5.3 Sanitation Promotion and Hygiene Improvement Plan

5.3.1 Sanitation and Diseases

The common diseases experienced by the villagers according to the village survey are as follows. The most frequent response is Malaria (31%), followed by Diarrhea[1] (23%) and Fever (9%) which can be linked to water use.

Table 5-19 Frequency of Common Diseases

Diseases	Frequency	Ratio
Malaria	203	31%
Diarrhea	148	23%
Fever	61	9%
Others*	233	36%
Total	645	100%

* This category includes: Cough, Headache, Measles, Stomachache, etc.

Those interviewees also responded to the specific cause of the diseases they believe. For Malaria, the majority could not identify its specific cause, while 12% thought unsanitary conditions are the cause and only 2% believed it is caused by drinking unboiled water. For Diarrhea, one third of the respondents refer to some risk of contamination from drinking water or food, while still more than half could not identify the causes.

From the results of the monitoring survey conducted during the Pilot Study, positive behavioral changes can be seen in the villagers' response towards decrease in water related diseases. About 70% of the pilot study villages reported on a noticeable decrease in water related diseases, especially in Diarrhea cases. Although confirmation of the actual decrease in diseases is very difficult to quantify, the villagers are realizing some changes in the occurrence pattern of diarrhea and fever of their children. This phenomenon was also conceived through their realization that absence from school of their children has decreased after water and sanitation facilities were constructed in their village.

[1] Dysentery included

5.3.2 Proposed Plans

To design an environmental health promotion program, although we need to focus upon some particular topics, the necessary messages are already established by the former efforts of the Ministry of Public Health and other concerned agencies. By reviewing existing training materials provided by those agencies, and also observing workshops conducted by the study team at some villages, certain communication difficulties have been identified. It is not only because of the different languages used by the ethnic minorities, but also the visual aids provided to support communication could not reach their understanding. It is partly because the visual aids are designed based on an average life pattern of a Laotian and some villages differ significantly from the average. Another important point is that the message should have been empirically acceptable for the target villagers, in order to have significant impacts to their attitude and practice change. For those reasons, the study team proposes three points of ideas for health promotion activities as follows.

(1) Presentation of Actual Epidemic Episodes by Local Health Staff

Actual episodes such as cholera outbreaks in the villages with actual names of the places and persons should receive acceptance with the local people with the best of interest.

(2) Actual Scenes of Village Life

Digital cameras and projectors can be used to show real scenes of life such as water fetching, preparation of food, bathing, washing, latrines and so on for clear understanding by the villagers of health related messages no matter how different they are from the average life pattern. It can be tailored out particularly for the target villages.

(3) De-worming

Since knowledge of bacteriology is not common for ordinary people, to make them see real parasite infection in a simple way, de-worming is the most powerful IEC tool for health promotion. Ascariasis seems common in the study area, and therefore after taking de-worming medicine, a handful of roundworms will appear with the stool next morning. It will have an almost magical impact to raise health consciousness among the village society.

5.3.3 Promotion Program

One of the characteristics of rural Lao is that people are living in remote villages under rather isolated circumstances. They are living with their own languages, cultures and lifestyles, which vary significantly from the ordinary or average pattern of the Lao. The uniqueness may sometimes hinder even local health staff to communicate effectively. The staff may find some difficulties in using available health promotion materials, which are mostly designed for average people in this country.

It is generally believed that it requires certain skills and talents to develop educational materials such as posters or visual aids for public health promotions. If we could have specifically designed visual aids for a target village, the health message shall have more reality and stronger impact to the people. This can be realized by modern digital technology, i.e. a portable computer, a digital camera and a projector.

The "On-site material development" is a new concept that needs close cooperation between the local health staffs and the study team. The local health staffs have the detailed and practical information on local epidemiological situation and are capable of communicating to the local villagers effectively. We introduce modern digital equipment to make them able to organize health messages into a form of slide presentations. There are several key concepts to realize it.

Local epidemic episodes

People in a village will definitely be interested and accept a message if they think it is useful. That is the core assumption of this activity. The message should be based on a "here and now" inspiration rather than an old medical textbook.

We began to search for a recent and nearby epidemic episode from local health staffs who have witnessed, or hopefully participated in that health event. If he/she could remember the outbreak control operation that he/she had attended, he/she has a good potential to tell the episode vividly to the villagers.

Health message organization

Based on the real episode, the course of the event, the control measures taken and the preventive measures which are specifically appropriate to the target village, are to be organized in a slide presentation format in order to persuade the people to avoid similar disease outbreaks again.

Visualization

There are two kinds of image sources. One is already the existing posters, flips and leaflets etc., and the other is the actual village scene. According to the health message developed by the local health staffs, most appropriate images are selected for the presentation. Using letters should be minimized in order to communicate with illiterate villagers.

Rehearsal

Along with the organized slide images, verbal presentation is to be organized. A presenter should be familiar with the local language spoken in the target village. For trained personnel with a "health education", advice should be given as not to be in a textbook style, or not to use any technical terms.

Feedback

The team reviews the Rehearsal and makes necessary amendments in the slide sequence and verbal presentation.

After fixing infrastructure for the on-site material development, the daily routine work can be as follows.

Village walk

Every morning a couple of hours or more should be spent to investigate real people's life in the target village, with a digital camera in the presenter's hand. Although it will not appear on the screen, odors and sounds in the village will also be inputted in the presenter's mind.

By using actual scenes in the village as the materials for the show, the show avoids becoming a one-way communication, which merely tells them what to do like an ordinary textbook. This village walk always gives important messages from the villagers with words as well as without words.

Getting pictures into Portable Computer

The picture files created by the digital camera are transferred into the portable computer. A device such as a "compact flash memory card" can be used for this process. It takes about one to two hours. The rechargeable battery for the digital camera is set in a battery charger in preparation for use the next morning

Editing

Based on feedback from the previous show, new findings or impressions of the village walk, any amendments would be discussed among the presentation team. For example, in order to make the health message clear and understandable, changing the order of the components, adding or deleting pictures, adjusting picture quality such as brightness or contrast, and modifying the manner of presentation should be considered. It takes about one hour, sometimes two hours.

Rehearsal

The presenter will play his role and the rest of the team will listen to his presentation. The slide change timings, appropriateness of the expressions such as use of difficult technical terms, and smooth flow of the messages are the main focus of attention. An inexperienced presenter can get certain confidence in him/herself by doing a rehearsal.

Slide-show

Shortly before sunset, preparations should be started and the show ground set up by hanging the screen, setting the generator and extending the wire. The actual show can begin around 7 o'clock in the evening. This is the time for most villagers to have dinner. However, if they have been well informed and the show is attractive enough, the villagers can arrange their time and come to gather at the show ground. The show will end at 8 or half past 8.

Feed back

If there is time to talk with the villagers after or during the show, those are the valuable chances to get direct feed back from the real audience. The comments from the villagers should be considered for the next slide show.

The actual slide show can consist of the following eight components as an example.

(1) Pre-attraction

After setting up the show ground, while waiting for the adult villagers to come, a pre-attraction show can be presented particularly for the children who will be watching the preparation activities with their utmost curiosity from the very beginning. Show them series of simple clips, animations and the village pictures. Although it needs no guidance or explanation with it, it should be designed to imply health and water issues to the audience. When they start enjoying and laughing, other people from nearby houses will run to see the show with their dinner in their hands.

(2) Introduction

This component responds to the villagers' two major questions: who the presenters are, and why they are here on that night. This introduces the objectives of the show and should give a brief orientation of the project.

(3) Epidemic Episodes

The locally experienced real epidemic episodes organized by the local health staffs are presented to the audience.

(4) UNICEF #6

Within the school health programme run by Nam Saat-UNICEF, a series of short stories has been provided. This "Story #6" is the funniest one among all. A schoolboy was seeking around for a comfortable place for evacuation and finally settled in the school latrine.

(5) UNICEF #8

This is another short story from the Nam Saat-UNICEF school health programme, with a theme on clean river.

(6) Pictures of Village Life

This component can show some 30~50 pictures taken in the village in the morning during the village walk by the presenter himself. It can have two conceptual themes: people's life and water. The presenter should add some comments on the pictures occasionally.

At the first time, people will seem to be surprised with their own familiar figures on the screen. Then they will start enjoying and become excited with the show. Through this stage, you can expect that the audience may be reminded that all the pictures or messages that have appeared on the screen are as real as their every days life.

(7) UNICEF #7

This is yet another short story from the Nam Saat-UNICEF school health programme. A village woman negotiates with a spirit "Meikala" for super medicine to cure diarrheas. The relationship between villagers and Meikala can be interpreted as the relationship between villagers and outside supporters such as Nam Saat or donors. The underling message is "the movement you need is on your shoulders".

(8) Project Information

At the end of the show, project information such as materials delivery schedule or communal labour can be given to the audience by showing related pictures. It will encourage all the villagers to participate.

The tools and equipment to be used in the health promotion activities are exemplified in the following box.

Portable PC[2]	Generator	Screen	Laser pointer
Digital camera	Stabilizer	Pins & Clips	Lamp
LCD[3] Projector	Fuel tank	Rope	Amplifier and microphone

[2] Personal Computer
[3] Liquid Crystal Display

The above equipment which we used during the Study will be donated to the Lao side at the end of the Study.

Portable Personal Computer

The PC that we have used is an ordinary notebook type PC. It has "High color[4]" mode display capacity, and "Windows 98" as an OS[5]. As for the application software, we have used "Power Point[6]" throughout the activities and "Photo Editor[7]" when we need to rotate a picture.

One of the common difficulties when you start working with "graphics" files on your computer is its huge size of memory. On the first trial, a presentation file with some 20 pictures easily exceeds 30 MB. Even with the fastest CPU with 400 MHz and bigger RAM[8] over 60 MB, it will make the editing or presentation slow and increase a risk of hung-up.

There are some know-how to keep the files small. The two important hints are: ❶ to insert a graphic file, which is a product of your digital camera, as a picture instead of an object to the power point slide and ❷ to minimize the number of pixels of your digital camera, normally 640 × 480 pixels can maintain enough quality for presentation.

Digital Camera

A digital camera takes pictures in the form of a digital file instead of on a film as in an optical camera. Its appearance is similar to an optical camera but the function is more or less similar to a small computer. It consumes battery rapidly. Therefore it is recommendable to use a rechargeable battery instead of dry cells.

LCD Projector

An LCD Projector (digital projector) is a machine to project a computer display to a wider screen. It requires 100~240 volts AC, 250 watts of electric power supply for its operation. Therefore we have to carry a generator to the target village where it has no electricity. The projector also has an audio and VTR[9] terminal.

[4] 64,000 colors (16 kilo bit)
[5] Operation System
[6] a presentation software, product of Microsoft.
[7] a painting software, product of Microsoft.
[8] Random Access Memory
[9] Video Tape Recorder (or Player)

Generator

For our slide show, we need to supply electricity to the projector, the PC, a fluorescent lamp and PA[10] system. Total power load seems around 350 watts. The generator we have used has a capacity of 1.5 kW, more than enough for our system. It is the heaviest item in our equipment.

The generator creates significant noise while it is in operation. For that reason we should carefully design the layout of equipment beforehand in order to minimize the interruption by that noise to the audience as well as presenter at the night slide show. Some pointers are: put the generator as far away from the audience as possible by using an extension cable wire, set the exhaust in an opposite direction to the audience, put the generator behind a house, behind a car or in a pit if possible.

We have used a stabilizer between the generator and the projector for security. However, since both the projector and the PC are designed to adapt to wider range of power supply, it might not be an essential item. We merely use it as a voltage indicator.

We had to carry some fuel for the generator. A steel, portable gasoline tank is preferable. We could only get a plastic container at a local market, and it leaked while we were driving on the rough road. In our case, one slide presentation for about 1.5 hours consumed 2~3 liters of gasoline.

Screen

The slide show attracts people in every target village. Almost every man and woman, young and old has come to gather to watch the show. In a small village, the audience was around a hundred, and in a large village it was enormous, sometimes even counted more than five hundreds. In order to enable all the participants to see the show easily, a screen must be large enough and setup at a higher position.

The size of a screen is limited by the luminous intensity of the projector, and moreover by the handling convenience and possibility of an appropriate hanging place. We made a 2 × 1.8 meters special screen by using an ordinary white cloth with two layers in order to increase reflection.

[10] Public Announcement: practically it means audio amplifier with microphone and speaker.

