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## A manual for the installation, repair and maintenance of the IRDC-UM handpump

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### INTRODUCTION

This is a report on a project concerned with the development of a manual on the installation, repair and maintenance of the International Development Research Centre (IDRC)-UM handpump. This manual was meant for use by the villagers in developing countries. The project covered four Asian countries: Malaysia, Thailand, the Philippines and Sri Lanka. It was implemented by the Program for Appropriate Technology in Health with field activities undertaken by its developing country affiliates.

In response to the belief that the selection, development, and use of reliable handpumps that can be locally produced, installed, maintained and repaired at an affordable price is a major step in the goal of providing safe drinking water and water for domestic use to rural communities, the International Development Research Centre of Canada has supported research in the development of more effective pumping systems. One of these is the IDRC-UM handpump which has been developed together with the University of Malaya. Due to the introduction of plastics technology and wide availability of polyvinyl chloride (PVC) piping in Asian countries, this was researched on as a possible simple, low-cost material for the handpump. After field trials in several developing countries proved the PVC handpump viable, mass production of the handpump is currently underway. Mass production of the handpump meant it was now ready for larger scale introduction in other developing countries.

It was at this stage that the concept of developing a villager's manual on the handpump evolved. Initial interactions with the villagers during field trials, demonstrated the need for a community-based program in which villagers themselves would participate in the introduction of the technology. The development of a villager's manual on the installation, repair and maintenance of the handpump sought to address the initial need of users for educational materials orienting them on the handpump. More specifically, it aimed to:

1. Obtain qualitative data on villagers knowledge of perceptions and concepts of water potability, its relation to health,

uses of water, water supply problems and experiences with water supply systems including the handpump.

2. Develop instructional materials for illiterate and semi-literate rural villagers on the installation, repair and maintenance of the IDRC-UM handpump. This will be conducted in collaboration with the University of Malaya, Department of Mechanical Engineering.
3. Begin to develop a strategy for introducing of the PVC pump at the village level and encouraging its acceptance and use by village community organizations.

Based on the prototype material developed in collaboration with the University of Malaya, printed support materials were further developed in four Asian countries: Malaysia, Philippines, Sri Lanka and Thailand.

### PROTOCOL

Since the project hoped to link technologies in water supply with the end users, the protocol for materials development was user-oriented. Thus, the materials development team worked closely with the end-users, the low-literate rural villagers with little or no mechanical background, through the various stages of materials development.

#### Materials Development Process

Development of the manual underwent the following process:

1. Conduct of in-depth qualitative research on the men and women villager's knowledge of, perceptions and concepts of water potability, its relation to health, water supply problems as well as their experiences with water supply systems including the handpump.
2. Identification of key instructions  
With the assistance of the engineers who developed the handpump, key instructions were initially identified. Based on the qualitative baseline data gathered in the first step, these instructions along with foreseen problem areas were conceptualized and executed through photographs and in artwork form. These were repeatedly pre-tested among the villagers and sections were simplified or expanded to respond

to the information requirements of the villagers.

### 3. Materials pretesting

The manual was subjected to an iterative process of repeated pretesting and revision among both men and women until a targeted level of comprehension was reached. The first wave of pretests involved pretesting the manual without text to determine whether the message carrying potential of the illustrations was maximized.

### 4. Fieldtest

Once the manual was understandable to the villagers, a fieldtest was undertaken. Villagers were provided a handpump and all the required parts for assembly together with a manual. They were then asked to install the handpump using the manual as their primary source of information. Any errors or group's suggested modifications were again reworked and upon final revision, the manual underwent printing.

#### Introduction strategy

Based on the data gathered from the numerous discussions held with both men and women villagers, the materials development work conducted at the village level, and on the consultations carried out with government and private agencies doing water projects, an introduction strategy will be drawn up. This will include specification of the key decisions makers at the local, regional and national level that should be involved in the introduction process to assure cooperation and support as well as suggested techniques for involving these individuals, their organizations and most importantly the villagers themselves.

The introduction strategy pursues the belief that for a technology to build and be able to retain interest in the community, it is necessary for the end-users, the villagers themselves to become part of the project, to participate in the decision-making and actual implementation.

It is at this point that this paper was written. The formulation of the above mentioned introduction strategy is currently being undertaken.

#### FINDINGS

##### Knowledge and perception of water potability, use, supply and its relation to health

The following perceptions were elicited from the various group discussions held among men and women villagers, some of whom use hand-

pumps and some who resort to other sources of water such as springs, rivers, canals.

