

THE RURAL WATER SUPPLY AND SANITATION PROGRAM IN THE SOLOMON ISLANDS

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MAY 1986

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under WASH Activity No. 213

by

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LIST OF ACRONYMS

ADAB	Australian Development Assistance Bureau
AHI	Assistant Health Inspector
CDW	Community Development Workers
CM	Corrective maintenance
CMO	Chief medical officer
EHD	Environmental Health Division
GI	Galvanized iron
IHAP	International Human Assistance Program
MOH	Ministry of Health and Medical Services
NGO	Non-governmental Organization
PHI	Principal Health Inspector
PP	Project paper
PS	Provincial Secretary
PVC	Polyvinyl chloride
PVO	Private Voluntary Organization
RWSS	Rural Water Supply and Sanitation
SHI	Senior Health Inspector
SI	Solomon Islands
SIDT	Solomon Islands Development Trust
SIG	Solomon Islands Government
UNDP	United Nations Development Program
USAID	United States Agency for International Development
USAID/Suva	USAID office in Suva, Fiji
VIP	Ventilated Improved Pit
WASH	Water and Sanitation for Health
WHO	World Health Organization



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The WASH team wishes to acknowledge the support and assistance extended by the Ministry of Health and Medical Services to carry out this assessment. We wish to thank the Permanent Secretary, Mr. Philip Funifaka, and the Under-Secretary of Health for Health Improvement, Dr. Nathan Kere, who have shown a keen interest in this evaluation. The Environmental Health Division, headed by Mr. Tom Lolamae, was most helpful in arranging the team's travels around the Solomon Islands, in providing vehicle support in Honiara, and in producing the various documents, reports, and other pieces of information needed in the assessment. We wish to express our special gratitude to Mr. Robinson Fugui, Principal Health Inspector, who opted to forego his scheduled annual leave to accompany the team to the various provinces visited, and to the Provincial Health Inspectors and Assistant Health Inspectors whose patience and dedication enabled the team to visit 84 villages in so short a time and under the most adverse travel conditions. We thank the people of the villages we visited, who have extended to us their very warm and hospitable welcome.

We also wish to thank Mr. Martin Walshe of Camp Scott Furphy who, by his knowledge of the Solomon Islands, helped us make the best use of our time in country.

Finally, we wish to thank Dr. Pat Lowry, Health, Population and Nutrition Advisor of the USAID Mission in the South Pacific, for giving WASH the opportunity, encouragement, and support to undertake what has been one of the most interesting assignments undertaken by WASH.



EXECUTIVE SUMMARY

At the request of the United States Agency for International Development/Suva (USAID/Suva) the Water and Sanitation for Health (WASH) Project sent a two-person team to Solomon Islands (SI) in January and February 1986 to assist USAID/Suva by recommending methods whereby USAID could best implement the Rural Water and Sanitation Project for Child Survival in the Solomon Islands. In addition, the Solomon Islands Government requested that the WASH team assess the effectiveness of the Rural Water and Sanitation (RWSS) Project which was started by the Solomon Islands Government in 1979.

The following is a summary of the consultants' findings, conclusions, and recommendations.

Findings:

1. In general, the Rural Water and Sanitation Program has been successful in providing improved water supplies to villages in the Solomon Islands.
2. The sanitation component of the RWSS Program has been significantly less successful than the water component.
3. The project has been administered by the Environmental Health Division of the Ministry of Health and Medical Services in a satisfactory manner.
4. The Environmental Health Division has not implemented an adequate management information system to enable program managers and other interested parties to readily determine the status of the program.
5. The types of water systems selected are appropriate for the Solomon Islands, and their design and construction is generally well done.
6. Transport and, in some cases, land rights are the major problems affecting the construction of new water systems.
7. The lack of maintenance of rural water supply systems is the major problem facing the successful completion of the RWSS Program.
8. A maintenance program relying on the provincial Environmental Health Division personnel and the villages is feasible in the Solomon Islands.
9. The villagers currently do not have the skills or tools needed to maintain their water systems.
10. In general, villagers have a good community spirit and a sense of ownership of their water systems.
11. In all cases villagers provided labor for constructing their water systems.
12. The willingness of the village people to maintain their water systems has not been used by the Environmental Health Division.

13. With the high population growth rate, sanitation will become a major problem in rural Solomon Islands.
14. Methodological problems, along with the great difficulty and expense in measuring directly the health benefits of the improved water supplies, makes an undertaking of this effort of doubtful value.

Conclusions

1. The Solomon Islands Government must decide if it wants to place greater emphasis on sanitation. If so it must recognize that fewer water systems can be constructed.
2. The Environmental Health Division should continue to administer the RWSS Program, but must implement a satisfactory management information system.
3. Steps must be taken by the Solomon Islands Government to resolve logistics problems faced by the Environmental Health Division personnel based in the provinces.
4. Implementing a program to maintain rural water systems is essential.
5. A two-tiered maintenance program should be implemented in rural Solomon Islands.
6. The villagers must be trained through community development workshops to organize water committees, collect funds for spare parts and tools, and to maintain their water systems. This effort must be initiated by the Solomon Islands Government.
7. The development and implementation of a research protocol to measure the health benefits of improved water systems in the Solomon Islands is not practical.

Recommendations

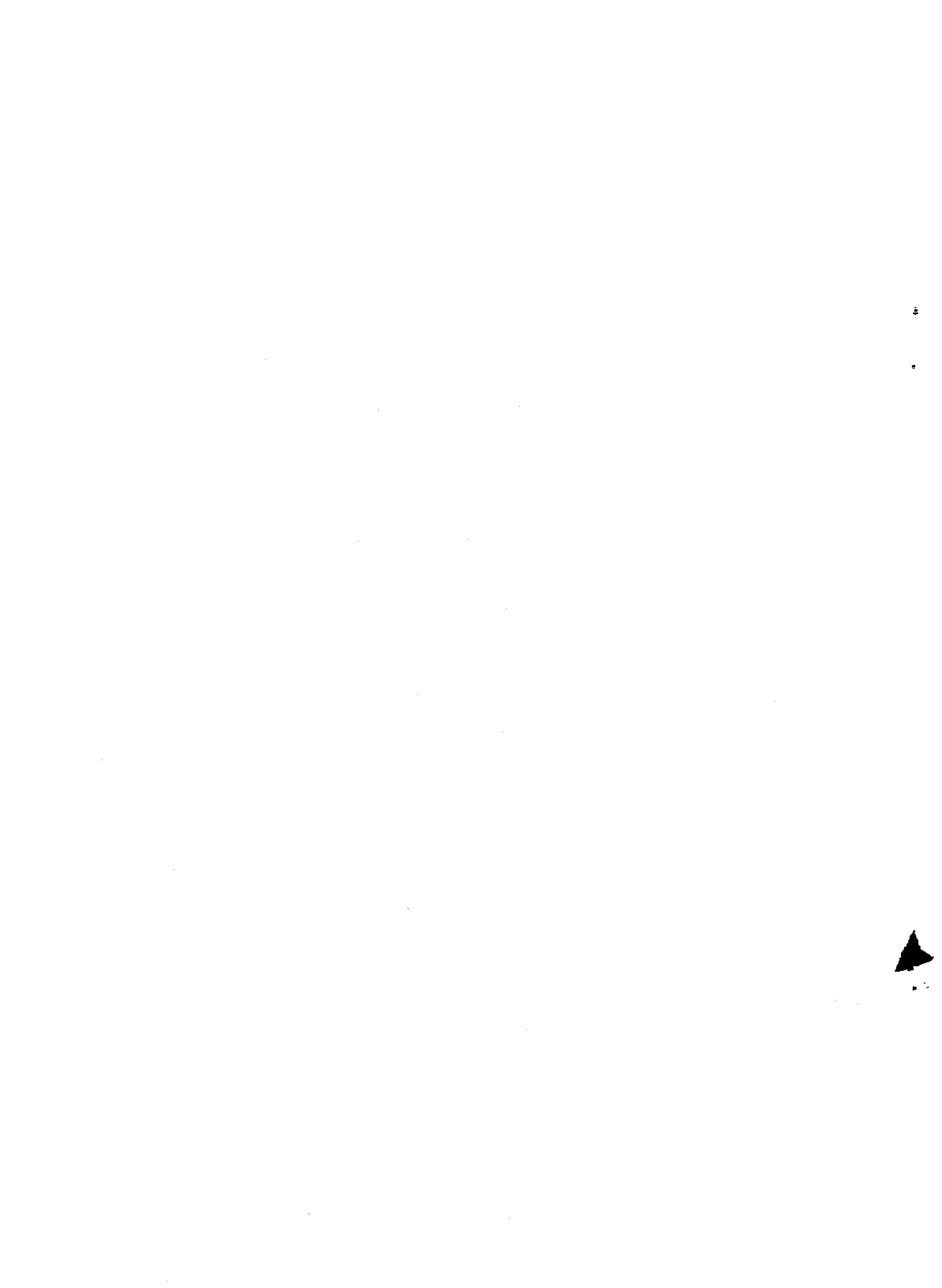
For the Solomon Islands Government:

1. The Ministry of Health and Medical Services should form a committee to make decisions on the direction of the RWSS Program with respect to sanitation.
2. The Environmental Health Division should enhance its information collection efforts according to the guidelines presented in Appendix 8.
3. Some of the funds currently allocated for materials should be used to provide more reliable transport for Environmental Health Division personnel. Assistance for this purpose should be sought from donor agencies.
4. The Solomon Islands Government should seek donor assistance to begin a program of developing community participation workshops for villages with

water systems and for those that will receive new ones. If outside assistance is unavailable, the senior health inspectors and their assistants must be trained to conduct these workshops.

For USAID:

1. USAID should provide financial support and management for the training associated with the development of community participation workshops.
2. USAID should financially support the purchase of appropriate transport for Environmental Health Division field personnel.
3. USAID should support a national workshop to train Environmental Health Division personnel in management reporting systems.
4. USAID should not provide major support for materials to construct new water systems. Current donor aid is adequate to support this part of the program. Instead USAID should channel funds from new systems to the rehabilitation of existing systems.
5. Until simplified and practical methodologies are developed, USAID should not fund attempts to undertake research programs to assess the health benefits of improved water supplies to the rural people in the Solomon Islands.



Chapter 1

INTRODUCTION

1.1 Description of the Solomon Islands

The Solomon Islands is a group of islands in the tropical South Pacific with a total area of 900,000 square kilometers, but only 28,000 square kilometers is land. The country stretches 700 miles east to west and 500 miles north to south and is divided into seven provinces and the capital district of Honiara. Each province is based on one of the major island groupings. Figure 1 is a map of the Solomon Islands.

The population of the Solomon Islands is approximately 266,000, with 85 percent living in roughly 6,000 generally coastal villages. About 20,000 people live in Honiara, which is located on Guadalcanal Island. There is tremendous cultural diversity with as many as 70 different languages spoken.

Transportation within the islands is difficult due to the frequently poor roads. Many villages can be reached for all practical purposes, only by motorized canoe. The national airline of the Solomon Islands, Solair, provides service between the major towns of the country.

The primary products of the Solomon Islands are copra, lumber, palm oil, fish, and cocoa.

Malaria is the major health problem facing the Solomon Islands. However, diseases relating to poor practices of gathering and using water, such as diarrhea, are also widespread. As a result, in 1978, the Solomon Islands Government began a Rural Water Supply and Sanitation (RWSS) Program.

1.2 The Rural Water Supply and Sanitation Program

1.2.1 Background

In 1978, 24 percent of the rural population in the Solomon Islands had an adequate water supply and 20 percent had adequate sanitation. By 1984, the RWSS Program had reached 60 percent of the rural population with improved water systems but only 22 percent now have adequate sanitation systems. The difficulties in changing behavior patterns plus the lack of emphasis on sanitation are the primary reasons for the small increase in the sanitation figures.

The water systems have proven to be very popular and the government is aggressively pursuing the goal of providing satisfactory water systems to the entire rural population by the end of the decade. However, if the number of rural people who have improved sanitation facilities is to be increased significantly, much greater emphasis must be placed on this part of the program.