Hanging places and methods vary widely village by village. If we found a wide, flat and higher wall, facing an open space which is big enough for all the villagers gathering, we simply put the screen on the wall with pins. In another case, we utilized two parallel poles standing at a plaza, for instance two pillars in a market place, to prepare a frame for the screen using some ropes. In those cases, the screen was attached to the rope with clips. Our hand made screen is transparent enough so that some audiences has found out that they can enjoy the scene even from the other side of the screen when there was no room in the front side of the screen.

Laser Pointer

A Laser pointer is a tiny but sophisticated gadget. It creates a sharp red laser beam to point to a certain part of the screen. This is a necessary tool for a presenter.

Lamp

A slide show is held after dark, usually from 7 p.m. to 8 p.m. A set-up activity on the show ground can be done in the last daylight, but the clearing up activity of the show ground after the show is finished is always held in the dark. For the convenience of the clearing up activity, a fluorescent lamp is quite useful. It should be portable, and preferably waterproof, shockproof and tube-guarded.

PA (Audio Amplifier)

When you have hundreds of audiences at the site, a presenter would have difficulty in communicating with them without a microphone even if the audiences are well behaved and silent. In our case, we used a Karaoke machine.

The attached slide pictures are a part of the slide show, which we have developed and actually used in Pha Oudom District.

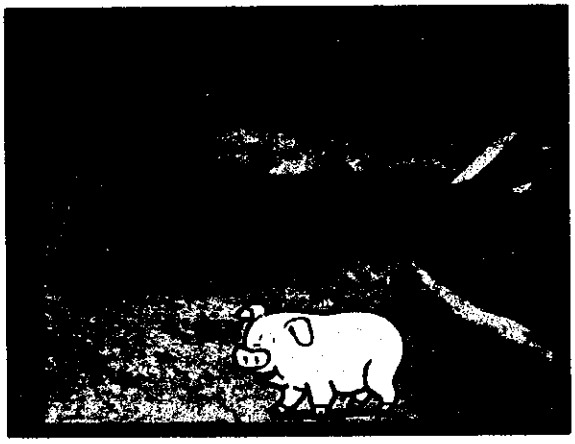
Incidentally, Nam Saat presented a paper entitled "Field Note on Sanitation and Hygiene Promotion in Lao PDR" at the Sanitation 2000 Forum in Washington D.C., U.S.A. in April 2000. A copy of this paper is included in the Data Book.

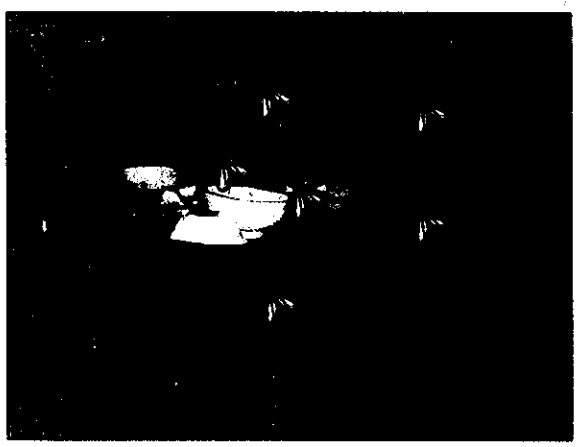
Tongkihak

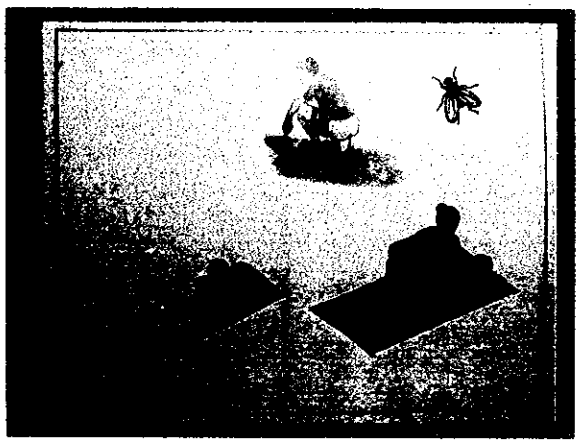
In 1994
Moung Phaoudom

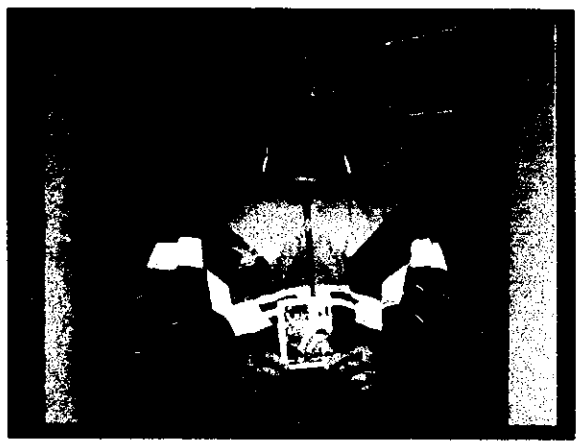
Tongkihak

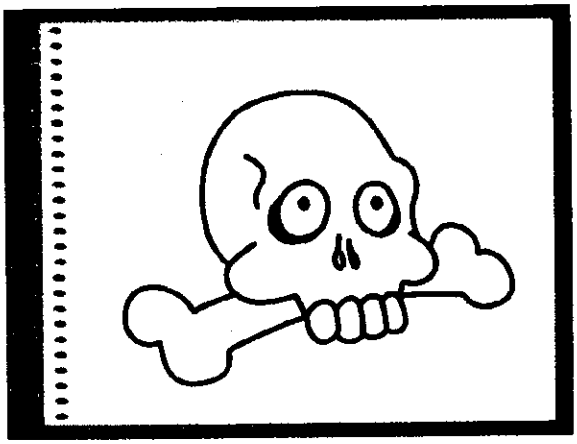
- 34 patients
- 21 deaths
- 3 days

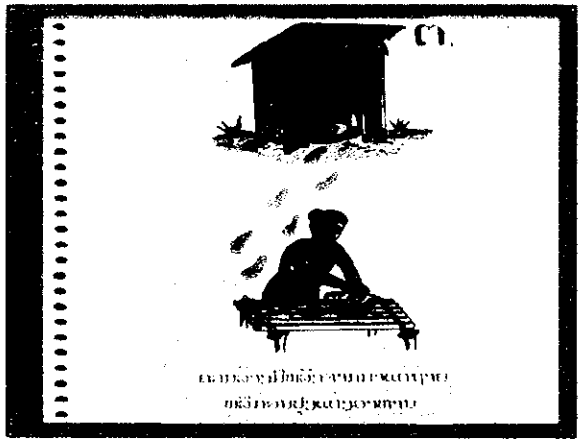


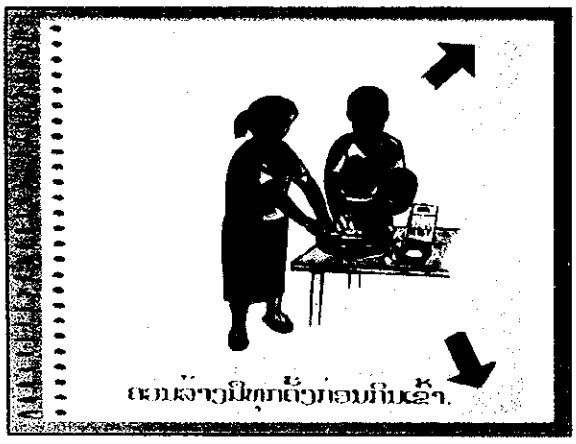


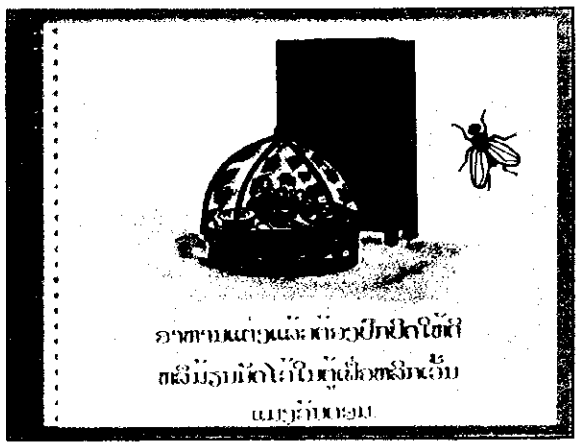


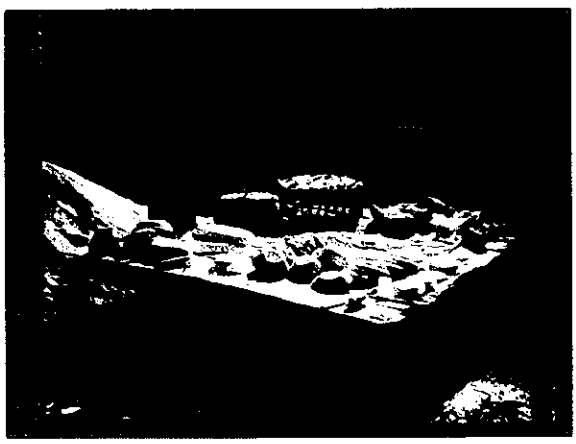


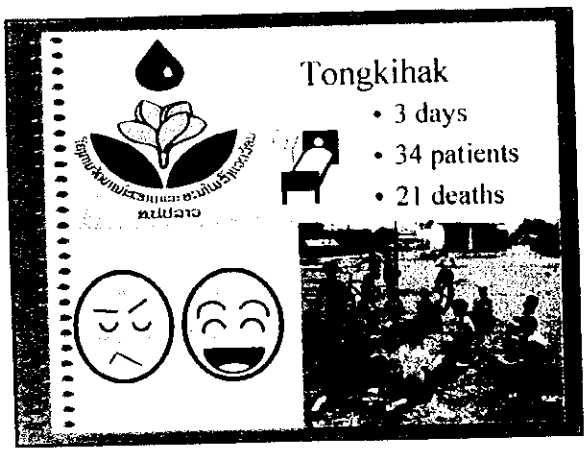





ລ້າງມືກ່ອນກິນ






Tongkihak
• 3 days
• 34 patients
• 21 deaths

5.4 Operation and Maintenance

5.4.1 WATSAN Committee

1) Function

For sustained use of the facilities, the village must form a WATSAN (water and sanitation) committee to control the activities related to water supply and sanitation. The members should include a village caretaker or volunteer to handle small repairs and technical matters, and an accountant to manage fees and bookkeeping, among others. Furthermore, since women are the ones who do most of the water fetching, the committee should have equal gender balance to maintain fairness in opinions as well as responsibilities.

The main functions and responsibilities of the committee are listed below.

(1) Clean and maintain the water supply and sanitation systems
(2) Supervise and advise on use and maintenance of taps, handpumps and latrines
(3) Collect water fees and keep accounting
(4) Organize meetings and discussions to resolve problems related to water use
(5) Distribute work responsibilities among men and women
(6) Make small repairs
(7) Monitor and promote sanitation and hygiene
(8) Control waste into water sources
(9) Prevent contamination of the environment

2) Improvement Requirements

The monitoring results for the pilot villages showed that WATSAN committees are functioning at about 76% of the villages. The villagers have shown high consciousness towards the importance of the committees, but only about half of the villages are collecting maintenance fees to sustain their systems. Nonetheless, many villagers, especially in the poorer villages, are expressing their willingness to maintain their facilities, but lack the knowledge and experience. The changes from the first survey to the second survey concerning their understanding towards the WATASAN committee are summarized below.

(1) Organized situation of committee to initiate change increased from 56% of the villages in the first survey to 76% in the second survey.
(2) Awareness on change in water and sanitation situation increased almost double to 88%.

(3) Knowledge on committee function and rules doubled to 84%.
(4) Acquisition of required technical skills tripled to 65%.
(5) Capability of taking corrective actions to solve problems increased almost triple to 79%.
(6) Capability to explain procurement of spare parts and handling of repairs increased only slightly to 79%.
(7) Capability to explain about bookkeeping and accounting remained unchanged at 94%, but in actuality, the villagers are having difficulties.
(8) Consulting users on setting water fees increased slightly to 97% shows some understanding on participatory concepts.
(9) Having at least half of the committee members being women is low at 53% showing low gender awareness.

The measures necessary to be taken to improve the functioning of the committees are listed below. Although most of these are conducted during the preparation for construction, they need to be repeated since constraints in project scheduling usually do not allow them enough time to satisfactorily absorb the concept. Also, the villagers need to learn-by-doing, so repeated actions can serve to recall and refresh their mind and memory.

