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Cambodia



AN ASSESSMENT OF PROMISING WATER RESOURCES MANAGEMENT APPROACHES IN THE DRINKING WATER AND SANITATION SECTOR

**Royal Government of Cambodia
Ministry of Rural Development**

**Cambodian Area Rehabilitation and Regeneration
UNDP/UNOPS/CAREERE**

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Executive Summary

[The three workshops organized by CARERE and Ministry of Rural Development in Cambodia were the first in its kind. The purpose was to get answer to the leading questions which support the 8 principles and to assess the existing water resources management in the country. A participatory method was used in all of the three workshops, include field visits and interviewing with key government personnel.]

Introduction

Mismanagement of water and land resources is putting human health and sustainable social and economical development at risk and can have negative consequences for domestic water supply. Integrated water management has been identified as essential to quality of life and to the sustainable development of water resources. Already at the 1977 Conference in Mar del Plata, WRM was discussed, but it was not until the early nineties that it was really put on the international agenda. A number of significant meetings, such as the Dublin and the Rio de Janeiro Conferences in 1992, and the Noordwijk Conference in 1994, have further reinforced the importance of integrated water management and have set out 8 principles for the formation of related policies and strategies.

In order to respond in a concerted manner, the UNDP/IRC Project entitled "Promising Water Resources Management Approaches in the Drinking Water and Sanitation Sector" was developed. The project is being carried out in three phases. A preparatory workshop was held in the Hague, the Netherlands, from 20 to 29 November 1996. This was followed by 20 days of in-country assessment over a period of 9 months, and lastly there will be a synthesis workshop in the Hague from 3 to 10 September 1997. The latter workshop was originally planned for the period 23 to 28 June 1997 but it was postponed at the request of participants who required more time to complete the assessment. There were 15 participants and three Advisory Group members in the preparatory workshop. The participants were from Cambodia, South Africa, Ghana, Guatemala, Colombia, Nepal, India and Sweden.

The two participants from Cambodia were Dr. Khun Ngeth of the Ministry of Rural Development, and Mr. Cheap Sam An of UNDP/UNOPS/CARERE. Both participants are being sponsored by CARERE.

Part of the geographical area that is assisted by CARERE was selected as a representative yet focused project target area for the assessment. The overall assessment concentrated on activities at three levels: the Phnom Penh Water Works at the national level, the Battambang Town Water Works at the provincial level, and Panh Nha at the village level.

Preface

This assessment would not have been possible without the support of a number of individuals who assisted in a variety of ways, at the national level in Phnom Penh, at the Battambang Town level, and in Panh Nha Village

Thanks are due to all those who assisted the project in one way or another, and a number of individuals merit special mention. Dr Èk Sam Chan, Director, PPWSA, provided the team with information and statistics on the Phnom Penh Water Works. Dr Khun Ngeth, Deputy Director General, Department of Technical Affairs, Ministry of Rural Development; Dr Veth Sreng, Deputy Director of Rural Health Care, Ministry of Rural Development; and Mr Keo Muny, Chief of Secretariat, Department General of Technical Affairs, conducted a workshop at the Phnom Penh level and helped gather related information. Mr Touch Sarin, Director of the Battambang Town Water Works and his team facilitated the assessment at the provincial level by giving the team access to the town's water supply infrastructure and by participating in the Battambang workshop and related discussions. Mr So Sovath, Deputy Director of the Provincial Rural Development Department, and Mr Mao Sophanna, Chief of the PDRD Water Supply Section, provided continuous support. In Panh Nha Village, Mr Nhoek Vith, Village Chief, and Mr Seng Hoen, Chairman of the Village Development Committee were instrumental in making the project's village level work successful. Mr Cheap Sam An, CAREERE WATSAN Programme Assistant, co-ordinated project activities at the provincial and village level and assembled the project's findings into report format. Mr Leo Goulet, CAREERE WATSAN Advisor, helped steer the project and edit the final assessment report.

Chapter 1 Background

Cambodia is classified by the UN as a least developed country, and the five CAREERE-assisted provinces are among the poorest of the country's 23 provinces. As is the case for all CAREERE support, the CAREERE-assisted WATSAN Programme concentrates on rural areas of the four provinces of Bantey Meanchey, Battambang, Pursat, and Siem Reap in the North-West, and Ratanakiri in the North-East. Some support is also given to national-level activities.

The rural inhabitants of the North-West are predominantly ethnic Khmer who observe the Buddhist religion, and who make a living from farming. Although there are mountainous areas, these are largely forested, prone to security problems that stem from the activities of rebel groups, and are generally uninhabited. The majority of the population live in plain-like areas, and in the area which surrounds the *Tonle Sap*, a large inland lake.

The rural inhabitants of Ratanakiri Province are from a number of ethnic minorities, each of which tends to have its own language and religious persuasion, frequently animist, and sometimes Buddhist. Many of the minority groups in the area are nomadic and live off hunting and slash-and-burn agriculture.

For Cambodians in general, the village is the most complex social unit in which they participate. It is seen as a fluid aggregate of families whose interaction changes to suit the occasion but whose affairs are variously overseen by village elders, temple laymen, monks and, of late, designated village heads.

In the North-West poverty can largely be associated with the intense security problems the area has experienced over the past 25 years, while Ratanakiri suffers from its geographical isolation from the rest of the country. Those who survived the horrors of the Khmer Rouge rule from 1975 to 1979 had all along to deal with the death and injury of family and friends, and the loss of their property and capital on a scale that is difficult to imagine. One of the consequences was the country's loss of a large proportion of the skilled workforce which would later have been required to rebuild it.

Hostilities of a military nature between the Khmer Rouge and the Viet Nam-supported Cambodian army resulted in large numbers of inhabitants fleeing to Thailand in 1979 and in lesser numbers during subsequent years. The refugees settled temporarily in camps along the Thai/Cambodian border. Meanwhile, within Cambodia, over the 1979 to 1989 period when there continued to be a strong Vietnamese presence, development aid was largely limited to sources in the former East Block countries, India, and a number of INGO's. Whatever little assistance did enter the country was channelled through the central government, and was in general directed at emergency needs. Contact with rural communities was very limited because of exhaustive travel restrictions.

As a result of the Paris Peace Accords of 1992, approximately 360,000 refugees were officially repatriated in an operation carried out by UNHCR. In addition, there was an undetermined number of refugees who returned "spontaneously" and outside the UNHCR umbrella. Approximately a third of the returnees settled in Battambang Province, with a slightly smaller number choosing Bantey Meanchey Province. The provinces of Pursat and Siem Reap also received a large proportion of the returnees, with the remainder distributed throughout the rest of

the country

In the North-Western Provinces the returnees increased the total population by as much as 25%, putting a strain on an infrastructure system already made frail by decades of turmoil and war. Poor security due to the presence of landmines and other factors, lack of means to increase agricultural production, lack of a system of primary roads in rural areas to increase access to markets, and health problems associated with an inadequate water supply, all were constraints to the successful resettling of returnees.

The CAREERE/WATSAN Project was initiated in 1992 as one of several CAREERE-assisted projects aimed at providing basic services to returnees from the Thai/Cambodian border camps. Much of the work done from 1992 to 1994 was directed at quick impact projects for road building, school construction, health care, and drinking water. In recent years approximately 1000 wells, both drilled and dug, have been installed in the province, mainly with the assistance of UNICEF, OXFAM, CARE International, ANS and UNDP/CAREERE.

After the formation of the new government in 1993 CAREERE's priorities gradually began to shift away from emergency relief to longer term, development related activities. There were fewer directly implemented projects, and more activities planned and implemented through the government.

In 1996 a second CAREERE project, with a duration of four years and a proposed budget of approximately US \$ 40 million, in five provinces, was approved. The mandate of the new CAREERE2 is to build the capacity of government institutions to decentralize their activities, in support of bottom-up planning that begins at the village level.

In this spirit, CAREERE assistance to the WATSAN Sector stresses the need to develop the government's capacity to assist villages in identifying and solving their own WATSAN-related problems. Approximately 10% of the CAREERE budget is allocated to the WATSAN sector.

The importance of overall policy and strategy development for the sector is recognized as a priority, and CAREERE has over the years been providing a sustained level of assistance to this sectoral area, particularly at the national level. The management of the Phnom Penh Water Works, which assessed in the context of the IRC project, is representative of policy initiatives at the national level. The Battambang Town Water Works was chosen for assessment as an example of water resources management at the provincial level, and the Panh Nha assessment gives an idea of WRM at the village level.

The Phnom Penh Water Supply Authority.

Available information on the Phnom Penh Water Works dates back to 1959, when the system included a water treatment plant that drew 30,000 cmd from the Mekong River, built in 1895 by CEEI (Compagnie d'Electricite et d'Eau de l'Indochine), and a 40 km distribution network. The water tariff and collection system in existence at the time, established earlier by the CEEI, allowed the PPWSA to cover operation expenditures and planned investments as required by the municipal government for the development of the city.

The Phnom Penh Water Supply Authority of Cambodia (PPWSA) was formally created by Decree No. 164 dated 24 March 1960. The PPWSA has the status of a company that is under

the direction of the Phnom Penh Municipality. The principal responsibilities of the PPWSA were the production and distribution of treated water for the city, and the generation of income to cover operations costs and investments.

The period 1959-1970 was a period of high investments, the results of which included the following facilities:

- the Phum Prek water treatment plant, put into operation in 1965, with a capacity of 100,000 cmd
- a rehabilitated Chrouy Chang War plant, built in 1895, that saw its capacity increased to 45,000 cmd, with Japanese assistance
- 240 kms of additional piping, covering the entire city, including new household connections for the supply of water to more than 500,000 inhabitants

Water tariffs and the tariff collection system were maintained, to the point where new investments were made possible.

By 1970 the water supply system was supplying 155,000 cmd of good quality water to the 600,000 inhabitants of the city, through a 280 km distribution network.

During the period 1970-74, the beginning of the degradation of the economic situation in Cambodia, the water system remained in good condition but no new investments could be made. A project for the creation of a National Water Company, financially autonomous but under the control of the Ministry of Finance and Ministry of Public Works, was planned but not implemented.

During the terrible "Khmer Rouge" period from 1975 to 1979, Phnom Penh was emptied of its population. The entire water system was left without maintenance and stopped functioning, except for the Chamkar Mon treatment plant, which was only kept in operation for the supply of water to some restricted areas.

