in jars. In the dry season there is a peak in sales during the month of April, the driest month of the year (just before the start of the rainy season), and also the month of traditional festivities, when people generally consume more water. To reduce this seasonal effect, entrepreneurs in some sites have begun to introduce payment of a minimal billing for 1 or 2 m^3 of water, which allows them to assure a minimum income during this period[56].

Lower margins, lengthening returns on investment

The MIREP systems are generally profitable, their revenues covering all costs, including capital costs (depreciation of the facilities financed through subsidies to the commune is done through an annual tax of 2% on the subsidized amount).

Staff is limited to one or two full-time employees per system (on average one employee for every 200 connections). Consumables and depreciation are the entrepreneurs' main expenses. The rate of water bill collection is excellent, in the order of 99%.

Figure 19 - Variability of water sales throughout the year (Pech Changva 2004)



[55] *The Technology Institute of Cambodia (ITC) is the principal and most important post-secondary technology institution in Cambodia for the education of technicians and engineers. This institution does not have a department specializing in water concerns, but only a department of rural engineering, which teaches, among other specializations, a background in water specialization.*

[56] *This minimal billing is considered preferable to the population than a subscription, since it involves a tangible (and lower) payment.*

The analysis of six MIREP systems that have been active for 3 years shows a period of return on investment in the order of 10 to 12 years, which is not as good as the 7 to 10 years envisaged at the start of the program. Indeed, the construction or improvement of the systems has resulted in somewhat higher investment, and also a higher operation costs related to the water treatment process (for energy and chemicals) which should have been compensated for by an increase in the volumes water sold, but that has not been the case, owing to increase in the cost of fuel.

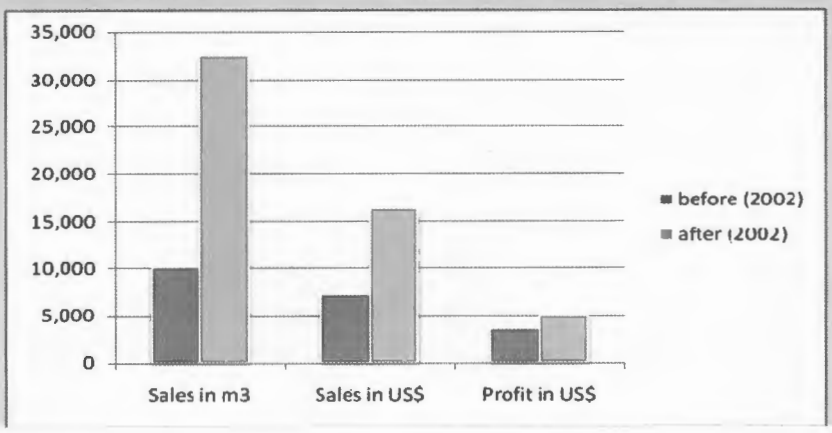
The graph below reflects the situation at Tram Knar, where, although sales have tripled since the system was upgraded (from 10,000 m^3 in 2002 to 32,500 m^3 in 2005), profits have increased by only 40%, from US$3,600 to US$5,000 per year. This situation is no doubt temporary, since the end of loan repayment will allow Mr. Kol Boal to make an acceptable profit.

At Tram Knar, as at most of the systems, the reduction of profit is due to the rise in cost of consumables, alum (aluminum sulfate), chlorine and lime, which are used to treat the water. On the other hand, despite the increase in investment in this system (from US$18,000 to US$107,000), the part of the depreciation in the tariff remains about the same.

Table 20 - Financial Data for the First 6 Years of the MIREP Systems

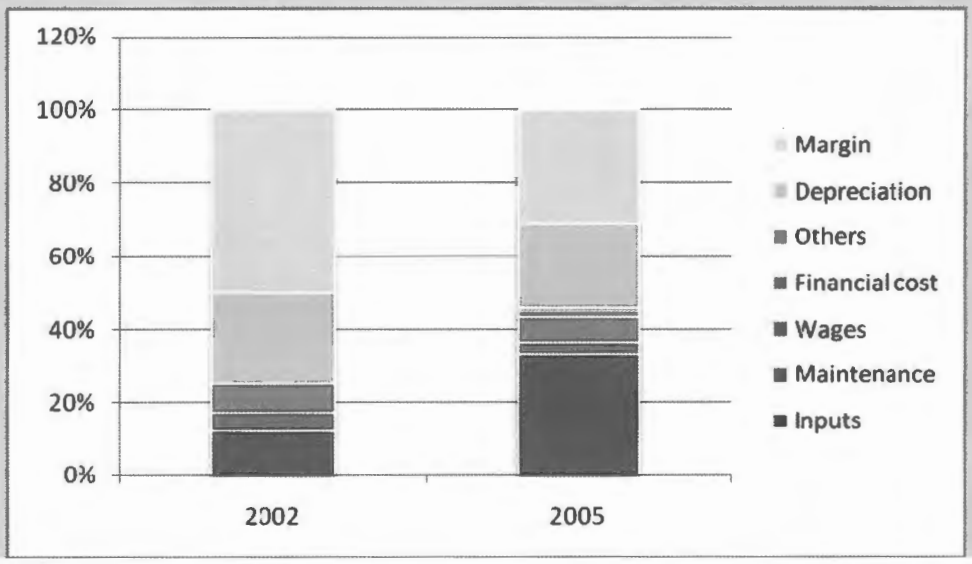
Network location	Profit 2005 / Sales 2005	Profit 2005 / Investment	Estimated return time over investment (years)
Smau Kney	35%	11.5%	6.40
Tram Knar	30.8%	5.4%	12.33
Pech Changva	30.3%	6.8%	13.50
Romeign	21.1%	6,6%	9.44
Phnom Den	8.8%	7.7%	8.53
Lumchang[57]	-29.8%	-2.2%	56.2

Figure 20 - The Evolution of Sales and Profits at the Tram Knar System



[57] *The system at Lumchang has been especially badly managed ever since its launch in February 2003. The owner of the system has handed over its management to employees who have no background in this kind of work and who are poorly paid and not sufficiently included in the system.*

Figure 21 - The evolution of costs before and after the formalization of the Tram Knar system



Fees: reluctance among the entrepreneurs

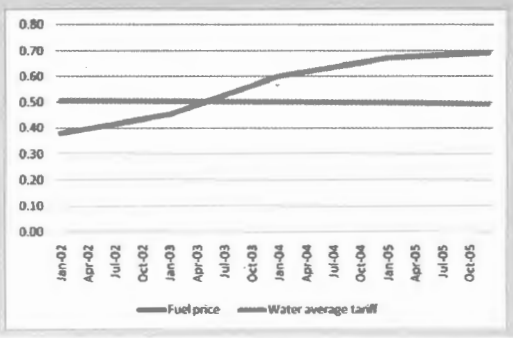
Despite the rise in the price of fuel, only 3 entrepreneurs out of 12 asked for water tariff increases. Among the three, two had below-average tariff (1,650 riels[58]/m^3 instead of the average 2,000 riels/m^3). The third, Lumchang, raised the price of water from 2,000 to 2,500 riels/m^3, in order to compensate for recurring bad management.

When asked about this behavior, the other entrepreneurs replied that it is difficult for them to raise the water tariff above the psychological threshold of 2,000 riels (US$0.5/$m^3$). They are fully aware of the difficulties their customers face and fear their complaints. They therefore prefer to temporarily accept a lower profit, partly compensated by increasing the output of their treatment facilities, and to look for new markets, such as the sale of water to other villages. The table below shows the variation in the price of fuel in relation to average water tariff in the MIREP systems. The tariff decrease during this period is due to two factors: the depreciation of the riel against the dollar; and the start-up of systems whose tariffs result from the bidding process, are less than 2,000 riels/m^3.

The monopoly and the periphery

Because Cambodia has only recently adopted a market economy, monopoly as a concept has often been misinterpreted. Local authorities had difficulty accepting the rationale for restricting the market, especially in a sector as vital as water supply. The argument advanced most often to convince them of its benefits was that "setting up two systems in the same area is a waste of public money", even though this argument was refuted by the fact that private financing was sought.

Figure 22 - The evolution of water fees in relation to the price of fuel



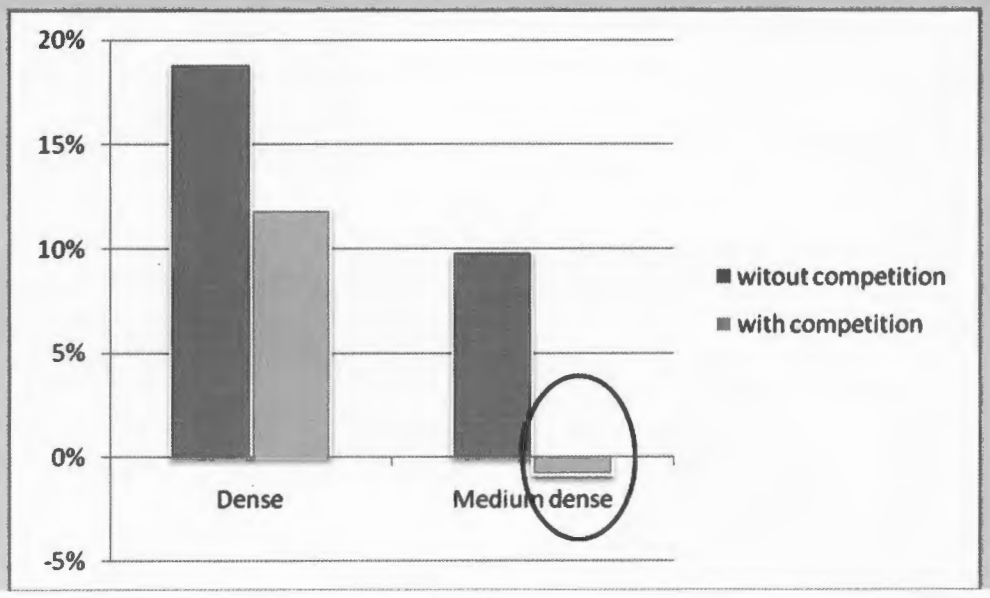
Nevertheless, analyzing the functioning of small entrepreneurs showed that the absence of monopoly, far from favoring the market, limited its expansion in peripheral zones, where the poorest families are living. The following is a revealing example of this problem:

[58] *The riel is the currency in Cambodia. At the time of the project, US$1 was equal to 4,000 riels.*

Box 20 - Smau Kney: Mr Sokhom

Since 2002, Mr. Sokhom has held a contract for water supply to the Smau Kney zone. Shortly after its installation, another informal competing entrepreneur, Mr. M.[1], set up a mini-system of untreated water in the central area of the small town (the most profitable area with the highest levels of water consumption). With an investment limited to a few pipes pumping water without treatment from a natural pond, with no guarantee of a steady supply (the pond is empty in the middle of the dry season), and with no legal obligations, Mr. M. sells water at half Mr. Sokhom's price, and has managed to take away 30% of his market. Because of his loss of volume, Mr. Sokhom's production costs went up from US$0.38/m^3 to US$0.42/m^3, and his profit margin fell by 10% and became negative in the peripheral zones where the supply costs are higher (fewer customers and longer distances). Mr. Sokhom thus had no further interest in serving the zones where he was losing money.

Figure 23- Gross margin by service zones in Smau Kney



Local public-private relationship

Although the participation of the private sector in small-scale water supply services has developed relatively well within a context of undeveloped institutions, the absence of a sound regulatory framework has generated unequal conditions of service access and coverage, and has limited the mobilization of local private sector to nearby locations.

What is at stake in the contractualization of the local private sector

In rural areas of Cambodia, private investment for local infrastructures development is mainly focused in two key sectors; water and electricity. In the water supply sector, the most realistic number for the systems operated informally by existing entrepreneurs is 300. These systems would serve, on average, 200 households, so to say a total population of 300,000 inhabitants. This number could increase significantly if the institutional context was more favorable.

A tool for local development

Since the first commune elections in 2002, the pressure brought to bear on the commune councils by voters in favor of quality infrastructure[59] has pushed commune heads to look for additional funding to compensate for the limited amount of state allocations for investment. Local contributions and contractualization in the private sector has therefore become a key for elected officials to fulfill campaign promises.

Thus, a growing number of communes are currently trying to convince the private sector to invest in local basic services . However, in the absence of modalities of local contractualization, as in the case of the irrigation system in Kbal Po shown here, the arrangements are mostly passed on on an informal basis without any guarantee of the quality of the service provided, and protection for the private party's investment. This situation results in high tariffs for the users (through the tariff consumers are actually financing the lack of performance and the risk taken by the entrepreneurs) as well as poor quality of service and possible discouragement on both sides.

Box 21 - The irrigation system of Kbal Po

Following the commune elections in 2002, the head of the Kbal Po commune had promised to repair the irrigation system. Since the services of the State refused, he convinced a local entrepreneur to invest in the repair of the system. Solely with the guarantee of a list of signatures (fingerprints), Mr. T. invested more than US$100,000.

After 3 years, and repeated requests for formal authorization from the central services with no response, Mr. T. currently has no official recognition and is growing progressively discouraged. Faced with this situation, the province undertook the process of legalization for Mr. T.'s investment at the provincial level.

The provincial public authorities: an opportunity for emancipation

While the public authorities at central level consider the participation of the local private sector as difficult to plan and regulate, and show limited interest for projects involving low amounts of investment (especially when compared to large-scale international aid projects), the provincial authorities are more interested in the participation of the local private sector. In Cambodia, the provincial rural development committees enjoy a certain autonomy, and have proven their ability to partner with the local private parties who are often ill disposed to dealing with the central institutions and its unilateral practices—the licensing system. They are also well suited to regulate privately-managed basic services, because they have technical capacities (the technical departments); they have local mediation resources (through the department of support to the communes); and they have authority (police forces). Along with the mastery of local private sector participation, the provinces also get the possibility of freeing themselves from their dependence on central budgets and procedures. This may explain the large involvement of the provincial authorities in the MIREP project. This willingness to play an active role in favor of the participation of the private sector for infrastructure development is part of the policy of ongoing deconcentration process in Cambodia.