(1) Explain function of the committee and confirm their understanding
(2) Train village caretakers on maintenance
(3) Train members on maintenance fee collection, as well as bookkeeping and accounting
(4) Explain importance of gender balance.
(5) Provide basic hand tools for simple repairs

5.4.2 Village Requirements

The proper operation and maintenance of facilities assures long life of the components and reduces the requirements for repairs. Operation and maintenance requires great efforts by the community since the activities must be on a regular basis with cooperative support from all concerned. Regular inspections are needed as a means for preventive maintenance, and minor repairs and replacements have to be made as soon as possible to sustain reliability of the facilities. Village committees must have an appropriate fee collection method and properly keep an accounting system to pay for the required efforts. The main activities required for proper operation and maintenance of each of the water supply and sanitation facilities, as tabulated below, need to be understood by the villagers.

Table 5-20 Operation and Maintenance Activity Charts
for Water Supply and Sanitation Facilities

1. GFS (Gravity Fed System)

Activity	Frequency	Person Responsible	Requirements	
			Materials	Equipment
Intake Cleaning and Maintenance	Every month	Village volunteer (Care taker)		Hoe, shovel, scraper, etc.
Pipe Inspection	Every 2 weeks	Village volunteer (Care taker)		
Water Quantity Measurement	Seasonally	Village volunteer (Care taker)		Bucket, watch, etc.
Water Quality Analysis	Seasonally	-District Nam Saat -Provincial Nam Saat	Analysis kit and chemicals	Sampling bottle
Filter Tank Cleaning	Every month	-Village volunteer -Water users		Bucket, brush, etc.
Water Storage Tank Cleaning	Every month or whenever necessary	-Village volunteer -Water users		Bucket, brush, etc.
Tap and Drainage Cleaning	Every 2 months	Water users		Hoe, shovel, brush, etc.
Small Repair	Whenever necessary	Village volunteer	Spare parts (joints, taps, pipe, etc.)	Repair kits, saw, shovel, knife, etc.
Big Scale Repair	Whenever necessary	-Village volunteer -Technician from District Nam Saat	Spare parts	Repair kits, saw, shovel, knife, etc.
Repair of Fence around Tap	Whenever necessary	Water users	Wood, nails, fence material, etc.	Saw, hoe, shovel, knife, hammer, etc.
Repair of Fence around Intake	Whenever necessary	-Village volunteer -Water users	Wood, nails, fence material, etc.	Saw, hoe, shovel, knife, hammer, etc.

2. Borehole

Activity	Frequency	Person Responsible	Requirements	
			Materials	Equipment
Pump Cleaning and Maintenance	Every week	-Village volunteer -Water users		Bucket, brush, etc.
Drainage Cleaning	Every month	Water users		Shovel, hoe, scraper, etc.
Water Quality Analysis	Seasonally	-District Nam Saat -Provincial Nam Saat	Analysis kit and chemicals	Sampling bottle
Repair of Fence	Whenever necessary	-Village volunteer -Water users	Wood, nails, fence material, etc.	Saw, hoe, shovel, knife, hammer, etc.
Repair of Foundation and Drainage	Whenever necessary	Water users	Cement, sand, gravel, wood, nails, etc.	Tape measure, bucket, shovel, spade, saw, knife, etc.
Borehole Repair and Maintenance	Whenever necessary	-Village volunteer -Technician from District Nam Saat	Spare parts	Repair kits & repair tools

3. Dug Well

Activity	Frequency	Person Responsible	Requirements	
			Materials	Equipment
Pump Cleaning and Maintenance	Every week	-Village volunteer -Water users		Bucket, brush, etc.
Drainage Cleaning	Every week	-Water users		Shovel, hoe, scraper, etc.
Well Cleaning	Twice a year	-Water users		Pump, hoe, shovel, bucket, brush, etc.
Water Quality Analysis	Every 3 months	-District Nam Saat -Provincial Nam Saat	Analysis kit and chemicals	Sampling bottle
Water Treatment	Twice a year	District technician	Chlorine	Bucket
Repair of Fence	Whenever necessary	-Village volunteer -Water users	Wood, nails, fence material, etc.	Saw, hoe, shovel, knife, hammer, etc.
Repair of Foundation and Drainage	Whenever necessary	Water users	Cement, sand, gravel, wood, nails, etc.	Tape measure, bucket, shovel, spade, saw, knife, etc.

4. Latrine

Activity	Frequency	Person Responsible	Requirements	
			Materials	Equipment
Latrine Bowl Cleaning	Daily	Family/Households	Washing powder	Bucket, brush, mop, etc.
Repair of Squat Plate	Whenever necessary	Family/Households	Wood, nails, cement, sand, gravel, etc.	Tape measure, bucket, shovel, spade, saw, knife, etc.
Repair of Superstructure	Whenever necessary	Family/Households	Wood, nails, bamboo, roof material, etc.	Tape measure, bucket, shovel, spade, saw, knife, etc.
Cleaning of Septic Tank	Whenever necessary	Family/Households		Shovel, scraper, hoe, pump, etc.

5.4.3 Responsibilities and Required Knowledge

Each person involved in the operation and maintenance of the facilities has his own responsibility. However, they must have minimum skills and knowledge related to their responsibilities in order to properly fulfil their responsibilities. The tables shown below outline the skills and knowledge required by each of the responsibles.

Since high level knowledge and skills are not required by the villagers, they should be warned not to neglect periodic maintenance activities, unless they do not want to prolong their conveniences.

An example of a village which is not conducting the required periodic follow-up for maintenance could be observed at one of the pilot villages in Long District. Some of the worn out water taps were left opened without repairs for over a week even though this situation can easily be remedied by replacing the old taps with new ones. Most of the village committee members reported that they were not trained enough on basic repair and management of their water schemes.

Table 5-21 Knowledge and Skill Requirements for Operation and Maintenance of Water Supply and Sanitation Facilities

1. **Water Supply Facilities**

Person Responsible	Responsibilities	Required Skills and Knowledge
Water User (Family/Household)	-Assist village volunteer in maintenance -Clean facilities (tap, intake, water storage tank, filter tank, pipe, pump, drainage, jar)	No specific skills required
Village Volunteer (Care Taker)	Maintenance, small repairs, monitoring of water supply schemes	-Basic technical skill and knowledge on repair and maintenance -Basic knowledge on sanitation
Village Committee (Water Committee, Sanitation Committee)	-Management and monitoring of water supply activities -Hygiene promotion	Basic knowledge on management and sanitation
District and Provincial Nam Saat	-Water quality analysis -Water quantity measurements -Big scale repairs -Monitoring of water supply activities -Supervise construction work	-Technical skills and knowledge in repairs, water quality analysis, flow rate measurements -Knowledge on management and sanitation promotion

2. Sanitation Facilities

Person Responsible	Responsibilities	Required Skills and Knowledge
Latrine User (Family/Household)	-Assist village volunteer in maintenance of latrine -Clean latrine	No specific skills required
Village Volunteer (Care Taker)	-Repair of latrine -Construction of latrines	-Basic technical skill and knowledge on repair and construction of latrines -Basic knowledge on sanitation
Sanitation Committee	-Hygiene promotion	Basic knowledge on management and sanitation
District and Provincial Nam Saat	-Monitoring on use of latrines and behavior towards sanitation -Supervise construction work	-Technical skills and knowledge in construction of latrines -Knowledge on sanitation and hygiene promotion

5.4.4 Cost Recovery

1) Recurrent Costs

The recurrent costs for operation and maintenance of the facilities can be given as the following.

- Payment to village caretakers in charge of the facilities
- Payment to personnel who come for periodic advice and repairs
- Remuneration or incentive to fee collectors
- Spare parts for minor repairs and preventive maintenance
- Major repairs
- Extensions or replacements
- Transportation
- Other expenses including those required when requesting repairs

2) Willingness-to-Pay

If the above funds are not adequately collected in a continuous manner, then the system will not function properly, become poorly maintained, and not be sustainable. The operation and maintenance costs can be recovered only if the users are able as well as willing to pay for the services. Some significant factors which can influence the willingness of users to pay are given below.

- Income: If villagers cannot actually pay, they will definitely be unwilling to pay.
- Service level: Users will be willing to pay only for the level of service they really desire.
- Standard of service: Users are unlikely to pay for poor service.
- Perceived benefits: Users may place priority on immediate social and economic benefits rather than health benefits which are important for project objectives. Perceived benefits can vary where some may be attracted to commercial opportunities of increased supply of water, whereas others can be interested in greater conveniences of getting water at an immediate location. The differences in benefits can result in a variable willingness to pay within a village.
- Opportunity cost of time: Since in most cases, it will be women's time that will be saved by the improved convenience, they may be more willing to pay than men.
- Acceptability of existing facilities: If villagers think their existing water supply is acceptable, then they may not be willing to pay for the new supply.
- Confidence in village committees: Past disappointments have often undermined the villagers' confidence in village committees, and so an open and transparent management system which consults users in making decisions will help instill trust and encourage payment.
- Community cohesion: Individuals in an ethnically mixed village may be unwilling to pay into a common fund.
- Policy environment: Previous policies have encouraged the belief that water should be free, and the villagers may be unwilling to pay for something which they feel should remain free.
- Sense of ownership and responsibility: Villagers may be unwilling to pay for maintenance of something they feel is not their own.

The monitoring survey on the pilot study villages revealed that some villagers were reluctant to pay the fees set by the WATSAN committee of the village. Their reasons varied according to the situation of the village, but the main reasons are listed in the following table.

Table 5-22 Reasons and Solutions for Reluctance to Pay Water Fees

Situation	Consequence	Solution
Their houses are farther away from the tapstand than others	Unfairness in use frequency and resultant inequality in quantity used	Collect fees on a volumetric basis instead of fixed fees, according to amount used
During some hours, they cannot get water when other tapstands are being used at the same time	Ignorant villagers keep tap open all day. Creates dispute over who will use the tapstand first.	Need strong leadership to educate villagers on conservation. Set up a use time table.
For borehole villages, water has undesirable odor	Do not want to use for drinking. Not willing to pay water fees.	Seek an oxidation treatment method, such as long-period storage. Need explanation on importance of collecting water fees. If necessary, construct a new dug well with handpump, or install a handpump on existing dug well.

3) Method of Fee Collection

Water fees are importance source of fund to balance the operation and maintenance costs. Various methods of collection are available, but the two common methods which are recommendable are listed below.

- Fixed rate — Users pay a fixed flat fee per person or per household on a periodic basis, such as per month, for a tapstand or well
- Volumetric rate — Users pay for the amount they use according to the reading on the water meter. In the case of villages with wells, this cannot be applied as there is no meter, but fees can be charged according to the used number of a standard container, such as a bucket.

Whenever a village starts collecting water fees, most often they will set the cost on a fixed fee basis such as a certain amount per household per month. This method is acceptable if all beneficiaries are receiving equal benefits. However, as soon as some users come to realize that they are not getting equal benefits, then they will start complaining or not pay the fees. To alleviate this situation, the volumetric approach is a solution. Nonetheless, this also has its drawbacks. The person in charge of collecting fees has to be well trained in reading the meter and calculating the correct amount used. If the fees are to be collected on a monthly basis, the readings have to be carefully recorded where accounting and bookkeeping has to be properly managed.

4) Proper Collection Fee

From the results of the Pilot Study, the amount which the villages are willing to pay for operation and maintenance is about 100 kip per person per month on the average, which implies about 550 kip per family or household per month[1]. The average monthly income of the Pilot Study villages is about 195,000 kip/family. This implies that the villages are willing to pay only about 0.3% of their income for recurrent costs. This amount is quite low, but the present collected fee of 100 kip/person/month is reasonable to balance the required expenses for routine maintenance only. However, to cover emergency situations and in consideration of replacement requirements, raising the fee is advised. An amount up to about 6,000 kip/family/month or 1,100 kip/person/month which is about 3% of the average income could be possible in relation to their income. This amount should be able to cover the realistic annual costs required for operation and maintenance on a long-term basis to create a sustainable system. However, as mentioned above, collecting a fixed fee cannot continue whenever the villagers start to realize its unfairness to all users, and a volumetric fee would become a more realistic approach if it can be properly managed.