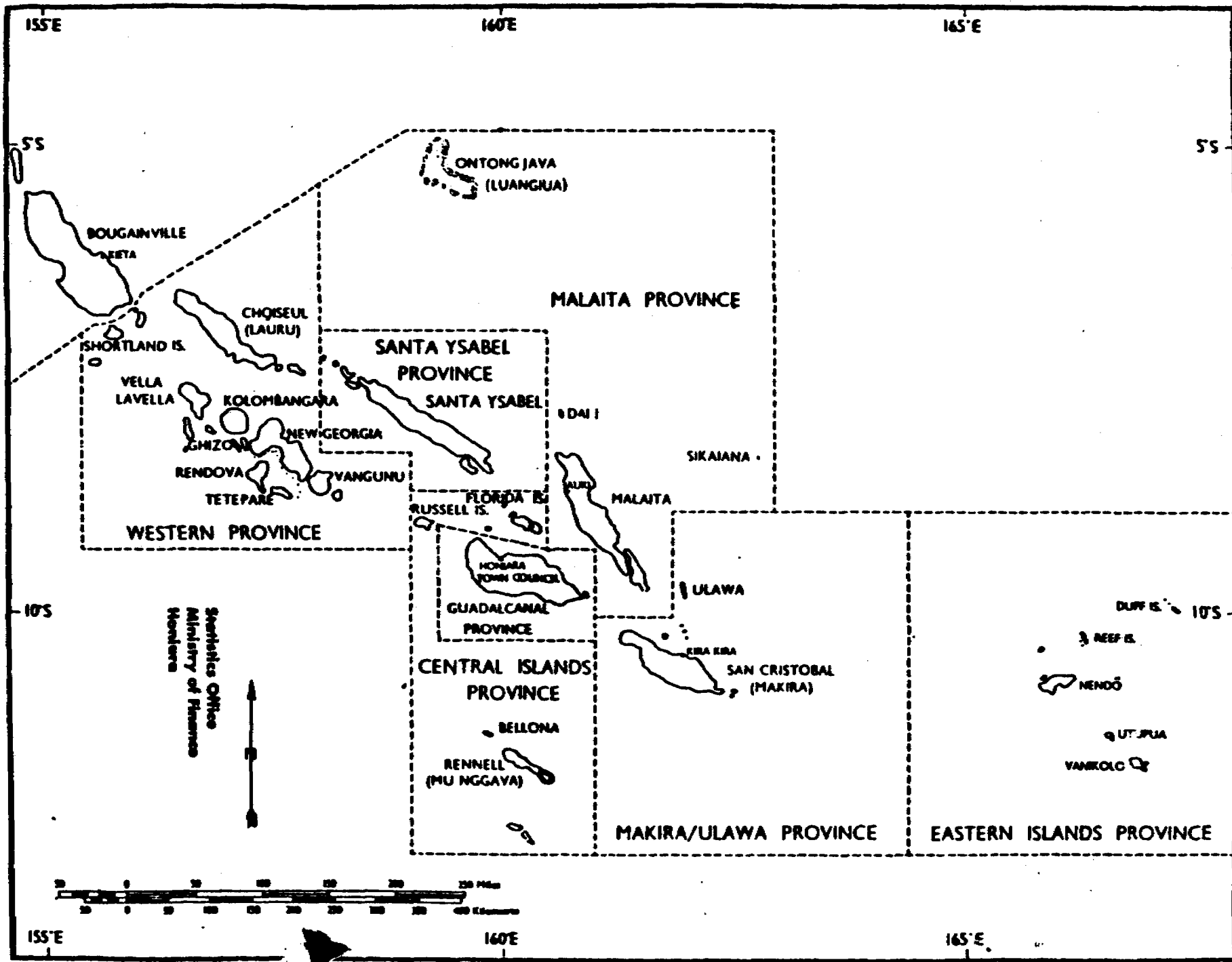


Figure 1
SOLOMON ISLANDS

1.2.2 Types of Water Systems

The Solomon Islands receives an abundance of rainfall, and virtually every village (except for communities located on the smaller islands) has access to water from springs or streams. However, in many cases, obtaining water from these sources for cooking and cleaning required walking one to three kilometers. The goal of the RWSS Program has been to construct systems that will deliver water from these sources to the villages, thereby providing a convenient source of water for the village people.

The Environmental Health Division (EHD) of the Ministry of Health and Medical Services has the responsibility to implement the RWSS Program and has wisely constructed systems that are relatively easy to maintain. These are

- gravity-fed systems piped from springs or streams,
- rainwater catchments,
- handpumps, and
- hydraulic rams.

The latter two are selected only if no alternative source (stream or spring) is available.

The provincial governments, with technical assistance from the senior health inspectors based in the provinces, have the responsibility of selecting those villages which will receive improved water systems.

1.2.3 Current Status of the Program

The program of providing improved water supplies to the rural people is very successful in terms of number of people reached. It is apparent, however, that some aspects of the RWSS Program have not been given proper attention.

As new systems are added to communities and as existing systems grow older, the problem of proper maintenance of the water systems will increase significantly. Plans to remedy this situation have not been drafted.

It is also clear that, in some communities, the improved water systems can have a negative impact on the health of the people. Numerous instances of standing water around standpipes caused by a poorly designed or maintained drainage systems were observed by the WASH team.

Furthermore, the emphasis of the program has been to provide water systems; inadequate attention has been paid to sanitation. Thus, the RWSS Program's goal of propagating sanitation to all people by 1990 will be difficult to achieve.

1.3 The Solomon Islands Rural Water Supply and Sanitation Project for Child Survival

The U.S. Agency for International Development (USAID) Mission responsible for USAID activities in the South Pacific has proposed a project to assist the Government of the Solomon Islands (SIG) to achieve the goals of the RWSS

Program. The USAID project -- the Solomon Islands Rural Water Supply and Sanitation Project for Child Survival -- is designed to provide assistance in the following areas:

1. Maintenance: Development of community-based maintenance programs, including a training component and provision for tools needed to support the maintenance program at the village level.
2. Construction of New Systems: Part of the USAID project funds will be used to provide materials needed to construct new water systems. An estimated 10,000 people will be reached by this aspect of the program.
3. Development of Information Systems: The goal of this aspect of the program is to enable RWSS Program managers readily to obtain information on water-system maintenance. The purpose is to enable them to assess the effectiveness of the water and sanitation program.
4. Reduction in Environmental Deterioration: The project will develop strategies to counter the effect of poor design and maintenance practices, as they may result in poor drainage.

1.4 Purpose of the WASH Consultancy

1.4.1 USAID Requirements

USAID requested WASH assistance to determine how effectively to achieve the goals of its proposed project (Section 1.3) and whether USAID assistance could be utilized in other ways to achieve the goals of the RWSS Program. USAID was seeking specific recommendations, particularly with respect to community participation, effective maintenance programs, and practical information systems.

1.4.2 Solomon Islands Government Requirements

The Solomon Islands Government requested that the WASH team assist it with the RWSS Program in two other areas:

1. The SIG has been planning to evaluate the RWSS Program, but recognized that evaluation findings would be more readily accepted by donors to the program as well as officials of the Solomon Islands Government if performed by independent consultants. Therefore, the government asked the WASH team to assess the effectiveness of the RWSS Program. This evaluation is also to include recommendations of ways that the program can be strengthened.
2. Ministry of Health and Medical Services officials also requested that the WASH team review the organizational structure of the ministry as it pertains to the management of the RWSS Program.

Consequently, the WASH team will address both of these topics in this report.

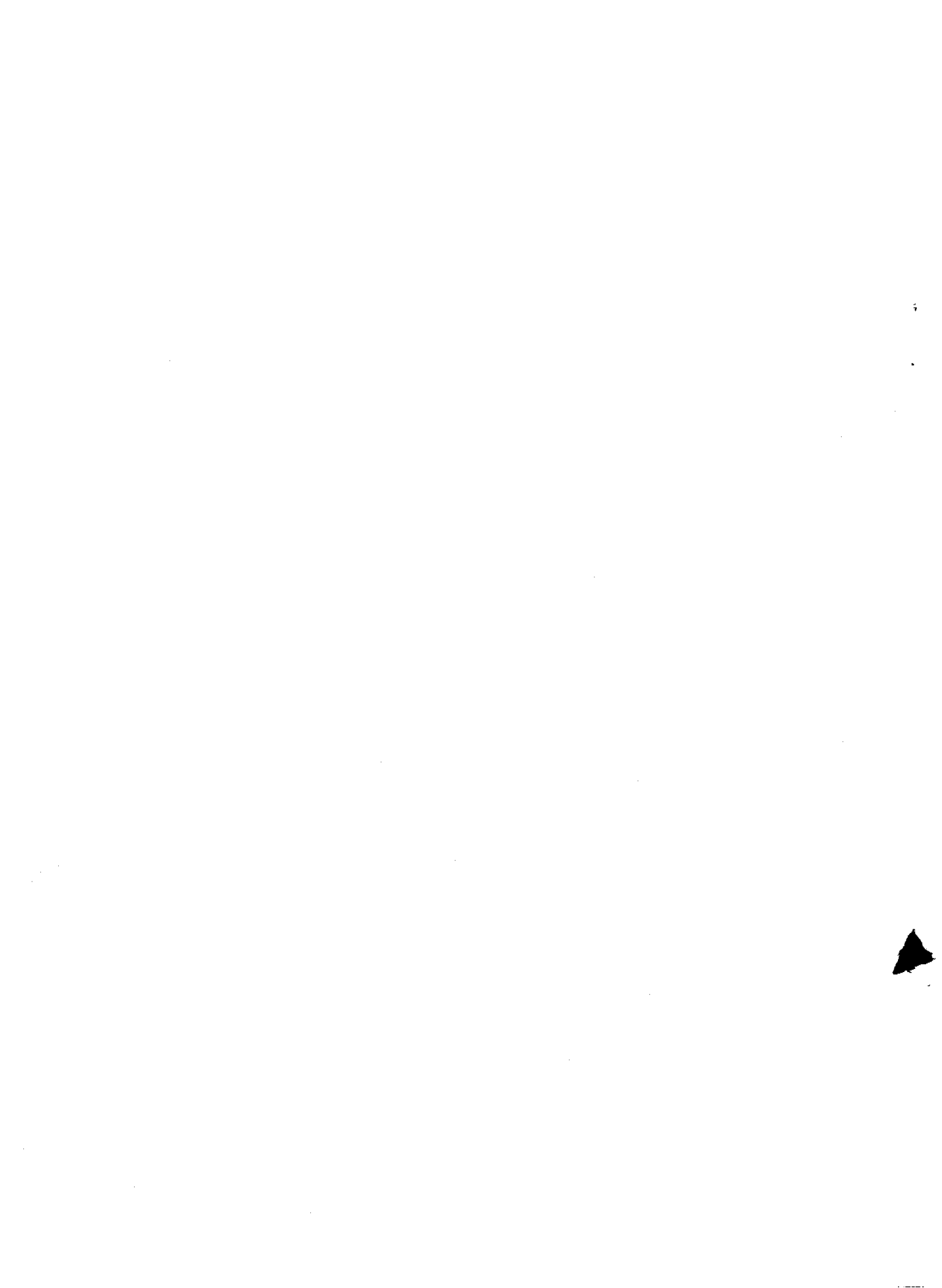
1.4.3 Other Donor Activities

The WASH team also investigated the role of multi- and bilateral agencies, and private voluntary and non-governmental organizations in the implementation of the RWSS Program. These represent an important source of funds to support the program and potentially could be involved directly in implementing the program, particularly with respect to community participation. The role of these agencies was investigated with particular attention to the possibility of direct collaboration between these agencies and the Ministry of Health and Medical Services in implementing the RWSS Program.

1.5 Scope of Work

The WASH staff determined that the team carrying out this activity should consist of a water supply engineer with experience in developing appropriate maintenance programs and a community development specialist with experience in public health.

The WASH team, comprised of James K. Jordan, operations and maintenance specialist, and Dr. Rosendo Capul, public health advisor, spent six weeks in the Solomon Islands visiting numerous villages with improved water supply systems in order to gain first-hand knowledge of the several different types of systems constructed there and to view both successful and unsuccessful installations. Appendix 1 contains the scope of work for the WASH team.



Chapter 2

METHODOLOGY

2.1 General

In order to respond adequately to the scope of work, the WASH team interviewed government and program officials at the national and provincial levels and officials of donor and development agencies, reviewed pertinent documents, and visited numerous villages.

2.2 Interviews with Ministry of Health and Medical Services Officials

Interviews with national level officials were unstructured. They were queried on broad program goals and policies, the priority accorded the RWSS Program in the national development plan, and the support given to the program from both internal and external sources. Their views were likewise sought on whether or not the program was meeting its goals, on operational and management problems being experienced, and on the program's effect on the state of health of the people.

On the provincial level data were uniformly collected by interviewing health inspectors with the aid of a standard questionnaire (see Appendix 2). In all, a total of five provincial capitals were visited, and all seven provincial health inspectors were interviewed. Provincial-level data collected were mainly on program organization, implementation systems and procedures, budgetary and logistics support, maintenance arrangements for completed water systems, and provincial policies on community participation in system construction and maintenance. Appendix 3 contains a list of persons that the team met with concerning the RWSS Program.

