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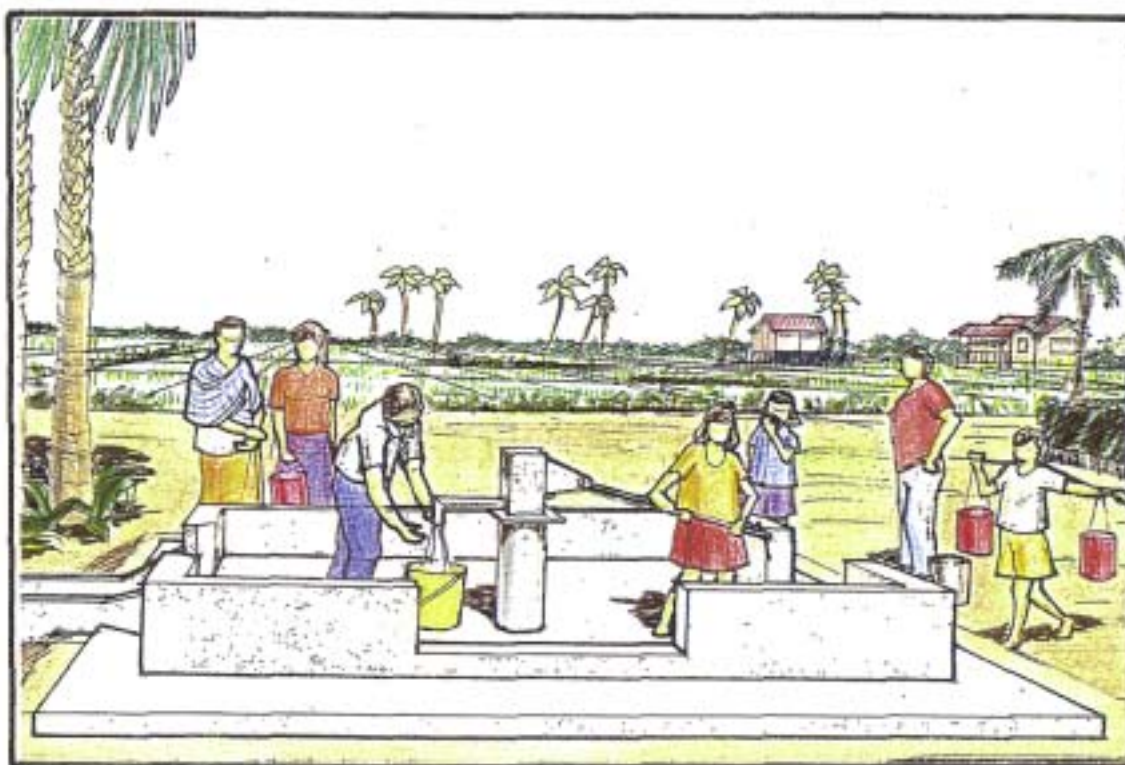
- Text 1 Operation and Maintenance Manual of the Pilot Well Water Supply Facility
(English Version)
- Text 2 Operation and Maintenance Manual of the Pilot Well Water Supply Facility
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(Khmer Version)

Text 5

Manual for Hygiene Control of Deep Wells with Hand Pumps for MRD (English Version)

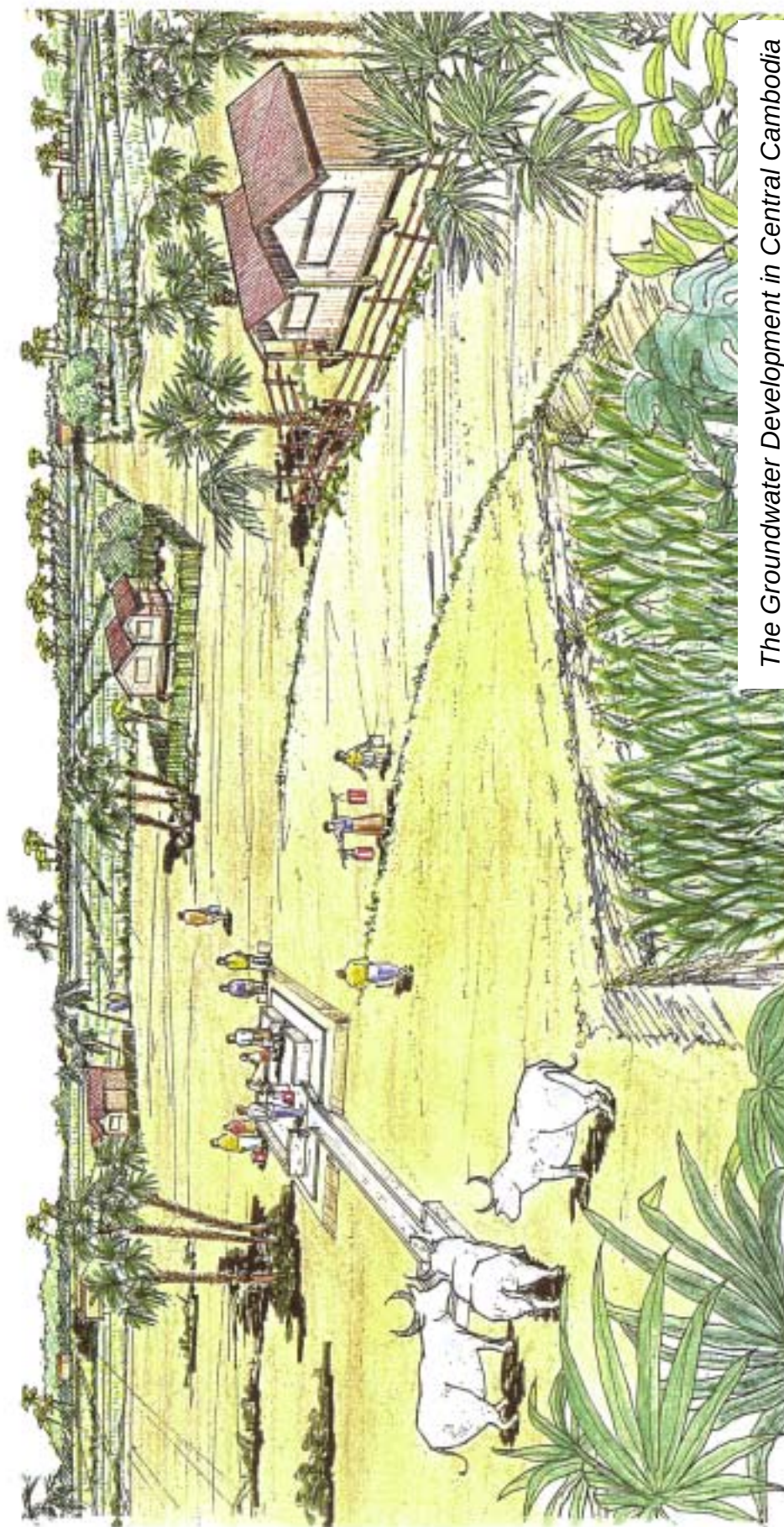
MANUAL FOR HYGIENE CONTROL OF DEEP WELLS WITH HAND PUMPS