In 1980 the PPWSA came back into operation under supervision of the Government, but difficulties in reorganising life in the city, the lack of funds, the embargo imposed on the country and lack of maintenance resulted in water being supplied under highly unsatisfactory conditions. In 1983 the operation of Chrouy Chang War treatment plant had to be stopped because of urgent need for rehabilitation. The other plants produced water only when electricity, chemicals and spare parts were available. Pumps could not provide enough water pressure in the mains, and the rate of distribution became very low.

As a result the population had to adapt its consumption practices. Public wells connected to the distribution system were created and ancient connections were multiplied, causing unceasing water losses (????????). Under these conditions, water was distributed free of charge.

Under assistance from the USSR and various NGOs it was possible to increase production, and in 1986 PPWSA received from the Government the authorization to sell water and collected money from the customers on a low rate basis.

Step by step the PPWSA has been reorganised but financial operations remained unsatisfactory.

Battambang Province.

Battambang Province borders Thailand to the West, and the provinces of Banteay Meanchey to the north, Siem Reap to the North-East, and Pursat to the south. It covers an area of 1,138,000 hectares, broken down into 270,000 arable hectares, 284,000 hectares of rice fields, 470,000 hectares of forested, and 238,000 hectares of Tonle Sap floodplain. There are eight districts, 66 communes, and 482 villages, in three distinct geographical areas. The province has a population of 678,000, of whom approximately 120,000 returned from the Thai border camps in 1993 and 1994.

In 1994 the newly created Provincial Rural Development Committee (PRDC) took over much of the overall responsibility for the implementation of rural development projects, while actual project implementation was carried out by the Provincial Department of Rural Development (PDRD). Since 1995, 91 Village Development Committees (VDC's) have been established in 17 communes of 6 districts, with the assistance of the PRDC. A large proportion of the province's existing wells are located in villages where there are VDC's.

Background to the Battambang Town Water Works.

The Battambang Town water treatment and pumping plant and its piped distribution system that serves the old centre of the town is a Government owned water supply utility that dates back to the mid 1950s. Prior to 1975 the waterworks was under the direction of the Public Works Department¹. According to officials, the waterworks was until April 1993 operating jointly with Battambang Electricity but it is now an "Autonomous Department" that reports to the Department of Industries. The waterworks was in a run down state until the European Community (EC), through the agency SAWA, began to assist its two year rehabilitation in 1992-1994, [it operates at only about one of its 6,000m³/day capacity treatment plant^{????????}]. It now operates at 50% of its capacity, producing 3,000 cmd. The treatment processes include settling, dosing with alum, rapid sand filtration and chlorination, but leaks in the ageing distribution system still result in a degree of contamination between the source and the end user.

At the time of this assessment the waterworks was operating at 50% of its originally designed capacity. This low level of output is due to the general run-down state of the plant, insufficient electrical generation capacity, and problems with the river intake. In the dry season, when the level of the river is very low, a dike has to be built across the river, near the intake structure, to keep the water level high enough to enable pumping (see annex ^{??????}).

Despite the fact that about 40% of consumers are regularly in arrears on payment of dues, by mid 1993 there was a small operating surplus, though with no allowance made for depreciation. This surplus was due to increased water sales since the SAWA rehabilitation work, a price increase in April 1993, and some progress in reducing arrears.

On paper, the degree of independence of the "autonomous department" is substantial, with technical advice and capital loans being the only assistance it receives from the government. Waterworks' officials report that prior to the SAWA intervention and separation from the Electricity Department running costs were recuperated from the users.

¹ ODA Report March 1994 (give additional details, page no. , etc^{????????})
048-177 DOC

Laboratory

The water testing laboratory was built in 1993 with EU/SAWA support, and actual water testing was able to begin in 1994. According to the Director, the laboratory has three staff, all of whom are women: two civil engineers and one technician.

Among other methods, titration and photometry are used. Tests include alkalinity (CaCO₃), turbidity, Ph, free chlorine, total chlorine, combined chlorine, iron, fluoride, manganese, nitrate N, nitrite N, conductivity, temperature, ammonia and bacterial testing. Most of the samples tested are from the town waterworks, but the agency Action Nors Sud also sometimes requires the testing of water samples from some of the village wells that they install.

Sources of Water.

There is substantial seasonal variation in water resource availability for Battambang Town, with the river being the principal source during the dry season. River water is also used during the wet season, complemented on a wide scale by the use of stored rainwater. Almost all households have either rain water jars or rainwater tanks (see annex). Roof run-off water is collected and stored in 200 litre jars or in tanks with capacities from 2 to 4 cu m.

The quality of the river's water has deteriorated substantially since ongoing gem stone mining began upstream at Pailin in 1985, causing a large increase in the level of suspended solids. Certain parts of town have access to groundwater, but preference is generally given to any form of surface water, in which the dissolved minerals that frequently give a noticeable taste to groundwater are absent. There are many private abstractions from the river along both banks, which provide water for household use, vehicle washing, or for the irrigation of orchards and vegetable gardens. For household use, the water is pumped up into jars where alum is added, and from which the water is then sold to local distributors, many of whom collect the water in small tanks mounted on push-carts (see annex ????)

From 1994 to 1996 four private exploiters, working in agreement with the waterworks, extended the piped water network to outlying areas West of the river: Chamka Samroung, the slaughter house area, Toul Ta Ek, Wat Kor, and to Rotanak, "13 January Market" and Anlongvil on the East side of the river. The exploiters manage and sell piped water to the residents of those areas, who supplement their supply with rainwater, surface water, groundwater and water from private vendors who pump it directly from the river.

Assessment of Panh Nha Village

Panh Nha is one of the six villages of Kompong Preah Commune, Sangke District, located 15 kms South-East of Battambang Town along National Highway 5. It neighbours the villages of Koki, Kompong Preah and Prek Chek of O'dambong Commune.

In 1945 the village had 500 inhabitants in 100 families. Presently, there are 303 families and a total population of 1,608. The village administration structure includes the village chief, the militia, group leaders, and groups responsible for various activities, such as the village health volunteer, the animal health person and the village development committee. There is one Buddhist temple and one primary school, which is supported by a local NGO called Buddhism for

Development In addition to its normal function, non-formal education activities are also conducted in the school

Most of the inhabitants of the village are farmers who use draft animals. There are 418 hectares of arable land. Besides farming, fishing, small businesses and kitchen gardening are activities that also take place. There is agricultural potential, but there is a lack of agricultural tools and skills to develop it further. The average family income is very small. When the standard of living is divided into three categories, 106 families (35%) are classified as average, 114 families (38%) are classified as poor and 83 families (27%) were considered as very poor (Rural Water Supply Office Wealth Ranking report). There was severe flooding in the area in 1994, 1995 and 1996 which led to a lowering of the standard of living of the villagers.

Sources of Water.

As is the case in most of rural Cambodia ponds, both family and community type, are the primary source of water. In general, however, the untreated pond water found in this village can be considered to be of poor quality since the ponds have no protection to prevent contaminated water from draining into the pond.

There is a substantial seasonal variation in sources of water. Pond water tends to run out during the dry season, at which time wells become a principal source. During the wet season, when rainfall is regular and plentiful, the use of stored rainwater increases and the use of well water decreases. Typically, the inhabitants of Panh Nha Village prefer the taste of surface water to that of groundwater.

In preparing the village map, the group held discussions with the villagers and visited most of the village's water sources, which are four communal ponds, 80 family ponds, 10 handpumps and five dug wells. Three handpump-wells belong to individual families while seven handpump-wells are communal and are managed by the Water Committee. All five dug wells belong to individual families, but neighbours can also have access to the wells provided they are able to first reach an agreement with the well's owner. The village chief mentioned that before the well rehabilitation and maintenance project, implemented by the PDRD with the support of CARERE, villagers who have no private well were using water from the communal ponds during the dry season for bathing, cooking, drinking, and for watering animals.

Chapter 2 Overall Assessment Method

It was necessary to first discuss the areas of the WATSAN Sector that are relevant to the study, and then to select some of those areas for assessment. These discussions led to the selection of three specific areas: The Phnom Penh Water Authority, The Battambang Water Works, and Panh Nha Village. Although CAREERE's assistance is primarily intended for the village level, the development of sector policy is also an area of concern, and one that needs to be addressed at the national, provincial and village level. The three areas selected for assessment represent each of those three levels.

It was agreed that the assessment would be carried out by five methods:

1. **Meetings with institutions.**
2. **Participatory workshops.**
3. **Field visits.**
4. **Water resources mapping.**
5. **Interviews with key government staff.**

1. Meetings With Staff of Institutions.

In order to discuss and explain the nature of the involvement of the various participants in the assessment, a series of five meetings were held at the institutional level. Two of those meetings were held at the national level with the ministries most closely associated with sector policy, namely the Ministry of Rural Development, the Ministry of Industry Mines and Energy, the Ministry of Agriculture, the Ministry of the Environment, and the Phnom Penh Water Supply Authority. Two meetings were held in Battambang Province with the concerned departments, and one meeting was held at commune level with the Commune Chief, the Village Chief and Village Development Committee Representatives.

2. Participatory Workshops.

Three participatory workshops were organized, focused on three case studies. The first was an "Assessment of Battambang Town Waterworks", held from 25 to 27 March in Battambang Town. The second was an assessment of an ongoing village project on the rehabilitation and maintenance of existing wells in Panh Nha, held in the village from 17 to 18 April. The third was an "Assessment of the Phnom Penh Water Supply Authority", held from 22 to 23 May 1997 in Phnom Penh. The first day of each workshop was generally dedicated to field visits, while the leading questions for the eight principles were left for discussion on the second day. (Photo)

3. Field Visits.

[Any field visits in PNP??????]

As part of the Battambang workshop the town waterworks and the Chamka Samroung Sewage Treatment Plants were visited. The participants were able to examine the waterworks' pumping plants, the treatment process, and the water distribution network. It was also possible for the group to study the reutilization of sewage water from the Chamka Samroung plant. (Photo) A field visit was arranged to Panh Nha Village to provide the participants with the opportunity to

discuss water-related issues with the water users. At the same time, the group was able to assist with the preparation of the village map.

4. Water Resources Mapping.

[Any mapping at the PNP level????????]