[1] The average number of persons per household is about 5.5 from the survey

5.5 Organizational Reform

5.5.1 Present System

1) Present Water and Sanitation Administration

According to the Prime Ministerial Decision on Management and Development of the Water Supply Sector No. 37/PM dated 30 September 1999, the administrative responsibilities for the water sector in the Lao PDR are to be divided as follows.

(1) MCTPC (Ministry of Communication, Transport, Post and Construction)

- Facilitation and coordination of the development process for water supply and wastewater management systems in urban and rural areas throughout the country
- Promotion and mobilization of all available resources toward achieving the set goals and objectives

a) DHUP (Department of Housing and Urban Planning)

- Setting out short, medium and long term strategies on water supply development
- Planning of staff training on planning and management of water supply systems
- Studying of regulations, standards, technical specifications, and performance indicators of water supply systems operation, in collaboration with WASA

b) WASA (Water Supply Authority)

- Assisting the Minister of MCTPC in technical issues of the Water Supply Sector, including redevelopment of the MCTPC strategic plan on water supply and wastewater management system which set out in more detail planning, action plan and detailed projects in urban and rural areas throughout the country
- Setting norms, regulations, technical standards and technico-economic specifications on water supply and wastewater management systems
- Directing on behalf of the MCTPC the management and monitoring the implementation of the water supply sector policy

(2) MOH (Ministry of Public Health)

- Facilitation, coordination and direction of all rural water supply, and urban and rural environmental hygiene activities throughout the country

a) **Nam Saat (National Center for Environmental Health and Water Supply)**

- Management of technical aspects in promoting rural water supply, and urban and rural environmental hygiene throughout the country

(3) MOF (Ministry of Finance)

- Investment support and financial arrangement for all funds utilized in the development of water supply and wastewater management systems, and environmental hygiene
- Financial support in the short- to medium-term to NPSEs where commercial targets cannot readily be achieved

(4) WRCC (Water Resource Coordination Committee)

- Coordination of planning, management, monitoring water and water resources protection in order to secure the sustainable development and use of water and water resources

(5) Provincial Governments

- Coordination, facilitation and investment support in the development of water supply and wastewater management systems, and environmental hygiene
- Collaboration with concerned Provincial DCTPC (Department of Communication, Transport, Post and Construction) in finding out suitable solutions to assist low income households which cannot afford the cost of sanitary facilities
- Setting by-laws on water supply sector within the Province concerned
- Direction of water supply and sanitation sector project implementation in the Province concerned
- Collaboration with the WASA in proposal for admission of water sources development through the WRCC
- Institutional arrangements for the implementation and management of centralized wastewater management systems as for water supply when these systems become economically and financially viable, but until such time on-site treatment will be pursued and the implementation and management of the facilities shall be the responsibility of the individual owner
- Rural water supply, and urban and rural environmental hygiene in the Province concerned

(6) NPSEs (Nam Papa State-owned Enterprises)

- Management and operation of all water supply and wastewater management systems and development of raw water in urban and rural areas within their respective provincial boundaries. The operation shall be on commercial principles and in accordance with three-year rolling corporate plans
- Compliance of the management of sanitary facilities with the sanitation regulation issued

2) Study Counterpart Agency: Nam Saat Central

The counterpart organization for the present study is Nam Saat, or National Center for Environmental Health and Water Supply (NEW), under the Ministry of Public Health. Nam Saat has emerged from a program office in 1981 to an administrative department in 1999 with higher responsibilities. The main functions of this organization are as follows.

- Support to community based activities related to improvement and expansion of rural water supply and sanitation services
- Promotion of community awareness to gain favorable benefits through proper and sustainable use of the water supply and sanitation services

Nam Saat is the central organization responsible for rural water supply and sanitation activities for the whole country having responsibilities as listed below.

- Formation of action plans for the rural water supply and sanitation sector based on Provincial and regional development plans around the country
- Technical assistance in supervision, support, advice and management of rural water supply and sanitation activities
- Coordination and allocation of funds from the state, private sector and external supporting agencies
- Procurement of materials and equipment
- Control and monitoring of rural water supply and sanitation activities
- Reporting to related sectors and agencies
- Conducting scientific surveys and research
- Establishment of standards and norms

The present organization chart of Nam Saat central is depicted below.

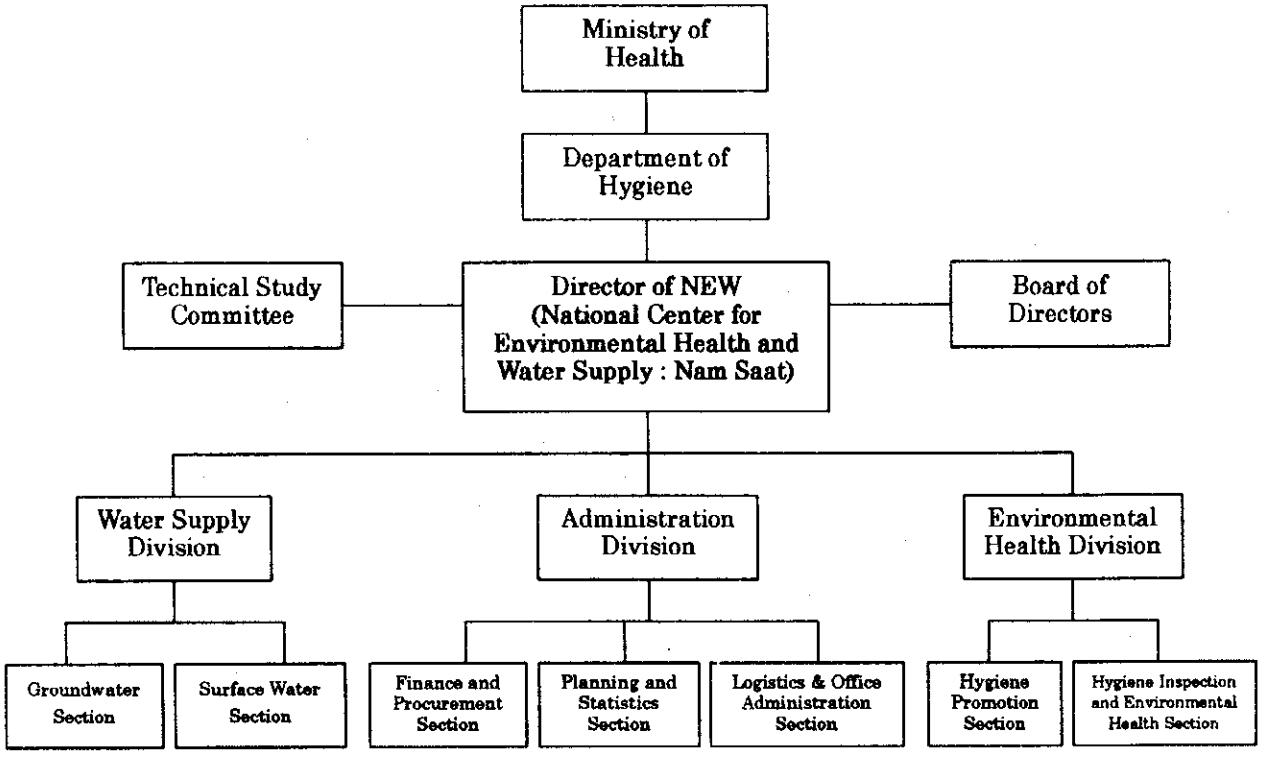


Figure 5-2 Organization Chart of Nam Saat

The numbers of staff of Nam Saat central for each division are as follows:

Board of Directors	3 persons (all male)
Water Supply Division	9 persons (all male)
Environmental Health Division	10 persons (4 females)
Administration Division	11 persons (5 females)
T o t a l	33 persons (9 females)

At the central level, Nam Saat now has thirty-three staff working in three divisions, that is, Water Supply Division, Environmental Health Division and Administration Divisions. Over 70% of the staff members are qualified as either medical doctors or civil engineers. Nine women are staff members, and three out of them graduated from tertiary institutions. This gender imbalance may lead to slow changes in gender awareness and attitude toward WID. The number of technical staff outweighs the managerial staff, as many of them have to take duel responsibilities. Over ten staff members have been involved in this Study at different stages and have acquired technical and managerial knowledge replicable to other similar projects. Especially, the assigned coordinator from this staff, who has participated in every stages of the Study, has performed his assignment with gradually improved skills and efficiency.

Achievements made by Nam Saat central during this Study in the course of their systematic learning process are listed below. They have taken initiative and direct responsibility on their trail to being self-reliant for future similar activities.

(1) Planning and presentation of workshops
(2) Planning and implementation of the Pilot Study
(3) Scheduling and facilitation of the TOT, including on-the-job training
(4) Training on and supervision of water supply and sanitation facilities design
(5) Coordination of community dialogue
(6) Facilitation and supervision of sanitation education and hygiene promotion
(7) Supervision of and advising on construction works
(8) Scheduling and coordination of monitoring

3) Provincial and District Level Nam Saat

The Provincial Nam Saat Office is a unit with limited number of staff as compared to the demand of the population in each of the target provinces. The Provincial Nam Saat is one of the sections directly under the Provincial Public Health Department along with other sections such as Drug and Medicine, Primary Health Care, Malaria, Epidemic, and Mother and Child Health. The number of staff varies from province to province. Luang Namtha has ten staff (two women) while Bokeo has seven staff (two women). Half of the staff have acquired intermediate level education or graduated from medical college. The technical, administrative and management skills of provincial personnel need to be trained to develop them for the field requirements.

The number of District Nam Saat staff usually varies between two to four for each district. None of the district offices have female staff working in neither administration/management nor in technical units. The organizational structure of Nam Saat at district level was simply set up with each staff responsible for each task assigned by the chief, and usually undertake the duel responsibilities for the management of water supply or sanitation development projects. Only 35% of the staff members graduated from intermediate level medical colleges. Lack of both technical and managerial skills and knowledge in addition to limited budget and resources, especially transportation means, are

considered to be the major constraints and problems faced by Nam Saat offices in each district. In all the district offices, there was no clear budget allocation policy where the staff would be able to work in the field only when they received a designated fund. The staff has unclear job descriptions and everyone seemed to compete over donor-funded projects which sometimes overlapped. Furthermore, the Sector Strategy was not clearly understood and supported by the staff at the district level.

5.5.2 Institutional Reinforcement

An institutional management assessment of Nam Saat at each administrative level was conducted by using the ID/OS organizational assessment method during the monitoring survey in June 2000. The results of the institutional management assessment are shown in the next page.

(1) Sector Strategy and its Support by the Staff at Each Level

The Sector Strategy is used as a policy as well as a mission of the organization to promote quality-oriented water supply schemes and sanitation facilities to meet the local demands, especially for remote zones where the water and sanitation conditions are the poorest. However, the extent of understanding the Sector Strategy by the staff varies between each administrative level. Dissemination and understanding of the Sector Strategy at district level is not as high as the central and provincial levels. For some of the district staff, it is necessary to develop a revised guideline that is easier to read and understand which describes the strategy in a more practical way to match the local situation.

(2) Improvement of Supply-Oriented Weaknesses to Promote Local Demand-Oriented Project Management

The results of the institutional management assessment of Nam Saat show that staff involvement in decision making varies for each level. That is, the amount of information being disclosed to the staff concerning the contents of the decision and plan is higher at central level and lower at district level, with consequent level of involvement. This predicament is coincident with the stance that water supply schemes are not sufficiently meeting the local demands.