[59] *At the time of the last legislative elections in 2004, the importance of infrastructure for the rural vote was emphasized.*

The importance of roles in the regulation of the local private sector

The genesis of regulation of the private sector

The first private-public partnerships, set up at the end of the 1990s with the first water systems , were established unilaterally, taking the form of local authorizations by heads of districts or heads of communes, and were not monitored, but they assured the administrative legitimacy of the private sector in its role as supplier.

Contractual building

MIREP is the first project to have introduced a bilateral contractual arrangement between the private and public sectors. Within this contractual framework both parties play a role in providing the service. The coverage area, the location of the pipes, the water tariffs, the conditions of connection and the duration of the contracts have all been discussed and negotiated (this could take several months) before validating the contracts. This negotiation process, which involves the customers, contributes to build legitimacy to the arrangement, and in general establishes the future relationships between the private sector and the customers. Neglecting this process, whether intentionally or not, can generate tensions as the adjacent example shows.

The support provided by the province to the communes has contributed to balancing the private-public relationship, in which the commune council members were previously at a disadvantage, with private parties exercising their financial superiority over the local elected officials. The legitimacy of the electoral process, and the poor material resources with which the commune councils function did not allow them to intervene and attempt to balance the relationship.

Box 22 - The absence of local legitimacy in an electricity service

In the village of T., an entrepreneur obtained legal authorization from the capital to set up an electricity grid. The population was not consulted in the choice of the entrepreneur, who now has numerous payment concerns, even though people who do not pay for a service are very rare in Cambodia.

Regulation: the persistence of the merchant spirit

The purpose of the contractual building process is to lift the water supply systems out of the "merchant goods" category and to give them the status of a public utility. Although subsidies have helped bring about this transformation, the effective enforcement of the contractual obligations, from both the private and the public points of view, are the real condition for the success of the transformation. While the private sector has adopted the ideas of public utility and the social dimension of water (provision of drinkable water, the extension of systems, keeping the tariff low), there is difficulty of the part of the customers to bring about this change.

For customers, the installation of water supply systems means progress in terms of service quality. With improved quality and the extension of the coverage area, the water tariffs have remained the same, or are even less than those of the former suppliers. But most customers do not associate this improvement with a takeover of services by the public sector. Surveys show that they are not aware of, or doubt the role of the public sector in the improvement and regulation of service. Their relationship with the private sector is based on a merchant logic. Thus, in the case of a change in connection fees or in the water tariffs, or a technical problem, they do not consider it useful or legitimate to turn to the public powers. The example of the water standpipes can illustrate it: Even though posters were put up announcing the water tariff, none of the customers relying on standpipes submitted a request to the commune to ask the entrepreneur to respect the tariffs.

Customers' committees and the customers elected to represent the users during project implementation often have limited effectiveness in the regulation process. Indeed, the customers who have a direct relationship with a local entrepreneur do not feel it useful to refer to the committees. Moreover, written contracts signed between communes and private parties are not considered by the customers as a regulatory tool, and do not attach much importance to them. In cases where the terms of the contract are clearly not being enforced, such as an increase in the water tariffs or connection without prior discussion, customers' recriminations remain personal and discreet, due to a mixture of fear and reserve; a frequent attitude toward entrepreneurs by ordinary Cambodians, who may feel that relative wealth, supersedes merit.

Box 23 - The customers: an attitude of avoidance

In the three localities studied, Koh Thum Ka, Tram Knar, and Kbal Po, we noted similar ways of avoiding conflict and an unwillingness to communicate on the part of the villagers.

Indeed, even if a family is questioned about the following ...:

- the reasons for a decision taken by the authorities (cf KTK: obligatory payment by cubic meter of water)
- a lack of coherence in information given out during the meetings (cf. KTK: higher fees per jar than those for a cubic meter)
- doubts about the practices of operators which make them skeptical about using a water system with confidence (cf. Kbal Po: the water system allegedly passed through a canal covered with filth)
- they are regretful and feel penalized if clauses specified both orally and in writing are not applied (cf. KTK and Kbal Po : the possibility of credit for connection allowed for in the contract was not subsidized by the operators)

... they never take steps to get the information, or even complain when they have the full right to do so. So much so that families "put up with" the system and do not turn against it even when it seems ill-adapted or incoherent. If, as is often the case, the responsibilities of each person are extremely vague or inexistent, the villagers nonetheless do recognize the local authorities: the heads of the village and commune.

(The inhabitants of KTK who were asked all voted in the municipal elections, even if they don't know the role of the commune. Yet, the mere asking of a question is already felt to be a source of bother and possibly of reprimands: that is why they practice self-censorship.)

(Excerpt from the internship report by Boursin/Billard, IFU/GRET 2006)

Difficulties in the participation of communes

Setting up the water supply systems has yielded a variety of participation from the communes. The level of commune participation is often linked to the personal involvement of the commune head, since the role of the elected commune councils in making decisions is still very weak. While the participation of elected officials and village heads (who officially depend upon the communes) has been acceptable with respect to the definition of service and the selection of the investors, it has also considerably diminished when the water system begins to supply the service. Day-to-day regulation, involving inevitable conflicts and problems, collides with the lack of conviction and institutional legitimacy of the elected officials of the communes (there has been no official decentralization of regulation of the water sector). There are management difficulties inherent to the Cambodian society and traditional practices of pandering request from public authorities (some commune chiefs receive an income for condoning their arrangement or they may ask for compensation[60]). In the water supply sector, the lack of clarity of roles between the central and decentralized levels does not facilitate responsibility to be taken locally.

Indeed, relationships with the managers of the systems do not differ much from those of other private entrepreneurs, and many elected officials do not feel that it is within their power to intervene in the service. Thus, while contracts call for the possibility of elected officials to visit the installations regularly, and encourage them to supervise water quality themselves, this has not been accomplished.

In this context, the minor decisions which might solve something at the commune level are avoided, and any issue of greater importance calls for intervention at the provincial level. The private sector complains of a lack of interest on the part of the commune heads in the regulation of service when economic and legal issues arise, and they turn instead to the provincial authorities. The customers dislike the behavior of the commune authorities, who send them back to the service provider or defer to the province if there is a decision to be made.

Reasons for hope

As the MIREP program has progressed and grown, commune participation has increased and improved, since there is now a better understanding of commune functioning, but also a

[60] *One commune leader even declared that he wanted several cases of beer before accepting a meeting with a private entrepreneur.*

realization of the responsibilities of the decentralized powers.

Financial participation has been the most influential factor in involving commune councils in the projects. Some communes have provided either land or funds, and have been managing the subsidy funds with assistance from the provincial level. In Prey Pkhoam, the last site equipped by MIREP program, the commune injected all of its annual investment funds into the project. Some communes in Kandal Province have also expressed a desire to use their funds for setting up water systems.

The importance of the commune councils in attracting the private sector is undeniable. While the MIREP program began with the existing, spontaneous private entrepreneurs, opening up to other investors provided an occasion for commune involvement that would inform and seek out potential investors through discussion with the villagers. The great majority of new entrepreneurs learned about the projects through their local neighbors.

In certain communes, we witnessed replication of the contractual arrangement with the private sector. Although, often rather basic contracts were used, this testifies to the understanding of the mechanisms of contractualization in the private sector. Some communes, with the support of provincial committees, have begun to manage small water pumping plants for irrigation.

Evolution at the central level

While the model for local contracting has developed enthusiasm at the local level, the direct regulation of all the systems, in the form of national licensing, as in the electricity sector is envisaged. This would put an end to the MIREP experiment, and besides the factor of concealment dissimulation of local private parties (who would undoubtedly seek to dodge this obligation), it would cause a withdrawal of the local public authorities from the appealing of the private sector, a delay in the expansion and regulation of water supply services, and a longer path toward the objectives of the Millennium Development Goals, which foresee a reduction by half of the number of people without access to potable water by 2015.

The intervention of the central level is nonetheless indispensable, in order to define the contractual framework and the modalities of service (water quality, fees, etc.), but it should conceive a role for itself in selecting and setting up the progressive delegation of the governance of the private sector at local levels.

This would involve differentiating between small water service systems, whose service is complementary to the existing rural solutions in zones of modest means, and the systems whose exclusivity and size justify more complex and better supervised regulation.

The transfer of responsibility to the communes and provinces must be accompanied by an improved contractual framework, with technical and institutional support from the regional authorities, such as the provincial development committees.

Users and the water utility

Surveys conducted prior to the installation of the water supply systems confirmed that convenience of the service was the first reason given for connection. Further surveys in the villages are consistent with this initial motivation, since it is the practical nature of the system that is the prime reason for satisfaction, with hygienic criteria coming in second.

Access to service

The average connection rate to the MIREP systems is currently 61% if we take into account the number of households connected compared to the total number of households within the small towns[61]. The performance of the connection rates are generally linked to the following three main factors: the presence of alternative water resources in competition with the system (wells at the houses); socio-economic level (especially the percentage of traders and artisans); and the technical and commercial capacities of the entrepreneur in charge of the system. The table below shows how these three factors correlate, totally or partially, with the connection rates. The color green indicates the conditions most favorable to connection, and red the least favorable. The levels of connection going beyond 100% correspond to entrepreneurs who have gone beyond the borders of the towns.

Connection rate progress: the performance of the entrepreneurs

The connection rate has been relatively rapid, and confirms the adequateness of local demand and type of service provided. The half-period (reaching 50% of the consumers) is less than a year in the majority of cases.

The rate of connections varies according to the effort of marketing put forward by the entrepreneurs. The entrepreneurs who are entering the field often perform better in marketing than the existing ones, because they adopt systematic canvassing of the population without prejudice toward the ability of the consumers to pay. This marketing effort, which illustrates the immediate profitability sought by the new entrepreneurs, contrasts with the more social approach of the existing entrepreneurs.

Box 24 – Case studies

The best performances: The water supply system installed at Tuk Meas has the highest rate of connection, even though it was only set up in 2004. It owes this performance to the combination of a low level of alternatives at the time of its launching, and especially to the big marketing effort carried out by the service provider. The Koh Thum Kah system, which represents an average joint effort, also owes its good level of connections to the marketing dynamism of the entrepreneur. Tany, Pech Changva and Tram Knar have a good socio-economic levels and no ground water alternatives. Smau Kney shows some good elements, but suffers from the competition of an unauthorized system, without which it would certainly have connected 100% of the households of the village. Phnom Den has a weak socio-economic level, and faces bad service management, but alternative resources in the dry season are totally absent.

The weakest: Kbal Po, Romeign, Ang Roca and Angkor Borey are rural zones where income level is at its lowest. Lumchang's bad results are due to the weak involvement of the entrepreneur, who is often absent, and who delegates the service to underpaid employees who are poorly informed and integrated.

The table below shows the evolution of the connection rates compared to total number of households in the towns. The curves for Touk Meas and Koh Thum Kah have seen much progress. This corresponds to the efforts of the entrepreneurs who have invested much in door-to-door selling or canvassing. The entrepreneur at Koh Thum Kah has even proposed a reimbursement of the connection fee to the consumers if they are not satisfied. There is obviously a difference in price/connection/supply corresponding to the season. The dry and monsoon seasons obviously correspond to respective increases and decreases in demand for both connection and supply.

[61] *This figure is based upon a register of all the households of the villages in question. The exterior limits of the villages were set at a distance between household thresholds of over 15 meters.*

Table 21 - Classification of systems in relation to their rates of connection for May, 2006								
Network location	**Province**	**Starting operation**	**No. of houses**	**No. of Connections**	**% of connection**	**Alternative Resources**	**S-Eco level**	**Entrepreneur capacity**
Touk Meas	Kampot	Dec 04	344	360	105%	Low	Good	Good
Koh Thum Kah	Kandal	Oct 05	591	600	102%	Medium	Good	High
Tram Knar	Takeo	May 03	359	360	100%	Low	Good	Good
Smau Kney	Takeo	Jul 02	280	242	86%	Medium	Good	Good
Pech Changva	Takeo	Jun 01	281	242	86%	Low	Good	Good
Phnom Den	Takeo	Dec 03	400	280	70%	Low	Medium	Medium
Tany	Kampot	Dec 05	677	452	67%	Medium	Good	Medium
Kbal Po	Takeo	Feb 05	286	150	52%	Medium	Medium	Medium
Sampoun Poun	Kandal	Dec 05	539	250	46%	Medium	Good	Medium
Romeign	Takeo	Jan 04	893	296	33%	Medium	Low	Medium
Lumchang	Takeo	Feb 03	172	57	33%	High	Medium	Low
Ang Roca	Takeo	Mar 06	157	59	38%	Medium	Low	Medium
Angkor Borey	Takeo	Feb 05	1,035	325	31%	Medium	Medium	Low
Prey Pkhoam (2)	Takeo	Nov 05	NA	NA	NA	High	Low	Medium
Total			6,014	3,673	61%			

(1) Prey Phkoam PWS is a rural system with stand pipes

Individual motivation for connection[62]

- Customers connect because it is practical

Ease of use is what motivates people to become connected to a water supply system.

This factor has been quoted and described in most of the towns and villages. "It is easier than before, I no longer need to make a trip to get water, and I can carry on my business without having to think about it."[63]. This gain in time permits customers to carry out other activities, and they are ready to pay for this service. The mere fact of having access to a permanent resource is also a motivation to connect. "Before, you had to wait for the push-cart[64], now I only have to open the tap."[65] Customers now have the impression that they have access to a water source which will never dry up.

- The notion of modernity

A comparison between the provincial towns or the capital is often used to describe the new water system: "It's like in the big cities." This comparison carries with it the notion of a strong desire for modernity on the part of customers. More and more, newly constructed housing already has an integrated connection to the water supply system; proof that in people's minds a modern house is a connected house. According to Mr. Thor Sen, a provincial authority for Takeo Province, access to a water supply in the home is a "virtuous cycle" of development, because the need for resources allowing access to the service brings with it, for people with the capacity, an increase in productivity and consequently of income.