Malaria was selected as an indicator disease to assess environmental deterioration as a result of improper drainage, and malaria incidence rates from 1980 to 1985 were obtained from the Malaria Program Office of each of the provinces visited.

2.3 Field Trips

A total of 84 villages in five provinces were visited, and information was collected on system types, defects and functional status, and drainage problems. In-depth interviews using a standard interview guide (see Appendix 4) were conducted in about a third of the 84 villages visited.

Respondents were key village informants, such as chiefs, council members, church leaders, and knowledgeable housewives. The survey questionnaire elicited information on the operations and maintenance of water supply systems, help-seeking behavior when problems arise, community participation in system maintenance, and the villagers' views on whether or not the water system had contributed to the improvement of people's health. The interview guide was designed to collect the villagers' views from which findings and

conclusions were generalized. The intention was not to collect village-level data for quantitative analysis.

The selection of villages that were visited and where interviews were conducted was not done systematically. Owing to accessibility problems, only villages that were readily reachable by truck or canoe were visited. However, the senior health inspectors visited were instructed that the team wanted to see a balance between problematic and non-problematic water systems. Appendix 5 is a list of villages visited by the team.

2.4 Interviews with Officials of Donor and Development Agencies

The WASH team interviewed the officials of the Australian Development Assistance Bureau (ADAB) who are managing the assistance of the Australian Government to the RWSSP, and the World Health Organization (WHO) representative to the Solomon Islands, who was, at the time of the assessment, also representing the United Nations Development Program (UNDP). ADAB, WHO, and UNDP are among the major donors to the program.

The team also interviewed officials of the Solomon Islands Development Trust (SIDT), a local PVO. SIDT has provided limited financial assistance to the program and has also engaged in activities supportive of RWSSP.

The views of these officials were sought on whether the program is accomplishing its goals, what they believed were the major implementation problems, program effects on people's health, areas where further assistance is needed, and their level of satisfaction over the manner by which donor assistance has been utilized. Their responses formed the basis for some of the team's conclusions and recommendations.

The U.S. representative to the Solomon Islands was also interviewed to seek his opinion on the proposed USAID assistance to the RWSSP and to validate the team's observations on the workings of the SIG bureaucracy.

2.5 Document Review

The documents reviewed included the RWSS Program Sector Brief prepared in 1979, annual reports of the RWSS Program, 1986 Solomon Islands Annual Plan of Action, the report on the 1981 Tripartite Review Meeting of the RWSS Program, the report on the 1985 RWSS Program Review Planning Conference, and the USAID project paper on the Solomon Islands Rural Water Supply and Sanitation Project for Child Survival.

Chapter 3

MAINTENANCE PROGRAM REQUIREMENTS

3.1 Effective Maintenance Programs for Water Systems

Many water supply projects fail to function as designed because effective maintenance is not provided for as the project is being planned. Part of the reason for this problem is that project planners may be inexperienced in developing maintenance programs for water supply systems. It is helpful, therefore, to review the concepts behind an effective maintenance program prior to assessing the maintenance program for any particular project.

3.1.1 Description of the Maintenance Function

To assist water project managers, a four-step process has been identified that outlines the objectives of an effective maintenance program:

1. The first step is to identify the operating standards of the system, that is, how the system is designed to operate.
2. The second step is to establish procedures that will enable those who have maintenance responsibility to determine when maintenance work is needed.
3. The third step is to provide the means to measure if the system is functioning as designed.
4. The fourth step is to develop and implement a program that will enable the water system to be restored to the operating standard in a timely manner.

In the Solomon Islands many of the water systems constructed are gravity-feed types where water is delivered by pipe to village standpipes. For this type of water system, the maintenance process is as follows. For the first step the assistant health inspector determines the water needs of the community and finds out if a source is available to meet its present and future needs. If so, the inspector then evaluates the different options -- (Is a storage tank necessary?) -- and selects the one that will reliably supply the needed water to the village. The operating standard is the flow rate of water to the village standpipes from the chosen system.

The second step requires that the community be informed of its responsibilities with respect to maintenance and be prepared to perform minor system maintenance. This may include repairing leaking standpipes and damaged pipes within the village and keeping drainage channels clear. The community and provincial environmental health division also must be clear on the proper course of action to take if the system experiences major problems, such as a break in the main pipeline. For this type of system, the third step, the means to measure whether the system is operating as designed, is generally whether water is flowing from standpipes in the same quantity as when the systems were originally constructed. In Solomon Islands villages a noticeable drop in water

pressure or a loss of flow completely during some parts of the day are the clearest signs that the system is not functioning as designed. Leaking standpipes and/or broken pipes are also signs of problems with the water system.

The development and implementation of a maintenance program -- the fourth step -- is the most difficult part of the maintenance process to complete successfully. It requires coordination between RWSS Program managers and the village receiving the improved water system.

This coordination requires an understanding of the central or key elements of a maintenance program and the ability to decide which are the most critical for the specific water supply program that is being implemented.

3.1.2 The Key Elements of Maintenance

Irrespective of how simple or complex a water system is, maintenance of that system is essential. In the Solomon Islands, as noted before, this need will be increasing as more systems are added and existing systems grow older. Therefore, it is imperative that the key elements of a maintenance program be understood and provided for in the project. These elements are listed below.

1. Institutional: Both the government agency responsible for water and the community (or communities) receiving an improved water system need to be actively involved in the water project. Each must be prepared to carry out its responsibility in maintenance.
2. Water Systems Maintenance: One key to ensuring effective water system maintenance is to make certain that responsibilities for maintenance are clearly defined before the project is started and that those who will perform maintenance have the necessary tools and skills.
3. Spare Parts/Supplies: Even the simplest water supply systems require that spare parts and supplies be available to keep the system in good operating order. For the gravity systems in the Solomon Islands, this means that several sizes of galvanized iron and polyvinyl chloride pipe, valves, and parts to repair standpipes must be available.
4. Logistics: In order for the government to take care of those parts of a water system for which it is responsible, it must have reliable transport. If transport is not available when needed, repairs are delayed and further water system deterioration is possible.
5. Finance: Before a water system is designed, the system planner must be certain that the government and -- particularly in the Solomon Islands -- the village can afford to maintain the water system.
6. Recordkeeping: Good recordkeeping needs to be a part of all water supply programs. In the Solomon Islands, maintenance records are needed to enable RWSS Program managers to

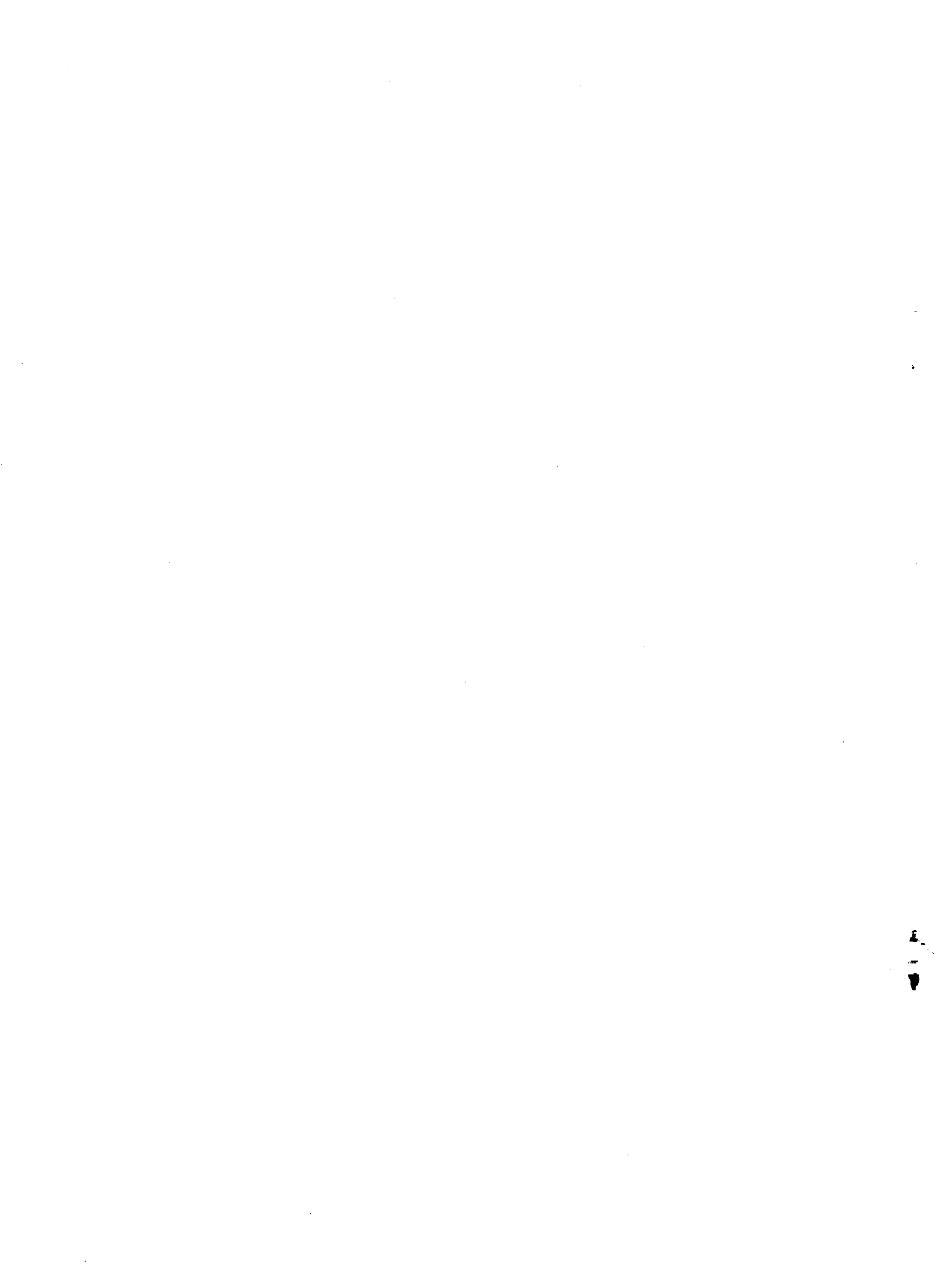
- determine spare parts/supplies needed for maintenance,
- prepare a maintenance budget, and
- determine how well the water systems are operating.

7. Training: Training programs for maintenance are needed for all types of water systems. In the Solomon Islands it is especially important to recognize that the villages receiving water systems must be adequately prepared to take care of their new systems. They will require administrative training in how to manage a water system and technical training in repairing their type of water system.

These seven elements form the basis for developing an effective maintenance program, and the recommendations in this report with respect to water system maintenance in the Solomon Islands will rely upon these key elements.

3.2 Water System Maintenance in the Solomon Islands

The awareness of the need for proper water system maintenance is increasing rapidly in the Solomon Islands. However, this awareness is stronger in the Ministry of Health and Medical Services than at the village level. Since most water system maintenance in the Solomon Islands should be the responsibility of the community itself, the development of an effective maintenance program should be directed toward the village people. The responsibility for planning this effort will certainly fall on the Environmental Health Division. The latter sections of this report will review in detail the observations and conclusions of the WASH consultants, along with specific recommendations for developing an effective maintenance program for the water systems in the Solomon Islands.



Chapter 4

FINDINGS AND CONCLUSIONS

4.1 Administration of the RWSS Program

4.1.1 Management Organization

The Environmental Health Division of the Ministry of Health and Medical Services is charged with the responsibility of coordinating implementation of the RWSS Program. Overall direction of the program lies with the undersecretary for health improvement. Specific responsibility for carrying out the program administratively is given to the chief of the Environmental Health Division. Technical support for the program is the responsibility of the principal health inspector (PHI). Responsibility for implementing the program at the provincial level lies with the senior health inspector (SHI), his assistants, and the construction workers located generally at the provincial headquarters.

Figure 2 is an organization chart for the Health Improvement Division as it relates to the RWSS Program.

4.1.2 Project Funding

The project has been funded by a number of agencies and the central and provincial governments of the Solomon Islands. These donor agencies include Norwegian Aid, the Canadian High Commission, the Australian Development Assistance Bureau, the New Zealand Government, the Solomon Islands Development Trust, and the World Health Organization. Appendix 6 gives a detailed breakdown of expenditures for the RWSS Program from its inception in 1979 through the end of 1985.