1. Potable water is clear, tastes good and fresh with no fishy or rusty taste. It is always cold and has no unpleasant smell such as that of mud or rust. Clean water should have no dirt, residue or floating objects in it. The non-pump users group in the Philippines remarked that clean water should come from a natural source and, that one sign of clean water is the presence of shrimps.
2. The relation of water to health was quite clear to the participants. To them, water quenches man's thirst and keeps them healthy. It facilitates good hygiene, cleanliness and sanitation of one's environment. Dirty or non-potable water would cause stomach cramps, diarrhea, vomiting and skin diseases. Dirty water is polluted, turbid, foul smelling and has garbage and other debris floating in it.
3. Women were agreed to be the principal users of water for domestic use. To them, an adequate water source should have the capacity to supply enough water for a family's drinking, cooking, cleaning and bathing purposes everyday.
4. Sources of water mentioned were numerous such as irrigation canals, rivers, open wells, springs and handpumps. Other than handpumps, springs were perceived as the cleaner and safer water source because it was continuously flowing and was a natural source. Handpumps, though, were perceived as more preferred because of its hygiene, safety qualities and its being convenient and time saving. Some disadvantages mentioned were the difficulty of repair and replacement of parts, its having rusty water and a fishy taste.
5. Acceptability and adoption of the IDRC-UM handpump technology could be ascertained by meeting such conditions as convenience, durability, safe and hygienic quality, clear appearance, sense of modernity or being up-to-date in style. It involves a continuous explanation/clarification and involvement of its recipients. Likewise, a continuous test of its acceptability to the locale should be a primary concern.

#### Materials Development

In developing the villager's manual on the IDRC-UM handpump, there are some lessons learned:

1. Keep it simple  
The step-by-step procedure in the installation process should show only the

important steps in proper sequence. However, it must be complete and adequate enough to cover the entire installation procedure without marked gaps.

2. Tools should resemble those locally available

If new tools have to be introduced, special effort must be made to ensure there is concrete understanding of how it is to be used.

For example, in the Philippines, the mallet known locally is made out of wood. Therefore, the red colored mallet available in Malaysia was not recognized. Furthermore, the extractor rod (used for extracting the foot valve) was unknown in the Philippines and villagers mistook it for a PVC pipe meant to be left inside the pump's metal case.

3. Use illustrations rather than words

Illustrations presenting the steps one goes through to install, repair and maintain the handpump are more understandable to villagers, particularly those with low levels of education. For non-readers, a textual presentation of the instructions renders the technology difficult to understand and accept.

Illustrations were found to be superior to photographs in that it enables one to emphasize the fine details of handpump parts and mechanism of action. The photographs had complicated backgrounds that made villagers have a difficult time understanding what the main message in each photograph was. Also the numerous photocopy reproductions that was necessary for the pretests often resulted in a loss of clarity.

4. Emphasize repair and maintenance problems most likely to crop up

Instructions on the repair and maintenance of the handpump should emphasize the problems most likely to crop up. It should first identify the outward manifestations of a potential repair and maintenance problem is that there is no water coming out of the spout. There are several possible reasons for this and the manual should guide the villager in identifying the reason, and then provide a solution.

Simple line drawings were used to illustrate the more technical installation section. The drawings in the repair and maintenance section was done in caricature so as to provide some sort of comic relief from the more serious and technical installation. Thus the layout of this section became one of identifying "the problem", "the cause", and "the solution or what to do".

A villager's manual on the installation, repair and maintenance of the handpump not only promotes correct use of the technology but also proves a useful tool for technology introduction. The villager's manual explains the technology, thus reducing people's resistance brought about by a lack of knowledge. Development of the villager's manual prior to large-scale introduction promoted an active dialogue between the technology developers and users. The handpump, seen from the perspective of the villagers who were potential users of the technology, required final technology "packaging" to facilitate acceptance and proper use of the handpump. Another dimension to the value of instructional materials is that it encourages village women to take an active interest and participate in the introduction of the technology into the village. Women have traditionally shied away from any involvement with handpumps and mechanical apparatuses saying that machines are meant for men. But with a step-by-step instructional manual on the handpump, women felt that with initial hands-on experience, they can now handle installation, repair and maintenance of the handpump on their own. They no longer need to wait till their husbands or other menfolk find the time to repair the handpump.

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