As the Battambang Waterworks have on hand a set of water resources maps it was not necessary for the group to produce additional maps. The group was briefed by the technical staff of the town waterworks on how water is distributed through out the town and showed the distribution system on the map???????? (Photo)

In Panh Nha Village, the group drew an outline of the village on the ground. The various water uses within that area were then marked by using sticks, stones and leaves. The group attempted to assess water quality but was unable to do so accurately as no water testing kits were available identified quality and quantity of water use (Photo)

5. Interviews With Key Government Staff.

[Any interviewing in PNP ??????????????]

In order to obtain information needed to answer the leading questions to the eight principles an interview with key government personnel is often necessary. The interviewing process mostly concentrated on key questions that it was not possible to answer during the workshops. The key government staff that were interviewed were from the Town Waterworks, the Department of Agriculture, the Department of the Environment, the Department of Industry, Mines and Energy, the Department of Health and the Department of Women's Affairs.

Chapter 3 Water Resource Management Principles Addressed.

Principle 1

Water source and catchment conservation and protection are essential

Background:

At the national level there is no legal framework to regulate water use, although government ministries and departments are expected to collaborate in matters related to water allocation. The key players are the Ministries of Industry Mines and Energy, Environment, Agriculture, Public Works and Transportation, Health, Tourism, Information, Rural Development, and Education, as well as private enterprise, the armed forces, and the communities concerned. Catchment area protection is not an area of high priority for the government. Deforestation continues on a broad scale, although some attempt has been made to control logging. To ensure the effectiveness of catchment protection, all stakeholders need to be involved and the government must inform the public at large through public education campaigns and the media. The Ministry of the Environment is in the process of developing a set of guidelines for water quality and solid waste disposal.

The Bassac and Sangke rivers are considered by all as a public belonging or as a government owned water source. Typically, people are not unduly concerned with the state of the rivers, and these continue to deteriorate, while catchment protection remains a low priority for the government. Silt mining from the riverbanks contributes to the high sediment load in the Sangke River, and this in turn contributes to the silting-up of the Tonle Sap which threatens the breeding grounds of aquatic life.

The water allocation mechanism introduced by the Phnom Penh Water Supply Authority (PPWSA) was critical since there was not enough water to meet the requirements of all users, especially during the dry season, at which time the number of complaints from users increases.

The primary source of water for Battambang Town is the Sangke River, the quality of which is deteriorating, mainly because of an increased sediment load due to gemstone mining upstream in the Pailin area, and extensive logging which leads to increased flow volume.

This principle is not directly to Panh Nha Village, as water sources are local, usually in the form of family or communal ponds. The latter are more heavily used during the dry season, when family ponds tend to dry up. Villagers were in general not aware of the importance of catchment protection, and they had limited knowledge of water management, despite the fact that a CAREERE supported drinking water and sanitation project was recently implemented in the village. Flooding has occurred in the village three years in succession.

Methodology Used:

Group discussions, the reviewing of existing maps, the drawing of water sources maps, and review of the Ministry of the Environment directive no 992, dated 23 May 1994, regarding the control of solid and liquid waste from industry and individuals. Those who participated in the assessment at the national level were from the PPWSA. At the provincial level, the Departments of Industry, Health, Agriculture, Women's Affairs, Public Works and Transport, Rural Development, MRD and the town waterworks were represented. In the village the Water Point

Committee and the Village Development Committee were represented, as were the Village Chief, the Commune Chief and selected villagers. Meetings were held to discuss assessment related activities, including the nature of the workshops to be conducted, and key personnel to be interviewed.

Results

Guiding Question 1.1

Has water source and catchment protection been identified as a need presently or in the longer term? (Why? By whom? When? How?)

Efforts are being made by certain government bodies to address the issue. Although there is as yet no related law, the Ministry of the Environment is in the process of developing guidelines for water quality and solid waste control.

Guiding Question 1.2

Are catchment areas negatively influenced by any activities?

Indicator 1.2.1

Is there a marked reduction in flow volume water level over the last five to ten years (do users have to walk longer distances)?

- There appears to be increased flow volume in the Tonle Sap Lake and Mekong River catchment area, at least some of which can be attributed to deforestation.
- The silting-up of the Tonle Sap, and of the rivers that flow into it, is a consequence of an increased silt load in the rivers.
- [Sam An this is not increasing, it is **decreasing**] The height of water level raised regularly. For example *in August 1994 the height of the water was 13.58m, m*.
- This indicator does not apply to Panh Nha Village.

Indicator 1.2.2

Are floods occurring more frequently?

- Available information indicates that flooding is on the increase. Floods occurred in Panh Nha Village in three consecutive years (1994 - 1996), with the 1996 flood being the worst of the three.

Indicator 1.2.3

Is there a marked deterioration of water quality over the last five to ten years (turbidity level, chemical quality, taste appearance, increase in cost for water treatment)?

- The quality of the water in the Sangke River began to deteriorate in 1985 when the Khmer Rouge rebel group began exploiting gemstones in the Pailin area, which is near the head of the catchment area. The high silt content of the water leads to high cost of water treatment, as settling reservoirs and filters require more care. The high cost of alum, chlorine and transportation, and inflation all lead to increased cost of water treatment.
- Industries frequently dump untreated waste into the waterways.

- Increased population, buildings, river traffic, oil drained from vehicles, fertilizer carried by runoff water, and latrines built near rivers, and sewage from sewerage systems all lead to increased water pollution
- Animals frequently use the same water sources as people, which is a particular problem in villages where drinking water is often taken from unprotected ponds

Guiding Question 1.3

What are the threats to water source and catchment area protection (water quality, water quantity, environmental degradation)?

- Deforestation, mining and the mining of sediment from river banks cause erosion in the catchment area, and lead to the silting-up of the Tonle Sap
- The activities that threaten water sources and catchment protection are gemstone mining in the Pailin area, illegal logging, and a shortage of geographical data that could indicate problem areas
- Fishing by means of laying bamboo or wooden barricades in water sources
- Raising animals without proper control or care
- Too great a quantity of water in the rainy season, and too little in the dry season
- Lack of awareness of the importance of environmental protection
- Increasing population in the catchment area
- Town sewage frequently dumped untreated in waterways

No village related data is available, but commune representatives mentioned that water flow increased during the last three years because of deforestation. Anti-logging measures are in general ineffective.

Guiding Question 1.4

What protection activities are being undertaken (livestock control, reforestation, land management), and by whom?

Indicator 1.4.1

Is the percentage of degraded land increasing over the last five to ten years?

- There is land degradation along the Sangke River, but as one river bank is eroded the opposite bank is built up, as the river changes its course. The mining of earth along the riverbanks in a haphazard manner sometimes causes unnecessary erosion. Specific data on land degradation is not available.

Indicator 1.4.2

Percentage increase of livestock over 5 years

- There is no reliable data on the percentage of livestock increase, but the Department of Agriculture, with the World Bank and the MAFF [??????] reported in 1996 that there were 167,887 cows, 17,311 [?????] buffalo, and 63,474 pigs in Battambang Province
- Panh Nha village officials reported that there were 312 cows, 16 buffalo and 160 pigs in the village, but it was not possible to determine the percentage increase over the past 5 years

Indicator 1.4.3

Percentage increase in irrigation licences / irrigated area

- No water use licences are issued. Farmers deal directly with Water User Committees at the local level
- There is no law on water use for irrigation

Indicator 1.4.4**Population growth in catchment area**

- Ministry of Environment directive No. 992 of 23 May 1994 regarding the control of solid and liquid waste produced by industry and individuals
- Reforestation is being encouraged but it is not taking place on a wide enough scale to balance deforestation
- Land management and land use measures are largely ineffective, and unenforced by local officials
- Public awareness activities are sometimes carried out by the Departments of Agriculture and Environment
- Increases in the population in the Battambang Town catchment area are reported but no reliable data is available to indicate the rate of increase

Lessons Learned:

The participants felt that the assessment was a good opportunity for them to learn about experience gained elsewhere, and to increase awareness of the importance of WRM. The issue of catchment protection is very appropriate in the present Cambodian situation. Mining in Pailin and deforestation were identified as major concerns, but related law enforcement was not seen as being effective. The water resources of Cambodia deteriorated due to the lack of water resources management. Many working classes operate their business along the sides of the sources and channelled waste water into the sources. Bassac and Sangke rivers were considered by all as a public belonging or government own water sources. They usually did not care or observed what is going on in the water sources and the catchment areas. Deterioration of the water resources dramatically increased every year and attention was not raised by the government concerning water resources management and catchment protection. Water with high sedimentation the Tonle Sap (Great Lake) become shallow which threaten to the life and shelter of creatures living in it. Water insufficiencies have been identified as a problem for those who have access limited to family pond, high populated areas and at the end of the distribution system, especially for use in the dry season.

Successes:

In Battambang Town, a high proportion of the town's sewage is now treated at the Chamka Samrong treatment plant, which significantly reduces the amount of sewage being dumped in the Sangke River. There was a reforestation day organized by the Department of Agriculture and Environment, which led to increased general awareness of the importance of the environment. A CAREERE supported WATSAN project on well rehabilitation and maintenance has increased the level of awareness of the importance of WRM in Panh Nha Village.

Mistakes and Weaknesses:

Despite improvements, a considerable amount of sewage is still channelled into waterways. Logging bans largely remain ineffective. Population growth in catchment areas puts pressure on

water sources, and chemical fertilizers drain into waterways with runoff water. Flooding takes place more frequently. Villagers are largely unaware of regulations on environmental protection, and are unaware of the importance of water source protection and management.

Open Issues.

Gemstone mining in Pailin continues unabated and the water of the Sangke River is still high in turbidity. Logging largely remains uncontrolled, and significant quantities of sewage still find their way into waterways. Population growth in the catchment area and the use of chemical fertilizers need to be better regulated.

Principle 2

Adequate water allocation needs to be agreed upon between stakeholders within a national framework

Background

A mechanism for water allocation is crucial since the quantity of water available is not sufficient to meet demand, particularly during the dry season. Distribution networks in Phnom Penh and Battambang were not designed to meet current requirements. A national framework governing water allocation is not yet in place, as this will only become possible once there is closer collaboration between the various concerned government bodies.

Similarly, there is no such infrastructure at the village level, but water resources are managed by Water Committees, Village Chiefs, and monks when the water source is located at a pagoda.