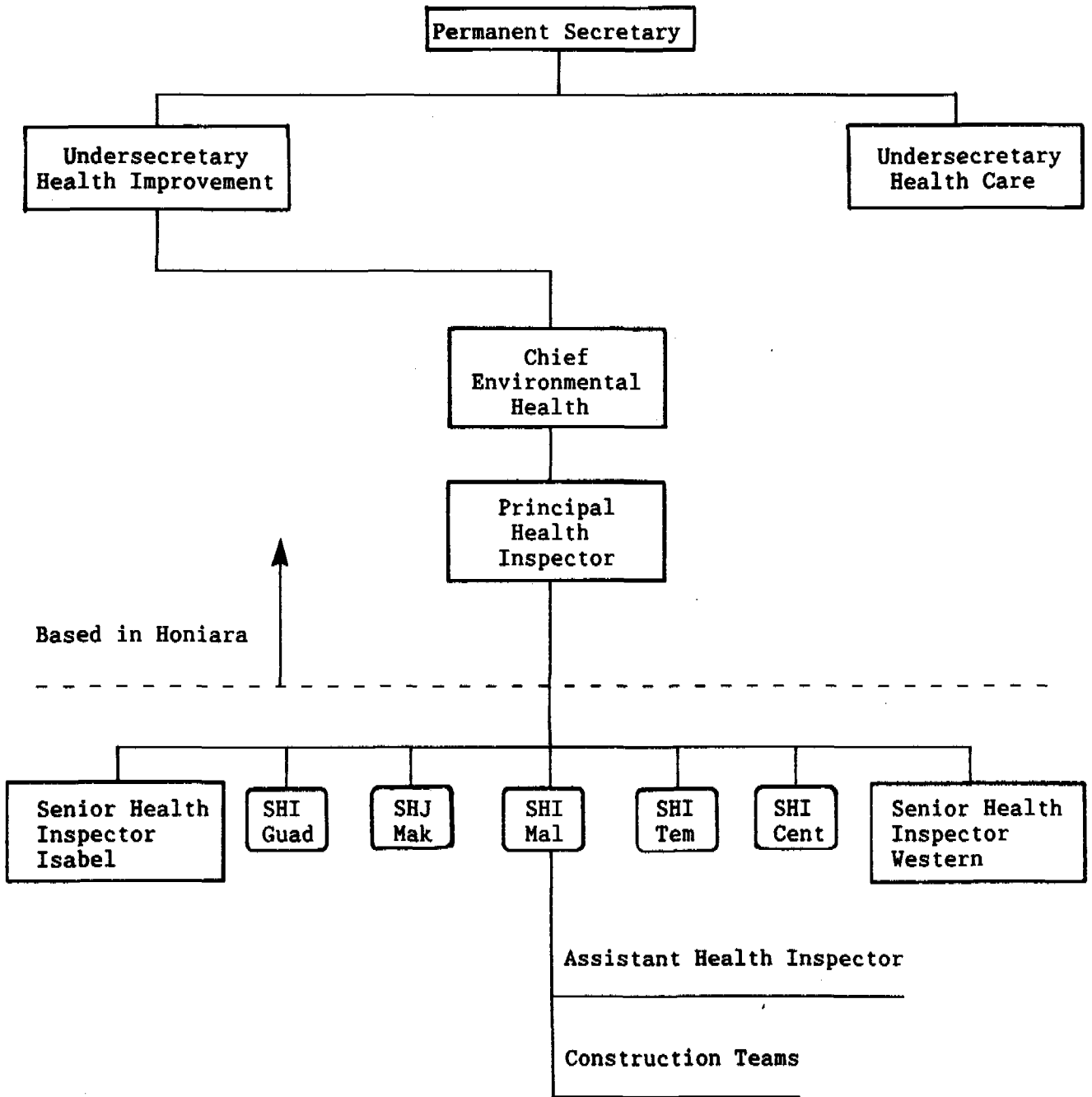
4.1.3 Project Goals and Achievements

The Solomon Islands Government has made substantial progress in meeting its goal of providing improved water supplies to its rural people by 1990. Since 1979 the percentage of rural people with water systems has increased from approximately 20 percent to the current level of 63 percent.

However, during each of the last four years the program has not met its goals. Each year the extent to which the target is met has diminished. Appendix 6 gives a breakdown of program goals and achievements since its start in 1979.

Achievements in the sanitation component of the project have fallen far short of targets. Government figures show that approximately 30 percent of the rural population has adequate sanitation and that only 11 percent of the targeted RWSS goals for sanitation were achieved. The best year was 1983, with 20 percent of the targeted population actually provided with adequate sanitation.

MINISTRY OF HEALTH AND MEDICAL SERVICES



Organization of the MOH for the RWSS Program

Figure 2

4.1.4 Role of the Senior Health Inspector

The duties of the senior health inspector generally include

- management of the RWSS Program at the provincial level,
- inspection of establishments processing or serving food,
- conducting workshops and meetings, and
- tending to administrative tasks assigned to the RWSS Program, including supervision of the assistant health inspectors and provincial workers.

4.1.5 Management Problems

The senior health inspectors were asked to relate their major problems in carrying out their role in implementing the RWSS Program. With one exception, they noted travel and transport of personnel and materials as their major problem. Other problems they mentioned are listed below:

- land rights,
- shortage of labor and material,
- technical problems, especially with design, and
- weather uncertainty.

4.1.6 Management Reporting Systems

Annual reports are prepared by the senior health inspectors giving the status of water systems with respect to completion. These are forwarded to the Environmental Health Division in Honiara for review. However, no action appears to result from these reports. The WASH team learned that several provinces did not have data on the number of water systems or sanitation facilities completed in the early years of the program.

No accounting for maintenance activities takes place at the national level and very little at the provincial level. Further discussion of this subject is given in Section 4.3.

4.1.7 Conclusions

1. The Ministry of Health and Medical Services has developed an effective infrastructure to administer the RWSS Program. Of particular note is the policy of decentralization -- making the implementation of the program a provincial government responsibility. This enables the provincial-based senior health inspectors to match the ability of the province to fund their share of the program with the material request made to the principal health inspector.
2. The WASH team noted that two senior health inspectors were assigned to Western Province, a situation not observed elsewhere in the Solomon Islands. This decision should be re-examined and changed if appropriate.
3. It appeared to the consultants that the majority of the senior and assistant health inspectors had either recently been assigned to their

present post or were scheduled for reassignment in the near future. This will result in much wasted effort as personnel need time to adjust to a new position. The philosophies and policies of transferring senior and assistant health inspectors should be studied for the previous three to four years to determine if extensive relocation of personnel has actually taken place. The current policy of two to three years at a post is a good one if it is followed.

4. The information systems employed for the RWSS Program are not adequate to enable program status and personnel performance to be readily assessed.

4.2 Design and Construction

4.2.1 General Description of the Process

With minor exceptions, the process whereby a village obtains a water system, from the initial request to the final construction, is uniform throughout the Solomon Islands. The significant events in this eight-part process are as follows.

1. The village contacts its area council, generally through its area council members, and requests the construction of a water system.
2. The area council compiles a list of all requests, and the area administrative officer forwards the list either to the province permanent secretary or directly to the province's senior health inspector. If the provincial secretary receives the request, he will send the list to the senior health inspector. Generally, neither the area council nor the permanent secretary screens the list.
3. If the number of requests is large, the senior health inspector will do an initial screening of the proposed projects. Those not deleted will then be surveyed by the SHI and his assistants. This step requires an on-site evaluation of the proposed project and includes the preparation of a design plan, including a list of materials needed to construct the system. Some projects will be rejected at this point due to technical problems, such as lack of an adequate source of water sufficiently close.
4. The senior health inspector will perform a final screening based on population served, need (i.e., is a good source available nearby?), cost, and available manpower in the province. He advises the area councils if a project has been rejected or postponed.
5. He then compiles a master list of all materials needed to construct the systems selected along with their cost. This is submitted to the principal health inspector in Honiara.
6. The principal health inspector receives requests from each of the provinces and is advised by the Ministries of Home Affairs and Economic Planning of funds that are available for the RWSS

Program. Then he will advise the senior health inspector and provincial permanent secretary of the amount of material that will be allocated to their province.

7. The senior health inspector then prepares a list of projects that can be completed during that fiscal year and plans the construction schedule.
8. When materials are received from Honiara, the construction of the water system begins.

Any scheduled projects that are not completed during the year are carried over as first priority for the next year.

The sanitation component of the RWSS Program has not received as much emphasis as water system construction, and, consequently, the process of constructing sanitary latrines is unstructured. Only in Western Province has the Environmental Health Division concentrated any significant effort to provide latrines. In that province there are two senior health inspectors with one assigned exclusively to promoting proper sanitation.

In all provinces, the materials to make a latrine slab must be purchased by the household requesting the latrine. The cement and reinforcing bars are purchased from the province, and the province has the responsibility of casting the slab and delivering it to the village where it is to be used. The household must dig the latrine pit and construct the superstructure for the latrine.

4.2.2 Types of Water Systems Constructed

The majority (68 percent) of water systems constructed during the RWSS Program have been gravity-feed systems from springs or dams. The balance (32 percent) are rainwater catchments, handpumps, and hydraulic rams. In some of the gravity systems water is fed into storage tanks prior to distribution while in others it is fed directly into the distribution network.

4.2.3 Design and Construction Techniques

The primary responsibility for designing appropriate water systems lies with the assistant health inspectors assigned to a province. Their job is to assess all potential water sources, select the proper type of system for the village, and prepare a plan for constructing the water system. In this latter effort, they can receive guidance in developing the detailed design of the system from the RWSS Program design manual prepared as a joint effort between the World Health Organization and the Ministry of Health and Medical Services. The design manual contains information on water and sanitation system types, construction techniques, proper sizing of the pipes, and materials used for construction.

The assistant health inspectors also have the job of organizing community participation in the construction of the system. This includes defining the

role of the community during construction, organizing work crews, and arranging for meals and lodging for the provincial construction workers.

The role of the senior health inspector in this process is to review all construction plans to ensure that the design is workable and that the materials list is correct. He also has the responsibility of determining if the project can be expanded to include more than a single village.

4.2.4 Conclusions

1. The water systems are generally well designed and the construction techniques are sound. Appropriate types of systems are selected for construction with emphasis placed on systems (generally gravity and rainwater catchment) that require less maintenance.
2. The team did observe several systems where the initial design was faulty and one where the design was good, but construction was not done according to plan. More design review at the provincial level would help to avoid the few faulty designs that the team did observe.
3. In Isabel Province a number of water systems had water supplies that were inadequate for part of the year or delivered muddy water periodically. In some cases, this was due to design or construction deficiencies; in others, the cause was an increase in population.
4. The team did not get the impression that projects, particularly those covering several villages, are given proper engineering review. Such major projects involving large funding and/or covering several villages require special attention, preferably by a qualified engineer.
5. There were a number of projects where land rights caused problems. In Malaita, Guadalcanal, and Western Provinces, projects were delayed or not completed because the question of land rights and ownership was not always resolved prior to the construction of the water system. This problem was cited by the senior health inspector in Malaita as his major difficulty in constructing new water systems. Land ownership must be established and, if possible, written agreements made between the land owners and the Environmental Health Division whereby the owners donate the land needed for the water systems to the government.
6. A number of systems require rehabilitation now and more will need major reconstruction work in the future. However, only in Isabel Province were funds requested for this purpose. Particular emphasis must now be placed on identifying the existing systems that require rehabilitation and budgeting funds to accomplish this.
7. The WASH team observed many instances where drainage around standpipes was inadequate. Only one village (in Isabel) had constructed soakaways to handle excess water from standpipes. In Western Province, the Environmental Health Division has adopted a policy of placing standpipes near the seacoast where water can be properly disposed of.

8. There is little difficulty in constructing sanitary latrines (VIP and water seal) in Solomon Islands. Villages can generally afford to buy the materials and can locate them properly in the village with assistance from the Environmental Health Division. However, the WASH team did not observe a single latrine constructed during their field trips. That indicates clearly the extent to which this aspect of the program has been neglected.

4.3 Water System Maintenance

4.3.1 The RWSS Maintenance Program

The design and construction component of the RWSS Program is reasonably well defined. However, this is not true with respect to water system maintenance. In general the Environmental Health Division in the province is responsible for major maintenance work such as repairing a break in the main water line or damage to a spring box or dam. Villagers are responsible for maintaining the part of the system within the village. If properly organized, this approach can work quite well for the types of water systems usually constructed in the Solomon Islands. However, if those responsible for maintenance are not taught how a water system should be taken care of, it is virtually certain that the system will not be properly maintained and will eventually deteriorate.