THE STUDY
ON GROUNDWATER DEVELOPMENT
IN CENTRAL CAMBODIA



MAY 2002

MRD / JICA



The Groundwater Development in Central Cambodia

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This book is prepared by Japan International Cooperation Agency (JICA) Study Team on groundwater development and the counterparts who have closely cooperated with Department of Rural Water Supply (DRWS) and six Provincial Departments of Rural Development (PDRD) by sharing information under the implementation of JICA Study Team Program in the central part of Cambodia.

Results of the pilot study were shown in the great achievement made by 20 test deep wells in the first step. Experiences and good ways to work are indispensable for the next step of the project proposal. We will make more efforts and the recommendation from the Department of Rural Water Supply will be fully taken into account so that the project can be more successful in that step.

Finally, we would like to express our deepest gratitude to both advisors to this project, Dr. Mao Saray, Director of DRWS and Mr. Chang Darong, Vice Director of DRWS.

PREFACE

Since December 1996, JICA Study Team has started its groundwater development program of the pilot study in central Cambodia in order to provide the clean and safe water to Peri Urban area and the five target provinces such as Svay Rieng, Pray Veng, Takeo, Kandal and Kompong Speu.

During the project implementation, the pilot study has been conducted with 25 test deep wells which were already drilled, hand pumps were installed, platforms were constructed, village water committees were established, and health and water use education were provided. The project will last until the year of 2002. The activities of the project have been carried out in close collaboration with DRWS advisors and counterparts of the Ministry of Rural Development (MRD).

Because of the factional fighting on 5-6 July 1997, the pilot project was stalled for 19 months. It was reopened on March 17, 1999 and will continue until the year of 2002 and if the study team is greatly successful, the grant aid project will be implemented in the 300 candidate villages as priority in the target areas.

In cooperation with DRWS, they decided to choose the strategy of hygiene and water use education and establishment of village water committee. In order to disseminate the methodologies to those people, who are still using the contaminated water from surface water source, the project can reduce the water-related disease.

Water is life. The adequate quantity of water as well as quality of it is for the health benefit, and if inadequate water were utilized for washing and cooking, poor sanitation practice would result in diarrheal disease.

The most important thing is to improve water and sanitation facilities can reduce the incidence of many diseases or eliminate them entirely and also support living standards in rural areas.

Through other NGO's experiences and some data on water supply and the implementation of JICA Study Team on hygiene education methods and water use education, the project has improved the pilot study successfully. Therefore, we concentrate on emphasis of these activities that the project is carried out. To make those people understand the advantages of water and sanitation, it is extremely necessary to educate them to change their hygienic practice.

INTRODUCTION

In 1993, DRWS had made a request to the Japanese government for water supply program in 500 villages in central Cambodia through JICA in Phnom Penh. In response to the request to supply water in the five target provinces, a study team was set up to carry out the groundwater development since December 1996.

While the JICA program has been implemented, health and hygiene education strategy was established. Water and sanitation can reduce many types of disease and improve the poor people's living conditions in the rural area.

SCOPE

This document describes the process of water and hygiene education of the water supply program, which was developed to optimize the benefits of the clean drinking water supply. There are three types of education such as community mobilization, water use and hygiene, and technical training for caretakers.

I. The water sector in Cambodia

In Cambodia, the people generally depend on surface water from ponds (private and public ones), irrigation canals, river, shallow wells or rainwater. Ponds are dug or re-dug as the water reservoir before the rainy season. Rainwater is the people's favorite water source for drinking.

The rainy season usually lasts from May to November. Many ponds and other sources are dried up, which cause a water shortage. Therefore, people have to get water and start relying on other sources (hand pump wells or buying water).

According to the field survey and observation of the water quality, they show us that most of traditional water sources are contaminated water used by the local people. Ponds, rivers and canals are used for all different demands including bathing, washing clothes, animals, and so on. Opening wells are rarely protected without covers and water traction system. Villagers take water individually by buckets, which is causing the water contamination.