Table 5-23
Institutional Management Assessment of Nam Saat at Each Administrative Level[1]

		Central	Provincial	District
1.0	**Strategy** Response Point System: 5>4>3>2>1*			
1.1	Is the Strategy relevantly and realistically formulated for the issues of the field?	4	4	3
1.2	Does staff understand and support the Strategy at all levels?	3	3	2
1.3	Has the Strategy been adequately translated in long-term objectives?	4	4	3
1.4	Has the Strategy been visualized in a clear and realistic plan?	4	4	3
2.0	**Inputs**			
2.1	Are there a sufficient number of skilled management and technical staff at all levels?	3	3	2
2.2	Are there premises and equipment adequate at all levels?	3	2	2
2.3	Does staff have sufficient access to training for upgrading knowledge?	2	2	3
2.4	Is there a relevant system of financial allocation and accounting?	4	3	2
2.5	Are inputs adequately utilized considering the activities for outputs?	3	3	3
2.6	Is there any overlapping of the resource utilization?	4	4	3
3.0	**External Relations and Networking**			
3.1	Is there a networking with inter-ministerial and inter-sectoral organizations?	3	4	3
3.2	Does organization try to avoid duplication amongst external organizations?	3	3	3
3.3	Do external agencies promote local initiated demand-based plans?	4	4	4
3.4	Do external organizations learn from past lessons and experiences?	3	3	3
4.0	**Structure and System**			
4.1	Is there a clear division in departments and units?	4	4	3
4.2	Do they have clear tasks and responsibilities by each staff?	3	3	3
4.3	Is there sufficient coordination between departments and units?	3	3	3
4.4	Is there a good system for monitoring and evaluation?	3	3	3
4.5	Is staff adequately involved in decision making?	4	3	3
4.6	Is staff adequately informed on decision and plan?	4	4	2
4.7	Is procurement system working relevantly and fairly?	3	3	2
4.8	Is management on a learning based approach?	3	3	3
4.9	Does staff have accountability of project	4	4	4
4.10	Is there a gender balance in/among departments and units	2	2	1
5.0	**Outputs**			
5.1	Do water supply schemes meet local demands?	2	2	2
5.2	Are there any regional differences of project allocation?	4	4	4
5.3	Are services delivered sufficiently in quantity annually?	2	2	2
5.4	Are services provided effectively and efficiently?	3	3	3
5.5	Does the project have technical and financial sustainability?	3	3	2
5.6	Does the project promote local ownership?	4	4	4
5.7	Does the project bring hygiene-related behavioral change?	4	4	4

* The number 5 indicates the highest extent, 3 as moderate and 1 as the lowest, in response to each question

[1] This is the result of interviews with Nam Saat officials at each level by the JICA Study Team during the monitoring survey in June 2000

In this sense, the central staff having professional technical knowledge play key roles in realizing a demand-based planning in collaboration with provincial and district staff. Planning can be guided by proper directions with professional judgment through a mixture of various expertise.

The network and infrastructure for communication has to be improved between field offices and central office to grasp the local situation, understand the demands and send feedback. Efforts have to be made to modify a plan flexibly, timely and relevantly, in accordance with the actual situation. Furthermore, technical training for the field staff, continuous follow-up of the program and periodic monitoring by each level office are also required.

Past experiences and lessons learned have to be utilized by Nam Saat both internally and externally, and should be disseminated among external organizations and agencies according to the learning-based approach. This can contribute to duplicating the successful experiences and avoid repeating the same mistakes to achieve more efficient and effective programs.

5.5.3 Proposed Arrangements

Nam Saat central should be allotted the responsibility of steering the direction of comprehensive strategy items and developing a long-term activity framework for the sector. The proposed recommendations are listed below.

(1) Build capacity and develop the institution of Nam Saat: Develop the right attitude to training. Training and development are twin processes in which training provides knowledge, skills and attitude, and development produces action through on-the-job application of capabilities. On the other hand, the staff of Nam Saat should take responsibility, commit to service, become partners in change, participate in interactive learning, model the change and provide feedback for learning. Furthermore, train Nam Saat in general management, financial management and administrative skills, and also develop a financial and procurement system in order for Nam Saat to become self-reliant and able take direct responsibilities. SIDA's Phase II Transitional Support along with the inputs of the CTA with back-up support from WB WSP-EAP and UNICEF are greatly contributing to build the capacity of Nam Saat to become independent of external assistance in management and implementation.

(2) Formulate plans based on grassroots level recommendations and needs through the support of District and Provincial Nam Saat offices: The government's new policy for planning and implementation of "central is the focal point for policy, Province for strategy, District for planning and the village for implementation" should be adopted. Also, decentralization of funds to Provinces is needed.

(3) Strengthen the links and collaborations with other agencies and supporters: Establish a collaborative working relationship and maintain an active partnership and good liaison with external supporting agencies and NGOs, and other government agencies.

(4) Stand firm on the concepts of the sector strategy and guideline national framework, and make efforts to expand and improve upon these concepts: In this respect, the Sector Strategy should be refined and mastered at all levels, especially by the District.

(5) Promote gender-balanced involvement in all activities at all levels: For the purpose of achieving this balanced involvement, the situation report[2] on gender policy should be consulted in order to involve women more positively and actively in the same manner as men.

(6) Strengthen function and roles of Nam Saat: Frequent changes in staffing has negative effects to the strengthening of Nam Saat. More trust should be handed over from the Department and Ministry to give Nam Saat more autonomy, delegate authority and responsibilities to become a more efficient system. Strengthening and restructuring of the institution and capacity building of Nam Saat staff could pave the way for Nam saat to become a department under the Ministry of Health.

[2] The Situation Report called, "Steps Towards Better Gender Balance in Rural Water Supply and Sanitation Sector in Lao PDR, From Strategy to Practice", is shown in the Data Book.

5.6 Technology Transfer

5.6.1 Training Sessions for Local Representatives

During Phase I of this study, a training program including training in the classroom and a practical (on-the-job) training at the village was conducted to 1) strengthen the knowledge on water supply and sanitation, its purpose, necessity and operation and maintenance of facilities; 2) build the capacity of Provincial and District level personnel from government as well as local representative organizations such as the Lao Women's Union and the Lao Youth Organization; and 3) promote the national Sector Strategy of Nam Saat in the water supply and sanitation sector. The aim of the training program was to introduce basic techniques for water supply and sanitation, and to train the participants on survey methods for implementing water supply and sanitation activities through community participation. Then an on-the-job training (OJT) was held to train the participants on practical survey at the villages, followed by the self-conducted village field survey. The main goal of the OJT and subsequent village field survey is to improve the water supply and sanitation conditions in the Study target villages by raising the living standards of the ethnic minority groups, decreasing the burden on women and children in water fetching, as well as reducing water-borne diseases caused by contaminated water and unsanitary environmental conditions.

In line with the Sector Strategy, the main objective of this Study is capacity building and institutional strengthening, and therefore much emphasis was placed on technology transfer to Provincial and District level personnel using lectures and on-the-job training. Furthermore, since another important component of the Sector Strategy is community participation and dialogue, participatory survey methods were applied in this Study as much as possible.

The process starts from the training session to the on-the-job training and to the village field survey, and eventually this would lead to the pilot study, monitoring and evaluation. In this relation, the development of capabilities is emphasized where appropriate training methods at each stage of the process were prepared, appropriate trainees were selected, appropriate trainer teams were formed, and wherever required, the JICA Study Team gave guidance and support. At various steps during the training, training results were fed back to reflect upon the actual

capability and potential of the trainees, and needed modifications were made accordingly. This concept applies to the "learning-by-doing dynamics" as given in the Sector Strategy.

The details and results of the training sessions and village field survey are presented in the first section of the Supporting Report.

5.6.2 Technology Transfer through Pilot Studies

In Phase II, a pilot study was conducted at 34 villages out of the 81 study target villages. The pilot study included further training, and planning and construction through the participation of the beneficiary villages, as well as monitoring of behavioral changes. The pilot study activities were centralized and initiated by the staff of Nam Saat central.

The pilot study program was divided into five stages from A to E aiming for capacity building of counterparts and communities at each stage of the program. Stage A was the introductory stage in preparation for the pilot study, where coordination and networking were emphasized and potential trainers trained so that they will be able to carry out the implementation in the subsequent stages. In Stage B, village participatory organization and planning kicked off the implementation at the villages selected for pilot study with aims to organize village committees and prepare their plans of action using the demand responsive approach and community dialogue. The objectives of Stage B were to establish a consensus within the village and make an agreement with the village. During Stage B, in addition to the method familiar with Nam Saat, the study team employed another participatory method called PCM (Project Cycle Management) at selected villages, which is appropriate to facilitate dialogue with the villagers, to assure the feasibility of the implementation, to strengthen the sustainability and to minimize negative impacts. Stage C aimed at formulating a plan for construction of water supply and sanitation facilities and for operation and maintenance. According to the plans formulated at this stage, the water supply and sanitation facilities were constructed with community participation and villagers' contributions in the form of labor, materials and cash in Stage D. The facilities constructed and operation and maintenance system established in Stage D were monitored during Stage E soon after completion of the construction works for each pilot study village.

Stage	Description
A: Training of Trainers (TOT)	1. Sanitation and hygiene promotion 2. Management and organization 3. Operation and maintenance
B: Participatory Village Activities	1. Community dialogue 2. Socio-economic assessment 3. Participation assessment 4. Community organization 5. Sanitation and hygiene promotion
C: Preparation for Construction	1. Participatory facilities planning 2. Operation and maintenance planning 3. Village action plan 4. Village agreement
D: Construction Works	1. Village contributions 2. Construction of water schemes 3. Construction of latrines
E: Monitoring	1. Study impacts 2. Technical appropriateness 3. Behavioral change 4. Sanitation awareness

The monitoring results from the pilot study gave favorable responses. Therefore, as a continuum to the previous pilot study, (1) in order to further strengthen the capacity of Provincial and District level personnel on implementation of water supply and sanitation facilities, and (2) to further expand the coverage of water supply and sanitation to this area, an extension pilot study was carried out at 17 additional villages.

The pilot study extension villages followed a similar staging procedure as conducted in the previous pilot study. The stages needed to be modified as described below in order to satisfy the stringent requirements to implement the extension study.

Stage A TOT (Training of Trainers)

A condensed version with emphasis on review was conducted since the participants were mostly the same as those who participated previously, and this served as a refresher course.

Stage B/C Participatory Preparation Activities

Preparatory activities such as community dialogue, participatory planning, hygiene promotion, operation and maintenance planning and village agreement were carried out in the same way as was done before, but in a continuous process from Stage B to Stage C.

Stage D Construction Works

Better coordination and stricter supervision was required than before in order to complete the construction. However, the coordinators and supervisors had gained experience from the previous pilot study to effectively handle this situation. On the other hand, similar to the previous pilot study, the participation levels of the villagers were highly different from village to village requiring flexibility in supervision works.

Stage E Monitoring

Unfortunately, due to constraints in the time period, monitoring could not be conducted as part of this study, but the Provincial and District staff should make every effort to monitor the results on a continuous, periodic basis by themselves.

Similar to the previous pilot study, the implementation was initiated and centralized by the Province and District with guidance from Nam Saat central. Required advice was given by the JICA Study Team. Also, the Sector Strategy concepts of community dialogue and informed choice are always included in the pilot study activities to ensure sustainability through local ownership.

See the Supporting Report for further information concerning the pilot study and pilot study extension. Also, the Supporting Report describes the results and evaluation of the monitoring surveys.

5.6.3 Future Anticipations

The preparations and execution of the training sessions were centrally initiated by the staff of Nam Saat central. Therefore, they have the capability and experience to implement further training during similar studies and projects in the future.

Furthermore, many of the participants who have received the training are now skilled enough to continue on their own.

The staff of Nam Saat as well as local representatives who participated in the pilot studies have acquired valuable experience through the technology transferred during the implementation of the pilot studies. Therefore, through the leadership and coordination of the Nam Saat staff, similar implementations can be anticipated in the future.

On the other hand, the villagers also gained experience in community organization and management through participatory planning and construction during the pilot studies. Such participatory activities can foster appropriate ownership for sustainable development of rural communities.

CHAPTER 6 PROJECT EVALUATION

6.1 Economic Benefits

6.1.1 Overall Benefits

The Project is designed to satisfy the basic human needs (BHN) of the villagers, who are mostly ethnic minorities, living in the remote areas in the North-West region of the Lao PDR, namely in Luang Namtha and Bokeo Provinces. A total of 81 villages in this area have been selected as the target villages for this Study. Out of these 81 villages, 34 villages as pilot study and 17 villages as pilot study extension for a total of 51 villages were already implemented water supply and sanitation facilities. The remaining 30 villages are the targets for Project implementation.

Similar to the Pilot Study villages, the Project is expected to yield a variety of direct as well as indirect benefits. These benefits can be received on a short term as well as a long term basis.

The direct benefits include, among others, the following.

- Increased number of beneficiaries
- Expanded coverage in water supply and sanitation
- Sanitation and health improvement
- Time savings
- Guide orientation and build capacity
- Consumer satisfaction
- Improved quality of life

Furthermore, the expected indirect benefits can be listed as follows.

- Increase in economic development owing to more time and greater opportunities for cash generation
- Reduction in morbidity and mortality of children as a result of improvements in sanitation and increased time for women to care the children
- Increased activities of the rural population for community development as a result of the reduced time

Although the benefits mentioned above are difficult to quantify, efforts are made to evaluate them in the following sections.