It is imperative that the villagers be trained in system maintenance and acquire the tools needed for their type of system. They must also know where to obtain spare parts and have the funds to purchase them.

It is equally important that the village is given a clearly defined procedure of identifying major system problems and reporting them to the proper provincial agency.

4.3.2 The RWSS Program and the Maintenance Function

It is in the second and fourth parts of the maintenance process (see Section 3.1.1) where the RWSS maintenance program has its greatest shortcomings. The second step -- defining maintenance responsibility -- is only partly done. The assistant health inspector and/or the construction team foreman inform the village that they are responsible for maintaining the systems but generally do not define precisely what system maintenance actually requires.

Developing and implementing an effective maintenance program, the fourth step, is deficient in several important areas. Currently, the RWSS Program managers have not taken the necessary steps to establish a proper maintenance program. Fortunately, most of the systems being installed are not difficult to maintain. The one exception is systems where handpumps have been installed. The WASH team observed eight to ten handpumps in villages; of these, only two were functioning, and they had been recently installed.

4.3.3 The RWSS Program and the Key Elements of Maintenance

The strong community spirit that the team observed will make the job of implementing an effective maintenance program for the water systems in the

rural areas of the Solomon Islands significantly easier than it otherwise might be. An analysis of the key elements of maintenance and the RWSS Program shows strengths in several areas and, of course, weaknesses in others.

1. Institutional: In most villages visited, the village people participated in constructing the water systems and thus feel a sense of ownership of the system. In both Guadalcanal and Isabel Province, however, the sense of ownership is not as strong.

In Malaita and Western Provinces, many villages have contributed one-fourth to one-third of the cost of materials used, and this tends to strengthen the people's sense of ownership of the system. The Environmental Health Division is also becoming more aware of the need for system maintenance.

2. Water Systems Maintenance: While the villages are informed that they are responsible for minor maintenance activities, they are generally not aware of specific responsibilities in this respect. In addition, the villages generally do not have the tools and skills needed to maintain their water system.

The Environmental Health Division, on the other hand, possesses both the tools and skills necessary to perform all maintenance tasks.

3. Spare Parts/Supplies: The Environmental Health Division and/or local suppliers can provide all spare parts and supplies needed to maintain water systems, except for imported handpumps. These materials, however, are not specifically budgeted for by the division, and the villages, in most cases, are uncertain of how they go about obtaining replacement parts.

For installations requiring handpumps, the use of the Solomon Islands Mark II handpump will help to alleviate the spare parts problem since this pump is constructed almost entirely from locally available materials.

4. Logistics: This is clearly a major problem in the Solomon Islands. Generally sufficient transport is not assigned exclusively for use by Environmental Health Division personnel either for design and construction activities or for maintenance.

In addition, travel within the provinces is slow due to poor roads. Many places are accessible only by canoe. Village people have the same difficulty as health personnel in traveling to a location where they can obtain materials to maintain the system.

5. Finance: The WASH team believes that both the Environmental Health Division and the villages do have or can raise sufficient funds to maintain the water systems. For the division, this may mean slowing down the program of constructing new systems and allocating some funds for the rehabilitation and maintenance of existing systems. Only one province (Malaita) has requested funds specifically for maintenance purposes. For the villages, the

creation of a water fund will be necessary to purchase tools and spare parts. The team observed only one village out of 84 that had established such a fund.

6. Recordkeeping: Maintenance records are not adequately kept for the RWSS Program. While some provinces (notably Malaita) keep records of requests for maintenance, this information is not forwarded to the RWSS Office in Honiara. No records of expenditures for maintenance activities are kept, nor is information on time spent on maintenance by division personnel readily available.

Because of its importance, the subject of recordkeeping and maintenance management systems will be discussed more fully in Section 4.3.4.

7. Training: The primary weakness in this area lies with the training of the village people to manage and maintain the water systems. Technical and organizational training should be done in advance of the construction of new systems and follow-up training for villages that already have improved water systems must be scheduled.

Each of these key elements of a maintenance program need to be considered when designing a maintenance program for the RWSS Program.

4.3.4 Maintenance Management System

A maintenance management system should be geared specifically to the program it is to provide information for. The system need not be complex, but must provide certain information. This information consists of the following:

1. A clearly defined means for the village to report major maintenance to the Environmental Health Division.
2. Accurate records at the province level on
 - type of water system involved,
 - number of maintenance complaints,
 - time taken to respond to complaints,
 - action taken, i.e., resolution of problem,
 - manpower and materials used in resolving problem, and
 - cost of resolving maintenance problems.
3. A maintenance budget with estimates of manpower and material cost for the next fiscal year.
4. Summary reports by the senior health inspectors from each province to the principal health inspector on provincial maintenance activities for the previous year. From the data received, the principal health inspector should prepare an annual report on maintenance similar to the one now prepared for construction activities.

4.3.5 Conclusions

1. Provision has not been made in the RWSS Program to effectively handle present and future water system maintenance. An effective program for maintaining improved water supply systems must be implemented for the RWSS Program. Failure to do so will likely result in the eventual failure of these systems and much of the effort made to date by the Ministry of Health in providing water systems will be wasted.
2. Maintenance responsibilities have not been clearly defined between the village and the provincial government. The villages must be advised not only that they have responsibility to maintain their systems, but also specifically how they can accomplish this.
3. The maintenance requirements for rural water systems in the Solomon Islands are not great, and a good maintenance program can be established by the Environmental Health Division and the villages.
4. The already existing strong community spirit in most Solomon Islands villages will contribute significantly in the establishment of a village-based program for minor maintenance.
5. The villages do not currently possess the tools or skills to maintain their systems. They must be trained to organize a maintenance program and make minor system repairs. Environmental Health Division health inspectors and construction workers have the required knowledge to perform all maintenance work.
6. Spare parts and supplies are generally available locally. These items, however, are not included specifically in the Ministry of Health and Medical Services budget, nor, in most cases, do villagers know how to obtain parts and materials to repair their water systems.
7. Logistics is perhaps the major problem affecting the maintenance program in the Solomon Islands. Efforts must be made to provide Environmental Health Division inspectors and construction teams with adequate transport.
8. The Environmental Health Division budgets virtually no funds for rehabilitating or maintaining existing water systems. It needs to include funds for maintenance purposes such as parts, labor, and travel expenses.
9. Villages need to establish a fund to maintain their water systems. These funds would be used to purchase spare parts and tools.
10. The maintenance recordkeeping is not currently adequate to enable Environmental Health Division program managers to keep track of maintenance problems and costs. A maintenance management system needs to be established to provide RWSS Program managers with data on EHD maintenance efforts.
11. Village water system caretakers need to be selected before the water systems are built or during a community participation workshop held for

villages which already have systems. The caretakers must be given training in how to operate and maintain their type of water system.

4.4 Community Participation

4.4.1 General

Community participation, as used in this report, refers to a set of actions undertaken by both program managers and beneficiaries to develop a sense of concrete ownership of projects by population concerned. The WHO Guide for Community Education and Participation in Rural Water Supply and Sanitation lists four criteria to be fulfilled before a program is deemed participatory:

- involvement in planning programs,
- involvement in implementing programs,
- equal sharing in the benefits of the program, and
- involvement in the evaluation of programs.

The World Health Organization also emphasizes that for community participation to be fully realized, political commitment is extremely necessary. Popular participation in program planning, implementation, and review involves directly the relations of government to its people.

Community participation has been viewed both as a development ideology and as a tool for planning and management. For the Solomons, the importance of community participation, particularly in the areas of financing of water systems construction and system operation and maintenance is very obvious. The resources of government are never adequate to cater to the demands of all; and because of accessibility problems, it is virtually impossible for the Environmental Health Division personnel to monitor regularly the status of the water systems and service the needed repairs. It is, therefore, apparent that communities should assume increasing responsibilities in system maintenance and repair in order to realize the full benefits of the program. These things, however, do not begin to happen unless people develop a concrete sense of ownership of the water systems and are fully aware of the attendant responsibilities. Equally important is that villages should be equipped with the skills and basic tools to exercise such responsibilities.

4.4.2 Participation in Planning and Construction

In all the villages visited, the WASH team sensed that the water systems were constructed in response to the villagers' perceived needs. In no instance was there a system that was constructed without the villagers' request. In all instances these systems were put up because people wanted them, or even demanded them. Ironically, the demand for village water systems was mainly for the convenience of having water in their own backyard and not for water of improved quality. The main sources of the gravity-fed systems, which comprise the majority so far constructed, are from open streams from which the villagers had been drawing their water traditionally.

Villagers are involved as early as the survey phase when they accompany the survey team to assess potential water sources and provide all the necessary

village information that goes into the planning and design of the village water system. People are consulted on the ideal location of the communal taps.

The village assumes custody of the construction materials when they arrive and provides the work force to haul the materials from the off-loading points to the construction site.

In all the villages visited, the beneficiaries contributed labor and local materials for the construction of the water systems. In addition, the people provide room and board accommodations to the construction team from the province.

Village contributions in the form of cash vary from province to province.

Malaita Province adopted a policy in 1983 requiring villages to contribute one-third of the cost of construction materials. This policy was apparently well received because all the post-1983 water systems visited were constructed with the required village contribution. In early 1986 the Malaita Provincial Executive suspended this policy. Requesting villages will no longer be required to pay for one-third of the materials for the water systems. However, there are some 100 villages that claim to have already paid their contributions but are still waiting for their systems to be constructed. The villages are now on top of the priority list of the province. At the rate of 28 to 30 systems completed per year, it may take Malaita more than three years to complete the backlog. Western Province has a policy of requiring villages to pay one-fourth of the costs of construction materials for water systems. This policy was adopted in 1984 and is still in force. Villages have a variety of ways to raise the needed counterpart funds, such as loans from development banks (to be repaid with proceeds from users fees collected monthly), fund raising through cooperative work, royalties collected by the village (especially in places where there are ongoing logging operations), etc.

Guadalcanal Province has no policy requiring village cash contributions, but requires a contribution of labor and local materials. The team received the impression that the feeling of ownership of the water systems by villages was not as strong in Guadalcanal as in the other provinces visited.

Central Province policy requires the requesting village to pay one-half of the construction cost of the water system. This policy, however, is very loosely enforced. For example, of the 24 systems constructed in 1985, only one village actually paid the required counterpart funds. The senior health inspector of the province claims that villages which pay the 50 percent cash requirement are put on top of the priority list.

Eastern, Isabel, and Makira provinces do not have a policy requiring village cash contributions. However, a contribution of labor and local materials is required.

The provincial health inspectors interviewed claim that enlisting popular support during the system construction phase, e.g., soliciting labor and local materials, has never been a problem at all.

When asked who owns the water system, informants in the villages visited generally claim that the community owns the system. There were, however,

revealing responses elicited from several provinces. Some villages in Guadalcanal Province think that the owner of the land where the water source is owns the system. Land disputes were found to be fairly common on Guadalcanal Province and were listed as the number one problem in Malaita Province. The majority of the villages visited in Isabel Province believe that the system is owned by either the area council or the province. There is a pervading sentiment that whoever is perceived to be the owner of the system has the responsibility to maintain it.

4.4.3 Participation in Operation and Maintenance

Operation and maintenance, as used in this report, refers to the process by which completed water systems are restored to the standards according to which they had been constructed, in a fairly timely manner. It includes such things as monitoring water flow, checking for leaks in drains, springs, and reticulation lines, repairing breaks and damaged system parts, and providing adequate drainage for excess water. The technical details of the current operation and maintenance system of the Solomon Islands RWSS Program is discussed in Section 4.3 of this report. This section discusses the team's findings on the degree of participation by villagers in the proper operation and maintenance of their water systems.

The general policy adopted by practically all the seven provinces with regard to maintenance responsibilities is as follows:

- Major repairs, such as those involving structural damage at the water source, are the responsibility of the province.
- Repairs needed at the main distribution lines are the responsibility of the Area Council.
- Repairs in the reticulated portion of the system are the responsibility of the village.

The majority of the villages visited are aware of their maintenance responsibilities. There are some villages on Guadalcanal and Isabel that believe that the province or the area council is responsible for all -- even minor -- repairs. (These are the villages that perceive the province or area council to be the owner of the system.)

Upon the completion of the water system, the area health inspector or the construction team supervisor holds a meeting with the villagers wherein the latter are informed about their maintenance responsibilities and the need to organize a village water committee to formulate policies on the operation and management of the water system. Beyond enumerating these responsibilities nothing is done further. Nobody in the village is trained in carrying out minor repairs, nor are villagers guided on how to go about organizing a water committee or raising and maintaining a village fund for the purchase of basic tools and repair materials. With very few exceptions, the villages visited do not have a village water committee.