II. Water-related health problem

Some of the major diseases in developing countries are related with water and sanitation. There are ten diseases that they take into account primary water and sanitation interventions to prevent diseases such as diarrhea, typhoid, ascariasis, giardiasis, hookworm, hepatitis (A, E), schistosomiasis, amebiasis, trichuriasis and dracunculiasis. These ten diseases cause a tremendous amount of illness every year, and the big killer among them was diarrheal disease as shown in the following table.

***Water-related disease in Cambodia**

The water born diseases are the major problems due to the lack of hygiene and health education in rural areas. This is a reason why the water supply program, hygiene and health education have been formed and carried out for the community where people do not understand them.

These diseases are still prevalent today, and most of them are spread by using and drinking unsafe water as follows:

1. The disease spread by drinking unsafe water

These types of diseases are dysentery, cholera, typhoid, hepatitis (A,E) and parasites. They spread to the people who are using unsafe water without boiling, that can be observed in the daily life in rural areas.

2. The disease spread by washing clothes and bathing with unsafe water

The human health can be affected by using unsafe water for washing clothes and bathing. These types of diseases are skin disease, itch and poxbelly.

3. The disease spread by agent

These types of diseases can be spread from the mosquito bite, which can cause malaria, dengue fever and so on. To avoid these diseases, people must follow the hygiene and health education provided by the Ministry of Health as well as non-governmental organizations on television, radio broadcastings, leaflets and posters related to the health and hygiene education.

III. Community participation and duty of village water committee

JICA's Water Supply Program in six provinces in central Cambodia closely cooperated with DRWS to make approvals on the establishment of village water committee and water point committee for taking care of, maintaining and repairing hand pump wells for a long term operation after construction. Especially, hygiene and water use education were placed an emphasis in the community and people learned how to manage the hand pump wells by themselves.

Communities have to form:

1. Village Water Committee (VWC)

- Chairperson (1 person): general responsibility
- Secretary (1 person): responsibility for report writing
- Accountant (1 person): responsibility for money collection

2. Water Point Committee (WPC)

- Two caretakers: responsible for repairing hand pump and platform when they are broken and damaged.
- Two other caretakers: responsible for taking care of a hand pump, providing water use education, hygiene education and operation and maintenance.

Table of water-related diseases

Name	Module of contamination	Prevention	Symptom
Diarrhea	- Contaminated by food and unsafe water. - Through patient's untreated material.	- To boil water before drinking - To cover food to protect from insect. - To clean patient's materials	- Stool more than 3 times a day, dry mouth, thirsty, no urine - The soft spot is sagging in wrinkled skin
Cholera	- Contaminated by food and unsafe water. - Through patient's untreated material.	- To boil water before drinking - To cover food to protect from insect. - To clean patient's materials	- Profuse watery, missed with white grains like rice, fishy stool, vomit is like stools. - It brings out easily. There is cramp, eyes are sunken and looked upward. Rapidly beats and there is no urine.
Typhoid	- Contaminated by food and unsafe water. - Through patient's untreated material.	- To boil water before drinking - To cover food to protect from insect. - To clean patient's materials	- Cramp diarrhea or constipation weakness, headache always present (or continuous headache). - Delirium, Anorexia, white tongue
Hepatitis A, E	- Contaminated by food and unsafe water. - Through patient's untreated material.	- To boil water before drinking - To cover food to protect from insect. - To clean patient's materials	- Jaundice, Dark yellow urine, White stool
Dysentery	- Contaminated by food and unsafe water. - Through patient's untreated material.	- To boil water before drinking - To cover food to protect from insect. - To clean patient's materials	- Diarrhea with blood, constipation cramp, sickness or poor nutrition lose stool with a lot of mucus
Polio	- Contaminated by food and unsafe water.	- To boil water before drinking - To clean patient's materials	
Skin diseases Scabies, rige worm	- Contaminated by bathing and washing with unsafe water	- To bath 3 or 4 times a day with treated water. - To make clothes dry under sunshine	- To itch at nighttime, infection in faulty. Skin has pus.

Manual for Hygiene Control of Deep Wells with Hand-pumps

MRD/JICA

1. Safe Water and Unsafe Water

Water is hygienically safe for drinking when it does not include any cause of diseases. Dirty water tends to bring about diseases. For example, if drinking water is contaminated by pathogens, it can cause water-borne diseases such as diarrhea, dysentery and typhoid. If the water from personal hygiene is of poor quality and contaminated, it can cause skin problems and infections such as scabies and trachoma.

Generally, adults develop some resistance to these diseases, but children are quite vulnerable and tend to contract them more often than adults. When people can get safe and sufficient water, these diseases will be prevented.

MRD/JICA drilled boreholes and installed hand-pumps so that village people have access to safe and clean water sources.

2. Water Sources and Contamination

There are various water sources in the villages such as rain, rivers, lakes, ponds, dug wells and deep wells. These water sources can be contaminated, but the level of contamination varies from one source to another.