6.1.2 Increased Beneficiaries

One of the significant effects of the Project is the increase in beneficiaries due to increased supply of clean water and improved sanitation. The basic design standards used in this study which are in accordance with the standards set by Nam Saat are the following.

Target year: 15 years
Population growth rate: 2.9% per annum

Therefore, the numbers of beneficiaries for each of the target villages are listed below. The total beneficiaries in the target year 2015 are projected to be 14,426 persons as is summarized in the subsequent table.

Table 6-1 Beneficiaries Projections for the Project Villages

District	No.	Village Name	Present Population (2000)	Projected Population (2015)
Houayxai	H-6	Ban Nam Deua	556	854
	H-10	Ban Phousene	369	567
	H-11	Ban Bolek	420	645
	H-12	Ban May Ngang	169	259
	H-13	Ban Done Gneng	246	378
	H-14	Ban Mayhya	218	335
	H-15	Ban Namtoi	284	436
	H-16	Ban Xaychaleun	169	259
	H-33	Ban Nampouktay	315	484
	H-34	Ban Nampoukkang	783	1,202
	H-35	Ban Done Xay	589	904
	H-36	Ban Nam Samoktay	380	583
	H-38	Ban Done Xavanh	467	717
	H-39	Ban Nam Saen	325	499
Viengphoukha	V-2	Ban Nam Paman	478	734
	V-3	Ban Donmay	376	577
	V-4	Ban Nam Phae	668	1,026
	V-5	Ban Phoulan	222	341
	V-7	Ban Sakon/Layloth	444	682
Long	L-3	Ban Pang An	136	209
	L-5	Ban Don Savang	308	473
	L-10	Ban Sivilay	331	508
	L-16	Ban Phatae Kao	146	224
	L-17	Ban Silimoun	195	299
	L-18	Ban Pheo Yae	135	207
	L-19	Ban Cha Yi	70	107
	L-20	Ban Khalung	84	129
	L-22	Ban Namoun	58	89
	L-24	Ban Paxang	236	362
	L-25	Ban Phataemay	102	157
Total			9,279	14,246

Table 6-2 Distribution of Beneficiaries by District

Province	District	Beneficiaries (Persons)
Bokeo	Houayxai	8,122
Luang Namtha	Viengphoukha	3,360
	Long	2,764
Total Beneficiaries		**14,246**

6.1.3 Expansion of Coverage

In addition to increasing the number of beneficiaries, the coverage rate of water supply and sanitation will also increase, which is one of the important aims of this Study. As a result of the expanded coverage through the construction of water supply schemes and latrines, the quality of life of the community will improve immensely.

The coverage rates for water supply and sanitation of the target Districts and Provinces are shown in Tables 6-3 and 6-4, respectively. At the District level for the 4 target Districts, the coverage rate for water supply will increase from an average of 25% before the project to 44% after the project. Similarly, the sanitation coverage rate at the District level will improve from an average of 16% before the project to 29% after the project. The Provincial coverage will expand from 37% to 46% for water supply, and from 21% to 27% for sanitation. This reveals that the coverage rates have higher significance at the District levels implying that the Study is targeting the less developed areas in the region.

Table 6-3 Coverage Rate for Water Supply

Service Area	Before Project	After Pilot Studies	After Project on Study Villages
Long District	7%	18%	26%
Viengphoukha District	13%	17%	25%
Houayxai District	55%	59%	70%
Pha Oudom District	35%	44%	44%
Average for Target Districts	**25%**	**37%**	**44%**
Luang Namtha Province	41%	44%	47%
Bokeo Province	32%	41%	45%
Average for Target Provinces	**37%**	**43%**	**46%**

Table 6-4 Coverage Rate for Sanitation

Service Area	Before Project	After Pilot Studies	After Project on Study Villages
Long District	2%	9%	17%
Viengphoukha District	7%	10%	17%
Houayxai District	33%	44%	54%
Pha Oudom District	17%	18%	18%
Average for Target Districts	16%	22%	29%
Luang Namtha Province	10%	12%	15%
Bokeo Province	37%	41%	44%
Average for Target Provinces	21%	24%	27%

6.1.4 Improvements in Conditions of Sanitation and Hygiene

The improvement in health conditions is one of the important objectives of a rural water supply and sanitation program. Some of the changes that can be realized through water supply and sanitation are listed below.

- Decrease in waterborne diseases and other related diseases
- Opportunity to regularly practice hygiene
- Sanitation education to children
- Improvement of sanitary living conditions
- Realization of a sanitary environment

According to the monitoring results of the Pilot Study villages, about 70% of the target population reported a noticeable decrease in the number of water related diseases such as diarrhea since they have access to clean water and sanitation facilities. This phenomenon was also seen in the villagers' realization that the days of absence from school of their children have decreased after receiving the conveniences. In this effect, the proposed Project is designed to also reduce the incidences of waterborne diseases through the provision of clean and safe water in sufficient quantity and installation of latrines to improve the sanitary conditions.

6.1.5 Effects on Time Saved in Water Collection

The positive effects of time saving due to a more convenient water fetching are as follows.

- Less workload on water fetching
- Increased use of clean water to improve sanitation practices and upgrade living customs
- Opportunity to realize other activities
- Increased income from new activities

A significant aim of a rural water supply program is the reduction in the workload of the villagers, particularly women and children, who are the principle water fetchers. The monitoring results revealed that 91% of the pilot villages responded to reduction in time for water fetching by using the improved water supply facilities. Furthermore, the average time spent before receiving the facilities was 30 minutes as compared to about 10 minutes after the construction, for an average time reduction of more than 20 minutes due to the improved accessibility. In the same manner, the Project will have effect on the reduction in water fetching time. This saved time can be used for activities which were not possible before, such as more care to their children, tending gardens and raising livestock with possibilities for increased income from these extraneous activities.

6.1.6 Contribution to Guiding Orientation and Building Capacity

Similar to the present Study, by learning the demand-driven and participatory approaches used during the Study, the Project can contribute towards guiding the orientation of counterpart government staff in terms of implementation using participatory methods and learning-through-sharing to apply demand-driven approaches. Furthermore, capacities of all level concerns can be built through upgrading skills and knowledge as a result of training sessions, on-job-training, and actual applications, which are conducted in line with the concept of learning-by-doing.

6.2 Social Evaluation

6.2.1 Evaluation of Social Impact and Social Considerations

The basic concept of social considerations is to minimize the negative impacts brought by project implementation, and ensure the sustainability of the project in terms of economical viability and social support by the community members. The negative impacts mean undesirable impacts on society, such as conflicts or disagreements among villagers, or negative phenomena having influence on productive activity. Considerations have to be examined from different points of expertise based on various information from different stakeholders and groups involved. Social analysis and considerations undertaken during Phase I and Phase II are summarized in the next page followed by the positive and negative impacts actually brought by the project in the following page.

Table 6-5 Social Analysis and Considerations for Phase I and Phase II

Parameter	Social Analysis	Phase I	Phase II	Issues and Problems/ Positive Aspects	Social Considerations and Measures	Lessons and Learning Dynamics
Ensurement of Implementation Feasibility	i. Identification of demands/needs for water (water fetching agent, method, amount, frequency, no. of trips to fetch water)	○		Reflection of community needs Incorporation of people's demands into the project	Promotion of community dialogue, demand creation	Further integration during survey may be needed. Selection criteria should be clarified to local community.
	ii. Population and social infrastructure (location, module of village, productive activities, interior and exterior mapping)	○		Participatory survey contributed to provide actual situation of the village and timely information	Promotion of community dialogue	Documentation of outputs at all levels has to be properly directed.
	iii. Seasonal labor pattern and man power for construction planning, feasibility of procurement of local materials	○		Construction period is considerably short, although seasonal period is appropriate.	Promotion of community participation	Need more sufficient time to implement
	iv. Institutional assessment		○	Institutional capability is high and coordination is good at all levels. Agency has many obligations to other projects and programs at the same time.	Meeting for exchange of views was encouraged to have effective coordination	Pre-assessment of capabilities and transfer of technology is required. Project scheduling is crucial
	v. Socio-economic situation	○	○	Economic situation varies from district to district, ethnicity to ethnicity and village to village.	Intra-community cooperation has to be promoted based on case in point.	Further financial discussions need to be made during community dialogue.
Maximizing Benefits to Beneficiaries	i. Coordination of counterpart agency at all levels in the planning and implementation	○	○	Counterpart agency at all levels made great efforts in coordination in spite of the time limitations.	Effective coordination and supervision.	Further overall guidance and training is highly required. Time constraints have to be solved.
	iii. Community participation in the planning and implementation		○	Although community participation is excellent at all stages, managerial, financial and technical information was not clearly understood	Strengthening of community dialogue	Managerial, financial and technical explanations must be understood by the community.
	iv. Group formation and institutional building		○	Fairly good solidarity of local community was utilized in terms of potentials for group formation.	Reflection of community ideas and thoughts	Lao community has good solidarity and participation, which contributed to successful outputs.
	v. Location of and accessibility to tapstands		○	Location of tapstands was decided according to the community dialogue, but more taps demanded.	Encouragement of community planning	Consequences of increasing tapstand number must be understood by villagers.
	vi. Water related belief, taboo, religion	○	○	People do not touch the points which they are scared of	Following decision by community dialogue	Community ideas have to be respected in any occasions.
	vii. Social strata and diversity of economic situation inside the villages	○	○	Economic situation varies from household to household; female-headed households and needy households mostly do not attend the meeting; gaps in ability of payment for construction and maintenance were observed.	Intra-community cooperation system has to be promoted based on the issues in consideration.	Appropriate system of collecting relevant amount of payment has to be clarified. Dialogue among households inside village is prerequisite.
Equity of Benefit Allocation	i. Distance to water source in terms of accessibility for each villager		○	Equitable distribution needs community dialogue with full participation of villagers.	Promotion of community dialogue	Understanding of feasible allocation for benefit of all village population is required.
	ii. Equity among ethnic minorities	○	○	Predominant group tends to take advantage to get water.	Protection of the disadvantaged on water usage	Conscious awareness has to be promoted.
	iii. Gender balance, gender equity	○	○	Men had high participation in decision-making, whereas female contributed as labor more than men.	Enhancement of awareness on gender issues	Overall female involvement ensures sustainability of the project.
Minimization of Negative Impacts	i. Relationship with the neighboring villages on management of water source	○	○	Water source sharing projects of different ethnic group villages or conflicting interest villages might cause social conflicts on usage of water.	Discussions and cooperation among villages with a trusted leadership	Water sharing schemes need detailed planning with careful consideration on reactions from the local side.

Table 6-6 Impacts Brought by the Project

Issues	Situation of the Impacts	Lessons /Recommendations
i . Needs Satisfaction	- In general, the GFS scheme with one source for one village brought higher satisfaction to the villagers. -Boreholes did not bring needs satisfaction to the villagers because water has odor. -The GFS scheme supplying 9 villages in Houayxai as one scheme did not bring high satisfaction to the villagers as was predicted due to the sufficient number of existing dug wells giving rise to low willingness to participate.	-A more needs oriented project formulation will nurture preferable ownership and lasting sustainability.
ii .Reduced Water Collecting Time	- In villages that were able to reduce collecting time, women especially expressed their use of time for agricultural work and household work. - In most of the pilot villages, time was reduced by more than 20 minutes.	-The villages which had been suffering from long water fetching times have been highly motivated to be involved in the project.
iii. Equitable Benefits Among Villagers and Social Relations	- Even though participation in community dialogue and contribution to construction were equally shared, actual benefits were not necessarily equal among villagers, such as differences in distance to tapstands and water flow.	-A record on the usage situation and contributions by each villager is prerequisite for the maintenance. Equitable cost sharing by a meter measurement system is recommended.
iv. Empowerment	- Through the three phases of the study, women were encouraged to participate. Although men were enthusiastic to participate in decision-making, female contributed to labor more than men did. - Poorer villagers living in remote areas were more cooperative and participatory	- Female participation has to be promoted in the whole process, including maintenance activities. - The more needy the people are, the more motivated they are.
v . Ownership and Sustainability	- Overall ownership through participation is excellent in GFS schemes, which induces responsibility of the facilities. This is especially realized for villages of one-village GFS schemes. - The level of ownership of the borehole scheme is not considered as satisfactory, because outside contractors have done most of the construction work. - If the project did not bring any improvement to the villagers, ownership had not developed. - Most of the village committees reported that they were not trained enough on basic repair and management of their water schemes.	-The important lesson learned is that villagers follow what were agreed and what they understood in the community dialogue. However, regarding the items that were not included in the dialogue, they have little idea as to what are required of them. Subjects such as arrangements for repair requirements, guidance on bookkeeping and accounting, and regular maintenance support system which are regarded as prerequisite for ownership and sustainability should be given more emphasis in the training program.
vi. Relationship with Government and Donor	-Villages that are benefiting from the project are very happy and grateful to the government and donor. However, those who could not get the benefits are disappointed.	- A more needs oriented project formulation has to be promoted by donors and government.
vii. Relationship with Neighboring Villages	- Co-ownership became difficult with increased number of villages, in which if a problem arises the responsibility is blamed on the others. For the 9 villages in Houayxai of one scheme, the water use balance created a dispute as to who is using more water. On the other hand, the 9 villages in Pha Oudom of one scheme are getting along relatively well due to a trusted leadership	- One source supplying a few villages is easier to manage than that for many villages. However, the cost effectiveness of supplying many villages with one scheme must be balanced with management and social aspects.