Generally, villages were participating minimally in the maintenance of the water systems. Most of them expressed willingness but claimed that they are

constrained by the lack of skills and basic tools. Communities that were more organized and those with strong leadership usually fared better than the others in maintaining the water systems. When asked if they were willing to raise funds for the purchase of basic tools and repair materials, the majority of the villages responded positively but stipulated that some people in the village be trained on how to make repairs on the system.

Almost all the villages visited have community work days, one or two days a week when people work on communal projects such as cleaning the village or building a school, a clinic, or a church. These workdays are observed in varying degrees of fidelity among the provinces visited. They were religiously observed in Malaita, Isabel, and Western Provinces, and less so in Guadalcanal and Western Provinces. Properly harnessed, the community workdays offer excellent potential for the proper maintenance of water systems, including the construction and maintenance of adequate drainage facilities.

4.4.4 Conclusions

4.4.4.1 Planning and Construction

1. There is a big demand for improved and convenient water systems in the villages. Beneficiaries have demonstrated a strong willingness to be involved in the planning and construction of water supply systems. In addition, community participation has had a long tradition in the Solomon Islands as manifested in the community workdays, the thriving consumers cooperatives, or the raising of community funds through voluntary labor contributions called the work union. The people's participation in the planning and construction of water systems has not been an artificial phenomenon, for, indeed, there is a strong cultural basis for it.
2. Although the people are now participating and contributing substantially to the construction of water systems through labor and local materials contributions, there is a need to increase the beneficiaries' participation, especially in the area of financing. External donor support is a finite resource and the financial capabilities of the government are not adequate to meet the demand for improved water supply systems. Furthermore, it has been demonstrated almost everywhere that where people have invested money for development projects, their sense of ownership of these projects becomes so strong that they value and take care of them.

4.4.4.2 Operation and Maintenance

1. The team's general conclusion is that communities are not participating actively in the maintenance and repair of the water systems; they are not even carrying out minor repairs, which is expected of them.
2. The reasons for the poor community participation in operation and maintenance can be summed up as follows:
 - a. Poor community preparation and organization for water supply system maintenance activities.

- b. Lack of skills and tools to perform even minor repairs.
- c. Absence of a village fund for the purchase of spare parts and repair tools and materials.
- d. Absence of a trained village water system caretaker who can monitor regularly the functional status of the system and mobilize villagers for maintenance work.

In a limited number of villages, there appears to be some confusion about the ownership of the systems, which in turn results in some confusion about who should maintain them.

- 3. Social preparation, which ideally should take place during the project planning and construction phase, has been neglected. Social preparation, as used in the primary health care approach, does not stop at informing people about their roles and responsibilities, but also includes the development of people's skills to perform these responsibilities.
- 4. Community preparation and organization activities are currently undertaken by the area health inspectors or by construction teams. These people have neither the necessary skills nor the time to perform these activities.
- 5. In order that villages fully participate in the proper operation and maintenance of the water systems, social preparation and community organization are essential and should, therefore, be a prerequisite activity in the planning and construction of projects.
- 6. There is a strong potential for enlisting full community participation in system operation and maintenance because the basic socio-cultural infrastructure already exists, such as village committees, community work days, union work arrangements, etc. What is needed is the harnessing and directing of this potential toward the proper maintenance of the water systems.

4.5 Sanitation

4.5.1 Sanitary Latrines

Fewer than ten of the 84 villages visited claimed that some houses in the area have toilets. Most of these are in schools and clinics or houses of pastors and priests.

All villages have central places in the bush or the mangroves where people go to defecate, one site for men, and one for women. Thus, although latrines are not available, the team did not find any indication of indiscriminate disposal of human waste.

A review of the RWSS Program budgetary allocations in each of the seven provinces revealed that there is no separate allocation for the construction and installation of water-sealed toilet bowls and slabs, with the exception of Western Province. The senior health inspector and RWSS Program director claims that provincial health inspectors are instructed to utilize left-over

materials from water systems construction to manufacture toilet slabs. These slabs, when available, are sold at a subsidized cost to interested families. Area health inspectors deliver and install the slabs to the village free of charge.

With the exception of Western Province, the team found that senior health inspectors and assistant health inspectors devote most of their time to rural water supply activities. Limited time is devoted to environmental sanitation promotion. In fact, it often takes place by chance and not through deliberate intent. Western Province has one provincial health inspector for rural water supply, and another one for sanitation. The rural water supply inspector supervises the construction teams while the sanitation inspector supervises the assistant health inspectors. Although there is one principal health inspector and three assistant health inspectors in Western Province who are not preoccupied with the rural water supply program, environmental sanitation activities are still very limited because of inadequate logistical support.

The team found that health education, a key approach to promoting environmental sanitation practices, has not been undertaken intensively. There is only one person at each of the Provincial Health Education Divisions to carry out such activities in the entire province.

Many key village informants interviewed said that they would be willing to construct and use sanitary latrines if toilet slabs were available and assistance was provided in their installation.

4.5.2 Drainage

The team found that 50 of the 84 villages visited have drainage problems, ranging from minor (where excess water has a natural place to drain but trenching or unclogging of trenches are needed) to major (where excess water has nowhere to drain and collects in a pool in the vicinity of the taps). Although a drainpipe was found to be a standard standpost fixture, provision for permanent drainage of excess water had not been given adequate attention during the construction phase. Most of the villages with major drainage problems are those found inland, particularly on Guadalcanal and North Malaita.

Most of the villagers interviewed claim that they were told by the construction team not to allow water to collect around the standpost, but were not given adequate instructions on how to do it. Many of the villages visited appreciate the need for adequate drainage and are aware that stagnant water breeds the mosquitoes that transmit malaria. Most of the coastal villages in Western Province, for example, deliberately situate standposts close to the sea to facilitate drainage of excess water.

The team found that there are certain village practices, particularly the community work days, which with proper direction, can be harnessed to mobilize total community participation in building and maintaining proper drainage systems.

4.5.3 Conclusions

4.5.3.1 Sanitary Latrines

1. The construction and promotion of sanitary latrines has not been given sufficient emphasis, resulting in the very poor performance of this component of the RWSS Program. The official figure is that 30 percent of households have sanitary latrines. That may be an overestimate. Most of the provinces do not have written records of the actual number of toilet slabs constructed and installed.
2. The major factors responsible for the poor performance of the sanitation component are the following:
 - a. There is no separate budgetary allocation for toilet slab construction and promotion.
 - b. Due to the meager resources available to this program, health inspectors would rather devote almost their entire attention to the activity with sufficient logistical backing, i.e., the rural water supply component.
 - c. People are deeply rooted to the custom of relieving themselves in bushes and mangroves. Reversing this attitude will entail a long education process.
 - d. The Health Education Division, the unit that plays a vital role in promoting good health habits, is inadequately staffed and equipped to carry out this function.
3. The assessment team is of the opinion that considerable emphasis should be given to this component of the RWSS Program. Although there is no evidence that major health problems have resulted from unsanitary excreta disposal practices (except for hookworm infestation of which the Ministry of Health and Medical Services is getting increasingly worried about), they pose a real threat to water sources, the majority of which are unprotected open streams. With the high population increase rate and the limited area for habitation, settlements will soon move up and gradually encroach on the streams from which most of the village water systems are sourced. One woman from Isabel noted that most of the mangrove in her village had been cleared to make room for new settlers and expressed the need for the construction of toilets. As mentioned earlier, educating people on proper excreta disposal practices is a long, iterative process, precisely the reason why a start should be made.

4.5.3.2 Drainage

1. The majority of the villages visited have drainage problems. The reasons for these, as gleaned from the responses of village informants, are that villagers were not shown how to construct and maintain a good drainage system, nor is the village leadership providing adequate direction to address such a problem.

2. Most villages are aware that stagnant water is unsanitary and are willing to do something about it given the proper direction. This was demonstrated in the village of Sepi in Isabel. After the provincial health team had undertaken a health education workshop, the villagers constructed the best soakaways at each of the standposts in their village that the WASH consultants had seen in the Solomon Islands.

4.6 Health Effects

4.6.1 Problems in Measuring Health Benefits

Measuring the health benefits of water supply programs in a convincing way is most difficult. The current methodology available does not permit an accurate measurement of impact, primarily because of attribution problems. Several attempts to measure the impact on rural health of water supply programs have proven very inconclusive. Some of these attempts have been on a massive scale involving investigations by teams of researchers over many years. These projects raised more questions than they attempted to resolve.

Current thinking is to discourage water supply programs from attempting to measure health impact, for often the attempt tends to blow up into an ambitious project which commands more resources than the water program itself.

Nevertheless, it is important to obtain insights into the health effects of the water program, whether positive or negative, especially for programs that have been argued on the basis of improving people's health.

Given the temporal, methodological and logistical limitations of the WASH assessment, the team's effort to get some insight into the beneficial or ill health effects of the RWSS Program was limited to soliciting the beneficiaries' perceptions in the villages visited, examining records at several clinics, and interviewing medical officers. Malaria was selected as the indicator disease to detect environmental deterioration due to improper drainage. Annual malaria incidence data from 1980 to 1985 were collected from all seven provinces.

4.6.2 Signs of Health Improvements

Village informants interviewed unanimously claimed that the water systems affected their health positively. Because water is now available in their own backyards, they have more water for personal hygiene and for cleaning the house. They perceive the health of the children in the village to be much better since the water system was constructed.

Of the 84 villages visited, only two reported child deaths (one each) in 1985. One child died of malaria and the other of a congenital defect. The common diseases claimed by village informants to be prevalent among children are influenza, malaria, skin disorders, and diarrhea.

None of the villages visited reported any disease outbreak since the construction of the water systems. The chief medical officers interviewed likewise claimed that no major outbreaks were reported since their posting.

There were no organized health data available in the clinics visited; therefore, the team could not assess any disease trend.

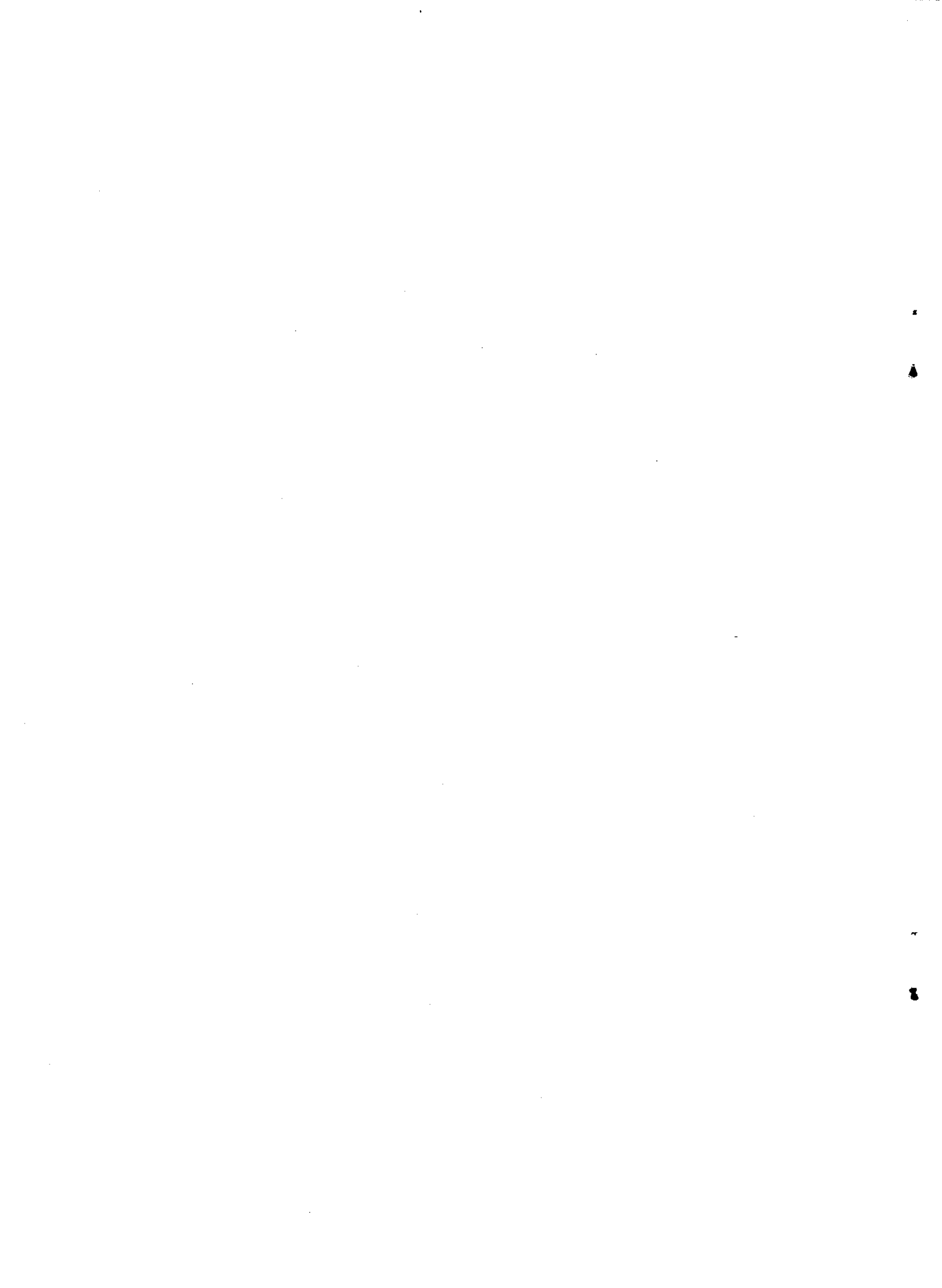
No bacteriological analyses are performed on the water systems. In some provinces, H₂S tests are used to screen water sources that are suspect.