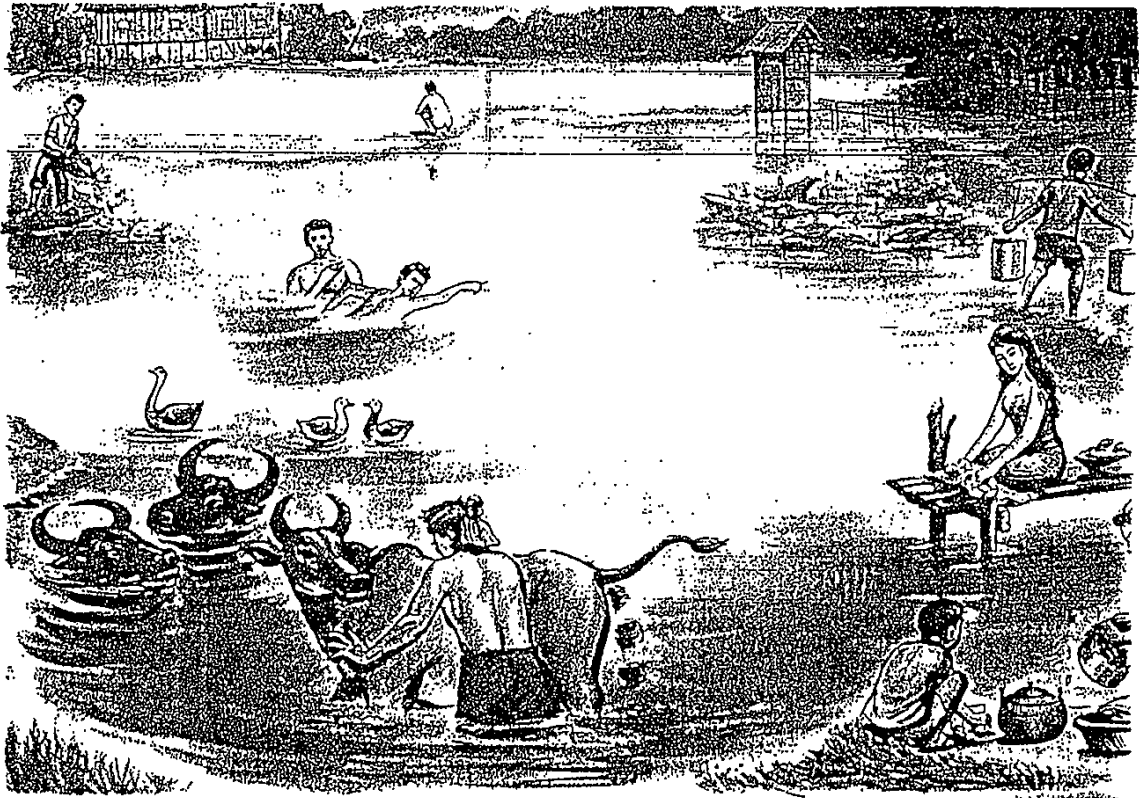
Rainwater is hardly contaminated except in industrial areas, where clouds can be affected by air pollution. Pond water is easily contaminated because cows and pigs bathe in it. Lakes are affected by similar conditions, but the velocity of contamination is slower than ponds because the volume of water is larger. Rivers and canals have less contamination than lakes and ponds, because the water flows.

1. Water related infections are classified in terms of their transmission routes. Since the impact of water supply improvements on disease depends on its transmission route, water supplies can be expected to affect the disease in a given group in a similar way.

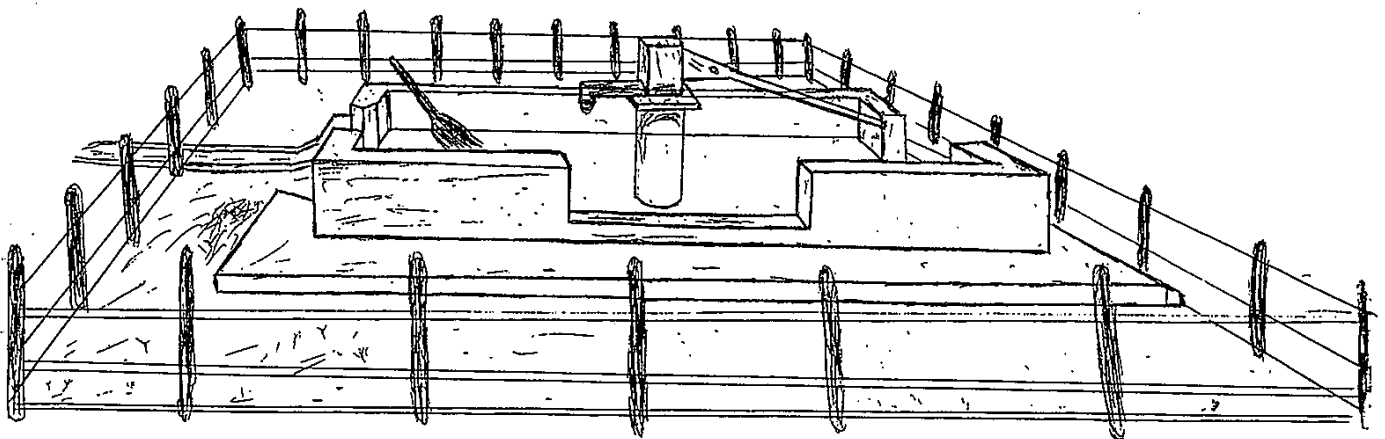
Transmission route	Description	Disease group	Examples
1. Water-borne	Transmission by Consumption of contaminated water	Feco-oral (water-borne or water-washed)	Diarrhea, dysentery, typhoid
2. Water-washed	Person-to-person transmission due to lack of water for personal and domestic cleanliness	Skin and eye infections (purely water-washed)	Trachoma, scabies
3. Water-based	Transmission via an intermediate host (e.g. a snail) which lives in water	Water-based	Schistosomiasis
4. Water-related Insect vector	Transmission by insects which breed in water or bite near water	Water-related insect Vector	Malaria, filariasis

Source : Feachem, R. O. (1977). Water supplies for low-income communities: resource allocation, planning and design for a crisis situation. In : Feachem et al. (eds) *water, Wastes and Health in Hot Climates*. Chichester : John Wiley and Sons.