- The low price of water supply encourages costumers to connect

Families who own a pond or a well with pumping facilities will abandon it for a system that gives them more time and more savings, after considering the increase in the price of petrol, and the time spent on installing and starting up the pump. Indeed, people generally find that water from a piped water supply network is not very costly compared to other traditional sources, or to the cost of petrol to start up a motor-pump.

[62] *Opinion surveys conducted by Clement Frenoux in 2005.*

[63] *Mrs. Samrith Sin, age 58, salesperson in Touk Meas.*

[64] *The towing of large 200 liter cans.*

[65] *Mr. Chhay Nov, age 51, bicycle repairman in Touk Meas.*

Figure 24 - The evolution of connections to MIREP supply systems (not including Prey Pkhoam)

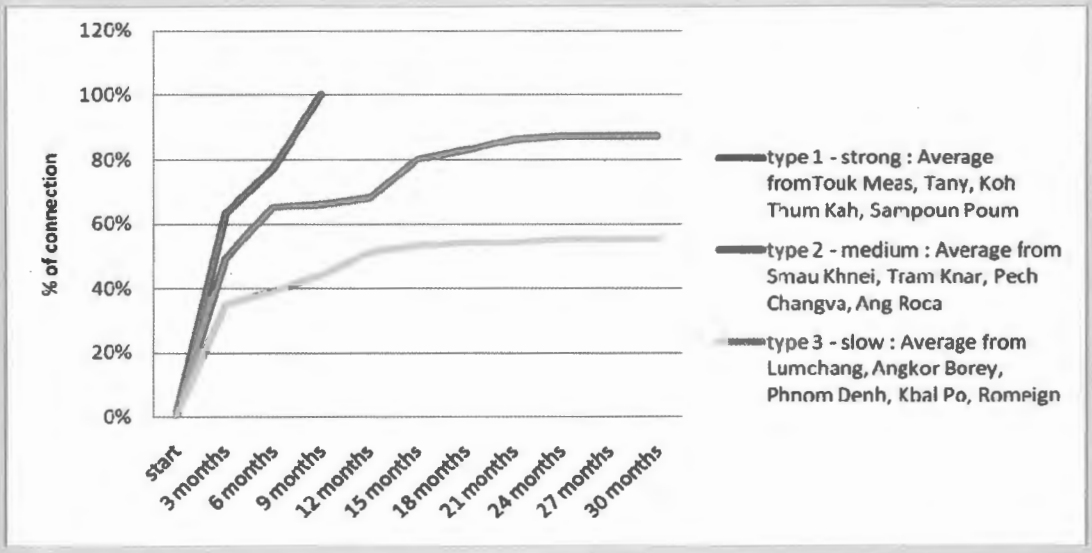
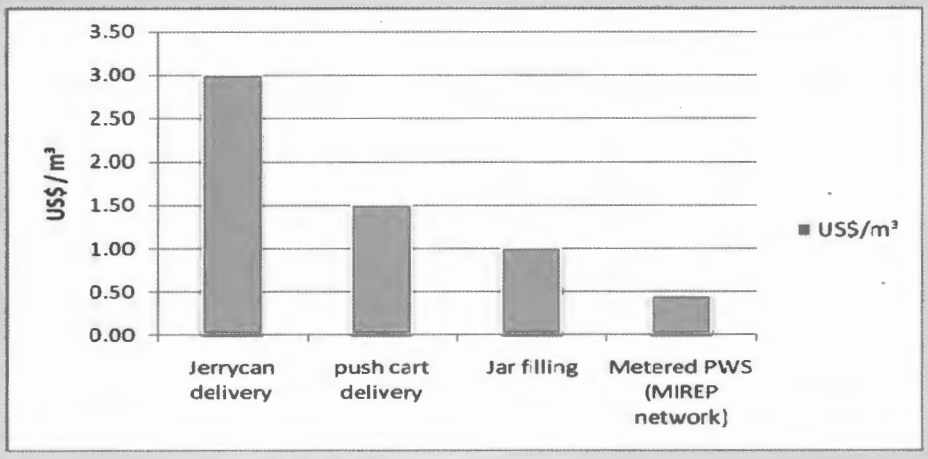


Figure 25 - Fee for water service in the household



- Circumstantial factors: contaminated water

One of the motivations for connection comes from an increasing perception that wells in some densely populated zones are contaminated by waste water from nearby households, and that the perimeter of protection of the resource is not good enough. This motivation is even stronger in zones where the ground water contains arsenic. When populations become aware of this problem, they transfer their drinking water consumption from the tube well to the water system.

People excluded from connection

Unconnected households are usually aware of the existence of the water system, but they are unconcerned about it either because they already have their own supply (in some small towns, ground water is easily accessible), or they have no means to acquire it—the cost of connection or the water tariff is too high. This category represents about 10% of the population of small towns.

No credit available for connection

Some households might wish to use credit to get connected, but this is not thought profitable by local micro-finance institutions, which consider it an expense rather than a potential income to reimburse the loan. In the same manner, credit provided for connection, as set out in the contracts[66], is not used by the entrepreneurs, who see it as a possible source of non-payment and of eventual conflicts likely to damage social relations.

Local re-sale and water fountains

Access to the water system for the poorest households is essentially assured by the resale of water, with the connected households reselling their water in small quantities. This practice is theoretically limited by the contracts—a maximum of 25% above the water fee—but it is impossible to regulate, and experience shows that it gives rise to abuses (see text box), because the beneficiary is often a captive of his supplier for geographic or social reasons.

The installation of water standpipes (previously unknown in Cambodia) ought to prevent this situation, but experience has shown that the regulation of water tariffs from the standpipes is difficult. In this arrangement, the tariffs are posted. The water tariff from the standpipes is the same as that from the water supply system, and the standpipe manager pays a wholesale price to the system entrepreneur and makes a profit from the difference between the retail and the wholesale price.

Box 25 – Abuses: the re-sale of water

In the case of the village of Kbal Po, the local entrepreneur, worried about having only regular payers, independently limited the number of people who would have access to a connection. He willfully neglected to offer connection to poor people who had nonetheless said they were creditworthy and wanted access to the system. Those fortunate enough to be connected developed a system of re-sale on a grand scale, involving nearly half the population, at a relatively high price, thus providing themselves with an income at the expense of those least able to pay.

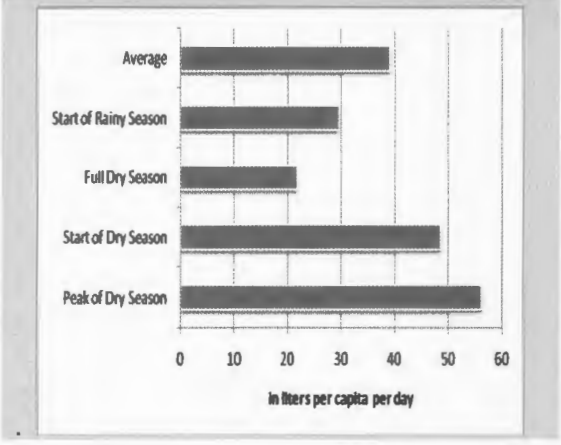
Consumption and behavior

The changes brought about by the system are essentially of a practical and economic nature. The system has allowed a noticeable reduction in the water tariffs, easy access and a convenience recognized by all households, but it does not seem to have brought about appreciable perceived changes[67] in the health of the population. If the installation of a system is followed by changes of consumption behaviors, it does not engender habits of exclusive use, and is combined with free water alternatives, even if they are of inferior quality.

Consumption from the water system: seasonal and economic variations

The analysis of the volumes of water consumed from the water systems show acceptable average levels with regard to selected targets, with average figures of 50 liters per day in the dry season, and about 25 liters per day in the rainy season, at which time householders prefer to use rainwater. According to a study conducted in Smau Kney, these figures also vary according to the income of the household, with the wealthiest consuming about 80 liters per day (of which 70% to 100% is taken from the water supply system), while people at an average socio-economic level consume about 66 liters per day (with about 60% of their supply coming from the water system). The lower consumption levels are not necessarily found in the poorest families, who are not connected, but among those households with their own water source (a well or a borehole) that want to be connected for further security.

Graph 21 - Level of consumption in the first six MIREP systems



[66] *The MIREP contracts have a provision requiring entrepreneurs to connect customers who wish to do so on credit, at the market fee of 2%/month.*

[67] *Based on surveys among the population (a perception of a decrease in the incidence of diarrhea among children in the family).*

Evolution of consumption: a first estimate (+4% per year)

It is still difficult to precisely evaluate behavior changes in the population with respect to water consumption. In the first two systems installed, Smau Kney and Pech Changva, we see a slight growth, in the order of 4% per year during the first years after the system became operational. It must be noted that these figures also include a small "commercial" consumption, essentially in bars and restaurants.

This increase is found, then, in the groups that consume more water (10 to 20 m³/month/household), while consumption among groups consuming low or average amounts (less than 5m³/month/household, or 30 liters per day; and between 5 to 10 m³/month/household, or 30 to 60 liters per day, respectively) tends to diminish. This improvement could be explained by an increase in income, or by the phenomenon of people becoming accustomed to the water system, although this aspect is refuted by the comparison of use during the dry season and the wet season (see the following paragraph).

Figure 26 - Average consumption in households for the first two MIREP systems

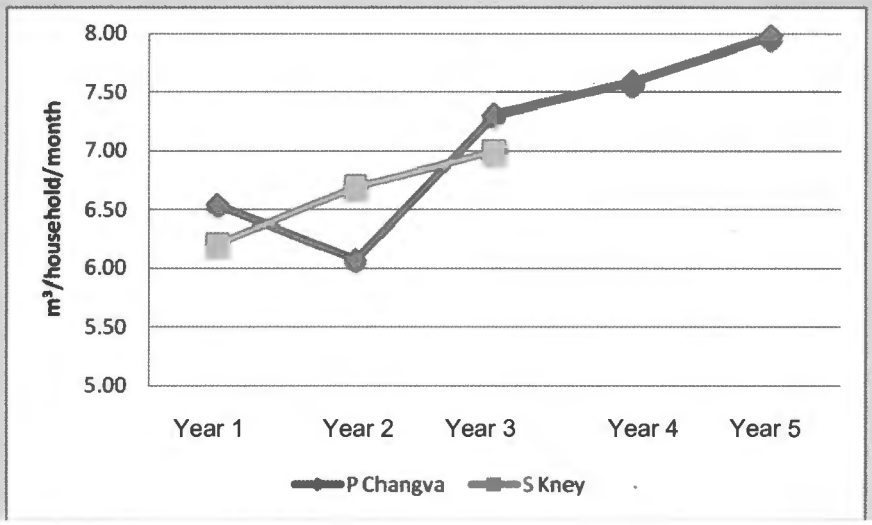
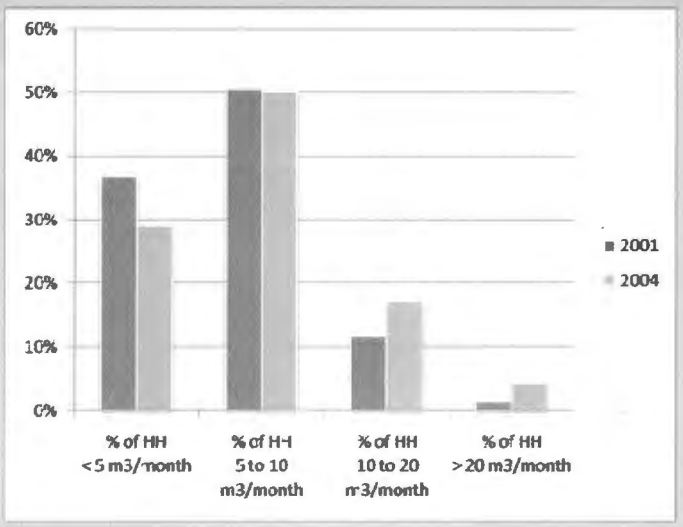


Figure 27- Evolution of groups of consumers in Pech Changva from 2001 to 2004



The economic reasons for recombination of water consumption

After the installation of the system, households continue to use their traditional, free water sources. Indeed, rain water remains the major source used during the rainy season, and households continue to use their wells in the dry season, except when they deliver bad quality water. It is essentially purchased water (delivery to the household of potable water in large containers or by barrel) that is replaced by the arrival of a water supply system. Pond water continues to be used, but less frequently, and only when there is not enough money to buy water from the supply system. Because of its taste, chlorinated water is not used primarily for drinking purpose (although this attitude is changing), and is reserved for other domestic uses (60% to 70% of people use it for personal hygiene and for washing kitchen equipment.

The adjoining example shows that in the village of Tram Knar, it is the "push carts" (motorcycles towing water barrels) which have been abandoned[68] along with the public ponds, which are often polluted. Free solutions (boreholes, wells, rainwater) have been kept. This observation is confirmed by the fact that the quantity of water that is consumed during the rainy season—from May to November—does not seem to vary much from the first estimates made in Pech Changva, where the system was installed in 2001. These data show that the use of water from the piped water system tends to decrease during the rainy season, and that the increase in consumption happens only during the dry season. This gives credibility to the hypothesis that increase in the use of water from the systems will happen only if there is an improvement in income, rather than an increase in the habit of using the tap.