4.6.3 Adverse Health Effect

One adverse effect on health of the program is its contribution to the increase in malaria. In practically all provinces, the trend of malaria incidence rose steadily since 1980, peaking in 1984 (see Appendix 7). It is logical to conclude that the improper drainage noted in many of the systems visited contributed to the rising malaria incidence. There was, on the other hand, a significant drop in the number of cases in 1985 over the 1984 level, with Isabel registering a reduction of almost four-fifths. All village informants interviewed (except North Malaita) claimed that the Malaria problem had improved considerably since the construction of the water systems, inferring that the improvement is attributable to the RWSS program. The WASH consultants, however, believe that the dramatic decline in Malaria incidence in 1985 was brought about by the Mass Drug Administration Program and sustained residual spraying operations initiated in 1984.

4.6.4 Conclusions

1. The WASH team concluded that the Solomon Islands RWSS Program has contributed significantly to the improvement of the health of the rural people. This conclusion is derived mainly from the responses of the beneficiaries, the very low child deaths in the villages visited, and the absence of any reported disease outbreaks. Given that the main sources of the village water systems are unprotected open streams, and that these systems are not monitored regularly for bacteriological contamination, it is a source of wonder that no major outbreaks of waterborne disease have ever taken place. The team believes that since the people have been using the same water source all along (the improvement being the piping of the water into the villages), the people must have developed some form of immunity from any contaminants present in the water.
2. The drainage problem that has been noted must have contributed to the rising incidence of malaria. The drop of malaria cases in 1985 can be attributed mainly to the adoption of the Mass Drug Administration Program and intensified residual spraying operations.



Chapter 5

RECOMMENDATIONS

5.1 Program Administration

1. Only one senior health inspector should be assigned to Western Province to handle both the water supply and sanitation components of the program.
2. The records on senior and assistant health inspector transfers in the past should be studied to determine if personnel are being moved around too often.
3. Additional data should be collected on the status of the RWSS Program. Appendix 8 provides guidance on the types of information needed.

5.2 Design and Construction of Water Systems

5.2.1 Design Review

Water system projects should be reviewed in greater detail to avoid the few design problems that the consultants observed and to maximize available funds for the program. The following specific actions should be taken.

1. The senior health inspectors should continue to review all plans and determine the feasibility of expanding the system to include more than one village, school, or other government facility.
2. The principal health inspector should review the design of all plans for which the material cost exceeds *SI\$5,000. He should also review plans where multiple villages are to be covered.
3. An independent review by a qualified engineer of all systems for which the material cost exceeds SI\$10,000 should be made. The consultants recognize that this may not be possible. If it is not, then the principal health inspector should visit the sites of these major projects to determine their feasibility.
4. After consultation with the principal health inspector, the senior health inspector should visit sites where the technical component of the project is suspect -- for example where the level of the water source with respect to the delivery point is close to the design limitations for proper fall in the system.

5.2.2 Land Ownership

The assistant health inspector and/or the villagers should contact each landowner during the system survey and find out if the claimed ownership is

*1.00SI = .62 \$US in February 1986

reasonable and obtain a written deed of donation of the land to the government. This is particularly important at the water source. If a written agreement cannot be obtained, the assistant health inspector and villagers should personally contact each landowner to obtain his verbal agreement with respect to use of the land. In no case should the Environmental Health Division rely upon the villagers' assurance that land ownership is not a problem.

5.2.3 Rehabilitation of Existing Systems

Particular attention should be paid to rehabilitating existing systems where needed, even if the funds to support this effort must be diverted from new system construction.

5.2.4 Drainage around Standpipes

No water system design should be considered complete unless proper drainage is included. For seacoast villages, the policy should be to place standpipes near the coast so that excess water will drain into the sea. For inland villages, the water system project should not be declared finished unless soakaways or other suitable drainage systems are installed.

5.2.5 The Solomon Islands Mark II Handpump

The Environmental Health Division should adopt a policy of using only the Solomon Islands Mark II handpumps where shallow wells with handpumps are the only practical water source.

5.3 Water System Maintenance

5.3.1 The RWSS Maintenance Program

Immediate steps should be taken by the Environmental Health Division to implement a two-tier maintenance program with the village being responsible for all minor maintenance and the province responsible for all major maintenance.

Village Responsibilities

a. Gravity-Feed Systems

- Report major problems to the province's Environmental Health Division.
- Repair standpipes.
- Replace damaged pipes within the village.
- Clean drainage channels and pipes.
- Inspect the system weekly for problems (this should include walking to the source to examine the main line and integrity of the spring box or dam).

- Measure the amount of water flowing from the standpipes and compare that flow-rate with the output when the system was constructed.
- b. Rain Catchment Systems
- Clean rain catchment tanks as needed.
 - Clean blocked gutters and pipes.
 - Inspect the system weekly.
 - Report major problems to the province.
- c. Handpumps
- Repair all components of the handpump.
 - Measure flow rate semi-annually.
 - Maintain drainage channels or pipes.
- d. Systems Employing Hydraulic Rams
- Same as for gravity-feed systems.
 - Add inspection of the rams.

Provincial Responsibility

- a. Gravity-feed systems
- Repair breaks in the main waterline.
 - Replace defective valves.
 - Repair damaged spring boxes and dams.
 - Repair damaged storage tanks.
- b. Rain Catchment Systems
- Repair damaged storage tanks and valves if part of a reticulated system.
- c. Handpumps
- No maintenance responsibilities except to provide technical advice if needed.
- d. Hydraulic Ram
- Same as with gravity-feed systems.
 - Add repair and replacement of the ram.

5.3.2 Maintenance Budget

All provinces should include funds for maintenance in their annual budgets. The budget request should include specific amounts for materials, labor, and travel.

5.3.3 Maintenance Management System

A maintenance management system should be developed for Environmental Health Division personnel to record maintenance activities and costs. Data that should be gathered and reported by the senior and principal health inspectors is given in Appendix 9.

5.3.4 Technical Training

Village caretakers should be trained to carry out the tasks outlined in Section 5.3.1. This training should take place during construction of the system by the construction team foreman.

5.3.5 Purchase of Spare Parts and Tools

1. Irrespective of whether a particular province requires a cash contribution from the villagers for construction materials, villages should be required to purchase a small supply of spare parts and the tools needed to repair their system. For provinces that require a cash contribution for construction materials, the cost for these items could be included in the total village cash contribution. For other provinces, the financial ability of the village to obtain these items should be demonstrated prior to construction. This approach should be adopted as official policy by the Ministry of Health and Medical Services and the provincial governments.
2. The spare parts needed will vary depending on the type of system. The principal health inspector should prepare a list of required spare parts for the various types of systems found in the Solomon Islands. For example, for reticulated systems, the list could include:
 - one complete tap for each five standposts installed,
 - two lengths each of appropriately sized galvanized iron or polyvinyl chloride pipe used in the distribution network within the village, and
 - a supply of washers.
3. The use of the spare parts would be managed by the village water committee, which would also be responsible for ordering new spares to replenish the stock.
4. The tools purchased by the village would be controlled by the village caretaker. The principal health inspector should develop a list of tools needed for each type of water system in rural Solomon Islands. The cost should not exceed \$100.00 in local currency.
5. As noted before, the WASH team concluded that the villages can raise funds to purchase the initial stock of spare parts and tools, and this is the recommended approach. However, if poorer villages cannot easily raise the funds, the government should provide the funds under a loan agreement. The government could seek these funds from bilateral or multilateral donor agencies.

5.4 Community Participation

5.4.1 Participation in Planning and Construction

1. Where possible, other provinces should adopt the policy currently practiced in Western Province and formerly in force in Malaita Province, that requesting villages be made to pay a part of the material costs of constructing new systems. Both of these provinces have demonstrated that it can be done, and the assessment team has discovered that there are a variety of options available to the villagers to raise the necessary funds.
2. Central Province, although it has adopted such a policy, should consider enforcing it more rigidly. It is recognized that it may be difficult to reverse policies, particularly when a precedent has been set that no cash contribution is required from a village requesting a water system. While admittedly difficult, this is not an impossibility, but can best be achieved by gradually weaning people away from total dependence on government for all their needs. Isabel, for example, does not have a stated policy requiring cash contributions from the villages but has a limited dollar-for-dollar arrangement with villages that badly need to construct new or extend existing systems. Provincial funds are being used for this purpose. This arrangement can gradually be made to evolve into a formal policy that people pay at least part of the costs of constructing new systems.
3. In provinces where it may not be possible to immediately adopt policies on cash contribution requirements, cash counterparts for the purchase of tools and spare parts to meet the minimum requirements of proper system operation and maintenance, should at least be required (see Section 5.3.5.) The Environmental Health Division, which is the main provider of materials for the construction of new systems, is in a good position to influence provinces to adopt the above policies.

5.4.2 Participation in Operation and Maintenance

1. For communities to participate fully in the proper operation and maintenance of their water systems, community preparation and organization activities have to be started early in the project planning and construction stage. The following activities should be included in the standard implementation procedures for the construction of new systems:
 - a. Shortly before the start of the construction of a new water supply system, a workshop should be held in the village for all community members. The workshop should be organized by a skilled community organization worker and should emphasize village ownership of the system and the responsibilities that such ownership entails. Issues such as the need for a water committee to lay down policies governing the operation and management of the water system, a trained village water caretaker to regularly monitor the maintenance requirements of the system, and a village fund to finance the purchase of repair tools and materials, should be carefully explained to the people. During this initial

workshop, a village water committee should be organized, a village water system caretaker selected, and a scheme for raising and maintaining a village water fund agreed upon. The water committee should be charged initially with the responsibility of organizing a labor crew so that construction can commence as soon as the materials and the construction team from the province arrive at the project site.

- b. During the construction of the water system, the water caretaker selected by the village should work closely with the construction team and should receive hands-on training on system operation and maintenance. The training should include familiarization with the parts and components of the system, building and maintaining adequate drainage, performing simple repairs, preventive maintenance, and prompt notification of the provincial Environmental Health Division staff when major damage occurs.
 - c. A follow-up workshop should be conducted when the construction work is finished, at which time the community organizer should ensure that the village water committee is functional, that a water caretaker has been adequately trained, and that the village has a viable plan for raising and maintaining a village fund. No system should be considered complete until all of the above are in place. The concluding workshop should provide an excellent opportunity to introduce other primary health care topics, such as oral rehydration therapy, immunizations, growth monitoring, and environmental sanitation.
2. The Environmental Health Division should develop and implement a supplemental program to enable villages where improved water systems have been constructed to acquire the necessary skills and tools to fully participate in system maintenance and repair. This program should consist mainly of fielding skilled community organization workers to undertake the activities outlined in recommendation 1, which were neglected during the system construction phase.
 3. Given the tight financial situation of the Solomon Islands Government, the implementation of recommendations 1 and 2 should be submitted for external funding support.
 4. There are at least three possible groups that could hold the recommended community participation workshops:
 - a. The activity could be added to the functions of the health inspectors and construction teams who are involved in the surveying of potential sites and system construction. These people would have to be trained in community organization skills and would have to find a way to add this additional burden to their already full schedules.
 - b. The staff of the Health Education Division of the seven provinces could be augmented and provided with the necessary logistic support to carry out the community organization activities.

- c. This activity could be contracted out to professional groups, such as the Solomon Islands Development Trust, to work under the direction of the Environmental Health Division.