THE CAUSE OF DIRTY WATER



TO FENCE AND TO PROTECT HAND PUMP FROM ANIMAL



But if human or animal excreta were dropped upstream, water would be contaminated all the way downstream. Contamination of dug well or deep well is caused by dirty water near the well, which can easily flow into it. However, whereas deep wells are fitted with a tube between the water source and the pump, dug wells are open and shallower than boreholes, and are more easily penetrated by dirty water.

Thus, MRD/JICA strove to drill boreholes. Since they are deeper than hand dug wells by other organizations, their aquifer will not be contaminated easily. However, unless users take preventive measures, there is still a contamination possibility. To prevent this, users will protect safe water source and the cause of dirty water near the wells.

3. Borehole Contamination Prevention

In order to obtain safe water from the borehole continually, village people must take great care in keeping the hand-pump, the platform and the surroundings clean.

- The hand-pump, the platform and the surroundings must be cleaned every day.
- People must not hang washing out on the hand-pump to dry.
- No garbage should be disposed of on the platform or the surroundings.
- People must not sprinkle dirty water on the surroundings outside the platform.
- If puddles of dirty water appear on the surroundings, the dirty water must be removed and the puddles must be filled up with soil.
- All livestock must be kept away from the hand-pump and the platform.
- No dumping ground or toilet must be set near the hand-pump.
- The drain must not be blocked.
- In case the drain gets blocked, it has to be cleared up.
- People must not do their laundry and bathe within the platform.

4. How to Use Safe Water

If people want to be able to draw safe water from the borehole, they must take care of it in order to keep the water safe. No matter how safe the water may be, if it becomes contaminated it will become unsafe, and cannot be turned back into safe water without boiling. Therefore, attention must be paid to the following.

a. Drawing water

- To clean the container for conveying water (with detergent or ash).
- To check the cleanliness of the hand-pump faucet. If it is dirty, it must be cleaned.

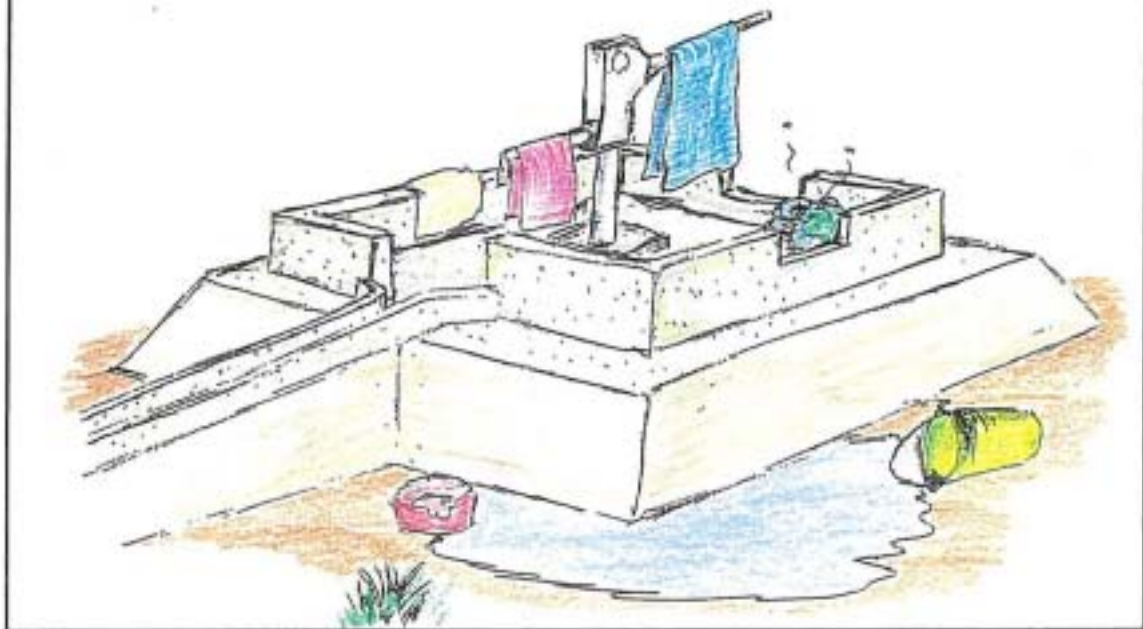
b. Conveying water

- To prevent any waste from entering the water container.
- To use a container fitted with a lid, and make sure to put the lid on when conveying water, if possible.