6.2.2 Evaluation of Community Participation

The situation of village participation, contribution to the project and ownership at the monitoring stage, are summarized in the following page. It varies from village to village according to the type of the scheme, the degree of villager's agreement and the extent of demand by villagers. Overall participation is excellent in GFS schemes and in most of the villages, labor and local construction materials have been sufficiently provided to the project. However, the level of participation of the villagers in Nam Ngao (H-3), May Pattana (H-9), and Leang (H-37) were not considered as satisfactory, because for borehole and dug well schemes, most of the construction work has been done by outside contractors who did not clearly understand the importance of community participation in this study. Furthermore, the boreholes dug by the contractor did not bring needs satisfaction to the villagers because water has undesirable odor. They expected reduced water collection time and clean water, but the villagers had to go back to their existing dug wells. Their willingness for maintenance is low because expected benefits were not met due to the quality of water.

The existence of co-ownership between nine villages in Houayxai being supplied by one scheme is causing some friction between villages with consequent insufficient development in sense of ownership. Low cooperation and participation by some of the villages was feared before the start of the Pilot Study. When selecting the villages for implementation using the selection criteria, while some villages qualified for implementation, some other villages out of the nine villages had low ratings due to low willingness and satisfaction with their existing water supplies. At first, plans to supply only those villages with high ratings were discussed, but it was feared that the villages not included would thoughtlessly branch their own pipelines to the mainline going across their village. Therefore to alleviate the unfairness and avoid conflicts between villages, the decision was made to include all nine villages in the scheme. However unfortunately, the least desired but expected consequence occurred as feared. In the predicament that the outcome did not reflect upon their actual requirements in water demand, the difficulty of convincing them to foster ownership can be solved only through the intervention of a strong leader and creation of a demand. The important lesson to be learned from this is that demand orientated project formulation is a key to nurture preferable ownership and substantial sustainability.

Table 6-7
Evaluation of Community Participation and Ownership for Pilot Study Villages [1]

No.	Village Name	Type of Water Scheme	Participation in Decision-making (1<2<3<4<5)[2]		Physical Participation (1<2<3<4<5) [2]		Contribution of Local Materials and Cash (%)	Present Level of Owner-ship
			male	female	male	female		
☐ Houayxai District, Bokeo Province								
H-1	Poung*	GFS	5	5	5	5	100	high
H-3	Nam Ngao	Dug Well	4	3	2	2	40	high
H-7	Namma*	GFS	4	4	5	5	40	high
H-9	May Phatthana	Borehole	4	4	2	2	40	low
H-17	Maynignom*	GFS 1 Scheme 9 Villages	5	5	5	5	100	middle
H-18	Thongsengcan		5	5	4	5	100	low
H-19	Xiengnam		5	5	5	5	100	middle
H-20	Nongneun		5	5	5	5	100	middle
H-21	Nale*		1	1	4	4	100	middle
H-22	Chomchouk		4	4	3	3	100	middle
H-23	Paksang*		4	4	4	4	100	middle
H-24	Mayphoukha*		1	1	3	3	40	middle
H-25	Namhotay*		3	3	4	4	100	middle
H-31	Done Keo*	GFS	4	4	4	4	100	high
H-32	Hat Phouan	GFS	4	4	4	4	100	high
H-37	Leang	Borehole	4	4	3	3	100	middle
☐ Pha Oudom District, Bokeo Province								
P-1	Phiengkham	GFS 1 Scheme 9 Villages	5	3	4	4	75	high
P-2	Thinkeoneua		5	4	4	5	100	high
P-3	Thinkeokang		4	4	3	4	100	high
P-4	Thinkeotay		4	4	3	4	100	high
P-5	Phaoudom		5	5	5	5	70	high
P-6	Nathong		4	4	4	5	100	high
P-7	Phonexay*		4	4	3	4	80	high
P-8	Somsavang		4	4	3	3	80	high
P-9	Sonexay		4	4	3	4	95	high
☐ Viengphoukha District, Luang Namtha Province								
V-6	Pangxai*	GFS	4	4	4	5	100	high
V-8	Namseua	GFS	4	4	4	5	100	high
☐ Long District, Luang Namtha Province								
L-1	Xiengkok May*	GFS/1Scheme 2 Villages	5	5	4	4	100	high
L-2	Xiengkok Kao*		5	5	4	4	100	high
L-4	Luang	GFS	5	5	4	4	100	high
L-13	Chakhamping	GFS	5	1	1	5	75	high
L-15	Tinthat	GFS	5	5	5	5	100	high
L-21	Daen Kang	GFS/1Scheme	4	3	4	5	90	high
L-12	Hoai Mo	2 Villages	5	4	4	5	100	high

*pour flush toilets also constructed

1) this table was summarized from the results of interviews with villagers and persons concerned during the survey from January to February 2000 and the results of monitoring in July 2000.

2) the numbers are relative ratings: 5 indicates the highest (participation is very high), 4 (high), 3 (not very good), 2 (rather low) and 1 (very low or poor).

6.2.3 Evaluation of WID/Gender from Project Cycle Perspective

Whereas most of the users of the water supply schemes are women, the water supply scheme, if relevant arrangements are not considered, tend to be implemented without women's involvement, which creates difficulty on reflecting the actual needs on the overall project. The major purposes of female participation are not only the sustainability of the project and maximization of the benefits to the beneficiaries, but the enhancement of awareness on gender[1] in daily life through the participation of the project, which would generate similar type of gender balanced development of the community in the future. Gender/WID evaluation on the whole process of this study is summarized into one matrix from a project cycle management perspective in the next page.

Although both men and women have capability and potentials, the biological differences due to the reproductive difference between men and women have to be carefully considered in the project level. Specifically the pump type issue is clearly pointed out in this sense. GFS communal taps are welcome to all population in pilot villages, but some pump types, especially the Tara pumps have different reactions from different users. For pregnant women, middle-aged women as well as aged women who had experienced delivery many times, it is hard to use this type of pump because the handle position is too low to pull and push for pumping water. Therefore, it has been pointed out that, since pregnant women and middle-aged women unconsciously avoid pumping water, sometimes girls or their daughters have to go to collect water instead of the mothers. In contrast to the Tara pump, the Rope Pump Lao-99 and Afridev pump solve this kind of physical burden to specific women. All village population including men, children, pregnant women and middle-aged women are able to use the Rope Pump Lao-99 and Afridev pump without much difficulty.

[1] Here, the word 'gender' means the socially made values and roles as well as the relative relationship between men and women, the features of which are different from biological sex.

Table 6-8
Gender/WID Evaluation for Project Cycle Management

Project Cycling	Phase/ Stage		Conducted Training / Measures	Actual Situation	Effects / Lessons
☐**Needs Identification**	I		• 32% of participants of the training who joined the non-technical survey was female from LWU. • The lecture for gender analysis and consideration in development planning was part of the training which included female trainers.	• During the community dialogue, women were major promoters who also encouraged village women to attend the workshop and articulate their needs. • 34% of participants in village survey workshop were female (average percentage of 81 target villages).	• It helped to involve women at the beginning of the study. Women also became aware that it is necessary to participate in the study. • Female are still shy in public to address their ideas and feelings at the workshop.
☐**Planning & Construction Preparation**	II	B C	• 23% of participants of the TOT on organization management, operation and maintenance were female who were all from LWU. • In the training course there were gender approach lessons on community management and organization which were held by Central Nam Saat officers which included female.	• 41% of total attendants were female in the community dialogue (average percentage of 34 pilot villages). • .53% of total participants were women in the preparation for construction. (average percentage of 34 pilot villages).	• Both gender had strong willingness and under-standing for the project and contributed very actively from the beginning to the end in labor, local materials and cash.
☐**Construction**	II	D	• Women were also encouraged to participate in the construction work as well as men according to their ability to contribute and capability to afford.	• 42% of total participants were female at the construction site who were digging the pipeline trenches and preparing food in accordance with their capability. (average percentage of 34 pilot villages).	• Nam Saat construction team and local supervising team were all men. However, village women were well mobilized and participated actively in the construction work.
☐**Monitoring**	II III	E	• Female monitoring staff was selected in order to facilitate interviews with women as major user of the scheme.	• 24% of monitoring team was female in the first official monitoring right after construction. One female in three official monitoring staff was selected as monitoring staff from LWU and health dept for the second monitoring	• In order to reflect user's reaction, various women as major users of the scheme were to be interviewed.
☐**Maintenance**	III Post		• In the training course there were gender approach lessons on maintenance and committee organization.	• WATSAN committees of 29 villages among 34 pilot villages include female members.	• Efforts have to be made to involve women in maintenance activities in order to activate the committee functioning.

6.3 Technical Evaluation

6.3.1 System Function

One of the consequences of a malfunction of a water supply scheme involves water suspension which aggravates the users. The most frequent incident for GFS witnessed during the monitoring survey was the clogging of the pipeline. After a heavy rain, extraneous materials such as silt, sand, leaves and other debris flowed into the intake clogging the screen of the pipeline to block the water flow. As a result, water did not come out of the taps. The villagers responded by going to the intake and cleaning out the unit. This relieved the situation only temporarily and after a while, the flow stopped again. Upon inspection of the intake area of these villages, it was found that the dam section behind the intake was also filled with silt and sand, raising the water level near the height of the intake. This resulted in the water to flow above the intake entering the intake unit directly without passing the filter section. Therefore, a solution would be to periodically clean out the dam section as well as the intake, and if this still does not solve the problem, then the pipes have to be disconnected to inspect the insides. Some of the problems with system functioning of GFS which were encountered during the monitoring stage are listed below.

Table 6-9 Problems Related to GFS System Function

Problem	Cause	Outcome	Solution
Pipe clogged	Silt, sand and leaves enter the pipe	Stop the flow of water	Dredge out dam behind intake and clean out intake.
Pipe uncovered	Shallow trenching or ground washed away by rain	Accidents such as pipe breakage or disconnection.	Periodic inspection of pipeline route and immediate correction upon discovery
Tap broken	Mishandling of tap, especially the handle. (Many reported children playing by hanging onto tap handle)	Leakage or running water	Education to villagers, especially children, on proper usage of facilities.
Poor drainage	Improper permeation into earth or poorly constructed drainage channel and/or soakaway.	Flooding of tapstand floor and can become a source for water-borne diseases.	Advice on proper drainage functioning and education on sanitation

For villages using groundwater with dug well or borehole, the problems with system functioning were limited to hand pump operation and drainage. Since the drainage situation is similar to that for GFS, the same can be mentioned as was listed above for GFS. As for the operation of hand pumps, even though different types of hand pumps involved different operation techniques, the villagers are not having big problems with their use. Only specific women, as mentioned in the previous Section on gender balance, were having difficulties due to the height of the handle of Tara type pumps. For the village which received the Rope Pump Lao-99,

the rope broke about a week after its installation, but upon advice on how to repair it, the villagers were able to solve the problem and learned how easy it is to repair this type of pump using materials locally available. The three types of pumps installed for the pilot study are compared in the following table. According to the response from the villagers, the rope pump Lao-99 was favored the most for reasons of comfortable turning of the handle and damages are easily repaired using locally available materials.