Figure 28- Abandonment of water systems after their installation

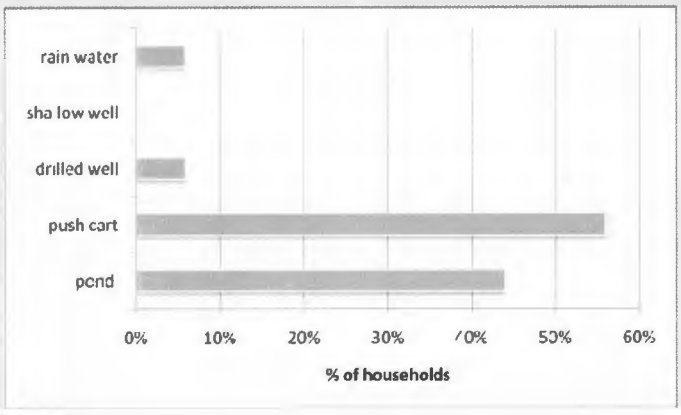
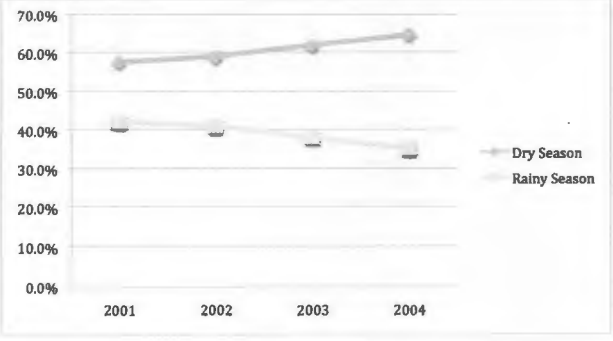


Figure 29 -The seasonal evolution of sales in Pech Changva



[68] *The pushcarts have switched to other intervention zones, or they continue to provide a 'niche' service for dedicated users of pond water. Some of them have exchanged their towed water cans for vehicles for transporting people.*

Adapting to chlorine: from marketing to public health

As mentioned above, the presence of chlorine in the water is an obstacle to the consumption of supply system water for drinking: Cambodian households do not like the taste of chlorine in the water and fear the use of chemicals (Cambodia recently experienced a number of cases of poisoning by products laced with battery acid). However, since the program started we have observed a significant increase in the consumption of water from the piped water system for human use. This analysis is based upon the results of four surveys conducted after the installation of the water supply system. A survey taken in the first MIREP village, known as Pech Changva, shows that the proportion of the population drinking water from the new system has increased from only 21% in 2001 to 67%. In the village of Smau Kney, the proportion of people drinking water from the new system in 2001 (after only two years of service) was 21%, and by 2005, it had almost doubled to nearly 39%. In the same village, the proportion of people drinking water from the supply system during the dry season has reached 40%, which is 10% more than two years ago. In Tram Knar, after only two years of service, the percentage of drinking water consumed from the new system in the dry season stood at 67%.

The increase in the consumption of chlorinated water from the system can be attributed to customers' awareness of the role of chlorine (entrepreneurs convey this message to their customers in various ways, especially through a note written on their bills), and also because of the diminution of other traditional water sources used for drinking purpose (especially the ponds which get polluted because of population density).

Impact on health diminished by the mixing and storage of water

Interviews carried out among customers reveal that for most of them, the water system has had no perceived impact on their health. This can be explained by the fact that the majority of households connected to the water supply system continue using untreated water, especially pond water. Also, small jars are still used for the temporary storage of chlorinated water, mainly in order to control consumption and to avoid losses linked to the direct use of the tap. This means that, even though the water from the piped water system is of good quality and disinfected with chlorine, once the chlorine has dissipated (chlorine is volatile) it becomes contaminated by the environment, since few jars have covers, and also by the practice of extracting the water (pots plunged into the water). Although systems of running water (taps, sinks, showers) are not widespread, they would bring about more hygienic water use by avoiding storage and the mixing of water from different sources.

Box 26 –The installation of the water supply system does not necessarily result in acquisition of households sanitary equipments

(Excerpt from the internship report of Boursin/Billard, IFU/GRET 2006)

In Kbal Po, very few families have latrines or a method of disposing of waste water. We have noticed that the rare families with latrines built them well before the hook-up with the system; in other words, it was not the setting up of the system that motivated investment in sanitation equipment. Only three families in all had planned latrines before the hook-up. For others, no extra equipment such as kitchen sinks, showers, or latrines, was considered potentially available.

In Prey Phkoam and Koa Thum Kah, conversely, households are mostly equipped with latrines and bathrooms. These are installations that pre-date the water systems, sometimes by 10 years, which emphasize the need to take into account sanitary measures installed well before the MIREP project systems were put in place.

Hygiene / water budget: the kitchen sink program

A survey that was conducted in 2003 to evaluate customer satisfaction with the Pech Changva water supply system, makes it obvious that the switch to piped water has little impact on hygiene practices. Women continue to wash food in basins on the floor, waste water stagnates near the jars or in the kitchen, food is prepared on wicker racks that are rarely washed, and the kitchens' earthen floors are impossible to clean. As an attempt to tackle this problem, kitchen sink promotion pilot, was initiated (kitchen sinks were unknown in the village before the pilot). The cost of 100 sinks and water drainage systems was subsidized by 50%.

Besides reducing stagnant water and microbes, hygiene practices have vastly improved since the installation of the sinks. People started using them for washing dishes, cleaning their kitchens, preparing food, washing their hands, and draining waste water. Many families benefiting from the sinks promotion project took this opportunity to improve the general condition of their kitchens, some of them building a concrete slab after the drain pipes were installed, and started hanging up their pots and pans. The first analyses show that the use of sinks, while improving hygiene conditions, has not increased the water consumption of these families, and has consequently improved the ratio domestic hygiene/water budgets.

The need for sanitation

In the villages that already enjoy a water supply system, very often sanitation is the main problem brought up by the population. "Many people would now like a sanitation system."[69] The ground is often soggy during the rainy season, and draining wastewater by infiltration into sumps no longer works. Some surveys show that the households are often willing to pay rather large sums, between US$50 and US$100 to get access to a sewer system. As it happens in some villages, like Tram Khnar [see photo] a small-scale sewage system is being built by the head of the town market.

[69] *Mrs Hun Vichet, 35 years old, connected in Tram Khnar.*

Initial conclusions

The figures confirm the validity of the participation of the local private sector

14 systems were installed in 4 years within the MIREP framework, 4 more than had been planned at the beginning of the project. Out of these 14 systems, 4 are existing ones that were enlarged in order to serve a whole town, and the others are completely new systems, set up by local or regional investors. In overall, 12 local entrepreneurs were supported and trained to set up and are now managing the piped water systems.

At the end of 2005, a few months after the start-up of the last water systems, the number of households connected to MIREP systems stood at 3,673, or about 21,000 people, or 61% of the households in the areas to be served. The average levels of consumption from the system is currently on the order of 40 liters per person per day, with strong seasonal variations, since the users have other sources available to them—wells and boreholes—especially in the monsoon season when rain water is abundant. The price of the water averages around 0.50 US$/m3, and the connection costs for customers are on the order of 15 to 18 $US per household.

All told, nearly $620,000 US in investment was mobilized to complete these water systems, of which 66% came from the local private sector, 31% in the form of subsidies, and the rest from public participation. The regulation of the piped water systems was assured by the development of local public-private contracts between the local entrepreneurs and the communes, in the form of divestiture, concession, rental or leasing.

These figures show that the private investors are well attracted by the water sector, are willing to professionalize themselves and welcome the formalization in a common framework, meanwhile they are able to match with the population's expectations.

Creating a space for the local private sector

MIREP's logic has not been that of systematically defending the local private sector, and the limits of this participation have been clearly set out in this document, but defining a space where the local and national private sector can, with the help of local resources, provide a service to the population without the country falling into debt in the long term. This participation presents an alternative to the high-end technical and financial solutions that often ignore the experience acquired by local private parties, their investments, their relationships with the population, and their ability to evolve toward professionalization.

The specifications have a great impact with respect to the participation of the local private sector. The desire for "modernity" often hidden under objectives of sustainability or public health, impose "deluxe" standards having no basis in reality, and which may be a barrier to local initiatives. The example of Smau Kney and Chambak described in this report show that, for a similar population, the difference of standards and specifications may bring about a relation of investment costs from 1 to 7.

In order to flourish, local private participation will therefore need a space, well-defined and even limited by existing standards, by attractive investment models, by flexibility in the designing standards, but obviously with no compromise on the quality of the water.

Contractual modalities must "convince" the local private sector

In spite of itself, MIREP has been a point of tension between the supporters of centralized versus decentralized governance. MIREP's option was to choose a local contracting process, one that provided continuity of relations between the local private parties and their environment. This model of legal framework attracted private entrepreneurs as much by its logic of construction,

of consultation, and of transparency (quite different from the unilateral licensing system, which is often arbitrary in its decisions, of short duration, and onerous in terms of its transactions) as by its legal basis, which is uncertain in the hazy institutional framework of the Cambodian water sector.

The validity of the decentralized model in the regulation of the private sector has yet to be built-up. The commune councils do not yet constitute a sufficient counter-force to regulate local systems. They are not encouraged by a population unused to making demands or expressing opinions publicly, badly served by an institutional arrangement that does not precisely define their role with respect to services, and ill-convinced themselves of the worth of elective offices when compared to the social success of the entrepreneurs. It is possible that, for lack of means, the program did not emphasize this component enough, but it is appropriate to recognize that the commune project ownership in this domain is premature as long as the conditions of minimal competence in the communes are not met.

Yet, giving up on involving the communes in water service would be an error, because the signs of involvement are encouraging: the attracting of local entrepreneurs, the mobilization of funding, the replication of private-public contracts at the local level, and the good level of transparency are all important bases for the participation of the local private sector. Supported by decentralized authorities, such as the provincial rural development committees, one could expect sufficient middle-term involvement by the local elected officials, if the national regulation system leaves them some room for exercising their competence.

The wider vision of attaining objectives of public health

Even if, in the best of cases, the connection rate approaches 100% in the dry season, the use of water from the system in the villages is not exclusive. The practice of combining piped water from the system with other water sources, mainly rainwater and pond water, reduces the potential for positive impact on health. The water fees, which are high when measured against income in the population, plus a relative ease of access to free water sources explains this situation.

Universal service, which would mean the whole of the population having access and using the piped water system in a systematic and exclusive way, is a matter of reducing scaled costs which is not possible in the case of the management of systems in the small towns, and also supposes factors of adjustment with the urban zones, especially through cross-subsidizations.

The objective of public health in the villages cannot be considered apart from a holistic approach to the problem of water, with support and regulation covering not only the piped water system but also the other sources of water available to the population. While MIREP, like numerous sectoral projects has focused its attention on setting up the systems, it would be necessary to integrate all elements of potable water conveyance in the small towns concerned.

Jean Pierre Mahé (2005)

Afterword

Setting-up a piped water supply service in small towns: a brief analysis of the MIREP project[70]

Written by the former project manager of MIREP, this document describes the story, the approach and the results of the MIREP project. This afterword aims at providing some hindsight from operational aspects, focusing on the essential choices that founded this project, and to adopt a more institutional viewpoint on this experience.

The emergence of a private, paying service in Cambodian small towns

The MIREP project aimed at setting up piped water systems in small towns of Cambodia, and anchoring an operational and institutional scheme in the prospect of scaling up the approach. This option responded to several observations:

- As intermediary grey area between villages – supplied by domestic systems or community wells – and cities – already equipped with public piped water systems – small towns have been left behind by water supply policies
- In these small towns domestic access to water is reduced, because of water scarcity and little time dedicated by local people to go and fetch natural water. A spontaneous private, water supply service has emerged in these areas: water cart vendors ("push-carts" filling up domestic jars for water storage), but also local entrepreneurs pumping surface water and supplying water through small distribution network to households, with local authorities backing
- These private initiatives illustrate the emergence of a paying water supply service; households show more and more interest in direct at home water supply service; the concept of piped water supply exists, involving local investment ranging from 2,000 to 10,000US$. However water supply by pushcarts is expensive and small piped water systems are limited to relatively dense and well-off areas while the problems of pollution are emerging and the legal status of entrepreneurs remains precarious.

Consistent with the new water supply policy in Cambodia, in 2000 Gret and Kosan Engineering supported one of these local entrepreneurs for the construction of a water treatment plant. Based on this experience and knowledge of private- and water sector dynamics, the MIREP project started, with the objective to set up 14 good-quality piped water systems involving local entrepreneurs, within a clear contractual framework established with the Government and the communes (Cambodian local authorities).

MIREP project consisted in a qualitative transformation of the water service: from an informal and unregulated service to an essential service, operated by the local private sector within a contractual framework. Main changes brought in

[70] *By Philippe Lavigne Delville, Director of the Scientific department*

by the project are: extension of the distribution networks beyond town centers, accessibility to the poor (at least, decrease of the costs), ensuring the production of treated drinking water, contracting with provincial and commune authorities.

Quality piped water systems, responding to intermediate standards

MIREP's objective was to promote small-scale piped water systems improving existing facilities: underground pipes, water meters for payment according to consumption, water tower for greater area of supply, and, above all, water treatment plants to guarantee safe drinking water. Indeed, even though at first the taste of chlorinated water was not appreciated by the people (who prefer rainwater), it was considered essential for public health to develop microbiologically safe water.

Besides the necessity of providing drinking water, these small piped water systems are justified by their low cost for users. It is now well recognized that poor people are excluded from piped water systems and pay high cost for water when traditional supply schemes get impossible[71]. In these small towns one cubic meter of water sold by push-cart is twice as expensive as informal pumping networks. Despite the high investment cost, MIREP piped water systems set up cheaper cubic meter tariffs than the latter, thanks to the coverage area and the contractual management of tariffs.

Furthermore, MIREP's objective was not to reproduce international standards for piped water system design, which would have raised all costs, and bred pernicious effects like dependency on external funding, higher cost for users, and obstacles for poor households' access. Technical and design options were decided according to different needs: ensure water quality and system quality, anticipate future water demand without oversizing the system, and limit investment and operational costs in order to maximize access to the service. Thus in comparison with other piped water systems in Cambodia, MIREP investment cost is 5 to 8 times lower, and the household connection fee is half the usual cost.

Mobilize local entrepreneurs within a sound contractual framework

Local private sector participation in essential services has been debated often, focusing on capital cities' water concessions and the involvement of multinationals. In the case of MIREP, the will to involve local entrepreneurs for the management or even the investment in piped water systems results from the observation of existing, local dynamics and the orientations of the national policy towards water supply. It is also inferred that the local private sector is efficient for this kind of responsibility. Cambodia has been characterized by entrepreneurial dynamics, notably in the electricity and water sectors, responding to public interest and therefore satisfying the users. Moreover the commune authorities were only recently elected and have been unable to manage such a service, even to contribute to the initial investment.