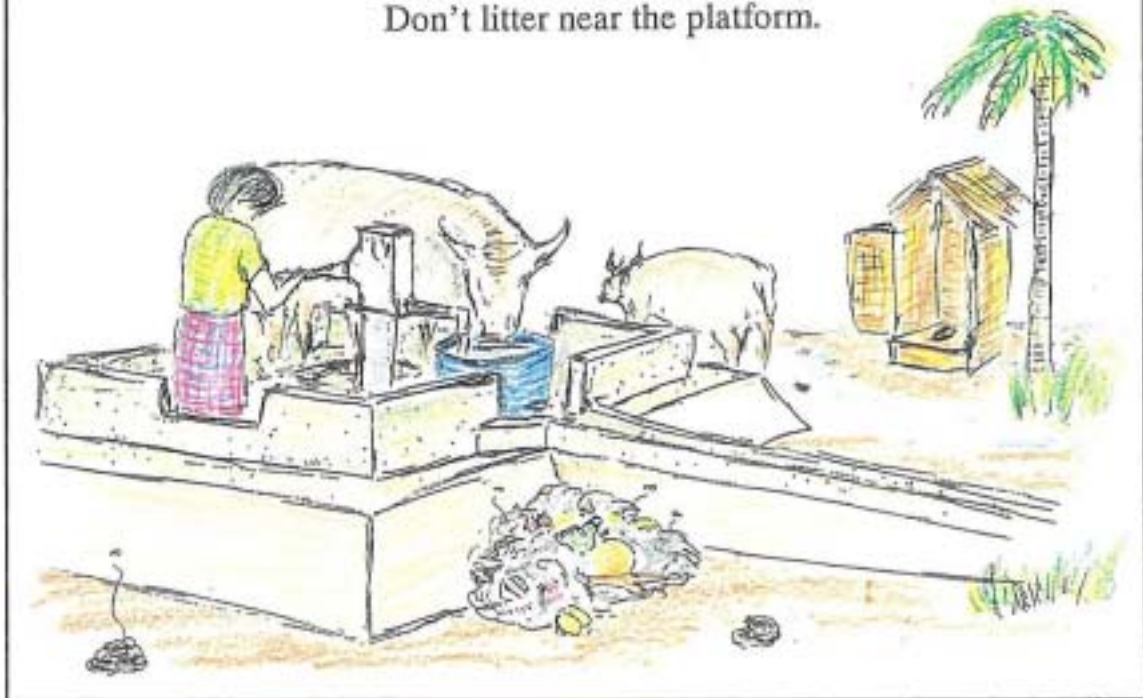
c. Storing water

- To wash the jar for storing the water from time to time (with detergent or ash).
- To prevent any waste from entering the jar when the water is poured into it.
- When the water is stocked in the jar, make sure to cover it with the lid so that no waste can enter it.

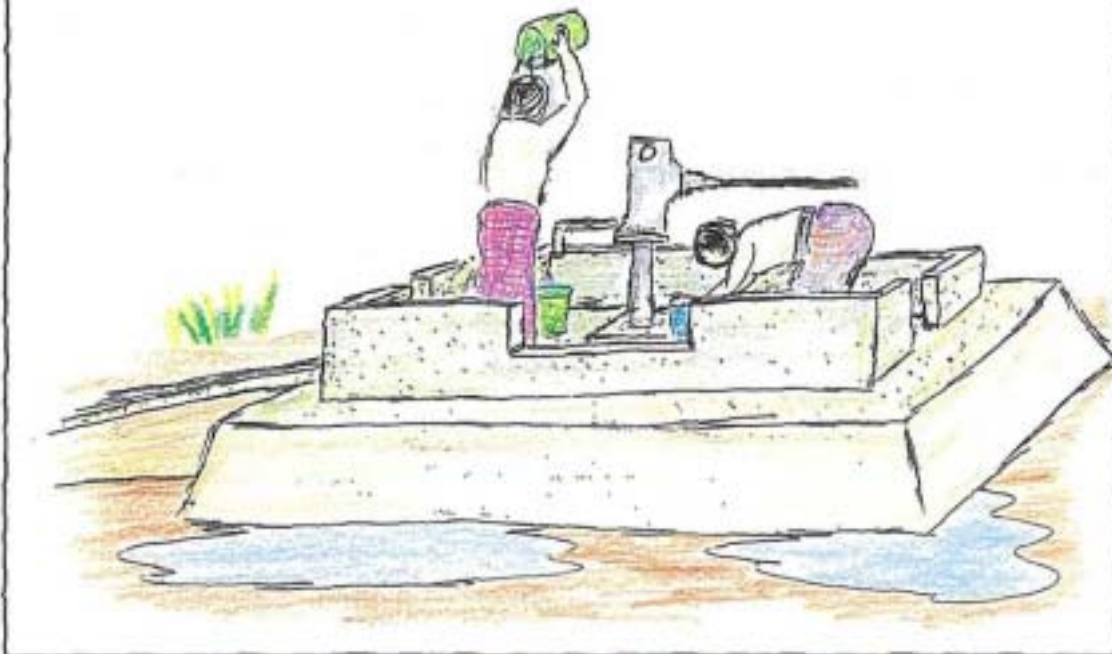
Don't hang the washing on the hand pump out to dry.
Keep the platform clean at all times.
Don't sprinkle dirty water near the platform.



Keep livestock away from the hand pump and platform.
Don't set up a dumping ground and a toilet near the hand pump.
Don't litter near the platform.



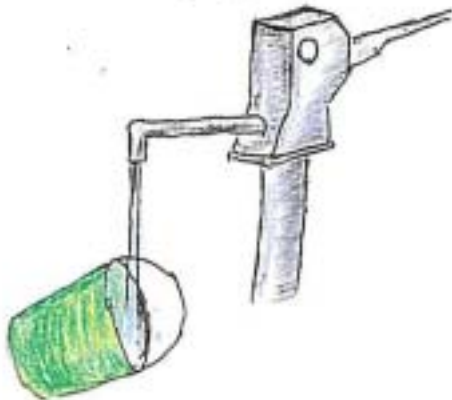
Don't bathe on or near the platform.



Don't wash the laundry within the platform.



Wash the container
for conveying water.



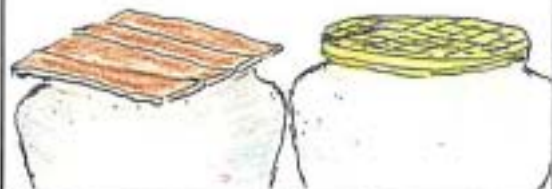
Use a container with a lid and
put the lid on the container
when conveying it.