Table 6-10 Comparison of Handpumps

Hand Pump Type	Initial Cost	Handle Operation	VLOM Possibility	Spare Parts
Rope Pump Lao-99	Low	Vertical Plane Rotation	Very High	Easily procured locally
Tara	Medium	Vertical Push-Pull	High	Not always available in remotest areas
Afridev	Medium (higher than Tara)	Up-down Lever Action	High	Not always available in remotest areas

Since the latrines installed for the pilot study are of the pour flush type, their functioning is very simple. The mechanism of the pour flush latrine is very simple involving no mechanical parts, and up until the time of the monitoring, the villagers were not yet faced with any problems with their latrines. Therefore the only conceivable problems to be encountered are cracks or breakage of the bowl and fully filled underground pits. Maybe after about 5 years, when the underground pit becomes completely filled, this pit has to be desludged or cleaned out so that it can be used continuously.

6.3.2 Water Quality and Quantity

1) Water Quality

The major problem associated with water quality occurred at the borehole villages. The groundwater in the borehole contains an undesirable odor to cause the villagers to avoid using the water for drinking. The water itself is clear, but the water has a sulfur-like odor. Although the sulfate content was analyzed to be below the standard value, the value is higher than other sources. Therefore, analyses were made on sulfur ion, but results gave non-detection. This situation is believed to be caused by biological phenomena of organic substances in the geology of this area. A possible solution to remove the odor is oxidation through such processes as (1) long period storage of the water before using, and (2) intensive agitation of the water. If the villagers are still reluctant to use the borehole, an alternative would be to construct a dug well with handpump, or if a

hand-dug well already exists in the village, this well can be rehabilitated or modified and installed with a handpump.

The problem related to water quality of GFS is turbidity, especially during the rainy season. The villagers complained that after a heavy rain, the water from the tap is colored causing resentment for use. The main cause of this situation is at the intake where the increase in the stream flow allows the water to flow over the intake unit permitting the water to enter the intake while bypassing the filter effect. This situation can be relieved by dredging out the dam behind the intake, which is the same step taken to solve the pipe clogging problem. Also, the height of the intake may need to be raised to prevent intrusion of water from above.

Another water quality problem worth mentioning is the number of coliform bacteria. This problem was not raised by the villagers but is apparent in the results of water quality analyses. Since the source of GFS is a stream, it is exposed to open air and is easily liable for contamination. The water quality analyses results indicated concentrations of all indicators within the standards except for the coliform count of most of the GFS samples. This does not imply absolute fear, but probable indications of fecal contamination. The most positive solution is to boil the water before drinking. This solution is assured because most of the villages are already boiling their water.

The countermeasures to problems with the significant water quality indicators are tabulated below.

Table 6-11 Water Quality Problems and Countermeasures

Indicator	Situation	Countermeasure
Odor	Groundwater from boreholes has undesirable odor resulting in villagers to avoid use for drinking.	Possible solutions to remove the odor would be oxidation by storing the water for a long period before using it or by intensive agitation of the water.
		If the villagers are still reluctant to use the borehole, an alternative would be to construct a dug well with handpump, or if a hand-dug well exists, the well can be modified and installed with a handpump.
Turbidity	The source for GFS is especially turbid in the rainy season.	This situation can be relieved by dredging out the dam behind the intake, and the height of the intake may need to be raised to prevent intrusion of water from above.
Coliform Count	Coliform bacteria are found in some water samples.	If the water is to be used for drinking, it should be boiled.

2) Water Flow

The water flow can vary between the dry season and the rainy season. Since the source for GFS is a stream on top of the mountain, the flow can diminish during the dry season. Also, for villages using groundwater sources from dug wells or boreholes, the groundwater potential of the aquifer will influence the pumping rate. However, although the water supply systems were designed with consideration of low flow periods, some villages complained that they are not getting enough water.

Some probable causes and their countermeasures are listed below.

Table 6-12 Water Flow Problems and Countermeasures

Water Scheme	Problem	Possible Cause	Solution
GFS	Flow stopped	Pipe clogged	Dredge out intake area.
		Pipe disconnected	Inspect pipeline and repair
	Insufficient flow	Pipe clogged	Dredge out intake area.
		Low flow rate	Schedule supply hours
		Design fault	Confirm design and modify
Dug Well	Not enough water when pumping	Water level lowering	Dig well to deeper level

Another important consideration for preserving the water sources is conservation of the environment around the water source. Slash-and-burn cultivation using the forests around streams can have adverse effects on their flow rate. Some villagers have come to realize this situation and are beginning to change their attitude towards disruption of the environment.

6.3.3 Maintenance

The key to sustained usage of facilities is preventive maintenance. If periodic inspections are made and foreseeable problems are solved before a major damage occurs, then the system can last a long time without a big burden on expenses.

One of the easiest and most important task for GFS villages is regular cleaning of the system. The village caretakers in many of the pilot villages are cleaning the intake on a monthly basis, and the storage tank every three months or so. Cleaning of each of the tapstands and their surroundings are the responsibilities of the residents who are using those tapstands. Another important maintenance job is the cleaning out of the drainage facilities. Periodic cleaning operations can

prevent clogging of pipes and drainages which can stop the flow of water with eventual high cost requirements for their repairs. Moreover, cleaning of drainages can prevent health hazards such as malaria and cholera. However, these operations are not always being conducted at all villages.

Any activity requires expenses of some kind to continue its success. Collecting maintenance fees on a periodic basis, such as each month, is very effect to achieve this goal. Many of the pilot villages have set a rate of about 100 kip/person/month on the average as the maintenance fee, but only about half of the villages are actually collecting these fees. Payment of periodic fees can contribute to foster a stronger sense of ownership for the facilities. Some villagers complained that they do not want to pay the fee because their house is farther away from the tapstand than others, which creates unfairness in the quantity of water use. This situation can be alleviated by collecting fees on a volumetric basis instead of a fixed price. For proper volumetric levying of fees, the flow meters installed in each of the tapstands should be used for this purpose.

Some of the problems communicated by the villagers related to maintenance as well as solutions to them are listed below.

Table 6-13 Problems Related to Maintenance and Their Solutions

Problem	Situation	Solution
Lack of basic tools	The villagers cannot make appropriate repairs because they do not have any basic hand tools.	Province and District should hand out some of the tools used during the construction to the villages.
Delays in response upon informing of damages	Upon informing the District and Province, repairs are not conducted immediately.	Province and District should make periodic interventions to handle these emergencies. And District and Province need means of transportation for this purpose.
Low knowledge of caretakers	Village caretakers cannot properly handle maintenance tasks and repairs because they were not trained.	A training program should be prepared and District and Province should make frequent interventions to advice on water use and sanitation, and support on operation and maintenance.
Maintenance fees not collected	Village misunderstands that the contribution in cash that they made for the construction is to be used for maintenance. Also, some villagers are unwilling to pay because of irregular supply or they are situated far away from tapstand.	The villagers should be trained on operation and maintenance, and given an education to foster a sense of ownership.
Unfairness of maintenance fee	Some villagers complaint that they cannot pay the same amount as others because they are using less than others due to distance from the tapstand or irregular supply.	Fees should be collected on a volumetric basis instead of a fixed amount. For this, the water meter is useful to determine the exact amount consumed by each user.

6.3.4 Overall Evaluation of Technologies

The water supply schemes chosen by the target villages are the following in order of preference.

(1) GFS (Gravity Fed System)
(2) Borehole
(3) Dug well
(4) Protected spring
(5) Rainwater collection

The technical evaluation of the water supply facilities is tabulated below. In spite of the high initial cost and skill requirements for construction, the GFS scheme is technically sustainable and therefore can be considered as the most feasible scheme. This conforms to the preference of the target villages.

Table 6-14 Technical Evaluation of Water Supply Facilities

Parameter		1.	2.		3.		4.	5.
		GFS	Borehole		Dug Well		Protected Spring	Rainwater Collection
			w/HP	w/MP	Manual	w/HP		
Technical Survey		○	×	×	×	×	○	○
Environmentally Sound		○	○	△	△	○	○	△
Construction Skills		△	×	×	○	△	△	△
Cost	Initial	×	×	×	△	△	○	○
	Recurrent	○	△	×	○	△	○	○
Convenience		○	○	○	△	○	×	○
VLOM		○	○	×	○	○	○	○
Replicable		△	×	×	○	△	○	○
Sustainable		○	△	△	○	△	○	○
Appropriate Technology		○	△	×	○	△	○	○
Overall		○	△	×	○	△	○	○

N.B.:GFS: Gravity fed system, HP: Handpump, MP: Motorized pump
VLOM: Village level operation and maintenance
○: Easy, low, good; △: Intermediate, medium, average; ×: Difficult, high, poor

The latrines chosen by the villages are listed below in order of preference.

(1) Pour flush bowl single pit latrine
(2) Ventilated improved single pit (VIP) latrine
(3) Septic tank toilet
(4) Lid or Cover latrine
(5) Conventional pit latrine

The technical evaluation of sanitation facilities is summarized in the table shown below. All of these latrine types are technically feasible, but if sufficient water is available, the pour flush and septic tank type latrines are the most acceptable. However, in consideration of the higher cost requirements for the septic tank toilet, the pour flush type latrine is more preferable.

Table 6- 15 Technical Evaluation of Sanitation Facilities

Parameter	1. Pour Flush	2. VIP	3. Septic Tank	4. Lid or Cover	5. Conventional
Environmentally Sound	×	×	○	×	×
Construction Skills	○	○	△	○	○
Cost	△	△	×	○	○
Sanitary	○	△	○	×	×
Flies and Odor	○	○	○	△	×
Replicable	△	○	△	○	○
Sustainable	○	×	○	×	×
Appropriate Technology	○	○	○	○	○
Overall	○	△	○	△	△

N.B.: VIP: Ventilated improve pit
○: Easy, low, good; △: Intermediate, medium, average; ×: Difficult, high, poor

6.4 Institutional Analysis

Nam Saat, the counterpart organization for the present study, is the central organization responsible for rural water supply and sanitation activities for the whole country. Their responsibilities includes improvement and expansion of rural water supply and sanitation services as well as promotion of community awareness to gain favorable benefits through proper and sustainable use of the water supply and sanitation services.

At the central level, Nam Saat now has thirty-three staff working in three divisions of Water Supply Division, Environmental Health Division and Administration Division. Over 70% of the staff members are qualified as either medical doctors or civil engineers outweighing the managerial staff, as many of them have to take duel responsibilities. Only nine women are staff members, creating gender imbalance and resultant low gender awareness. Many staff members have been involved in this Study at different stages and have acquired technical skills and managerial knowledge replicable to other future similar projects. Nam Saat central has taken initiative and direct responsibility on its trail to being self-reliant for future similar activities.

On the other hand, the Provincial and District Nam Saat offices are units with limited number of staff as compared to the demand of the population in each of the target areas. Luang Namtha Province has ten staff (two women) while Bokeo Province has seven staff (two women). The technical, administrative and management skills of provincial personnel need to be trained to develop them for the field requirements. The number of District Nam Saat staff usually varies between two to four for each district with no female staff. Lack of both technical and managerial skills and knowledge in addition to limited budget and resources, especially transportation means, are considered to be the major constraints and problems faced by District Nam Saat offices. The District staff has unclear job descriptions and everyone seems to compete over donor-funded projects which sometimes overlaps. Furthermore, the Sector Strategy was not clearly understood and supported by the staff at the district level.

The results of the institutional management assessment revealed the following.

(1) The extent of understanding the Sector Strategy by the staff is the lowest at district level with gradual elevation to the provincial level up to the central level. A revised guideline that is easier to read and understand is necessary for some of the district staff.

(2) Staff involvement in decision-making varies for each level where the amount of information concerning the contents of the decision and planning being disclosed to the staff is higher at central level and lower at district level. This situation is coincident with the level of involvement which delays development of necessary water supply schemes in contrary to the local demands. Past experiences and lessons learned have to be utilized by Nam Saat both internally and externally, and should be disseminated among external organizations and agencies according to the learning-based approach. This can contribute to duplicating the successful experiences and avoid repeating the same mistakes to achieve more efficient and effective programs.

In this predicament, Nam Saat central should be allotted the responsibility of steering the direction of comprehensive strategy items and developing a long-term activity framework for the sector. The following are proposals for improvement of the institution.

(1) The institution of Nam Saat must be further developed through capacity building.

(2) Plans must be formulated on the basis of the needs and recommendations of the Provincial, District as well as the villages.

(3) The links and collaborations with other agencies and supporters must be strengthened.

(4) The concepts of the sector strategy and guideline national framework must be refined and mastered.

(5) Gender-balanced involvement in all activities at all levels must be promoted.

(6) The function and roles of Nam Saat must be strengthened.