EXPERIENCE IN THE TRANSFER OF HANDPUMP TECHNOLOGY TO LESS DEVELOPED COUNTRIES

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ABSTRACT

Many of the world's nations have neither adequate water supplies nor sufficient sanitation facilities. The United Nations, therefore, designated 1981-1990 as the International Drinking Water Supply and Sanitation Decade with the explicit goal of providing the world's poor with access to adequate water supplies and proper sanitations. Over the past eight years, the International Division of the Engineering Experiment Station at Georgia Tech has been helping the world's poorer countries assess their need for hand-operated water pumps, develop effective hand pump programs, and manufacture, install, maintain and monitor the pumps. The purpose of this paper is to provide a methodology for technology transfer that is applicable to hand pumps as well as to numerous other hardware items.

INTRODUCTION

Waterborne or water-related diseases are among the major causes of sickness and death in developing countries and contribute to high infant mortality, low life expectancy and a poor quality of life. Such diseases can be prevented if people are provided with a safe drinking water supply and the facilities to dispose of wastes. Unfortunately, for more than a thousand million people in developing countries, water supply and waste disposal facilities are either totally absent or so inadequate that even the most rudimentary public hygiene is impossible.

Fortunately, this need for basic water supply and sanitation services has been recognized by the governments of the world. An ambitious program has been mounted to provide these needed services to as many people as possible during the decade of the 1980s, an effort which is part of a global strategy to make health services available to all by the year 2000.

In implementing the water and sanitation decade activities, special emphasis is being given to rural and under-served areas including the large squatter settlements around urban centers. It is the poor in these areas that suffer the most from the absence of basic services because they lack not only the means to provide the facilities but also information on how to minimize the ill effects of the unsanitary conditions in which they live. As a result, the debilitating effects of unsanitary living conditions lower the productive potential of the very people who can least afford it. Consequently, there are few development projects...
that have a greater potential for directly benefitting the health and social and economic well-being of people than those which provide water and sanitation.

The Georgia Institute of Technology, through its Technology Applications Laboratory of the Engineering Experiment Station, has played a major role in providing water supply facilities to developing countries with funding from the U.S. Agency for International Development (AID). Hand pump technology has been successfully transferred to Nicaragua, Costa Rica, the Dominican Republic, Sri Lanka, Indonesia, the Philippines, and Honduras using a pump designed by Battelle-Columbus Laboratories. This pump incorporates a number of design features that make it particularly appropriate for rural areas in developing countries. It has a long life under severe operating conditions; it is easily maintained using simple tools and unskilled labor; it can be easily operated by women and children; and it can be manufactured in-country.

However, the success of these hand pump programs is not due solely to a well-designed piece of hardware. As Dr. David Bradley of the Ross Institute of Tropical Hygiene has stated, “No matter how much we have learned about the engineering details of alternative sanitation systems and the related health aspects, unless these findings can be translated to the target population in a way they can understand and accept, this is mostly an academic exercise”. (The World Bank Seminar on Appropriate Technology, January 1978). The programs incorporate all facets of appropriate technology:

- Adaptation of technology to existing environmental conditions,
- Maximum utilization of local resources,
- Stimulation of indigenous initiative and innovation, and
- Development of logistical support within a cost-effective framework.

This paper presents the general approach taken for all of Georgia Tech’s hand pump programs and highlights a specific example – the hand pump program for Indonesia.

GENERAL APPROACH IN TRANSFERRING HAND PUMP TECHNOLOGY

Before describing the sequence of activities in technical assistance, it is appropriate to discuss the AID hand pump design and operation as well as the maintenance requirements.

AID Hand Pump Design and Operation

The AID hand pump (see Figures 1 and 2) is a single-acting, positive displacement piston pump for community or multi-family use. It consists of an above-ground pump stand made of cast iron and galvanized steel, a drop pipe and a PVC or PVC-lined pump cylinder containing a brass piston or plunger assembly with leather cup seals. It can be mounted on tube wells or on a platform built over dug wells. Its average pumping capacity is approximately five gallons per minute and it can pump from depths of up to 100 feet. The pump produces approximately one half liter of water per stroke of the handle. The pump has not been in operation long enough to determine its average useful life be-