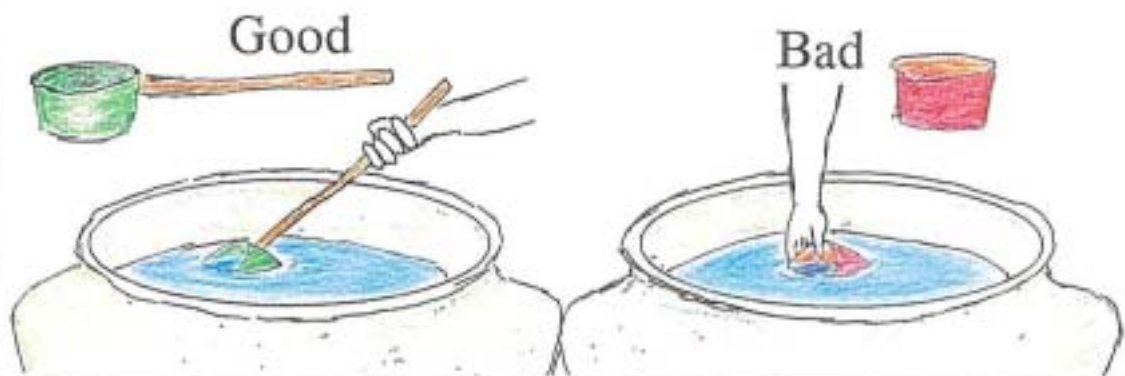
Wash the jar to stock water
occasionally.



Put a lid on the jar,
so that refuse will not enter it.



Use a dipper with a long handle
for ladling water from the jar.



d. Using water

- To use a dipper with a long handle for ladling water out of the jar.
- To rinse the dipper every time before drawing water.
- Not to lift the dipper directly to your lips.
- Not to insert anything into the jar except the dipper (like hands or a cup).

e. Boiling

When there is not enough safe water for consumption, contaminated water can remain safe by boiling to kill the pathogens; the main cause of diseases brought about by water.

Before you drink water, especially if you do not know whether it is safe or not, it is better to boil it and drink water after it has cooled off. If you want a cold beverage with ice, you must make sure that the ice was made from safe water.

f. Filtration

Turbid water and water that contains a lot of iron can be cleaned by filtering. MRD/JICA installed Iron Removal Device on the side of hand-pumps in some villages. This device filters out iron from water through a cloth, gravel and sand filter.

Please pay close attention to the following regarding the public Iron Removal Device.

- Impurities such as iron gradually adhere to the cloth, gravel and sand filter inside the Iron Removal Device. Thus, the cloth, gravel and sand filter must be washed every three months, or replaced when necessary. At that time, put some chlorine into the Iron Removal Device.
- To make sure that no waste enters the Iron Removal Device.
- To keep clean the surrounding of the Iron Removal Device faucet.
- Not to sprinkle any water on the outside of the platform. (Please refer to the Manual for Operation and Maintenance of Deep Wells with Hand-pumps for detailed explanation of the Iron Removal Device.)

Any family can install an Iron Removal Device themselves, because its structure is simple and similar to public Iron Removal Device.

5. Water and Hygiene

When people get enough safe water, they should use it to improve hygiene, which in turn will contribute to improving their health.

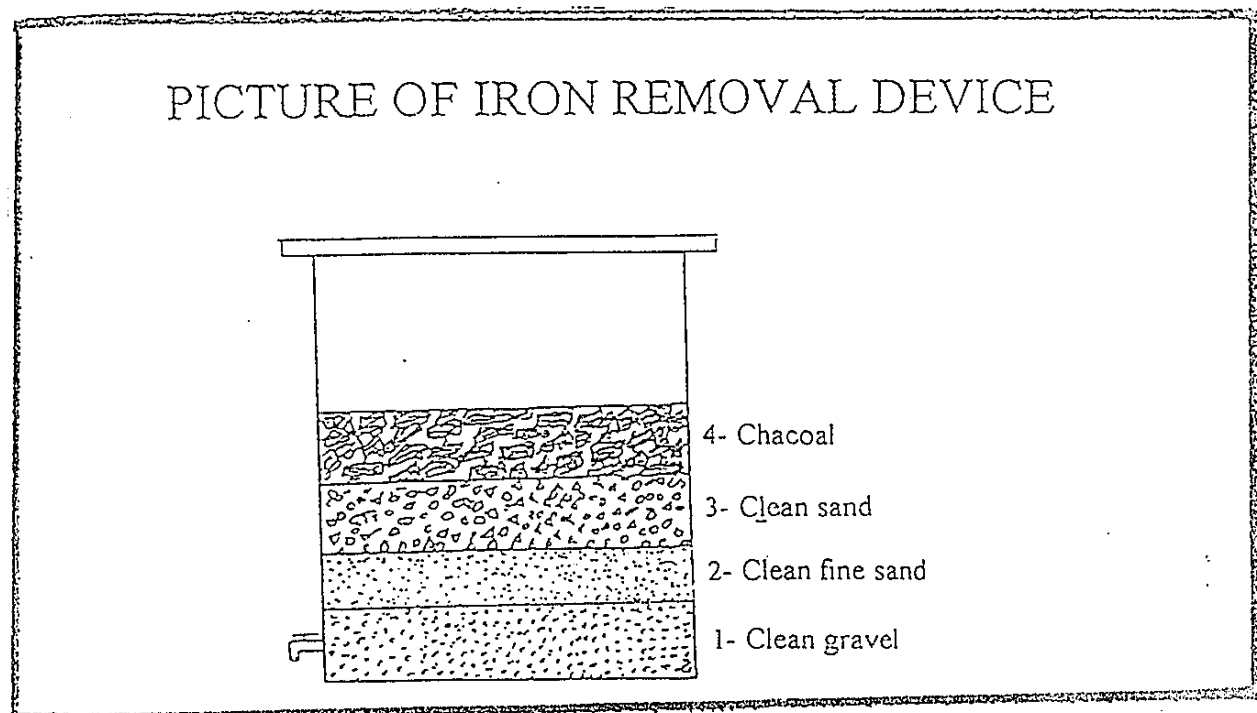
As previously mentioned, drinking safe water prevents the spread of diseases brought about by contaminated water. However, diseases can also spread through pathogens attached to dirty hands or tableware. If people do not wash their bodies or their clothes, skin diseases could infect them. Thus, attention must be paid to the following:

