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**LOCAL HANDPUMP MANUFACTURE;
A DEVELOPMENT OPTION FOR AID AGENCIES:
ATTITUDES EXPRESSED BY NEW ZEALAND NGOs.**

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PREFACE

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ABSTRACT

A major reason for implementing water supply programmes is their potential contribution to health. The recently concluded United Nations International Drinking Water Supply and Sanitation Decade (1981-1990) attempted to provide access to clean water and sanitation for everyone in the Third World. There are several problems and constraints which preclude success in this area, many of them are sociological factors concerned with the transfer of technology and practices to cultures other than those in which they were conceived.

Projects are implemented, often by outsiders, involving handpumps for water supply mounted on wells or boreholes. Such systems have a poor record with regard to their sustainability; often the handpump breaks down after donor withdrawal and is never repaired. Donor assisted projects often use handpumps sourced from the industrialised countries and paid for in hard currency, usually \$US. When spare parts are needed they too must be sourced from overseas and paid for in scarce foreign exchange. Local inflation and currency devaluation can make these spares prohibitively expensive. The result has been neglected maintenance and breakdowns.

This thesis examined the potential for local handpump manufacture to address operation and maintenance problems and assess the economic contribution local manufacture could make to the local community through employment and income generation.

A case study of the Makeni Handpump Workshop in Lusaka, Zambia was used to compare the cost, landed in Lusaka, to an aid agency of handpumps sourced from the U.K. and from a local manufacturing operation. The provision of employment and income to local people arising from patronising the handpump workshop was also assessed as a 'developmental benefit'. This was over and above the acquisition of handpumps alone; aid money would be spent directly in the community by choosing a local source of equipment.

Interviews with selected NGOs in New Zealand were conducted to establish their attitudes to water supply projects in general and to local handpump manufacture specifically.

It emerged that local handpump manufacture could be profitable at the small-scale level of the case study and a viable form of income generation. New Zealand NGOs agreed that there should be more to water supply projects than a welfare consideration alone, an element of development should be included. They were supportive of local handpump manufacture where it existed but did not invest in it as a means of income generation.

TABLE OF CONTENTS

PREFACE	ii
ABSTRACT	iii
TABLE OF CONTENTS	v
LIST OF FIGURES AND TABLES	vii
ABBREVIATIONS	viii

CHAPTER 1

INTRODUCTION	1
1.1 GENERAL INTRODUCTION	1

CHAPTER 2

LITERATURE REVIEW	6
2.1 INTRODUCTION	6
2.2 VARYING OBJECTIVES OF WATER SUPPLY PROJECTS	6
2.3 RESEARCH DURING THE IDWSSD	7
2.4 SPECIFIC RESEARCH ON LOCAL PRODUCTION	8
2.5 LOCAL ECONOMIC CONDITIONS	10
2.6 LOCAL CULTURE	10
2.7 STANDARDISATION	11
2.8 INSTANCES OF LOCAL PRODUCTION	12
SARVODAYA SL5 HANDPUMP.	12
PREY VENG PUMP.	13
SHINYANGA PUMP.	15
INDIA MK2.	15
AFRIDEV PUMP.	15
TARA.	16
ROWER PUMP.	16
2.9 LOCAL CAPACITY	16
2.10 CONCLUSIONS	17

CHAPTER 3

OBJECTIVES OF THE STUDY	22
3.1 OBJECTIVES	22
3.2 LIMITATIONS OF THE STUDY	22

CHAPTER 4

CASE STUDY OF LOCAL HANDPUMP MANUFACTURE	23
4.1 INTRODUCTION	23
4.2 RESULTS AND DISCUSSION OF QUESTIONNAIRE FROM MAKENI HANDPUMP WORKSHOP	23
4.3 ROWER PUMP SOURCED IN THE UNITED KINGDOM.	25

CHAPTER 5

NEW ZEALAND NGO PERSPECTIVE ON LOCAL HANDPUMP MANUFACTURE	29
5.1 RATIONALE BEHIND CHOICE OF NGOs	29
5.2 METHODOLOGY OF SURVEY	31
5.3 RESULTS AND DISCUSSION OF INTERVIEWS	31
5.4 DISCUSSION	37

CHAPTER 6

CONCLUSIONS	39
--------------------------	----

CHAPTER 7

RECOMMENDATIONS FOR FURTHER RESEARCH	44
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APPENDICES

APPENDIX A	
ZAMBIAN HANDPUMP WORKSHOP QUESTIONNAIRE.	46
APPENDIX B	
NGO QUESTIONNAIRE.	47

BIBLIOGRAPHY	51
---------------------------	----

LIST OF FIGURES AND TABLES

FIGURE

1	Lined Well and Handpump for Source Protection	2
2	Effects of Well Protection on Coliform Count	3
3	Goals for Water Supply Projects	4
4	Summary of the VLOM Concept	5
5	Returns to Scale of Production	11
6	Definitions of Reliability	14
7	Opportunities for Future Handpump Research	21

TABLE

1	New Zealand NGOs and their activities	30
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ABBREVIATIONS

IDWSSD, (1981-1990).