Then the PPP (public-private partnership) concept made its way. But this term includes a broad choice of realities, according to the institutional frameworks, the responsibilities of involved stakeholders, the relationship established between them, and the regulation capacity. In fact this term does not say much about the interactions emerging between the public and the private sphere. Indeed the local entrepreneurs - already involved in small water services or mobilized through MIREP – have nothing in common with the multinationals collaborating with large cities in developing countries. Even though most piped water systems under MIREP have consisted in divestiture, several contractual solutions were offered, from leasing to concession, allowing adequate negotiation on institutional choices, according to the responsibilities that the commune felt able to handle.

The content of the contracts was carefully elaborated and discussed, even though all stakeholders did not have the same capacity to fully understand such a recent scheme, and rooting a contractual framework requires experience over a longer timeframe. PPP principles relied on interests convergence: while private entrepreneurs committed to invest and connect a certain number of households to a good-quality, affordable and continuous water service, local authorities guaranteed a safe investment recovery through the contract, formal negotiations, legal recognition and access to credit. For local authorities, the advantage was to extend a water service coverage at a low cost (only the treatment plant required subsidy, to say 30% of the total cost), to ensure good water quality and acquire a control and regulation role.

Thus entrepreneurs invested much more than they used to do for informal networks, as they trusted the proposed framework or their capacity to assert their own interests. It is too early to draw conclusions, but several elements can be highlighted: the connection of poor households follows a slow process in some of the small towns, but so far the water service has been delivered without breakdowns or interruption; the water tariff has been respected and the entrepreneurs have not systematically taken the opportunity of

[71] *UNDP 2006 report on human development,* Beyond Scarcity. Power, poverty and the Global Water Crisis, *confirms on a large sample of countries this empirical observation made by Gret for several years.*

renegotiating the tariffs after oil price increase; entrepreneurs show some will of professionalization that is differing between investors living in the served area and operators living outside the service area. Even though higher than before[72], the investment cost remains quite low (around 30-40,000 US$ in total, 60% financed by the entrepreneur) and represents a source of income for business people or retired managers looking for a regular, sustainable income rather than optimal profit.

A public and more decentralized institutional framework, within a water supply policy in process

In 2000 the main orientations of the water supply policy, including the mobilization of private investment, were fixed, but the methods of implementation were not. The legal and institutional framework was under construction (the water supply policy was signed in 2003) and the process is still ongoing today. The framework defining the PPPs was made for big investments and was centralized. Besides the decentralization process and the creation of communes were latent – the elections were held in 2002. This situation was an advantage as well as a constraint. The advantage was the opportunity to pilot an institutional scheme, and then contribute to the discussions on the different political choices to make. MIREP suggested a more decentralized system than the piped water systems of big cities run under the responsibility of central authorities. Thus, even though they were recent and quite weak, the communes were at the heart of the PPP contract. The provinces were given the role of coordination and supervision. The provincial rural development committees gathering the technical agencies supporting the communes have a confirmed technical expertise and ensure local proximity. The provinces highly committed themselves, showing a strong interest in the on-going dynamic and the powers conferred on them compared to the central level. Such a pattern seems to work, and could possibly be integrated in the water supply policy if the Government finds it relevant (the same prevails for contractual and technical specifications issued from MIREP). Beyond the competition between national and provincial level authorities, it seems that the new PPP framework widens the contractual options and plans some delegation at the provincial level.

Simultaneously this situation of anticipation also is difficult, as it forces us to act and decide within an unclear framework, to suggest choices that, even though discussed, do not get rooted in institutional terms. This situation was a big issue, as the status of small towns and the responsibility of water supply were not officially stated, between the Ministry of Rural Development (MRD), responsible for rural areas, and the Ministry of Industry, Mines and Energy (MIME), responsible for urban network systems. The MIREP project started under the supervision of the MRD and the sharing of responsibility between MRD and MIME was formalized only in 2005. This did not facilitate political dialogue on institutional options at the central level. Ideally such a project should have been part of a wider process of water supply law preparation, under the ownership of MIME and through reinforced technical and political dialogue with the Government. The time frame of all on-going processes made this ideal not possible, even though many dialogues were held[73]. This perspective is more conceivable within the new PACEPAC project, carrying on the same objectives.

A public water supply service in progress

As Jean-Pierre Mahé explains, the "MIREP programme was born from the idea of transforming local private sector initiatives into a basic water service:

- Water matching international water quality standards;
- Geographical coverage matching the small towns population affected by the lack of water and the pollution of traditionally used water sources;
- Individual access (connection) to the highest number of inhabitants, with alternative services for the poorest;
- The setting up of a regulation framework, defining the service conditions through a common agreement between users, local authorities and the private sector"

Beyond the evolution of the water system (piped network, treatment, house connections), the *nature* of the service is concerned. The situation

[72] *This also made evolve the general profile of entrepreneurs, as a certain number of owners of information piped networks were not selected and were compensated for the loss of their water business.*

[73] *About the articulations between experimental projects and elaboration of the sector policy, cf. Kibler, J.F. et Perroud C., 2003.* Vers une cogestion des infrastructures hydro-agricoles. Construction associative et réhabilitation de polders : l'expérience du projet Prey Nup au Cambodge. *Paris : Editions du GRET ; Matthieussent S., Carlier R. et Lavigne Delville Ph., 2005,* Un projet d'électrification rurale en Mauritanie (1995-2000) : Alizés Électrique : histoire et enjeux d'une tentative de construction d'un service durable, *Études et travaux en ligne n°6, Paris. Éd. Gret, 154 p.*

switches from an informal private service delivering raw water to a hard core of customers with no guarantee of supply, to an extended service, of which the quality is guaranteed, and implemented within a contractual framework negotiated with the communes and the provincial authorities.

The qualification of "basic service" or "public service" depends on two major issues:

- Access for the poorest: is the service large enough to be qualified as "public"?
- Regulation: are the share of responsibilities and the capacity of regulation of public authorities effective? Can the users influence the implementation of the service?

The issue of access to the service, and the situation of poor households[74]

The first piped water systems now have been operating for 3-4 years and the most recent for one year. It is therefore too early to measure effects that can be assessed only over a long period. However it is worth noting a connection rate close to the objectives after two years of service (differing a lot according to the sites), and the absence of any problem in the service and the bill recovery. On average 61% of houses located in the central part of the small town are connected. The connection concerns more central locations, business and handicraft activities and well-off households, even though the latter prefer rainwater and have important water storage capacity. Isolated or/and poor households do not connect so easily, depending on their distance from the service central area and the willingness of the entrepreneur to connect these households in the short term (as the entrepreneur has a contractual deadline for connecting this population). Some people remain excluded from the service, at least for some time, despite the setting up of community stand pipes and the development of water sale by connected households.

The geographical exclusion (isolated areas or houses, depending on the village organization) is linked to this technique of water supply, and progressively disappears, through public investment. Socioeconomic exclusion is partly related to the geographical exclusion, according to the socio-spatial organization of the village. Apart from remote or dispersed areas, this exclusion is not due to the cost of water, as it is cheaper than other solutions. Yet lower connection rate is noticed in remote areas than in dense and central areas. Poor households sometimes do not dare requesting connection; the obstacle of the connection fee is not an argument according to some studies: in MIREP sites the connection fee is 15-18US$, which is a very low amount compared to rates in Africa, where connection is a real issue. But is has also been observed that entrepreneurs never applied the credit for connection defined in the contracts; moreover entrepreneurs also invest gradually and usually prefer ensuring a stable coverage area in the central part before extending the network. It is anyway too early to conclude on this issue, as the strategies of entrepreneurs and users keep evolving. Access to the service also relies on the regulation capacity of the public authorities, in case of reluctance to respect all commitments.

It seems that the MIREP approach did not sufficiently tackle the issue of water resale in some of the small towns. Indeed MIREP focused on individual connections, so to say the major demand for access to water. Reselling water extends the service, but resale tariffs are much higher and not regulated, bringing supplementary income to the resellers. So far no clear rule has been set up for this matter, and neither the entrepreneurs nor the public authorities have tried to deal with this. Information to the users about water tariff, comparison between all water costs, alternative solutions like community stand pipes and network extension are probably the most suitable solutions to limit this resale phenomenon[75].

Some stand pipes are currently managed by one household and cover poor parts of the town in the service coverage area. This temporary solution presents the disadvantage to make tariff regulation difficult, as the operator loses the responsibility for these points. It would be more consistent to insert this management in the public-private contract, in which the private operator decides to manage by him/herself or to contract out.

Before the new piped water system was established, households relied on different water sources (rainwater storage, private wells, ponds, water carts, etc.). Connected households also combine several water sources, usually rainwater, pond and piped water, according to the sources available, the season and their living standard. The arrival of the piped water system reduces the use of water cart vendors (push-carts) a lot, making them "victims" of the new water service;

[74] *Apart from this document, this paragraph relies on a study conducted by Clément Frenoux, 2005,* Analyse de la consommation de l'eau dans les zones semi-rurales du Cambodge après la mise en place du programme MIREP, *GRET, and on an impact study on recently connected villages (Billard C. et Boursin J., 2006, IFU/GRET).*

[75] *We could also imagine that some households would be official resellers, benefiting from wholesale tariff under regulation. Negotiations with micro-finance organizations for a credit for connection could also be envisaged.*

other water sources are still preferred by people, like boiled rainwater for drinking. Piped water is used for all other uses, especially in the dry season. Consumption levels vary between both seasons, and a slight quantitative increase is observed. The acceptance of chlorine taste also develops.

The perception of piped water as a supplementary solution, combined with other water sources is normal. This confirms the necessity of realistic system sizing, based on effective consumption levels and mid-term prospects rather than theoretical standards tending to oversize all installations and overestimate water volumes to be sold, periling the infrastructure profitability.

The evolution of these two aspects of access to poor households and users in general will be interesting to follow in the long term.

The issue of regulation

MIREP's contractual framework involves three contracting parties: the province, the commune and the entrepreneur. Provinces bring technical support via rural development committees (PRDC). The commune councils were created as the project was starting and were quickly integrated in the contract, despite their recent appearance.

The local management is handled by the users' representatives, initially members of the Village Development Committees (VDC) [76], or being the heads of village or volunteers. They are given the task of monitoring the service quality and transfer the grievances to the entrepreneur or the commune.

The content of the contracts always breeds long discussions. Yet so far the culture of written contract has not been assimilated in the local culture. The respect of commitments is more verbal and depends on power relations. Several terms and articles of the contract have not been respected (differed payment for connection, accounts transparency, regular meetings) but the contract remains useful to secure the entrepreneurs' investment and some major articles (tariff and service quality) have never been breached.

The issue of regulation is more problematic. Users remain quite passive, even when rules are not respected, like a unilateral review of the connection fee. Users' committees, with no contractual obligations, do not work. Only heads of village as users' representatives are quite active, but more on behalf on their elective function. The personality of the head of the commune, as well as his/her commitment in regard with the piped water service is variable, but is usually more important in the context of leasing contracts than private contracts. An example of the limited regulatory role of local authorities is the absence of reaction over the issue of water reselling by some households. This issue is all about a learning process, but the socio-political situation and the nature of the contract should not be neglected.

In reality, during this first phase of implementation the technical team Gret/Kosan played a crucial role. PRDCs have developed know-how for project implementation methods, Governors have been committed to the projects; communes on the contrary are weaker and the commitment of political representatives differs from one to another.

Regulation capacity probably has the highest potential at the provincial level. During the project implementation MIREP team played an important role of mediation and regulation. Now that the institutional and legal framework is built and defines responsibilities, the stakeholders can develop an assimilation of these responsibilities. Time for learning process again is necessary to make these functions stable at the provincial and commune level. First conflicts shall be considered as a test to analyze the way stakeholders react and manage these situations, especially regarding the importance that local authorities attach to the service quality standards.

Basically, learning by doing shall remain the rule: the willingness and capacity to respect the contract and to ensure regulation by the public authorities will be assessed by observing the daily management. Trials, errors and adjustments obviously are to be expected and shall lead to some adaptations. All stakeholders will feel able to play their role if they enjoy a necessary institutional recognition within the public policy framework and if they receive some support during this learning process.

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[76] *This participatory agency was created under SEILA programme and does not exist anymore. Its role was to mobilize local people in a committee and submit projects related to the development of the commune.*

Postscripts

Update and road map of the MIREP experience?[77]

Implemented from 2001 to 2005, the MIREP program was drawn-up to address water supply issues in Cambodian small towns. Based on Public Private Partnership (PPP) approaches through delegated management, the MIREP program aimed to pilot public-private participation for financing and operation of water utilities, to promote low-cost water treatment and supply technologies, and to test financial mechanisms for supporting local Small-Scale Private Service Providers (SPSPs).

In its four years of operation, the MIREP experience resulted in: the implementation of fourteen water utilities; the creation of a suitable environment for private investment, and the piloting of several contractual arrangements between private sector and public authorities. Written in 2006 by Mr. Jean Pierre Mahe, this publication highlights several outcomes, outputs and lessons learned that can be spread and considered in other countries. However, four years after its publication in French, the present English version has been updated and reviewed, incorporating current data as well as changes observed from past years.

For that purpose, the first part of this postscript will show the evolution that took place following the end of the MIREP program and the current performance of the water utilities. The second part will identify and analyze the main constraints and opportunities regarding the development of water utilities based on public-private participation. Finally, the third part intends to lay out a road map for a suitable scaling-up of PPP approaches in Cambodia.

What has happened since the end of the MIREP program?