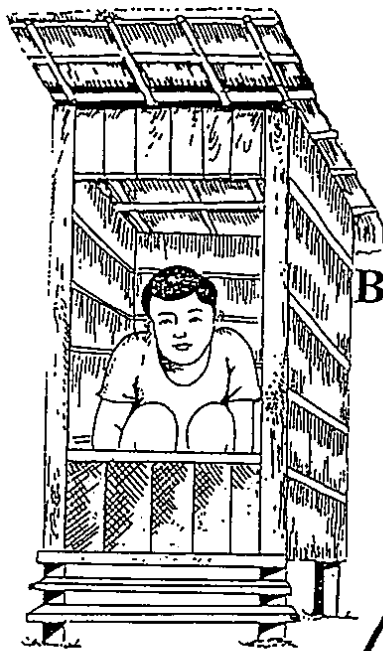
- To wash dirty hands.
- To wash hands after going to the toilet.
- To wash hands before a meal.
- To wash dirty tableware.
- To bathe regularly for personal hygiene.
- To wash dirty clothes.

6. Other Environmental Hygiene Consideration

There are other hygiene considerations concerning water as follows.

- To clean all water from sources like rivers, canals, lakes, ponds, dug wells and boreholes.
- Not to defecate and urinate near any water source.
- Not to dump garbage in any water source.
- To burn all combustible garbage, while being careful with fire.
- Not to burn synthetic materials such as plastic and vinyl, as they produce harmful smoke when burning.
- To collect wastes made of synthetic materials in a dumping ground decided by the village chairperson. Because those types of wastes neither rot nor turn into soil as organic elements would do, such waste that is dumped in the village will remain there and spoil the surrounding beauty.





**PLEASE WASH
YOUR HANDS
BEFORE AND AFTER**



A Guide to Personal Hygiene

Problem areas

Remedial actions

Hair: dirt sticks more easily to greasy hair combs and brushes.

Hair: wash hair, combs and brushes often; at the same time check for head lice and treat if necessary.

Nose: outer skin is greasy and can collect grease, blocking pores.

Eyes: wash carefully around the eyes, especially of babies, to avoid excess mucus; avoid rubbing, particularly with dirty hands or cloths.

Armpits and Genital Areas: sweat collects here, encouraging growth of bacteria. Stale sweat smells and can favor growth of pathogens.

Skin: wash frequently to remove sweat, dirt, dead skin cells and grease. Using soap helps remove this matter and clears pores, essential for skin functions; in the absence of soap, ash can be used.

Hands: many materials handled are easily spread other parts of the body, particularly the mouth and eyes.

Hands: wash well, particularly before preparing food; before eating; after excreting; after gardening; after handling dirty clothes; before and after cleaning and treating sores and wounds; after handling animals and after handling chemicals at work or in the home.

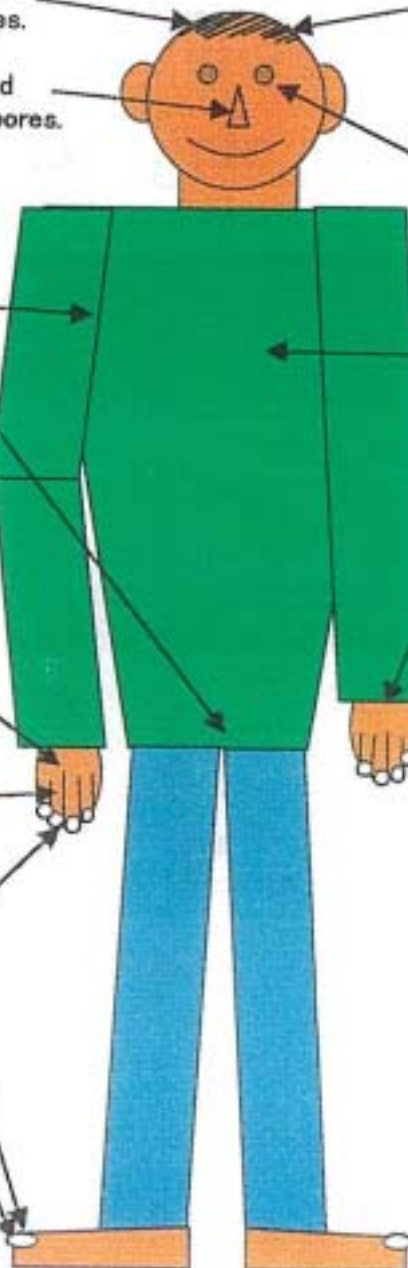
Fingers and toes: sweat between them can soften skin and favor fungal growths.

Nails: keep clean and trim.

Nails: dirt etc. under the nails provides food and shelter for many organisms, including parasite eggs.

Feet: wash dirt and sweat between toes and dry well afterwards to discourage growth of fungi (athlete's foot).

Feet: bare feet can pick up worm larvae as well as other pathogens from the soil and latrine floor.



Source: The Worth of Water: Technical Briefs on Health, Water and Sanitation.
with an introduction by John Pickford, Unidentified author, published year, and publisher.