The United Nations International Drinking Water Supply and Sanitation Decade.

VLOM.

Village Level Operation and Maintenance, later Management of Maintenance. This refers to the suitability of a handpump for repair and maintenance operations to be carried out on it by semi-skilled or unskilled villagers with minimal tools. The idea being that if the pump is easily maintained by the people who depend on it, when it fails it will be more likely that a repair will be made by them. If, on the other hand, repair was dependant on a centralised system of mobile mechanics repairs would be delayed or never undertaken at all.

CHAPTER 1

INTRODUCTION

1.1 GENERAL INTRODUCTION

A major justification for expenditure on water supply projects is their potential to improve health. Water borne and water related diseases are widespread in the Third World. Some are transmitted directly by drinking polluted or contaminated water, others by an inadequate quantity of water being available to maintain levels of hygiene that would prevent their transmission. It is understood that clean water alone has not and will not provide the solution to this complex problem (McGarry, 1977; Black, 1990). Concomitant health education and sanitation are required; there is strong complementarity between these different elements.

The amount of time and effort involved in collecting water, this onerous task usually falling to women and children, should be reduced to help them enhance their lives. At the end of a sixteen hour day, which often entails, collecting water; itself involving a walk of several kilometres carrying a twenty kilogram load, cooking, cleaning, tending livestock, and cultivating the family garden they will have little energy left. When so much time and effort is spent on survival there must seem little opportunity to improve ones lot in life. Development must have a social component, it should contain an element of self development for people; the realisation of their potential when released from oppression in all its forms (Rahman, 1990). Locked into an arduous routine of survival and ill-health this potential can never be realised. The low quality of life experienced by many poor people in the Third World is a symptom of their poverty. Measures taken in the name of development must address their need for income generation as well as welfare provision.

Even after the International Drinking Water Supply And Sanitation Decade, (IDWSSD, 1981-1990), there were in 1990 an estimated 1230 million people without

access to safe water (Black, 1990). Many of these people live in rural areas where treated, piped water supplies are neither affordable or appropriate. Simple handpumps mounted on hand-dug wells or boreholes offer a means both of extracting ground water and sealing the well head against contamination. This source protection itself goes a long way towards improving water quality. (Morgan, 1990)

The potential of handpumps as a solution to rural water supply problems has been known for some time. Various countries have implemented handpump based water supply programmes over the last several decades. In the 1960s in India a borehole drilling project was initiated in response to a period of drought. By 1975 about 150,000 handpumps had been installed. However, it was found in a survey that up to 100,000 of these handpumps were not