According to the latest figures available from GRET, in December 2009 there were between 175 to 1,200 households in the water supply service area of the 14 towns supported by the program. It is estimated that the water utilities served more than 28,000 inhabitants. Six additional systems have been developed without external technical assistance, financed directly by the private water operators. Unfortunately, the contractual model has not been replicated; only the technical and economical components were copied. Others SPSPs have diversified their activities toward bottled drinking water production or other services such as electricity supply. Only one water utility was sold to an existing private investor. Since 2006, GRET has also been implementing another program named PACEPAC. Based on a similar approach to MIREP, it still promotes PPP at commune level but also includes a sanitation component. Four more piped water systems have been installed. Thus, the results presented here include all sites that were implemented with the support of GRET in Cambodia.

[77] *By Clément Frenoux, Cambodian Watsan Program Manager, frenoux@gret.org.*

Currently, all commissioned piped water systems are operational, but their performance is mixed. Indeed, as can be seen from Table [78], a number of them have largely exceeded their previous water coverage objectives while others have been unable to do so. The current situation of water utilities depends directly on the water market in place. Indeed, most of sites that have exceeded their coverage objectives present a mature water market. The average production and consumption values are 41 lcd and 34 lcd respectively. This is quite low but it is in accordance with the design criteria chosen during the MIREP program. Non-revenue water averages 13% but varies from 8% to 29%. This shows that perhaps have the operators manage their operations well. However, most of them do not have a head meter in order to monitor the performance of their utility. The water treatment process is known and applied but water quality measurements are rarely done.

During the last 3 years, Cambodia's water supply sector experienced several events. Most of them are external, linked to the economic crisis in 2008. Indeed, the escalation of prices for oil and construction materials dramatically raised investment, operation and maintenance costs of water utilities. In 2009, water tariffs were quite homogeneous, close to USD 0.60 per cubic meter. Monitoring of tariff changes showed that the increase over a three year period is on average close to 15% or about 5% per year. Looking at Cambodia's inflation rate as well as the fluctuation of energy prices (which played such a strong role in tariff increases), We see that overall tariff changes are lower than the inflation rate. Indeed, when energy costs grew from USD 0.80 to USD 1.20 per liter of fuel, the water price increased from USD 0.60 to USD 0.70 per cubic meter. After the 2008 fuel crisis was over, the water price returned to an average of USD 0.60 per cubic meter.

Private investment in small towns of Cambodia

The Kingdom of Cambodia and particularly urban and peri-urban areas are undergoing a rapid transition due to market development in the Mekong sub-region and growth in the tourism sector. It appears that small towns are also following this growth thanks to the development of transportation infrastructure, diversification of economic activities and access to electricity.

Table presents all financial schemes implemented by MIREP and PACEPAC over the past years. Disregarding contractual differences, the breakdowns of stakeholders' participation shows that: 59% of financing sources came from private investors; 26% from public subsidies; and 11% from the users. The average total investment cost per household is estimated at 128 US$.

This table also shows that the average investment cost of systems is increasing (see: Svay Prateal commune and Traey Sla commune). However, in the same period, the average number of households connected per system increased too, from almost 500 to close to 1000.

What are the main constraints and opportunities for developing the sector?

Since 2006, Cambodia has made some progress in enhancing access to water and promoting private investment in the water supply sector. After the MIREP program, several studies were conducted by bilateral (AFD) and multilateral (WB) donors on the potential for the development of private water operators. These studies confirmed that private suppliers played an important role in the development of the Cambodian water supply sector and could continue to do so. However, figures also show that there are significant differences among them. Their potential for expansion is quite large, service standards and water coverage vary widely, and financial capacities are uncertain. Most of them are vendors or resellers but few have developed piped water networks supplying from 500 to 1200 households with a technical and business schemes similar to the ones used by "standard" water utilities.

The case of Cambodia is quite unique considering the various typologies of private operators, the level of financial investment, their demonstrated initiative and the financial risk taken[79]. Most private investments are spontaneous and supply water to the community from their own water sources. Unfortunately, water utilities are characterized by poor design and construction, distribution of unsafe water, and low service coverage (with coverage limited to the more profitable areas). Most private providers are uncontrolled, unregulated and remain informal. Finally, in the Cambodian water supply sector a lot of uncertainty remains relating to the unclear legal and investment framework (especially focusing on the regulatory model and financing modalities); uncertainty about the number of private operators and the number of suitable potential sites; a lack of access to loans; and the technical and institutional support needed to scale-up.

[78] *It is a simple data analysis from the Mirep water observatory.*

[79] *MIME, 2006, Water Supply and Sanitation Project in Small Towns of Cambodia, Final Report, Volume 1 – executive summary, AFD, 105p.*

Unclear legal and investment framework

Since 2004, the Ministry of Industry Mines and Energy (MIME) has been in charge of small town water supplies that are privately managed (an MOU with the Ministry of Rural Development describes responsibility for community-managed piped supplies). Several laws and reforms are under preparation, especially on the establishment of the water supply authority of Cambodia and on tariff policy, but the timetable is not clear. As a result, reform of the water supply sector is yet not completed. Consequently, the license is the only official document provided to the private water operators at the moment. However, the process to obtain a license is not well documented and tariff setting is not based on a clear tariff policy. The fact that the validity of licenses is only three years or less also generates risks and uncertainties for licensees. In addition, license conditions are not clearly defined and do not identify: technical performance standards; target coverage rate; and technical standards to respect, except an obligation to provide safe water to customers. Furthermore, the proposed legal framework does not integrate taxation policy. Most of the private operators don't pay any taxes or fees. However, it seems that one condition for developing a suitable regulatory framework is certainly linked to the incorporation of taxation in the water supply policies.

The unknown number of informal private operators in Cambodia

Some figures show that there could be from 300 to 400 private piped water providers throughout the country. However, the exact number is uncertain and not based on an in-depth survey. Moreover, the number of potential sites identified depends on the technical standards used, the type of contractual models selected, and the investment breakdown applied. Therefore, following the water market in place, the final number could be lower or higher than any forecast. On the other hand, the RGC has not yet developed a water and sanitation investment plan allowing them to promote this kind of project to potential donors.

A lack of access to loans

Currently, several private water operators are facing difficulties in accessing loans. The main constraints are focused on the high level of collateral required by the banks in order to grant a loan. The high amount of interest (12% per year) is not considered a problem because private water operators borrow mainly from the informal sector at a higher interest than banks provide (estimated at 16% to 18% per year). However, loan conditions are flexible, the grace period is revisable and no collateral is needed. Furthermore, discussions between private informal "loaner" are easier than with bankers. Recently, a few private funds expressed growing interest in this kind of model but no experience has been achieved outside the MIREP loan scheme.

No local technical assistance available

Professionals working in Cambodian are mainly civil engineers trained in national or international schools. No course is available in country on urban water engineering; courses are mainly focused on rural engineering. As an example, no hydraulic engineering diploma exists in Cambodia. Finally, the knowledge and experience of Cambodian engineers depends very much on their professional experience and few of them are capable of designing a water production plant, or of supporting the construction and operation process. Besides, few local companies are able to provide professional consulting services on design, supervision and monitoring of piped water systems; only (expensive) international consultants provide such services and skills. Private water providers cannot afford international consulting services and very often design their own facilities. Unfortunately, given the poor quality of construction, every year a lot of money is invested for a bad result at the end.

How to scale-up the MIREP approach in Cambodia?

Passing from a pilot experience to a large scale program is not easy. Indeed, the MIREP pilot experience required significant involvement of technical staff, and such an approach could not be used in a large scale program. Based on its own experience, GRET would draw up a brief road map and key points needed to achieve this transition.

A need for mapping: How many potential sites can be set-up?

As we discussed, in Cambodia, the number of potential sites that can be implemented through a PPP approach is not clearly known and the total amount of investment needed is very high. For that reason, we believe that the first step would be to produce a comprehensive investment plan showing the amount needed following the contractual arrangements chosen by public authorities. In other sectors and in electricity supply in particular, such tools were developed and contributed to enhanced access to energy in many places throughout the country. A possible benchmarking between rural electricity and water would to be an interesting starting point.

Clarify the institutional arrangements and modalities for regulating the sector

The question is not whether the contract or license model is the best way to develop and regulate private investment in water supply in Cambodia. What is sure is that the duration of the arrangement should not be too short, in order to reduce risks and uncertainty and thus to increase opportunities for the Cambodian private sector. Moreover, the contractual arrangements should integrate technical standards and clear, but simple, performance objectives linked to an affordable tariff that can be controlled at local level. Furthermore, the modalities for financing the regulation of the water supply sector are not defined but several experiences showed that the main constraints are concentrated on this point. Shall RGC include the cost of this task directly into the water tariff or find other administrative options?

Develop affordable water technologies and disseminate them

Several low-cost technologies exist in Cambodia but no local engineering firm knows them and can provide affordable service to SPSPs. The water treatment plant developed during the MIREP program and improved through the PACEPAC Program can easily be standardized and disseminated at local level. We think that it is also possible to develop standard models of all technical aspects of water production and supply. However, engineering skills are still required in order to control the designs and even more to monitor the quality of construction works. Moreover, in order to reduce the first investment costs and reduce the risk for SPSPs, a modular approach would greatly contribute to a national planning of new investment needed in relation to the increasing population and water demand. Build a network of local engineering companies that can provide technical assistance and training.

Unlock and promote a new model of access to credit

Develop the water sector in Cambodia need to build a national access to loan. However, to achieve it, several remarks can be identified namely: the term of loan shall be close to 5 years as well as the amount of interests should be not higher than 6% per year. A joint credit scheme among electricity and water also could be achieve in order to reduce the risk of loans (electricity sector generate higher amount of loan and investment return than water supply sector). Without the bank expertise, a technical expertise must be available in order to promote the credit to the private investors as well as to validate the technical and financial viability of the project deposit. Moreover, for instant, few projects were totally financed by the private sector and in order to motivate them an initial subsidy is still required. While a motivate private Cambodian investors, a high potential for scale-up this model, several political and financial decision should be taken before an eventual development of the sectors.

Clément Frenoux, March 2010

Table 22: Summary of performance indicators

Site name	Program	Province	Starting date	Number of Houses	Number of HH 2009 connected	Water Coverage (%)	Production / Capita (lcd)	Consumption/ Capita (lcd)	NRW (%)	Water tariff (USD/m^3)
Touk Meas	MIREP	Kampot	Dec-04	344	424	123%	57.51	52.79	8%	0.6
Koh Thum Kah	MIREP	Kandal	Oct-05	591	1,000	169%	23.07	18.21	21%	0.6
Tram Khnar	MIREP	Takeo	May-03	359	415	116%	NA	37.99	NA	0.6
Smau Kney	MIREP	Takeo	Jul-03	280	280	100%	51.47	45.53	12%	0.6
Pech Changva	MIREP	Takeo	Jun-01	281	245	87%	37.98	27.05	29%	0.6
Phnom Den	MIREP	Takeo	Dec-03	400	320	80%	NA	38.85	NA	0.6
Tany	MIREP	Kampot	Dec-05	677	800	118%	31.11	25.93	17%	0.6
Kbal Po	MIREP	Takeo	Feb-05	286	139	49%	NA	14.93	NA	0.9
Sampoun Poun	MIREP	Kandal	Dec-05	539	1,000	186%	73.74	70.61	4%	0.6
Romeign	MIREP	Takeo	Jan-04	893	361	40%	29.02	28.73	1%	0.6
Lumchang	MIREP	Takeo	Feb-03	172	70	41%	NA	25.91	NA	0.6
Ang Roca	MIREP	Takeo	Mar-06	157	112	71%	NA	39.75	NA	0.6
Angkor Borey	MIREP	Takeo	Feb-05	1,035	502	49%	NA	26.83	NA	0.6
Prey Pkhoam	MIREP	Takeo	Nov-05	800	280	35%	18.48	17.44	6%	0.6
Prey Rumdeng	Pacepac	Takeo	Jul-08	368	150	41%	47.20	39.44	16%	0.8
Svay Prateal	Pacepac	Kandal	Nov-09	1,367	0	0%	NA	NA	NA	0.6
Traey Sla	Pacepac	Kandal	Jul-08	1,600	1,100	69%	NA	NA	NA	0.4
Thalon Khob	Pacepac	Kandal	Nov-09	560	60	11%	NA	NA	NA	0.5
AVERAGE				**595**	**403**	**77%**	**41**	**34**	**13%**	**0.6**
TOTAL				**10,709**	**7,258**					

Table 23: Overview of financial data of MIREP water utilities

Name of site	Name of program	Type of contracts	Starting Date	Private (US$)	Public (US$)	Users (US$)	Total (US$)
Touk Meas	MIREP	BOO	Dec-04	$ 30,740	$ 12,250	$ 6,360	$ 49,350
Koh Thum Kah	MIREP	BOO	Oct-05	$ 66,700	$ 11,500	$ 15,000	$ 93,200
Tram Khnar	MIREP	BOO	May-03	$ 61,685	$ 15,000	$ 6,225	$ 82,910
Smau Kney	MIREP	BOO	Jul-03	$ 29,974	$ 10,000	$ 4,200	$ 44,174
Pech Changva	MIREP	BOO	Jun-01	$ 37,621	$ 15,000	$ 3,675	$ 56,296
Phnom Den	MIREP	Leasing	Dec-03	$ 14,100	$ 13,100	$ 4,800	$ 32,000
Tany	MIREP	BOO	Dec-05	$ 74,214	$ 14,500	$ 12,000	$ 100,714
Kbal Po	MIREP	BOO	Feb-05	$ 46,240	$ 12,800	$ 2,085	$ 61,125
Sampoun Poun	MIREP	BOO	Dec-05	$ 44,350	$ 11,700	$ 15,000	$ 71,050
Romeign	MIREP	BOO	Jan-04	$ 42,050	$ 15,800	$ 5,415	$ 63,265
Lumchang	MIREP	BOO	Feb-03	$ 9,291	$ 8,000	$ 1,050	$ 18,341
Ang Roca	MIREP	BOO	Mar-06	$ 20,515	$ 9,200	$ 1,680	$ 31,395
Angkor Borey	MIREP	BOT	Feb-05	$ 67,900	$ 23,700	$ 7,530	$ 99,130
Prey Pkhoam	MIREP	Management	Nov-05	$ 1,000	$ 27,090	$ 4,200	$ 32,290
Prey Rumdeng	Pacepac	BOO	Jul-08	$ 22,400	$ 12,000	$ 11,040	$ 45,440
Svay Prateal	Pacepac	BOO	Nov-09	$ 131,500	$ 39,300	$ 41,010	$ 211,810
Traey Sla	Pacepac	BOO	Jul-08	$ 109,170	$ 38,800	$ 48,000	$ 195,970
Thalon Khob	Pacepac	Management	Nov-09	$ 1,500	$ 68,200	$ 14,310	$ 84,010
AVERAGE (MIREP - PACEPAC)				**$ 45,053**	**$ 19,886**	**$ 11,310**	
TOTAL - (MIREP-PACEPAC)				**$ 810,950**	**$ 357,940**	**$ 203,580**	**$ 1,372,470**
PARTICIPATION RATIO (MIREP-PACEPAC)				**59%**	**26%**	**15%**	**100%**
INVESTMENT COST/HH				**$ 76**	**$ 33**	**$ 19**	**$ 128**

Domestic Private Water Suppliers in Cambodia[80]

Introduction

The main body of this report describes in some detail a successful approach in promoting domestic investment in 14 small town piped water supplies as used by GRET in the MIREP program. Given the remaining needs in the domestic water supply sector in Cambodia, the story of MIREP is well worth telling, for it holds many lessons and valuable insights in possible approaches to community selection and participation, system design and operation, financing and contracting, and operator training.