Methodology Used:

Group discussions, the reviewing of existing maps, the drawing of water sources maps, and review of the Ministry of the Environment directive no 992, dated 23 May 1994, regarding the control of solid and liquid waste from industry and individuals. Those who participated in the assessment at the national level were from the PPWSA. At the provincial level, the Departments of Industry, Health, Agriculture, Women's Affairs, Public Works and Transport, Rural Development, MRD and the town waterworks were represented. In the village the Water Point Committee and the Village Development Committee were represented, as were the Village Chief, the Commune Chief and selected villagers. Meetings were held to discuss assessment related activities, including the nature of the workshops to be conducted, and key personnel to be interviewed.

Results

Guiding Question 2.1

Is sufficient water of required quality available to meet the demands of all water users?

Good quality water is in general not available in sufficient quantity, as the number of users exceeds production capacity. Water systems and village water sources are inadequate. Spare parts and tools are in short supply. Distribution systems leak and village sources are often not sufficiently well protected.

Indicator 2.1 1

Percentage of estimated water use by different sectors

Water use in Battambang Town [????????] is broken down as follows

Sector	Proportion (%) [????????]
Domestic.	?
Commercial & industrial	?
General population & monasteries.	?
Water vendors.	?

Government institutions & school.	?
NGOs	?
Hotels & restaurants.	?

The participants estimate that the 303 families of Panh Nha village use water in the following proportions

Irrigation of Cash Crops	Watering Animals	Bathing and Cooking	Drinking
18,000 l/day = 18%	41,000 l/day = 43%	33,330 l/day = 34%	4,545 l/ day = 5%

Indicator 2.1.2

Estimated water use allocation per-sector in 1996

Domestic use	10,279,560 cu m
Commercial and industrial use	4,405,526 cu m

No water use allocation is made at the village level

Indicator 2.1.3

Level of satisfaction of stakeholders with allocated volumes (no of registered complaints, percentage of dissatisfied stakeholders)

Some users in both Phnom Penh and Battambang are not satisfied with allocated water volumes. Frequently, users who live on upper floors or at the end of distribution lines find that water pressure is not sufficient to provide an adequate quantity of water. No written complaints were available, however, and specific data is unavailable.

This indicator does not apply in Panh Nha Village

Guiding Question 2.2

What water allocation mechanisms exist, who is consulted and who makes decisions?

The PPWSA decides on water allocation for the city, both urban and peri-urban. At the provincial level, in the case of requests for network extensions, the Waterworks consults the PWT, the Department of Industry and the town's authorities. At the request of the provincial authorities, the Waterworks sometimes provides water to help relieve emergency situations such as those that relate to internally displaced persons. Requests for household facilities will be decided by the Waterworks, while requests for water for commercial use will be discussed with the other interested provincial bodies.

No formal water allocation mechanism exists at the village level. Villagers reported that when a support agency came to the village to install water facilities they were not properly consulted. The CAREERE assisted well rehabilitation project in Panh Nha Village introduced the users to the concept of local responsibility for planning and managing projects of this nature. This was discussed in meetings with commune representatives, village chiefs, VDC members and some of

the end-users.

Indicator 2.2.1

Percentage of stakeholders represented in the decision making (elected stakeholders representation, percentage of stakeholders who feel their voice is heard)

There are no elected stakeholders in the decision making body, but water exploiters representing the users participate in decision making discussions. The exploiters can make decision limited to the areas where they are assigned only [???meaning unclear - please elaborate????]

In Pahn Nha 46 % of the village's 303 families were represented when villagers met to discuss the CAREERE assisted project there in 1996

Indicator 2.2.2

Available of water resource data

Comprehensive water resource data is unavailable, but there is a considerable amount of information on specific aspects of the sector. The General Directorate of Irrigation Methodology and Hydrology has information on hydrology country wide, and on groundwater in certain areas. A groundwater database has been under development for the past two years with CAREERE assistance. A number of support agencies, such as UNICEF, that have been active in the sector for many years, often have their own database of water related information. In 1993 and 1994 the ODA conducted an intensive, multi-faceted study of the water situation in Battambang Town.

Indicator 2.2.3

Accessibility of information to all stakeholders (percentage of stakeholders who feel they do not have good access to information)

In Phnom Penh, stakeholders can approach the PPWSA for information, but no general information is given in the media. In Battambang, the Waterworks can be approached for information. In the village, a PRA exercise carried out in 1996 helped define the existing water resources in the village. It is to be noted, however, that there are no statistics at any level that indicate how many users feel they do not have access to adequate information.

Guiding Question 2.3

What legal framework and traditional practices for water resources allocation exist? Is it effective?

There are no general laws that govern the allocation of water resources, but there are directives that cover certain aspects of the sector. Subdecree no. 32 of 31 December 1987 deals with the provision of water for use by Ministerial Councils [???please clarify???]. MIM directive no. 1 of 7 February 1996 deals with payment for water use in Phnom Penh [?????]. All users must pay for the amount of water they consume as indicated by a water metre. If payment is not made over a period of two consecutive months the user will be given written notice. If payment has not been made within 15 days afterwards, supply will temporarily be cut off. It is to be noted that this government institutions do not normally observe this regulation.

Guiding Question 2.4

Is there equity in water distribution? Are existing distribution mechanisms effective? (do

sectors/users get what has been agreed? How is this measured?)

Because the water distribution networks are outdated water distribution is not equitable in urban areas, particularly in zones of high population density. Within the population that does have access to piped water the existing water distribution mechanism is considered effective, provided that regulations are observed and metered connections are properly monitored.

This question does not apply at the village level.

Indicator 2.4.1

Percentage of people with equal access to water supply (distance to source, number of supply hours)

There is no data that indicates the percentage of people who have equal access to water supply.

Indicator 2.4.2

Percentage of people with equal access to irrigation water

The PPWSA and the Battambang Town Water Works do not provide water for irrigation. In rural areas of Battambang Province it is estimated that 30 % of farmers pump irrigation water from the Tonle Sap, and an even higher proportion pump water from the Sangke River. In Chheu Teal Commune there is a system which irrigates an area of 300 hectares in the dry season.

In the village 70 % of farmers are farm only in the rainy season, as there is no irrigation system in place.

Lessons Learned:

This principle cannot adequately be discussed in the Cambodian context for lack of a national framework and supporting legislation. On the other hand it is necessary to have government support if water supply projects are to function effectively, regardless of whether there are governing rules and regulations. The government has, nevertheless, indicated in various ways its interest in and support to the sector. The ministerial decrees mentioned elsewhere in this report, and the numerous sector related activities that receive government support are proof of this.

The water distribution systems are observed to be mostly a mix of traditional and private practices [???please clarify???]. Typically water systems function to only 80 % of their intended capacity, largely because of lack of maintenance.

Successes:

[??? Phnom Penh ???]

In Battambang, four private exploiters have become working with the Waterworks to improve the town's distribution system. As a result an increased number of the town's residents will gain access to piped water supply, and the private sector will be encouraged to become more involved in areas of activity that were formerly controlled by state-run enterprises. Public awareness campaigns on environmental protection carried out by concerned departments have increased awareness of the importance of the environment.

The CAREERE supported project in Panh Nha has increased the level of awareness of the

importance of WRM

Mistakes and Weaknesses.

There is still no regulation of activities that could affect the environment at the village level, and villagers in general are unaware of the importance of water source protection and water resource management

The entrepreneurs who are working with the Battambang Waterworks sit on the decision making panel, but they cannot make decisions that concern areas where they are not actually working [??? clarification required ????] End-users are not represented at any of the decision making meetings The water supply authorities do not have the power to levy fines on government institutions that do not pay for the water they use

Open Issues.

[??????]

Principle 3

Efficient water use is essential and often an important water source

Background:

In urban areas the quantity of water available to end-users depends more on the efficiency of the distribution network than on availability of water at the source. During the rainy season there normally is no shortage of water in rural areas of Cambodia, although the quality of available water frequently is a problem. During the dry season villagers who do not live close to a river or lake typically need to travel longer distances to collect water as the sources closer to home dry up. Water collected in this way generally requires the initiative of an individual or a family, and there are no organized measures for increasing water collection efficiency.

Methodology used:

Group discussions, the reviewing of existing maps, the drawing of water sources maps, and review of the Ministry of the Environment directive no 992, dated 23 May 1994, regarding the control of solid and liquid waste from industry and individuals. Those who participated in the assessment at the national level were from the PPWSA. At the provincial level, the Departments of Industry, Health, Agriculture, Women's Affairs, Public Works and Transport, Rural Development, MRD and the town waterworks were represented. In the village the Water Point Committee and the Village Development Committee were represented, as were the Village Chief, the Commune Chief and selected villagers. Meetings were held to discuss assessment related activities, including the nature of the workshops to be conducted, and key personnel to be interviewed.

Results.

Guiding Question 3.1.

Is inefficiency in water use identified as a problem? If yes, who perceives it as a problem, and why?

Indicator 3.1.1

Percentage of persons in user groups identifying inefficient use as a problem (users, operators, agency staff and farmers)

- It is perceived as a problem in Phnom Penh but there is no data on the number of users who see it as such
- Also perceived as a problem in Battambang Town, where the staff report electricity shortages. Large quantities of sediment are removed from the water. This requires frequent cleaning of the sedimentation tanks, but the Waterworks staff do not have the means to inform consumers. Leakage's were reported as being a problem in Phnom Penh and Battambang. In Battambang the demand for piped water far exceeds the capacity of the distribution network, which was designed to meet needs 50 years ago
- 36 % of a population of 3,000 families do not have adequate water in the dry season. Those who are at the end of the distribution network, above ground floor level, or in areas of high population density
- 60% of 303 families indicated that they don't have sufficient water for drinking and other purposes, especially during the dry season

Guiding Question 3.2.

What inefficiencies have been identified?

In urban areas the deteriorated state of the water network, particularly as regards leakage and unreliable sources of electricity, frequently implies water shortages for users who are connected to the network. Entrepreneurs sometimes add new connection to extend the network without receiving prior authorization from the water authority.

As explained earlier, water use at the village level tends to centre on water availability, particularly during the dry season, rather than on inefficient water use.

Indicator 3.2.1

Percentage of leakage in supply system

- The PPWSA estimates that in 1996, 60 % of the water pumped into the Phnom Penh [??????] network was lost through leakage. Much of the leakage takes place in areas where buildings have not been built to standard.
- In Battambang the Finance Department set up a guideline for the percentage of leakage over a four year period. 50 % in 1994 and 1995, and 45 % in 1996 and 1997. Reported by Town Waterworks.