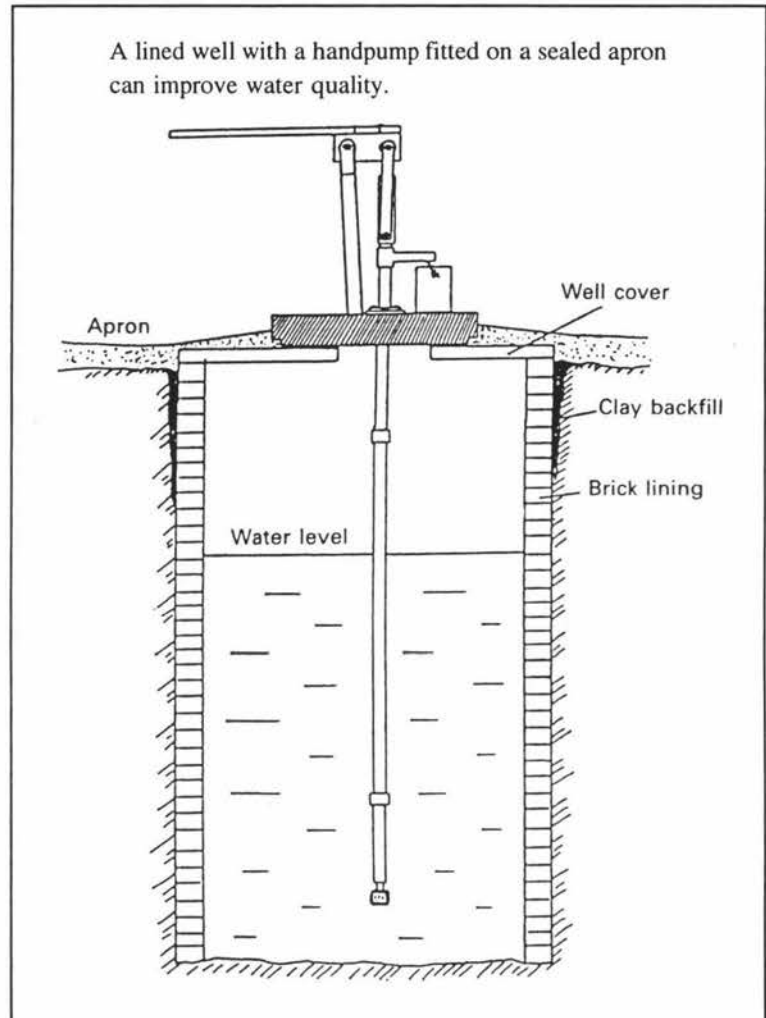


Figure 1 From Morgan,1990:166

operating at any one time (Pacey, 1983). Initial engineering shortcomings were corrected yet still maintenance problems persisted. These problems were finally identified as administration and management failures coupled with a lack of personal responsibility felt by the villagers for the handpumps.

One aspect hindering the maintenance of any equipment is the availability of spare parts. Many handpump projects have involved the importation of large numbers of handpumps made in the industrialised countries. These handpumps operated

Reduced faecal coliform counts in wells with ascending levels of protection.		
Source	Mean <i>E. coli</i> /100 ml sample	Number of samples
Poorly protected well	266.42	233
Upgraded wells	65.94	234
Bucket Pump (overall)	33.72	338
Blair Pump (tubewells)	26.09	248
Bush Pump (tubewells)	6.27	281

Figure 2 From Morgan,1990:253

efficiently for some time with no maintenance, however, once they broke down the problems identified earlier in India compounded by poor spares availability, or lack of foreign currency to buy them, resulted in the handpumps often never being repaired. Sometimes the only recourse was total replacement by a donor agency with a new handpump. The much vaunted goal of sustainability was never attained.

"It is only now that many policymakers are beginning to realise how importing handpumps from the industrial nations can hinder a handpump project, making sustainable operation and maintenance almost impossible without continued donor assistance."
(Mtunzi and Lombardi, 1993:5)

Another valuable contribution to water supply project sustainability that local manufacture of handpumps can make is in the area of standardisation. When an aid agency donor undertakes a water supply project in a country it may well import handpumps from its home country. Thus in Africa where many donors from several countries have established projects there is a large variety of handpumps each with specific tools and spares requirements (Mtunzi and Lombardi, 1993). An ideal would be to standardise on one or two types of handpump per country (Wurzel, 1992). Sustainability of water supplies will only be accomplished when all factors militating against it are addressed. Local, standardised manufacture could expedite maintenance.

Further discussion of local manufacture versus overseas procurement requires that the broader issue of development and attitudes towards water supply projects be confronted. In financing a water supply project an aid agency may have one or several objectives: the supply of safe drinking water in adequate quantities at an accessible distance from the dwellings of the users may be the only issue of concern; a welfare issue alone. Alternatively, the water supply may be seen as a vehicle for local community development. Employment and income thereby generated for local people and the local capacity built by their involvement in the scheme could benefit them to a greater extent than the water supply alone would have. A deeper, long-term view beyond welfare is needed to realise the full potential of any water supply project (Pacey, 1977).

Table 1. Goals and objectives for water supply improvements in rural areas of developing countries

<i>Immediate Objectives</i>	<i>Further goals—stage I</i> (these follow as consequences when the immediate objectives have been met)	<i>Further goals—stage II</i> (these follow from previous stages if complementary inputs are provided)	<i>Further goals—stage III</i> (these are consequences of reaching the previous goals which follow if there are also inputs on many other fronts)
<p>FUNCTIONAL: to improve the quality, quantity, availability and reliability of the supply</p> <p>OTHER: to carry out this improvement in a manner which (a) secures the support of users; (b) conserves scarce resources (e.g. capital); (c) avoids adverse environmental consequences (e.g. lowering water tables, encouraging mosquitoes)</p>	<p>HEALTH: to reduce incidence of water-borne and water-based disease</p> <p>ENERGY/TIME (ECONOMIC): to save time and energy expended in carrying water</p> <p>SOCIAL: to arouse interest in the further health and economic benefits which may arise from the water supply</p> <p>ECONOMIC: to provide more water for livestock and garden irrigation; (water may be used for this even if it is intended solely for domestic supply)</p>	<p>HEALTH: to reduce incidence of water-washed infections <i>(inputs required: improved hygiene, health education, improved sanitation)</i></p> <p>SOCIAL/TECHNICAL: to ensure good long-term maintenance of water supply and sanitation facilities <i>(inputs required: training, clear allocation of responsibility, build-up of local maintenance organization)</i></p> <p>ECONOMIC: to use energy/time savings and increased water availability to achieve better agricultural output <i>(inputs required: extension work, fertilizer supply, etc.)</i></p>	<p>to achieve the greater well-being of the people through:</p> <p>(a) social change—greater self-reliance in the community, better organization, better deal for the poor, women, etc.</p> <p>(b) improved standard of living - health, nutrition, income, leisure</p>