At the same time, there has been little in growth in private water supply investment following the program and we need to ask ourselves what can be done to unlock investment and further leverage the lessons of MIREP.

The Water and Sanitation Program of the World Bank (WSP) has been working with Domestic Private Service Providers (DPSPs) in Cambodia since 2006, aiming to increase financial and technical inputs from the domestic private sector to improve the scale and rate of progress towards the Water Supply and Sanitation MDGs. Activities are aimed at supporting the development of small-scale private providers through: (i) the study and reform of policy and business environments for small-scale water supply; and (ii) the development of programs to improve the conditions under which they operate, including activities such as developing a capacity development program for transferring needed technical and management skills to DPSPs and helping them to apply this knowledge; and strengthening the regulatory environment, including reforming the licensing regime (to bring it more in line with the contracts that are being issued).

The DPSP data and analysis presented here are used to take a look at some of main constraints to growth and identify some possibilities for moving forward. The data are primarily summarized from a study commissioned by the World Bank in 2007 [1], supplemented by data and observations from the WSP DPSP support program as documented in [2]-[4], an AFD sector assessment from 2005 [5] and a recently published re-analysis of the original World Bank study [6].

We hope that presenting the detailed information on the MIREP operators combined with a more broad-brush summary of the status and opportunities in the private water supply sector will be of benefit to the RGC and other stakeholders in making decisions that will improve the institutional, business and operational environment for DPSPs.

Water Supply Needs: Coverage and Financing

The RGC has committed itself to reaching specific targets for water supply in urban and rural areas by 2015, under the Cambodian Millennium Development Goals. While the provision of piped water supply can perhaps be described as an "urban type service", most of the existing piped suppliers service rural areas[81].

[81] *Urban areas in Cambodia were reclassified in 2004. Under the new definitions (applied commune by commune) only those communes which (i) have a population* density *of at least 200 per square kilometer, and (ii) have a population of at least 2,000, and (iii) have a percentage of male employment in agriculture below 50 percent are classified as urban. In 2008, the urban population comprised 20% of the total.*

[80] *By Jan Willem Rosenboom, Country Team Leader of the Water and Sanitation Program of the World Bank (WSP). jrosenboom@worldbank.org*

Table 24: Water supply coverage figures and targets, 2000-2015

	2000 JMP	2010[82] JMP	2015 Target
Urban Water Supply	**64%**	**81%**	**80%**
Household connection	33%	55%	
Other improved	31%	26%	
Rural Water Supply	**42%**	**56%**	**50%**
Household connection	2%	5%	
Other improved	33%	51%	
TOTAL	**46%**	**61%**	--

While the growth in overall coverage in the past ten years has been impressive, the increase in household connections is much less pronounced. Nevertheless, a first impression is that Cambodia's CMDG targets for water supply coverage have been reached well ahead of schedule. The national picture hides vast differences among regions and income groups however. Access to an improved water source varies from 20% in Kep to 93% in Svay Reing; the richest 20% of people are 22 times more likely to have access to a piped supply than the poorest 20%. In spite of good progress, much remains to be done.

Furthermore, national surveys and JMP data report on access to "improved water supply technologies" while the 2015 CMDG target specifies "access to safe water" and the two are very different. If we were to interpret the CMDG targets as referring to access to water that has undergone treatment and disinfection and is supplied through a piped connection, the conclusion drawn from the above table would have to be that at present rates of progress Cambodia will miss its water supply targets by a wide margin.

A water supply and sanitation sector financing strategy developed with assistance from WSP[83] modeled an increase in urban household connections to a total of 95% and an increase in rural water supply coverage to 100% using low-cost solutions. To reach those targets by 2028 would require a total investment of USD 9 billion (in 2008 prices) or the equivalent of USD 28 per person per year. More than two-thirds of this is required for investment in infrastructure; the model excludes the costs for developing the required capacity. The RGC urban water supply strategy estimates that approximately $100 million is required to attain CMDG coverage targets for urban water supply, funds which are not currently indicated as priorities in the National Strategic Development Plan or the Priority Investment Plans. The estimate excludes the costs for capacity building and Technical Assistance (estimated at a further $31 million by the government).

The role of small scale private providers is not explicitly considered in the sector strategy or financing plans. Yet they play a small but important role in water supply.

What do we know about private suppliers?

A 2007 survey [1] estimated that there were 280 private water supply providers active in Cambodia (precise numbers do not exist) with a "market share" as summarized in Table .

As part of the survey, 75 private piped water suppliers were assessed. The survey concluded that private operators have been effective at providing water services in small towns in Cambodia. It also confirmed earlier conclusions that water services are a viable business, with social benefits that can enhance an operator's profile in society [2]. A number of donor projects (e.g. MIREP and the World Bank) have resulted in utilities of a higher standard some of which include specific efforts to reach the poor.

Data from the operator assessment were used to divide the DPSPs into three groupings according to the volume of water sold; small operators are those selling less than 10,000 m^3 per year (the largest group), medium are those selling between 10,000 and 60,000 m^3 per year while the rest are classified as large operators (of which there were only 4). Due to the lack of information about annual production, 14 of the suppliers could not be categorized. Table summarizes some of the main characteristics.

All providers described themselves as private commercial businesses, and all of them produced their own water (mostly using surface water sources) for distribution. In terms of network length, the MIREP operators fall somewhere between the small and medium operators, although in terms of number of connections they fall between medium and large. In general however, the survey shows operators that are predominantly small in all respects, and relatively inefficient compared to the larger businesses

[82] *JMP figures published in 2010 are compiled from 2008 and earlier data.*

[83] *Final results will be released in April 2010*

Table 25: Private supplier footprint (all data 2007)

Estimated # of DPSPs operating	Estimated # of people served	Customer base		Estimated % of population Served	
		Rural/small town (%)	Urban (%)	Among population with access to improved water supply	Among entire population
280	70,000	93	7	9%	2%

(the literature suggests that for a "well run utility" staff to connection ratios can reach 4:1000 or below; only the large suppliers come close to this). With increasing size comes decreasing staffing numbers, increasing use of treatment and household metering (which in any case is high even for the smaller operators), increasing operating hours, increasing consumption and in general a more positive business outlook as evidenced by business growth and desire to invest in expansion and/or water quality improvements.

Table 26: DPSP Operating Characteristics

	Small Operator (35)	**Medium Operator (22)**	**Large Operator (4)**
Average annual production volume in m^3 (range)	3,450 (290-9600)	22,130 (12,000-60,000)	184,680 (96,000-300,000)
Average number of Full Time Equivalent Staff (per 1,000 connections)	1.6 (26.7)	3.9 (13.3)	9.1 (4.7)
Average number of HH connections (range)	85 (6-300)	310 (100-580)	1,856 (1,142-2,410)
Proportion with water treatment plant	20%	50%	100%
Proportion with 100% metered connections	74%	95%	100%
Average network length in meters (range)	1,690 (60-6,600)	6,280 (900-14,500)	27,590 (1,900-71,560)
Average operating hours per 24 hours	13	17	24
Average percentage Unaccounted For Water[+]	22	25	27
Average daily consumption per connection in liters	125	190	260
Average water price in USD/ m^3 (range)	0.47 (0.25-1.00)	0.46 (0.18-0.43)	0.43 (0.38-0.48)
Average cost of connection fee in USD	16.77	18.63	40.00
Average annual turnover in USD (range)	1,635 (165-6,300)	10,220 (2,700-25,500)	80,212 (38,700-123,750)
Proportion with business growing / declining	34% / 37%	77% / 0%	75% / 25%
Proportion wanting to invest next year	26%	50%	75%
Reason to invest	Expand network: 44% Water treatment: 22%	Expand network: 45% Water treatment: 55%	Expand network: 100%
Licensing status	MIME: 9% DIME: 17% Other/None: 74%	MIME: 41% DIME: 36% Other/None: 23%	MIME: 75% DIME: 0% Other/None: 25%

[+] Some of the data are too good to be true; particularly small and medium operators have limited ability to estimate UFW with some assessing ("guessing") in the 0-5% range.

What changes little across the categories is the amount of non-revenue water or the price charged for water (even though price fluctuations are much larger for the smaller operators than they are for the bigger ones). As mentioned already, the non-revenue water figures are not particularly reliable;

recall that 14 of the operators could not even provide their annual water production figures. The relatively constant (and high) water pricing would suggest that the operators don't determine tariffs based on an understanding of the costs of production, but instead charge either what the market will bear, or what others in the area charge for their water. MIREP operator data shown earlier in this report reveal the same trend. Anecdotal evidence from conversations with providers and PPWSA suggest that indeed the knowledge of water production costs is very limited.

Finally, although medium and larger operators are more likely to operate with a license from MIME or DIME, the prevalence of smaller operators means that overall only 48% of all surveyed private operators operate with such a license (although all operators have some form of local agreement with the district, commune or even the village authorities even if those are not recognized as "operator licenses").

Opportunities and Issues

The foregoing sections show that the need for continued investment is great, and the current coverage through private suppliers is significant, but small at below 10% of the population covered with piped water.

As the responsible ministry, MIME operates public water supplies in 19 of 23 provincial capitals; the remaining four are served by private utilities operating under license. The reality of these provincial utilities is that they serve a small proportion of the population at best (estimated at 15%-30%) and most have been unable to expand their networks significantly (or at all) in the past 15 years (although a number of these public utilities were renovated with donor funds, some of them more than once).

At present, MIME does not intend to expand the public water utilities beyond the current number, lacking both resources and capacity. The Ministry encourages private investment in water supplies, although there is no regulatory framework in place that offers protection to would-be investors (a water supply and sanitation law that was drafted in 2004 proposes establishing a regulator. The law has not yet been submitted to Parliament however).

According to 2008 census data, there are 2000 rural villages in Cambodia with 300 or more households and almost 300 rural villages with 600 or more households (see Figure 30). Few if any of those communities are currently served by piped water. Physically, the possibility (and need) to invest in water supply is there; the operators have shown that it is possible to turn a profit with a few hundred connections[84]. Operating at a slightly larger scale and looking at rural communes as units, almost 1,100 out of more than 1,400 count at least one thousand households, while 400 communes have 2,000 families or more. Why is it that private suppliers are not investing in these underserved areas on a larger scale?

The urban water supply strategy indicates that there are two main constraints to growth in the sector. With a small generalization in the language, these constraints apply equally to public (urban) utilities and private small town water suppliers; first is the absence of a comprehensive strategy to channel financing into the sector and to address weak incentives to raise more own-generated funds from user revenues and domestic private investors. Second is the capacity of the providers to absorb increased funding and utilize resources efficiently towards expanded access to sustainable services.

Suppliers themselves echo these constraints in slightly different words. In DPSP workshops, the three most commonly mentioned constraints to doing business were:

1. No access to funds;
2. Limited technical and management skill;
3. High costs, particularly due to high energy prices and corruption.

The Economisti survey among 75 private suppliers [1] confirmed those findings (Figure 31) with the exception of the observation on technical and management skills.