Indicator 3.2.2

Percentage of leaking/open taps

- no reliable data available

Indicator 3.2.3

Percentage of households using drinking water for cattle

- In Panh Nha Village 50% of the 303 families use drinking water for cattle, especially in the dry season when ponds dry up.
- In Battambang town 15% of the people who use pipe water for pig raising, estimated by town waterworks.

Indicator 3.2.4

Percentage of traditional irrigated area

- No Data available at the time of the assessment

Indicator 3.2.5

Percentage of irrigated area with crops with high water requirement

- No Data available at the time of the assessment

Indicator 3.2.6

Percentage of persons in user groups adopting water saving measures (reuse in the households, repair leakage, reuse/waste minimization in industry)

- 85 % of 3,000 families who use the Town water supply make special efforts to save water,

- estimated by Town Waterworks
- 3 % of 3,478 families in Chamkar Samrong have reused treated sewage water from the sewage treatment plant, reported by Department Environment
- 50 % repaired in 1994 -1997 (small repair as temporary arrangement in order for the system to run)

Guiding Question 3.3.

What measures are undertaken for the effective & efficient use of water? Who is involved and who decides?

- To handle this the PPWSA and the Town Waterworks have developed an internal regulation for water use management, expanding distribution network and cash pledge for the right of using water as follows
 - The imposition of fines.
 - Warnings
 - Strengthened internal management, and maintenance of the distribution network and the production system
 - An inspection unit to read water meters.
 - A tariff collection unit to collect payment from the consumers
 - A mixed group to monitor water meters and clean the distribution systems The Departments of Industry and Finance, and the provincial authorities are represented, but final decisions are taken by the director of the PPWSA [??? clarify How is the PPWSA involved with the provinces???
- In 1996, 12 water user groups were organized and trained by the PDRD This was a first opportunity for the water user groups to learn about the importance of hygiene and water source protection Village water points are maintained and managed by the end-users with the assistance of the Water Point Committee and the Village Development Committee

Guiding Question 3 4

Are there measures which have been considered but not implemented? If not why not?

The following are measures which are in place but which are frequently not observed, or have not yet been implemented

- All industrial liquid and solid waste is not to be drained into waterways or lakes
- The Departments of Health have given instructions that water should not be drunk directly from rivers
- In Battambang Town, there is a plan to rehabilitate the water distribution network, with funding from the Social Fund of the Kingdom of Cambodia
- Changing the locations of factories that are too near the river
- Condemn open sewers that now drain directly into the river
- The commune authorities have requested an additional of 30 water points for a whole commune in order to have adequate water both in the dry and rainy seasons

Lessons Learned:

[????????]

Successes:

In Battambang, 50 % of the existing network was repaired with assistance from the EU. This led to a 50 % increase in its production capacity. A sewage treatment plant was built to treat part of the town's sewage water that used to be channelled into the river. Some of the treated waste water is now being used by farmers for vegetable gardens in Chamka Samrong Commune. In Panh Nha new concepts of problem identification and project management were introduced with the assistance of the PDRD and CARERE.

Mistakes and Weaknesses.

No public water resources management is systematically undertaken at national or provincial levels. Sector planning is generally weak. Certain new measures have been proposed or put in place, but they are not widely observed. At the village level, maintenance of water points remains an issue, as many villagers see facilities assisted by departments or agencies as public property which they do not feel obligated to maintain.

Open Issues.

[????????]

Principle 4

Management needs to be taken care of at the lowest appropriate levels

Background:

Overall water management at the Phnom Penh level is the responsibility of the PPWSA, while the Town Waterworks and entrepreneurs have this role at the provincial level. As there is no government water management policy, however, it is difficult for both the PPWSA and the Town Water Works to manage the water sources. Public water points such as rivers, lakes streams etc are under the responsibility of the Department of Hydrology, while private water points are under the responsibility of individuals or the owner of the water sources.

In rural areas, water sources such as family ponds and wells are taken care of by villagers and Water Point Committees. Communal sources, such as communal ponds, lake and canals are overseen by local authorities, teachers and monks. At times villagers fail to care of the sources, and resort to pumping out pond water to catch the fish, allowing animals to drink in ponds, or by not preventing children from defecating in the source's catchment area. Projects such as the one supported by CAREERE in Panh Nha Village encourage the end-users to take on as much responsibility as possible for project related activities.

Methodology Used:

Group discussions, the reviewing of existing maps, the drawing of water sources maps, and review of the Ministry of the Environment directive no 992, dated 23 May 1994, regarding the control of solid and liquid waste from industry and individuals. Those who participated in the assessment at the national level were from the PPWSA. At the provincial level, the Departments of Industry, Health, Agriculture, Women's Affairs, Public Works and Transport, Rural Development, MRD and the town waterworks were represented. In the village the Water Point Committee and the Village Development Committee were represented, as were the Village Chief, the Commune Chief and selected villagers. Meetings were held to discuss assessment related activities, including the nature of the workshops to be conducted, and key personnel to be interviewed.

Results.**Guiding Question 4.1**

Who manages water supply systems? How long have they managed systems?

- The PPWSA has been managing the Phnom Penh water system since 1895, except for the 1975 – 1979 Khmer Rouge period.
- The Battambang Town Water Works has been managing the system since 1 March 1993, prior to which it was under the direction of the Electricity Department
- The Water Point Committee, water users, monks and teachers have been managing the Pahn Nha CAREERE-supported project since it began eight months ago

Indicator 4.1.1

Percentage of systems with functioning monitoring systems

- 92% of functioning monitoring systems, sources PPWSA (In 1975 - 79 no monitoring system existed) The PPWSA has its own system for monitoring the technical aspects of the network
- 80% of functioning monitoring systems, sources town waterworks The town waterworks has its own system for monitoring the technical aspects of the network
- In Panh Nha the villagers are expected to carry out participatory project monitoring, while the PDRD monitors project implementation.

Indicator 4.1.2

Average and range of years of experience of management committees

- There is no reliable data for Phnom Penh or Battambang
- The Panh Nha Management Committee has eight months of experience, beginning with the CAREERE-supported project there

Guiding Question 4.2

Who manages different water resources ?

- Operational (day to day management of surface water and groundwater)
- Strategic (policy, legal, planning)

- There were private water abstraction from Tonle Sap and bore wells
- No information available, but there were four exploiters who managed the water they buy from the supply systems
- Local authorities include village chief, monks, lay man, teachers, commune and district (public ponds, lakes and canals (streams) only For the public hand pumps and dug wells managed by the water committee while private wells responsible for by individual

Indicator 4.2.1

Percentage of systems with functioning monitoring systems

- 92% of functioning monitoring systems, sources PPWSA (In 1975 - 79 no monitoring system existed) The PPWSA has its own system for monitoring the technical aspects of the network]
- 80% of functioning monitoring systems, sources town waterworks The town waterworks has its own system for monitoring the technical aspects of the network
- In Panh Nha the villagers are expected to carry out participatory project monitoring, while the PDRD monitors project implementation

Indicator 4.2.2

Average and range of years of experience of amangement committees

- Board committee was established in 1997
- Three years (01 March 1994 to 1997) experiences after separation from electricity department and becoming Autonomous Department
- The Panh Nha Management Committee has eight months of experience, beginning with the CAREERE-supported project there

Guiding Question 4.3

Is management currently taking place at the lowest appropriate / possible level? If yes, describe constraints in having management at one step lower level [??? statement unclear ???] If not, why not? [??? question unclear ???]

- No data available for this, but team was set up to take care in place such as illegal building area
- Four private exploiters who managed water supply under contract agreement with town waterworks They supply 19,000 cu m / month to the consumers An average of 4,750 cu.m / month managed by each exploiter

Indicator 4.3.1

Percentage of management committees with clear task assignment

- 60% [??? does the PPWSA mgmt committee have a clear task assignment ???]
- 85% of task were appointed by the director of the town waterworks
- 75% of the 12 committee with clear task assignment, Panh Nha

Indicator 4.3.2

Percentage of problems referred to higher level authorities (frequency and level of back-up support)

- 25 % of the problems referred to PPWSA, estimated by PPWSA
- 20% of the problems submitted to the town waterworks, estimated by the town waterworks
- No problem has been referred to the higher level since the all of committees were newly established

Indicator 4.3.3

Percentage of users/stakeholders satisfied with the management

- 60% [????]
- 75% to 80% satisfied with the management, estimated by the town waterworks
- It was estimated that 80% of all stakeholders satisfied with the present management

Guiding Question 4.4

Does existing legislation facilitate this principle? Is legislation effective? if not, what other appropriate arrangements exist?

- It's no clear cut answer to this question eventhough the town waterworks has received the subdecree from the government, but only about 85% effective Some of the government institutions still not respect the decree
- No legislation at the village level, but in Panh Nha the water committees who manage the water points

Guiding Question 4.5

What are the changes taking place regarding the levels at which water resources are being managed? What are the constraints if any?

- [?? in PNP ??]
- On 1 March 1994, the Battambang Waterworks was separated from the Department of Electricity and become economically autonomous
- There have been significant changes at the village level. In the past water sources were generally provided without the involvement of end-users at the planning stage. When the PDRD was established, its staff began assisting the setting up of Water Point Committees and Water User Groups, and in providing water use and hygiene education. Some of the constraints were that it was sometimes difficult to secure local contributions, and to make the end-users committed to the project.

Lessons Learned:

Significant changes have been taking place at every levels of water resources management, as with the promotion of privatisation at national, provincial and village levels. Although the government still does not have a specific policy for WRM, the Ministry of Rural Development has issued WATSAN Guidelines for the sector, which could lead to the finalization of a WATSAN sector policy. In March 1994, the Battambang Waterworks became an economically autonomous department, and after three years it is now nearly self-sufficient economically. As a first step, the Waterworks was able to sell part of the network to four entrepreneurs, who now buy water from the Waterworks and sell it to the consumers. Through a CAREERE-supported well rehabilitation project, the PDRD was able to introduce new WRM concepts at the village level. The fact that some of the villagers in Panh Nha were difficult to convince is attributed to the fact that the original handpump-equipped well installations were installed as a quick-impact project with little community involvement, and the villagers tended not to see themselves as project owners.

Successes :

[?? PNP ??]

The Battambang Government is willing and interested to support the private sector and enable the Waterworks to become economically autonomous.