Figure 3 From Pacey, 1977: 6

Table 1 in figure 3 from Pacey, (1977) shows the potential goals of a water supply project in several stages. Depending on the perspective of the implementing agency the immediate objectives may be the only consideration. Alternatively, further stages may be considered important by an aid agency interested in promoting

development as well as welfare. Local manufacture of a VLOM (Village Level Operation And Maintenance) handpump, as defined below in figure 4, would address maintenance issues and provide employment and income. This approach can be a catalyst for social development.

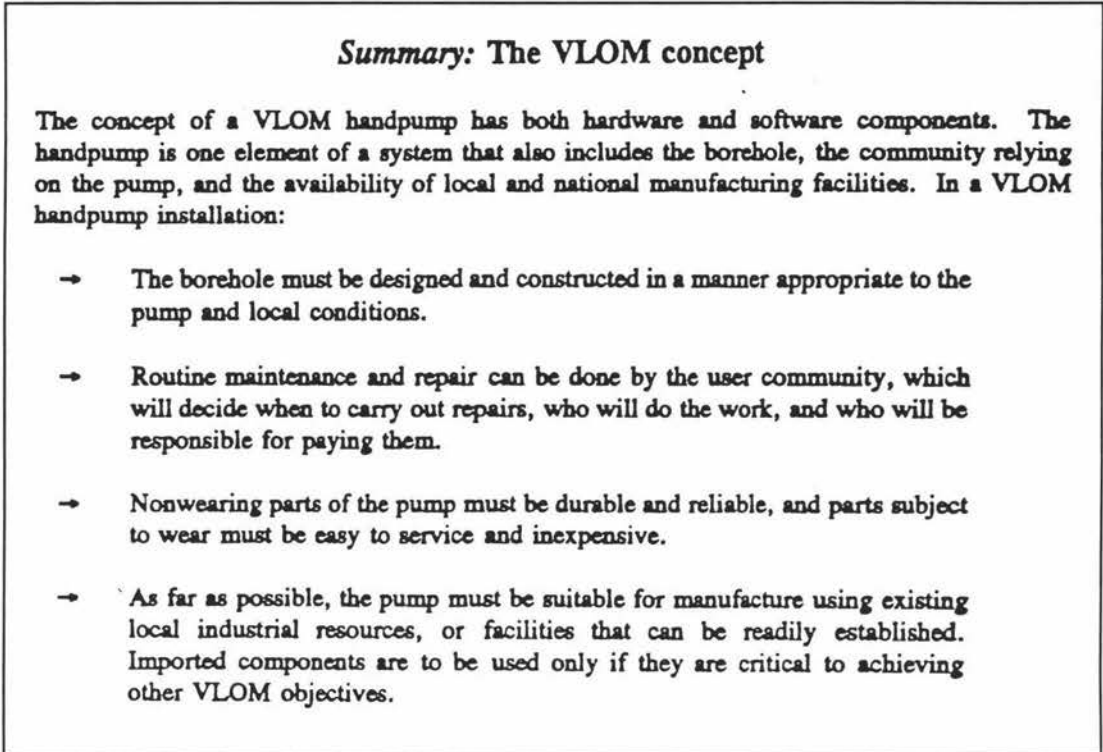


Figure 4 from Reynolds, 1992: 4

Simple handpumps for village water supply were seen by international agencies as a potential solution to water quality and availability problems. Shortcomings in operation and maintenance subsequently emerged and were identified as institutional weaknesses requiring the participation of local people (the users) in the design and construction of water supply systems. Given the above background a question arises as to the role of local handpump manufacture⁽⁵⁾ in supplying handpumps and spare parts. This would avoid the logistical and economic constraints involved in importing similar equipment. Income generation from employment of local people in handpump manufacture would be a developmental spin-off that importing equipment would not engender. It is understood that local manufacture would only address part of the operation and maintenance problems that have been encountered in community water supply projects and programmes. The sociological component affecting the sustainability of these projects would continue to be a major issue in itself.