[84] *Even though the MIREP experience shows that there is no direct relationship between profitability and number of connections. It is possible to make money with 300 connections, and to lose money with 800. The presence of economic activity and a more or less agglomerated village center appear to be better predictors of profitability, even if there is a boundary below which the construction of a piped supply makes no economic sense.*

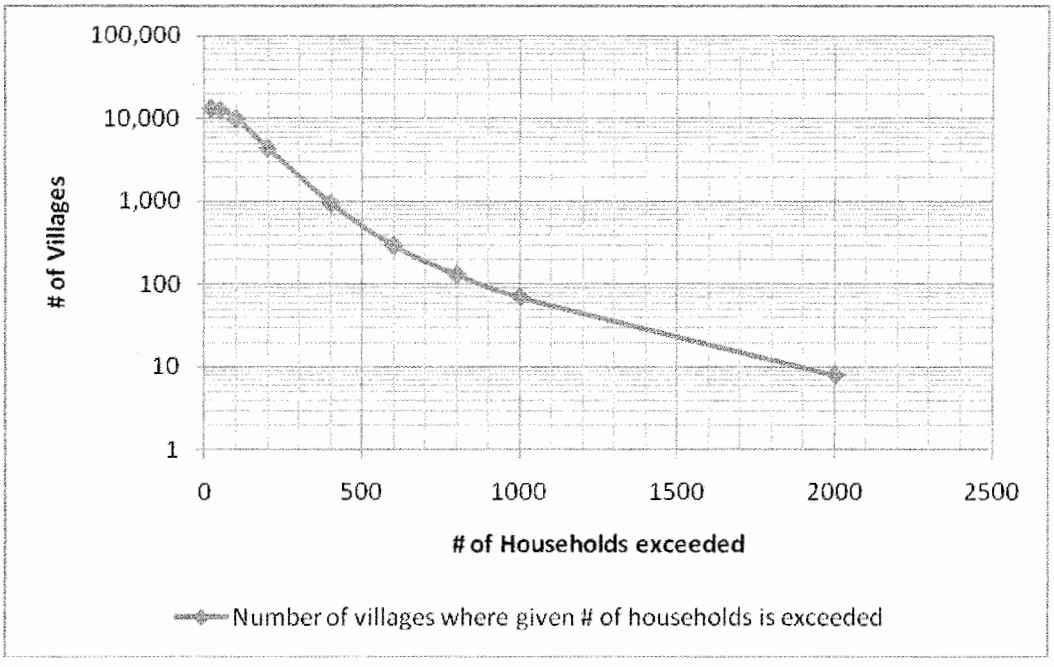

Figure 30: Number of rural villages exceeding a given number of households (created from census 2008 data)

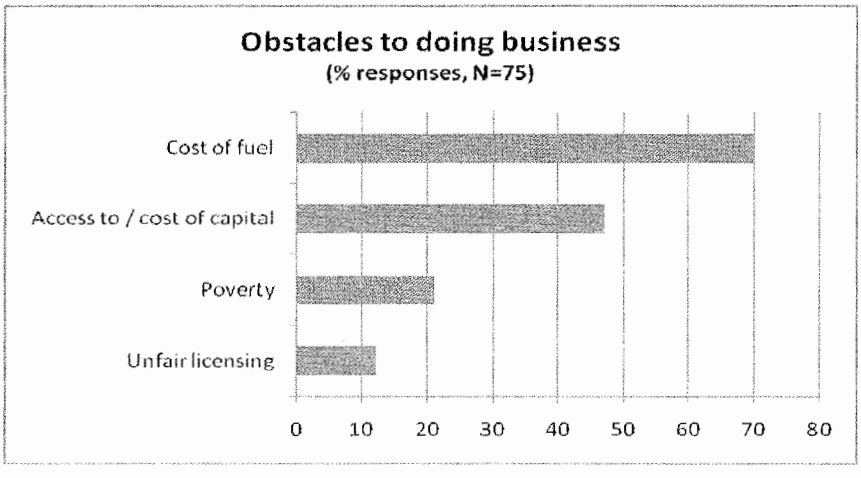

Figure 31: Percentage selecting indicated obstacle as first or second most pressing problem for business

Main concerns from the government perspective include a desire to regulate the operators and tariffs to ensure operators meet minimum technical standards, and provide good quality water at reasonable prices. The role of the government in helping providers meet minimum standards (e.g. through technical and advisory services) is not very well defined and neither are the minimum requirements themselves.

The key issues here are in the business and operational environment.

- Business environment

Licensing. Officially, operator licenses are only issued by MIME in Phnom Penh, and technically, the informal licenses issued at subnational levels do not confer official "licensed operator" status. The MIREP operators skirted this issue, since

there was an agreement with MIME on the subject. The local contracts signed by the Provincial Department of Industry, Mines and energy (PDIME) were recognized as local licenses (but they were not considered equivalent to national licenses). At national level, MIME only issues licenses valid for one or two years, and licensing conditions and costs are poorly defined. This uncertainty can drive up tariffs (as operators seek to recoup their investment as quickly as possible) and it makes the sector unattractive for would-be investors; a better match between license validity and asset life would lower the investment risk.

Access to credit. Many operators mentioned that they could not access finance to expand or improve their operations. Generally commercial loan products offered are short term (6-12 months) in the form of an overdraft facility. The guarantee fund established at a commercial bank by the MIREP project enabled borrowing by small providers, but this was an exceptional arrangement. High interest rates, short loan tenor and high collateral requirements all hamper access to debt financing. Loans paid back over a longer period of time would be more in tune with the nature of the business (just like long term licenses make more sense than short term ones) and would remove some pressure from water tariffs (having said that, even banks willing to provide longer term loans may not have access themselves to longer term credit). Although banks are extremely conservative in their attitudes to risk, given current growth in the sector, increasing competition and the search for new markets, opportunities exist for the development of specialized lending products (if warranted by market size and viability). Based on current cash flows, it appears that at least some of the existing suppliers could formulate viable projects to be financed through loans. Currently there is no relationship between operator size (measured as number of connections or annual revenue) and debt absorption capacity. This implies that it is project planning and management that will determine the viability of planned investments and that focus on this will increase the number of bankable projects.

Access to technical advice or business support services. Providers express the need for technical support for a variety of situations, including system design, water treatment improvements (e.g. chemical dosing, measurement) and leak detection and repair. A particularly strong component of the MIREP program was the support provided at the system design stage, and the training of operators in system management (including water treatment and system operation and maintenance). However, outside the scope of specific support projects, consulting or business support services are not available at a cost that providers can afford (in addition, the willingness to pay for support is very low among providers). While provincial government departments (and even MIME) have expressed some willingness to provide technical support to suppliers, capacity in the government is also generally low (and advice provided by government staff is not necessarily trusted by operators).

High operating costs. Even though this is hardly part of the general business environment, it is undoubtedly true that the fuel crisis increased operating costs, and the effects of the financial crisis may decrease customers' ability to pay their bills. Managing such unpredictable impacts is realistically more part of overall business management by the providers.

- Operational environment

Limited business and technical skills of operators. The operators themselves are not shy in pointing out that they lack essential skills, relating to both the technical aspects of being a water supply provider, and the running of a business in general. Smaller providers tend to operate without keeping business records and many do not know how much water they produce or what it costs to produce it (as evidenced by the apparent reference pricing among operators). None are able to perform their own water quality monitoring, and there is no credible system in place for the licensing authority to monitor compliance with water quality standards.

Government as service provider. At present, government is itself a service provider, it issues licenses to private service providers and it monitors compliance with licensing conditions. This is a system that creates obvious conflicts of interest, and is not a credible approach to sector management. Fortunately this is a situation that is recognized and addressed in the draft water and sanitation law. Unfortunately however, this law has seen no progress since it was drafted in 2004.

In the presence of those constraints, and in the absence of a government strategy actively promoting expansion in the sector, piped water supply provision is unlikely to grow significantly beyond its current levels. Existing operators will continue to struggle to find the means and the ways to improve and expand their operations. At the same time –given the lack of alternatives– private operators will remain important service providers, and it is well worth considering what can be done to improve existing operations and encourage new ones.

Improving and Expanding Domestic Private Water Supply

To address some of the issues summarized before and capitalize on the opportunities, a number of immediate actions are necessary, primarily aimed at addressing the uncertainty of

the business environment and lowering costs through improving operational management and record keeping by existing operators. Longer term steps should aim at systematizing approaches to technical assistance and capacity development, as well as improving access to finance.

Immediate next steps

The main recommendation is that the planning and licensing of water services should effectively be devolved to the commune and district levels, with the distinction based on size of the proposed scheme. Technical and planning support to the communes and districts to enable them to manage the local sector responsibly should be provided through the existing DIME offices at provincial level[85]. MIME should develop 10-15 year licenses, with clear license conditions and minimum requirements and pricing publicly disseminated. Looking at the MIREP contracts, simple performance objectives could include: system coverage, water quality, tariffs and conditions for tariff review, connection costs, system ownership as well as other duties and responsibilities of the operator and the local authorities. Licenses should be issued at commune level (for individual village water supplies) or district level (for larger multi-village clusters). A simple standard operator contract which clearly spells out rights, duties and remedies should be adapted for individual operators. This could include information on OBA-type subsidies that have been agreed, lease or other payments, depending on the type of scheme. The existing experience with the MIREP project holds valuable insights, as do the World Bank financed OBA and DBL projects for small town water supply and sanitation (even if experience with the latter is partly negative in nature; standard World Bank contracts for example proved much too complicated). Long term licenses alone may lower operator costs and improve access to finance.

Providing technical support should be aimed at lowering costs (e.g. lowering water loss, access to alternative energy sources, benefiting from economies of scale and increased connections - for example through an OBA component subsidizing public standposts or connections of poor households). The ongoing DPSP capacity development work by WSP, GRET and VBNK is providing valuable insights into what approaches work, and is contributing to better record keeping and systematized data collection. How to make technical support more widely available outside of specific support projects is a non-trivial question requiring serious further attention. Associations of suppliers could become the focal point for capacity building efforts, receiving or managing funds for the purpose. In the longer term, associations could become the providers of technical assistance to new operators or other associations.

Beyond the immediate

- Supplier associations.

Further lowering of costs and strengthening of operations can come from the formation of supplier associations at the commune or district level. As mentioned before, they can become the focus of capacity building efforts, but they can have other advantages as well, for example through more effective engagement with government or other utilities (such as PPWSA). They can lower purchasing costs through bulk supply (e.g. of chemicals) and they can play a role in advocacy. On the business operations side, associations can play a role in accreditation of operators, systematizing data reporting systems and associated benchmarking efforts. There is little positive experience with supplier associations in Cambodia, and few –if any– examples that operators can follow. Careful encouragement and support by sector stakeholders could play an important role in overcoming the hurdles.

- Engage with Phnom Penh Water Supply Authority.

The PPWSA forms a vast resource of experience, technical expertise and goodwill. Making use of PPWSA experience and expertise should be a "no-brainer" especially given the fact that PPWSA management seems more than willing to play a supportive role in the DPSP sector. At present, more effective engagement is held back by the fact that there is no "entity" to effectively engage with (but the formation of associations could change that) and by the fact that the expertise in PPWSA is not very accessible. Making the experience of a utility with some 175,000 connections relevant to a rural water operator with 300 connections requires some creative thinking.

In addition to being a source of technical expertise, in future PPWSA may be able to play a role as investor in new water supply projects. Such a role would require permission from the board, as at present PPWSA is not allowed to invest in anything but its own operation and expansion. As such this is a future strategy component, but pursuing discussions with PPWSA on the subject would be worth it (especially in the absence of appropriate financing available to the sector, as mentioned earlier).

- Focus on water quality

Although immediate work could be done (and should be done) with suppliers to strengthen their understanding of, and ability to deal with, issues

[85] *This may be easier said than done; a number of PDIME offices may themselves require strengthening. MIME and perhaps PPWSA could play a role in fulfilling this need.*

relating to water quality, that alone will not be enough. There is value in working with suppliers on water safety planning (work that could be supported by the large number of supporting publications on the subject freely available from WHO and IWA). This would arguably lead to improvements, but without credible systems in place for independent surveillance such improvements are bound to be short-lived. Supporting improved surveillance capacity, including random testing, on site analysis and free technical assistance for those operators who consistently fail water quality tests should be considered as part of any water quality improvement efforts. In addition, any water quality improvement work should include a consumer education program. This is particularly important because at present there is little customer demand for a chlorinated water supply. As a matter of fact, customers don't like the smell or taste of chlorine, and some households go to some lengths to ensure that the water they consume has no residual chlorine any more (e.g. use the water from a house connection to fill up a rain water jar, and then let the chlorine dissipate before using it). For an operator, it may be hard to resist the choice not to chlorinate the supply and sell more water.

- Support MIME

A number of the ideas and recommendations raised earlier of course imply working with and supporting MIME, as well as subnational authorities (such as provincial DIME offices and Commune Councils). Such support would take the form of assistance in developing license conditions and contracts, developing appropriate minimum technical standards (taking into account the experience with MIREP and other projects), and supporting the development of improved water supply surveillance capacity. In terms of direct support to MIME for sector reform, assistance with the formulation of a comprehensive reform package, as well as an assessment of public sector reform impacts should be considered. Reform impact assessment should encompass reforms as proposed by MIME itself, as well as those currently being formulated by the Ministry of Interior, such as those described in the law on the Decentralization and Deconcentration (D&D).

- Improve access to finance

It is likely that trained operators with a long term license, accredited by their local supplier association, and with proper business and operational records will find it much easier to access debt financing than is the case today. In other words, some of the work currently ongoing, and other activities proposed in the main body of the report as well as this supplement may lead to substantial improvements in operators' ability to access finance. At the same time, further financial products could be designed that better match conditions in the sector, or serve to remove obstacles. Offering loans to licensed providers on easier terms (longer loan tenor, lower interest rate) were mentioned already. Including an OBA component subsidizing connections for poor households would be another example of a loan product supportive to sector goals.

Conclusion

It is clear that much can be done to improve the functioning of the current small scale private water operators, as well as increasing the attractiveness of the water sector for domestic would-be investors.

For that, engagement between entrepreneurs and government is required (as well as donor support). At the same time, we need to realize that capacity constraints on the side of operators as well as government makes this difficult. Operators want to run their business, not engage in policy debate. Most have a practical arrangement with local authorities and see limited need to engage at national level. Government is not set up to engage with a varied group of geographically spread businesses, and the question of how to engage remains difficult to answer. Lack of trust between both sides makes any engagement harder still.

Recognizing the need to move forward in the absence of clear answers, the current capacity building pilot program includes a "relationship building" component between government and participating operators, creating a safe space for the exchange of ideas as well as issues. Hopefully, the experience and materials resulting from that program can be used to benefit capacity building and overall reform on a larger scale.

Much data and useful experience exists and has been documented. All that is needed now if the political will (and the resources) to apply it.

Jan Willem Rosenboom, March 2010.

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Building water utilities with local entrepreneurs

The example of the Mirep program in Cambodia 2000-2010

Small town water supply management in Cambodia has been undergoing a transformation of late. Served by community wells or household rain water jars before, a number of small towns have seen spontaneous local investors establish water systems offering various service- and quality levels, ranging from pushcarts to treated, piped supplies.

This publication highlights one approach to supporting domestic private water supply initiatives implemented in the period 2000-2005. With the benefit of hindsight, some lessons are distilled from the experience. Furthermore, some suggestions are offered for the further promotion of small scale private water supply in the country, based on the most important lesson of all.

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