Management of the Panh Nha Project at the village level

Mistakes and Weaknesses.

[??? PNP ??]

Shortage of reliable data. All task assignment to the committee was done by an appointment. No reliable data on cost recovery system, though part of the system have been sold to the entrepreneurs.

Difficulties in obtaining end-user contributions, and to convince them of the need for their involvement.

Open Issues.

[????????????]

Principle 5

Involvement of all stakeholders is required

Background:

[?? for PNP ??]

In Battambang end-user involvement in planning and management generally is limited to payment for water provided. The four entrepreneurs who are associated with the Waterworks participate in discussion meetings but they are not represented at the decision-making level.

In Panh Nha consistent efforts were made to involve the villagers in project planning, management and water use education. Prior to the start of actual project implementation planning meetings were held at the village level and training courses were organized, but genuine involvement of the end-users in these activities remained low.

Methodology used:

Group discussions, the reviewing of existing maps, the drawing of water sources maps, and review of the Ministry of the Environment directive no 992, dated 23 May 1994, regarding the control of solid and liquid waste from industry and individuals. Those who participated in the assessment at the national level were from the PPWSA. At the provincial level, the Departments of Industry, Health, Agriculture, Women's Affairs, Public Works and Transport, Rural Development MRD and the town waterworks were represented. In the village the Water Point Committee and the Village Development Committee were represented, as were the Village Chief, the Commune Chief and selected villagers. Meetings were held to discuss assessment related activities, including the nature of the workshops to be conducted, and key personnel to be interviewed.

Results.

Guiding questions 5.1.

Who are the stakeholders? Do they perceive themselves as stakeholders and as being actively involved?

The stakeholders are government officials, the armed forces, organizations and institutions, farmers, entrepreneurs and the general population. Not all see themselves as stakeholders in the active sense. Those who use piped or transported water in urban areas perceive themselves as stakeholders in the limited sense that they pay for the water they use, and the Battambang Waterworks report that 98 % of water users pay their bills. [?? PNP ??]

At the village level some of the users try to be actively involved in the process by attending meetings and participating in training courses, by helping install water points and by contributing money to buy locally available materials.

Indicator 5.1 1

Percentage of stakeholders perceiving themselves as being involved

10% perceived they are being involved (reported by representative of the town waterworks)

50% of the 12 water points perceived they are involved, reported by water points committee

20% perceived they are being involved (reported by representative of the PPWSA)

Guiding questions 5.2.

Do stakeholders wish to be actively involved in WRM?

Indicator 5.1.1

Percentage of stakeholders perceiving themselves as being involved

- Most of the end-users do not appear to be greatly interested in becoming actively involved in the management of water resources. Their main concern is that they should have water available in adequate quantity
- There are four entrepreneurs who have a limited role in the management of the Battambang Waterworks

Some of the stakeholders are willing to be actively involved in water resources management [?? details ??]

Indicator 5.2.1

percentage of stakeholders requesting information

[?? PNP ??] The PPWSA report that there are increasing requests for information

25 % of stakeholders/ end-users are reported to request information, quite often end-users not interested for information as long as they have enough water. They make request for information when issues directly related to them such as increase tariff rate etc, reported by a representative of the Waterworks

There has not been any request for information from higher levels from the residents of Panh Nha, apparently because they still are not sufficiently involved in the management of the project

Indicator 5.2.2

Percentage of stakeholders who wish to be more actively involved (interested to explore in what way they feel they can be involved)

- In progress [??????]
- In Battambang, it is estimated that 57% of the stakeholders wish to be more closely involved. The four entrepreneurs tried to attract more users by allowing the user to pay on a monthly basis until completion of the initial cost. Waterworks' officials have attempted to reduce the number of illegal water vendors who drive around the city, as part of its town beautification programme
- There has been a significant and steady increase in the number of requests made for connections to the network

- 1,139 requests in 1993
1,357 requests in 1994
2,392 requests in 1995
2,996 requests in 1996
3,000 requests in 1997
- In Panh Nha 35 % of the stakeholders said that they wish to be more actively involved

Guiding question 5.3

Who own the water resources / sources (at various levels?)

Within the Phnom Penh Municipality the PPWSA own the water distribution network, while individual water sources such as ponds and tubewells are generally privately owned.

The situation is essentially the same at the provincial level, except for the arrangement made with the four entrepreneurs

Indicator 5 3.1

Percentage of stakeholders / stakeholders groups owning sources / or water rights

- Parts of the sub-urban area of Phnom Penh have their own water sources / water rights [??? clarify meaning, & indicate % if any ???]
- A total of 24,000 families (88 %) in Svay Por District (Battambang Town) have their own water sources / water rights
- At the village level, 50 % of the 860 families surveyed have their own water sources, generally in the form of ponds situated near their home
 - Panh Nha village 12% (303 families of whom 100 families have their own water source)
 - Andong Trach village 5% (210 families of whom 43 families have their own water source)
 - Kompong Preah village 33% (347 families of whom 284 families their own water source)

[??? % and # of families do not match ???]

Indicator 5 3.2

No. of systems being constructed No. handed over to community / farmer co-operative

- The existing Phnom Penh network is being extended to previously unserved areas of the city
- In Battambang Town, no new systems are being build, although the ODA completed an extensive multi-disciplinary study in 1993 and 1994 that could serve as a basis for new system construction if it were possible to locate a source of funding From 1992 to 1994 SAWA rehabilitated some sections of the existing system, with EU funding. Four entrepreneurs

extended the network West of the river (slaughterhouse area, Chamkar Samrong, Toul Ta Ek and Watkor), and East of the river to "13 January Market", Rathanak and Anlongvil

- In Panh Nha, 11 handpumps were repaired and one was newly installed, after which the 12 water points were handed over to the community

Guiding question 5.4

What forums exist for decision making? Do they work effectively? Who takes the decisions?

[?? PNP ??]

In Battambang there are office level meetings to discuss the implementation and plans for further action. There are Executive Committee meetings to monitor investment cost and profits, and to review project-related financial reports. These mechanisms appear to work effectively. Decisions are taken in agreement with the provincial authorities.

Meetings or training exercises were held prior to the installation of the WATSAN facilities, on site selection, the formation of water committee, the organizing of water user groups, (35 families / well), training on water use, and maintenance.

Indicator 5.4.1

Percentage of problems acted upon (for each forum)

Estimated 40% on improving production ability and the network [?? response unclear. The required info relates to the no. of problems addressed at a particular meeting, and later acted upon. For example, if 10 problems are addressed and action is taken on 6 of those, then the answer would be 60 % ??]

Not yet implemented [?? see above ??]

Indicator 5.4.2

Percentage decisions acted upon (for each forum)

Estimated 45% of 15 meetings [?? see above ??]

80% of the 6 meetings [??????]

Indicator 5.4.3

Percentage of stakeholders represented on one or more co-ordinating / decision making bodies

Estimated about 35% of 15 meetings [?? are these decision making meetings ??]

7% of 860 families represented in decision making meetings [?? source of data ??]

Indicator 5.4.4

percentage of decision making platforms with a monitoring system in place

No reliable data is available on this indicator

Guiding Question 5.5

What conflict management mechanisms are applied?

Indicator 5 5.1

Number of conflicts resolved over a certain period or at different times of year

[??????????]

Lesson learned:

The level of involvement of end-users in any of the aspects of WRM at all levels is low Existing forums for decision making is generally limited to office level meetings and Executive Committee meetings Because few end-users are consulted or even closely informed, conflicts sometimes break out when water distribution is cut to enable system maintenance, or when fines need to be levied when dues are not paid Task assignments for the entrepreneurs were frequently not well defined, which can lead to problems, particularly when they choose to extend the network at their own initiative There are many potential users who are unable to connect to the network for lack of network capacity The level of community participation in the decision making process and project implementation is low, care was taken to prepare the community in advance of project development and implementation There is a severe shortage of reliable data on WRM in Cambodia, which will no doubt lead to a higher degree of subjectivity than would otherwise be considered normal for this type of sectoral assessment

Successes :

[??? PNP ???]

Four sector entrepreneurs in Battambang who are closely involved with the Waterworks will contribute to the sustainability of the town's water system The provincial government is supportive of the private sector, as shown when it enabled the Waterworks to become economically autonomous, which it has almost reached after a period of three years Part of the system was repaired with EU funding [??? I believe this is repeated from an earlier principle ???]

In the village, the fact that even a small number of end-users actively participated is considered an achievement eventhough their numbers were small The establishment of a Water Point Committee and Water User Groups will lead to improved WRM at the village level

Mistakes and weaknesses.

[??? PNP ???]

There is a scarcity of reliable WRM-related data Task assignments for sector entrepreneurs are

not clear. Sometimes the entrepreneurs make new connections to the network without informing the authorities, which leads to water shortages in other areas. There are large numbers of potential end-users who are unable to be given a connection because of a lack of network capacity. At the village level the degree of active end-user participation remains low.

Open issues.

[????????]

Principle 6

Striking a gender balance is needed as activities relate to different roles of men and women

Background:

[?? PNP ??]

In Battambang, from 1979 to 1993, what is now the Department of Women's Affairs was then known as the Women's Association. At that time gender issues were not treated as a priority, and it was not until 1994 when the Women's World Conference was organized in Beijing that gender issues moved closer to the forefront, but the level of understanding remains relatively low. From 25 to 29 May 1997 a workshop on gender issues was organized by the government with financial support from CAREERE: among the 45 participants only seven were women. In three recently held multi-departmental Provincial Planning Workshops only one of the participants was a woman, out of a total of approximately 75 men. The Director of the Department of Women's Affairs mentioned that there was a need for a balance between activities related to the different roles of men and women. Women have fewer roles in leadership: for example in technical departments such as the Department of Health there were both female and male doctors but the male doctors have the leading roles. She recommended that in all circumstances, leadership must be shared by qualified individuals of both genders.

In Panh Nha, the village authorities gave their assurance that at least two women would participate as members of the Water Committee and they have encouraged women to participate in the decision making process. The level of participation of women in meetings is high, and they often outnumber men, but their involvement in decision making is low and they tend to contribute few opinions or suggestions.

Methodology used:

Group discussions, the reviewing of existing maps, the drawing of water sources maps, and review of the Ministry of the Environment directive no 992, dated 23 May 1994, regarding the control of solid and liquid waste from industry and individuals. Those who participated in the assessment at the national level were from the PPWSA. At the provincial level, the Departments of Industry, Health, Agriculture, Women's Affairs, Public Works and Transport, Rural Development MRD and the town waterworks were represented. In the village the Water Point Committee and the Village Development Committee were represented, as were the Village Chief, the Commune Chief and selected villagers. Meetings were held to discuss assessment related activities, including the nature of the workshops to be conducted, and key personnel to be interviewed.

Results.**Guiding question 6.1.**

How are gender differences, if any, perceived at planning level? At decision making level? At user level?

[?? PNP ??]

In Battambang the perception appears to be that women are less well educated than men, and that this is one of the reasons why their level of involvement in planning and decision-making is low. Out of a sample of 78 departmental staff only eight (10 %) were women involved with planning, while none of those was represented at the decision making level.

In Panh Nha, each Water Use Committee has two 2 women and 3 men as members, an arrangement similar to that of the VDC. Women are involved with all stages of planning and decision making.

Indicator 6.1.1

1.1 Percentage of persons indicating need for gender differentiation (planners, decision makers and users)

It was estimated that at 30% of women representing in the planning process and 30% representing in the decision making process (PPWSA) [??? different info required E G, if there are 40 decision-makers involved, and 20 of those indicate a need, then the percentage is 50 % ???]

It was estimated that at 35% of women should be representing in the planning process and 30% of women should be representing in the decision making process (among the 26 departments of Battambang Province) [??? see above ???]

40% of women attended in the decision making meetings (example in Village Development Committee and Water Point Committee). It was difficult for the facilitators to discuss this matter at village level, as the respondents mentioned not having any related problems [??? see above Second sentence OK ???]

Guiding question 6.2.

What are the differences in the degree of participation and influence over decision making by men and women?

Indicator 6.2.1

Percentage of decisions making gender differentiation

No reliable information or data available

Indicator 6.2.2

Percentage of stakeholder representatives that are women (at decision making forum)

In Phnom Penh it is estimated that approximately 10 % of stakeholder representatives are women.

The Director of the Department of Women's Affairs estimated that only 2 % of the members of the decision making boards of the province's 26 departments [??? is this figure correct ???] are women.

At the village level more women than men are represented at decision making meetings, but men

nevertheless end up making most of the decisions

Indicator 6.2.3

Percentage of women and men that are satisfied with their influence of their gender group in decision making

There is a very low proportion of women who are satisfied with their influence in decision making, but no data is available and estimating the percentage is not possible [??? in an earlier indicator you mention that women are reluctant to present an opinion on this What about men ???]

65 % of the women in three villages (4,300 women) are satisfied with the influence of their gender group in decision making [??? source and reliability of data ???]

Indicator 6.2.4

Percentage of meetings timed to suit both men and women

In Phnom Penh, only 30 % of meetings are timed to suit both women and men, as women generally remain at home to cook for the family [??? clarify Are these meetings not held during working hours ???]

In Battambang, 75% of meeting time suit women and men (within the working hours because most women have to go back to cook for the family) [??? need to clarify See above ???]

35 % of 20 meetings suit women's times [??? type of meeting At what time were they held Why only 35 % ???]

Guiding question 6.3.

Do approaches promote equal participation and access to resources for both men and women?

The participants felt that this practice have encouraged more women participation than men

Indicator 6.3.1

Percentage of gender specific activities (differentiate between men and women) [??? meaning unclear Activities designed for, or carried out by, men or women ???]

22% for PPWSA (471 staff 100 are women) [??? see above ???]

No information on this because most of the working promote both participation [??? Where? BTB ???]

In Panh Nha, the project treasurer and the hygiene educator are women [??? were the activities specifically designed for women ???]

Guiding question 6.4.

What are the gender sensitisation programmes, if any, at different levels?

Gender awareness activities are organized on 8 March yearly, around International Women's Day, at both the national and provincial level, and in 1997 at the village level by an NGO called VEGILAN and the Department of Women's Affairs

Gender sensitization aspects are included in the yearly ceremonies, in Battambang, on the occasion of World Water Day

Lessons learned:

There are few if any formal restrictions on the involvement of women in activities that concern their community, but on the other hand women are not actively encouraged to become involved in management structures, where men still outnumber women by far. With rare exceptions, men occupy senior positions in government and the private sector, while women occupy lower level posts or take the responsibility for household duties. Up to the time of the Beijing Women's Conference the level of gender awareness in Cambodia was very low, and it was only when the Women's Association became the Department of Women's Affairs that gender issues began moving to the forefront. It was then that meetings began to be held to discuss issues related to gender, and workshops were organized with external support to raise gender awareness, but even in such gatherings the proportion of women is low, and usually does not exceed 25 %

Successes :

The Women's Association was changed to the Department of Women's Affairs, thus gaining in importance and acquiring a greater role in pursuing gender related matters. There are regular meetings and workshops that support the promotion of gender awareness. At the village level, in Panh Nha, the CAREERE assisted project encouraged women to take up roles as project managers, an initiative that was met with limited success, but still worthwhile as 40 % of the local WATSAN Committee members are now women

Mistakes and weaknesses.

In general the level of involvement of women in sectoral activities remains low. There still is very limited knowledge of gender issues. Most senior government and private sector posts are still occupied by men, while women generally look after household duties. As women tend to carry out tasks that require more water than tasks carried out by men, they should have a greater say in the way the water is obtained and used. Many of the gender related activities that are carried out, such as meetings and workshops, are supported by external agencies, both in terms of funding and facilitating. There remains a need for greater local initiative in this area

Open issues.

[??????]

Principle 7

Skills development and capacity building are the key to sustainability

Background:

Capacity building can be classified as a key to sustainable development but government support is minimal. Most of the capacity building activities that have taken place in Battambang were part of projects supported by external agencies. For example, under the ODA study, some of the Waterworks' staff received training on planning and management, and in research techniques. Computer training was one of the activities supported in this manner.

In Panh Nha, capacity building was built into the project, in the form of the training of trainers for PDRD staff and end-users on planning, management, repair and maintenance of handpumps, and hygiene.

Methodology used:

Group discussions, the reviewing of existing maps, the drawing of water sources maps, and review of the Ministry of the Environment directive no 992, dated 23 May 1994, regarding the control of solid and liquid waste from industry and individuals. Those who participated in the assessment at the national level were from the PPWSA. At the provincial level, the Departments of Industry, Health, Agriculture, Women's Affairs, Public Works and Transport, Rural Development MRD and the town waterworks were represented. In the village the Water Point Committee and the Village Development Committee were represented, as were the Village Chief, the Commune Chief and selected villagers. Meetings were held to discuss assessment related activities, including the nature of the workshops to be conducted, and key personnel to be interviewed.

Results.

Guiding question 7.1

Is capacity building a part of project activities? If so what are the key capacity building initiatives at different levels?

Capacity building, concentrating on planning, management and technical aspects, is the most important part of the PPWSA. [??? Is this correct? What about water distribution ???]

In Battambang, the ODA assisted the development of the planning and managerial capacity of Waterworks' personnel. In 1997 the budget allocated by the Waterworks itself was for computer and language training, for which a budget of 2,200,000 Riels (US \$ 870) was set aside out of a total budget of 475,826,000 Riels (US \$ 18,700).

In Panh Nha, capacity building was built into project activities. Members of the Water Use Committee received training in various aspects of project management, including the accounting of project related funds.

Indicator 7.1.1

Percentage of budget allocated for training or capacity building

- 10% of budget allocated for staff training and/or capacity building [??? where ???]
- 18% of budget allocated for staff training and/or capacity building (this allocation is for 1997 only) [??? where ???]
- 25% of the total budget were allocated for capacity building [??? where ???]

Indicator 7.1.2

Percentage of persons who have received training through the programme / project at different levels (lower / middle / top).

- 471 of 32 [?????!!!] personnel have received training through the project abroad and 124 have received training in country (10%) [???staff of what? at what level???
- 21% of 70 personnel have received training through the project (4 7% technical level and 16 3% management level) [??? staff of what ???]
- 30% of all beneficiaries have received training from the project [??? where? what level???

Guiding question 7.2.

Can capacity be developed at all levels? If not what are the constraints / reasons (legal, institutional, lack of resources, etc ?)

It is not possible to develop capacity at all levels, lack of sufficient financial resources being a major constraint, as is the limited number of training staff The four entrepreneurs who signed contracts were to manage water distribution themselves with monitoring by the staff of the Waterworks [??? meaning unclear ???] Institutions frequently do not pay their bill as scheduled, and legal follow-up action is inefficient, resulting in insufficient revenue

Indicator 7 2.1

Percentage of trained people utilising recently acquired skills [??? meaning unclear Recently trained people ???]

100% trained personnel utilising their skills in the project [??? where? what personnel? ???]
Of the 21% trained personnel, 38% utilising their skills in the project [??? meaning unclear ???]
As the committees are newly established it is difficult to provide reliable data, but during the assessment all the water points were found to be well maintained by the end-users themselves It's estimated that 75% of trained skills were utilized at the village level [??? last sentence unclear ???]

Guiding question 7.3

Which technique / philosophy are used for capacity building ?

The ODA supported a training course on research techniques SAWA, with EU assistance, SAWA, also with EU assistance, provided training in water system rehabilitation, and later in the design of urban water systems

[??? say something about CAREERE assisted projects ???]

Lessons learned:

Capacity building can be classified as a key element of sustainable water resources management, but government financial support is limited. Most project related capacity building activities are supported by external agencies, which risks making the results less sustainable.

The importance initiation of Battambang town waterworks was to the extent that English language training [??? meaning unclear ???] No provision for other technical build-up for the staff who acquired such knowledge to better manage, plan and operate in the system. [??? meaning unclear ???] Working with the Panh Nha project provided a good opportunity for PDRD personnel to familiarize themselves with new management techniques. As the water point committee just started, it was not possible to judge the extent to which the end-users will be able to manage their facilities. There is a tendency for water supply managers to be too dependent on external support. The PPWSA is still able to allocate 25% of its total budget for capacity building, while the Battambang Waterworks are still able to allocate 18% of its total operational budget for capacity building. In Panh Nha village, 30% of all beneficiaries have received training on WATSAN planning and management, repairing and maintaining of the facilities, and water use and hygiene education from 25% of the project budget.

Successes.

18% of the total budget was allocated for capacity building [??? what level ???]

18% of the total budget was allocated for capacity building. Some staff have received training course through external supported agency funds [??? where ???]

25% of the total budget were allocated for capacity building and 30% of all beneficiaries have received training on planning and management of WATSAN facilities from the project in Panh Nha.

Mistakes and weaknesses.

A very small budget was allocated for capacity building (only English language). No other arrangement made for capacity building [??? which project ???]

The Government allocates only very limited resources to capacity building.

It is not yet possible to build capacity at all levels, for lack of funding.

Open issues.

[????????]

Principle 8

Water is treated as having an economic and social value

Background:

[?? PNP ??]

Users of water from the Battambang Waterworks pay a monthly water bill. Those who refuse to pay or those who do not pay three months in a row will be given a written warning, and if they still do not pay the Waterworks then has the authority to cut the service. Before the Waterworks became an economically autonomous body the departments were not required to pay for the water they used. After the transition all users, including government bodies, were required to pay, as otherwise the Waterworks would not have been able to continue functioning as a viable enterprise.

In the village project area, a system of collecting from users was introduced, by which each family has to pay for water use at the rate of 200 - 500 Riel / month, but funds collected in this manner are for maintenance and repair, not for cost recovery. Cross-subsidies were arranged for the poorer members of the community to enable them to participate in the project. [?? explain the last sentence ??]

Methodology used:

Group discussions, the reviewing of existing maps, the drawing of water sources maps, and review of the Ministry of the Environment directive no 992, dated 23 May 1994, regarding the control of solid and liquid waste from industry and individuals. Those who participated in the assessment at the national level were from the PPWSA. At the provincial level, the Departments of Industry, Health, Agriculture, Women's Affairs, Public Works and Transport, Rural Development MRD and the town waterworks were represented. In the village the Water Point Committee and the Village Development Committee were represented, as were the Village Chief, the Commune Chief and selected villagers. Meetings were held to discuss assessment related activities, including the nature of the workshops to be conducted, and key personnel to be interviewed. Field visits and mapping.

Results.**Guiding question 8.1**

Do all users pay for water used?

The cost of water is charged to those who use water from the supply network of the PPWSA. Those who use water from other sources, such as ponds, rivers and lakes, are not required to pay for the water they use.

In Battambang the cost of water is charged to those who use water from the Waterworks. Those who use water from other sources, such as ponds, rivers and lakes, are not required to pay for the water they use.

Prior to the CARERE supported project in Panh Nha, water users there did not pay for the water

they used, because they did not understand the importance of safe drinking water, and the initial water sources were provided without any community participation

Indicator 8.1.1

Percentage of water users that pay for water (water supply, irrigation, industry)

[?? PNP ??]

90 % [?? check ??] of households pay for the water they use There is no reliable information on payment for water used for farming or industry

60% of the water users pay for the water they use (example of three villages) [?? which villages? source of data??]

Guiding question 8.2

Is there a tariff system for water users ? If so describe the system

The present water rates in use PPWSA are described in the following table Those who use water from other sources do not have to pay for it

Description	1993	1994	1995	1996	1997
Domestic use under town waterworks management	R 1,600/m ³	R 1,200/m ³	R 1,200/m ³	R 1,200/m ³	R 1,200/m ³
wholesale under town waterworks management	N/A	N/A	R 700/m ³ (the cost is to assist the first exploitation)	R 800/m ³ (the cost is to assist the first exploitation)	R 1,100/m ³ (the cost after two contract)
Government administrative	R 1,150/m ³	R 1,150/m ³	R 1,150/m ³	R 1,150/m ³	R 1,200/m ³
Water sold by exploitation			R 1,500/m ³	R 1,500/m ³	R 1,800/m ³
wholesale under exploter management	N/A	N/A	N/A	N/A	N/A

The financial projection for the future of the autonomous State Company show that without any modification in water rates, financial autonomy can not be reached, even if it is in a close future

The present water rates in use are [?? for BTB? Is the following table correct (it is identical to the previous one ??]

Description	1993	1994	1995	1996	1997
Domestic use under town waterworks management	R 1,600/m ³	R 1,200/m ³	R 1,200/m ³	R 1,200/m ³	R 1,200/m ³
wholesale under town waterworks management	N/A	N/A	R 700/m ³ (the cost is to assist the first exploitation)	R 800/m ³ (the cost is to assist the first exploitation)	R 1,100/m ³ (the cost after two contract)
Government administrative	R 1,150/m ³	R 1,150/m ³	R 1,150/m ³	R 1,150/m ³	R 1,200/m ³
Water sold by exploitation			R 1,500/m ³	R 1,500/m ³	R 1,800/m ³
wholesale under exploter management	N/A	N/A	N/A	N/A	N/A

There were not clear tariff system but there an arrangement in place
Example of three villages

Panh Nha	Andong Trach	Kompong Preah	Remarks
200 Riel/family/month	500 Riel/family/month	500 Riel/family/month	V N # 6. 200 R/F. Afrdev. 500 R/F

The Water Point Committee collects money from water users on a monthly basis

Guiding question 8.3

Does the tariff system (or cost recovery system) meet the capital cost? the O & M cost? replacement cost ?

Sometimes the tariff system does not provide enough revenue to cover the cost of O&M

The Battambang Waterworks is now able to meet O&M costs and replacement cost - provided that all consumers pay for the quantity of water they use Those who default on payment for water-use typically include police offices, the military police, military bases, and senior government personnel

In the village a tariff system for recovering costs has not been put in place Maintenance, repair and replacement of spare parts are paid with dues collected from users

Indicator 8.3.1

Ratio of income from tariffs and O&M cost

In 1995 the income from tariffs was 485,647,100 Riels (\$186,787) and the expenditure was 478,641,452 Riels (\$184,093) [??? where ???]

In 1996 the income from tariffs was 494,976,850 Riels (\$190,376) and the expenditure was 506,800,283 Riels (\$194,923) [??? place ???]

The Network and the treatment plants are in poor condition and they require a considerable amount of rehabilitation work The income from tariffs may not be large enough to cover the cost of rehabilitation

In the village, income from tariffs is 10,000 Riel / month for one Afridev handpump with 35 families, and 4,200Riel / month for one VN # 6 handpump with 35 families It is to be noted that only 60 % of the water users are now paying for the water they use, it is hoped that this rate will increase

Guiding question 8.4

Is there any cross subsidy system to enable poorer communities to receive water supply? if so

how does it work? What level of supply serves poorer communities?

There is no cross subsidy system for poorer communities [??? earlier you mentioned there are cross subsidies ???] but if people use less water they will pay less, and those who use more will pay more. For example, those who use less than 15 cu m / month pay 300 Riel / cu m, and those who use more than 90 cu m / month will pay 600 Riel / cu m [??? is this PNP ???]

In Battambang, there is a cross subsidy system for the new exploitation companies for their initial investment in expanding the system into new geographical areas. There is a system in place that favours the poor, who are permitted to pay towards the cost of a new connection by contributing monthly until the initial investment is reached. The initial investment is about Riel 15,000 (\$ 60). Once the family has a connection to the supply system they will receive the same amount of water as other customers.

In the village, there is no clear-cut cross subsidy system, but an arrangement has been made to favour the poor. Community members considered middle class pay \$35 / well installation, plus the cost of unskilled labour. Poor members pay \$30 / well plus unskilled labour, and very poor members pay \$20 / well plus unskilled labour. All physical community contributions are in the form of locally available materials. Poverty was ranked through a PRA exercise.

Guiding question 8.5

Is the financial system transparent? If so, how is it transparent?

[??? PNP ???]

The financial system of the Battambang Waterworks is considered transparent, since they follow a relatively open accounting system. Twice each year an auditor from the Finance Ministry checks the books. Legal documents [??? what kind ???] are then prepared and submitted for approval at the end of each year.

In the village, there is no clear financial system in place yet. Each committee has a book which is used to record all of the project related transactions. This is a new arrangement, as there was no such tariff system when the wells were originally installed.

Guiding question 8.6

Do different water users feel the price of water is "fair"?

Indicator 8.6 1

Percentage of users considering they pay a fair price

The cost of water is appropriate for the free market, but government officials tend to see it as an unreasonable burden on their \$ 20 / month salary.

Battambang Waterworks' staff report that the cost of water here is deemed high in relation to what it is in other provinces. The cost of the Battambang Water Supply is considered as the highest of all (see leading question 2, principle 8).

It is estimated that 85 % of users are of the view that the cost of the water they use is fair. Others

still do not pay for water used

Lessons learned:

Financial projections for the autonomous state company in Battambang show that without any modification in water rates, financial autonomy can not be reached, whether in the near or distant future. Water rates have been modified to meet the financial needs of M&O only, not for recovery of the capital investment cost. There are cross subsidies for poorer communities to get a connection to the water supply system, provided that users require to full amount but not capital investment at the same time, but they will pay to the supplier on different stages [??? second half of the sentence unclear ???] Most consumers pay regularly for water used, with the main exceptions being police and military installations, and certain high level civil servants. As a result expenditure sometimes exceeds income

At the village level it was possible to break down the tariff rate into three categories based on wealth ranking. It is obvious from the Panh Nha situation that it is difficult to introduce a cost recovery mechanism if the water installation is already in place. Follow up monitoring will be required to see the extent to which the end-users will be able to independently maintain the facilities

Successes.

The project provided a good opportunity for the stakeholders to work together. Relatively high proportions of budgets are being allocated to capacity building activities. 30 % of all beneficiaries have received training on planning and management of WATSAN facilities from the project. There were cross-subsidies for a poorer communities. The Battambang Waterworks was allowed to become an economically autonomous body. A high percentage of users pay for the water they consume

Mistakes and weaknesses.

No cost recovery for capital investments, as income from tariffs is only sufficient to cover the cost of O&M. Capacity building cannot yet be carried out at all levels. Some end-users still not understand the importance of clean drinking water, and they do not fully participate in the system, by paying some of the related costs, attending training courses, or assisting with project management

Open issues.

[????????????????]

Chapter 4 Conclusions.

Annexes

Map of Cambodia one page,

Map of Town Waterworks two pages (A3),

Map of Battambang Province one page,

Map of Panh Nha village with water sources one page,

References

Overseas Development Administration report Battambang Urban Water and Sanitation Development, March 1994 [??? incomplete ???]

Phnom Penh Water Supply Authority Five Year Development Plan. [??? incomplete ???]