5.5 Sanitation

5.5.1 Sanitary Latrines

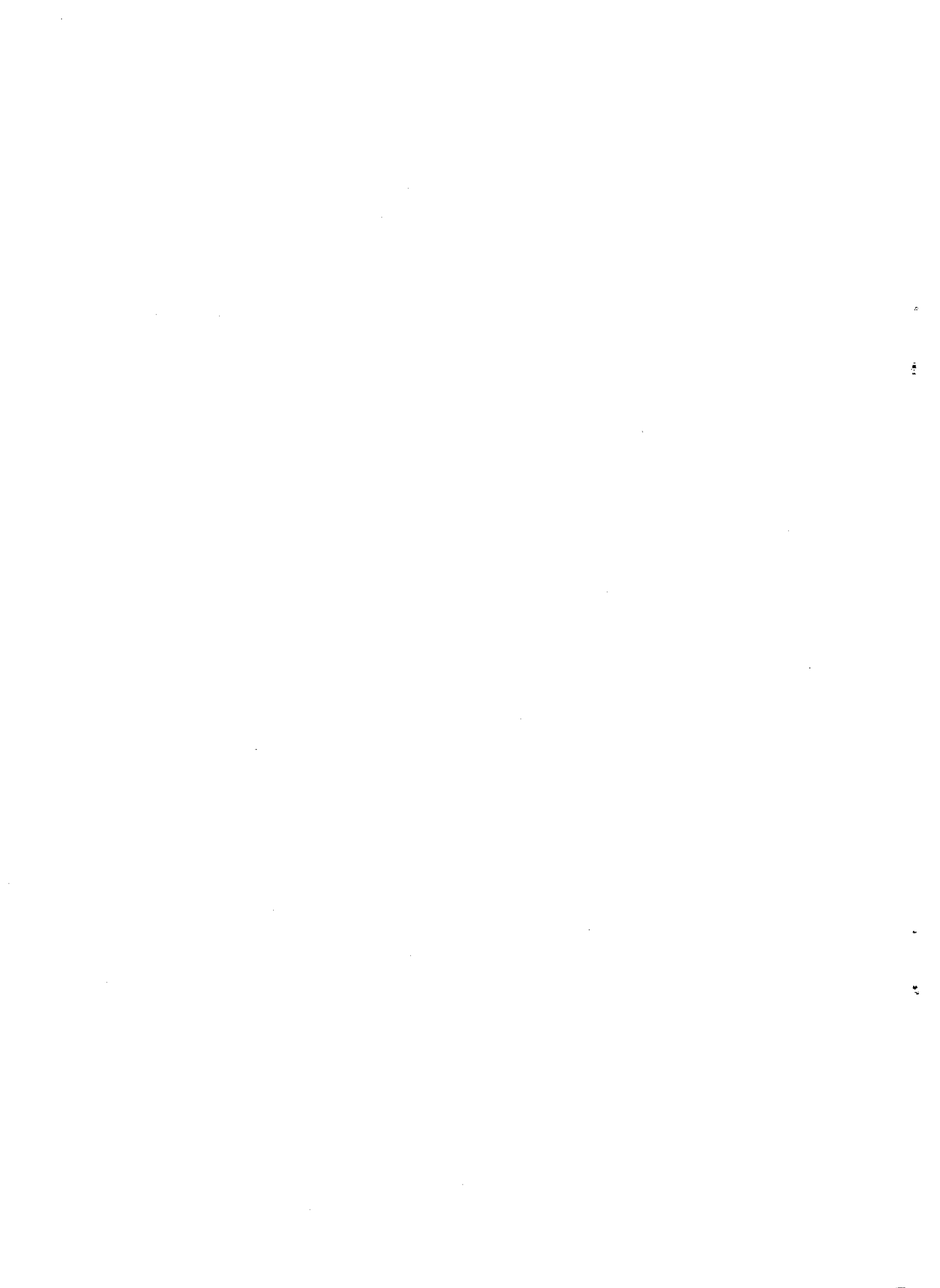
1. If the Environmental Health Division decides that promoting sanitary latrines is an important component of the RWSS Program and should be given added emphasis, this activity should be undertaken in a more deliberate and organized manner. A separate budgetary allocation for toilet slab construction and promotion is necessary, and health inspectors have to be directed to pay added attention to this program component. The staff of the Health Education Division must be strengthened and provided with the needed logistics to travel to the villages in the province to conduct health education sessions. Funds are also needed to enable the Environmental Health Division to develop effective communications messages and strategies, as well as innovative teaching aids.
2. Funding for implementing the above recommendation should be solicited from an external donor.

5.5.2 Drainage

1. As recommended in Section 5.2.4, no new water system being constructed should be considered complete unless a permanent drainage system is in place and people in the village are shown how to maintain it.
2. The workshops recommended in Section 5.4.2 should address the drainage problem as a major issue.
3. Health inspectors should make it a point to inspect the condition of the drainage system during their visit to the villages. If problems are noted, these should be reported to the village chief, who should then be advised to have these problems remedied during the next community workday.

5.6 Health Effects

Since the RWSS Program has proven to be beneficial to the rural people it should be continued. However, to maximize its effectiveness, attention should be given to correcting the deficiencies that have been noted in this report. The drainage problem, when corrected, and in combination with the Mass Drug Administration Program will further reduce the malaria incidence rates.



Chapter 6

USAID PARTICIPATION IN THE RWSS PROGRAM

6.1 General

The USAID-proposed project, the Solomon Islands Rural Water Supply and Sanitation Project for Child Survival, identified several areas that the RWSS Program has not effectively addressed. Foremost among these are community participation activities and water system maintenance.

The problems associated with drainage caused by poor system design, construction, and maintenance were pinpointed in the USAID proposal. In addition, lack of management information was cited in the project paper.

However, the WASH team after visiting 84 villages in five provinces, observed some aspects of the RWSS program that are not consistent with the statements made in the project paper. These observations have resulted in recommendations from the WASH team to USAID on how USAID can contribute to the RWSS Program in at least one other area not originally envisioned in the proposed USAID project.

6.2 Findings Relevant to the USAID Project Paper

1. Communities are not prepared properly to operate and maintain their water systems. There is, however, a strong community spirit evident in the villages the WASH team visited. In most villages the people did feel as if they owned the water system. Some exceptions to this were observed in Guadalcanal and Isabel Provinces.
2. The Solomon Islands Development Trust is not currently participating in community preparation work in coordination with the Ministry of Health and Medical Services. It has, however, expressed interest in participating in a community participation workshop with direction being given by the Environmental Health Division.
3. Poor water system maintenance is a major problem for the RWSS Program. Villagers, however, in most cases, can raise money to purchase tools to make simple repairs.
4. The team observed many systems with drainage problems. The solution to these problems, however, can readily be implemented by the construction team and the villages.
5. Travel and transport are among the most serious problems facing the provinces in constructing and visiting new and existing water systems.
6. The RWSS Program was inadequately funded in 1984. In both FY 85 and 86, however, it appears as if the Environmental Health Division will be able to fund the cost of materials for the program. In addition, the Australian Development Assistance Bureau has agreed to resume funding for materials

purchases and to continue for at least three years at approximately A300,000 per year.

The WASH team does not believe that the infrastructure or the financial capability of the provinces can effectively utilize significant additional funds for the materials to construct new systems. The goal of 500 systems constructed per year appears unreachable.

7. The management information systems currently used by RWSS managers are inadequate. The amount of information needed, however, is not great and could be developed by Environmental Health Division personnel without significant additional effort.
8. It was evident in all villages the team visited that people are using their extra time productively, mainly in gardening and fishing. The value of this time is, however, difficult to assess effectively.
9. It will be very difficult and costly to develop a protocol for measuring the health benefits from the improved water supply. This effort would require a lot of manpower and resources that could likely be used more productively in other areas.

The fact that medical services has improved greatly in the Solomon Islands will render an attempt to attribute health benefits to improved water supplies virtually impossible.

The difficulty in such a study is compounded by the fact that under the RWSS Program in most cases the water system uses the same source that people used before. Water is now more convenient, but the quality of the water is generally unchanged.

The most significant health benefit of the improved water systems is probably that the village people are cleaning themselves, their clothing, and cooking utensils much more frequently. Cleanliness was cited by virtually every village as the major health benefit from the water systems.

6.3 Recommendations for Utilizing USAID Assistance

1. USAID should play the major role in supporting community participation workshops. Two types of workshops are needed. The first would train community development workers (CDWs) on how to conduct community development workshops in villages and include training in those topics that need to be covered in the village workshops. The second series of workshops would be held by the CDWs in villages that already have improved water systems or that would have new ones in the near future.

The most viable alternative is for USAID to contract with the Solomon Islands Development Trust or a similar organization to organize and manage this effort. Another alternative is less attractive because of time constraints on Environmental Health Division personnel. Senior and assistant health inspectors would be trained to carry out community development workshops. If this alternative were chosen, many villages would not receive training for a number of years.

Further information on topics to be covered in the workshop can be found in Section 5.4 of this report.

2. USAID should provide funds for demonstration tools and materials for training purposes, but should not loan money to villages for the purchase of tools. Accounting for such purchases would place a burden on the Environmental Health Division. Furthermore, virtually all villages can raise the funds needed (approximately US \$75.00), or borrow the funds from another source.
3. USAID should provide funding for two management development workshops with particular emphasis on management information systems. The first would be scheduled as soon as funds are available and would cover the use of management information and maintenance management systems as outlined in Appendices 8 and 9. The second would be scheduled approximately two years after the management reporting systems developed in the first workshop were implemented. This second round would review the progress of the RWSS Program managers in implementing the MIS, and modify the data collection and reporting components of the systems as needed.

The chief, principal, and senior health inspectors, plus representatives of the Ministries of Economic Planning and Home Affairs, should attend these workshops.

4. USAID should purchase appropriate transport vehicles (trucks or canoes) to support the RWSS Program. These vehicles should be assigned exclusively to provincial Environmental Health Division personnel to enable them to
 - facilitate water system construction,
 - conduct more sanitation workshops, and
 - visit existing systems to determine their status.
5. USAID's funding of materials to construct new systems should be reduced or eliminated. No funding for this purpose should be authorized unless the Environmental Health Division has presented an effective plan for utilizing the funds designated for materials.
6. USAID should support a rehabilitation program for existing water systems. The most effective approach for USAID in this area is to
 - work with the principal health inspectors to identify 10 to 20 water projects in each province that require rehabilitation,
 - establish the priority for completing the rehabilitation,
 - complete two to four water system rehabilitations per year by contracting the work to a private contractor. Working under the direction of the chief and principal health inspectors, the contractor would completely handle the effort, including management, labor, and materials ("turn-key"), and

Community development workshops should be held at the selected villages prior to the rehabilitation effort, and the villages should contribute local labor and materials as they would for a new system.

7. The USAID evaluation of the RWSS Program should be restructured so that it analyzes the physical accomplishments of the program, such as number of water systems and sanitation facilities constructed, percent increase in population served by improved systems, and water usage by households.
8. The WASH team sees the need to intensify the sanitation component of the RWSS Program, particularly the promotion and construction of sanitary latrines. USAID may wish to consider funding this activity, given the tight financial situation of the Solomon Islands Government. USAID funds can be used to purchase latrine construction materials and to intensify sanitation education activities either through the Environmental Health or the Health Education Divisions.
9. In order to minimize USAID's problems with managing the proposed project, a detailed project implementation plan and a comprehensive project implementation systems and procedures manual should be prepared. The various personnel involved in program implementation should be involved in their preparation, so that they will become familiar with their expected functions and responsibilities.

APPENDIX 1

Scope of Work



SCOPE OF WORK

SOLOMON ISLANDS

Background

The Government of the Solomon Islands (SIG) instituted a program in the late 1970s to bring adequate water supply and sanitation facilities to their rural population. This program is part of the long-term strategy of the SIG for reducing diarrhea and water-related diseases. By the end of 1984, this project had reached 60 percent of the population with potable water systems, but only small advances had been made in providing adequate sanitary systems.

Several problems have become apparent which are limiting the effectiveness of the program. First, many systems are not maintained properly. Second, there is evidence of casual water and environmental deterioration in some villages with new systems, possibly due to improper usage, leaky taps or poor drainage. Third, the program has neither been evaluated to identify other problems that might be occurring nor to understand the conditions under which it is having a true impact on the reduction of diarrhea and water related diseases.

USAID/Suva is considering support for a project to assist the SIG with their RWSS program. USAID/Suva is considering assistance in the following areas:

- Installation of new systems
- Establishing a self-sustaining maintenance program
- Development of assessment, evaluation and management information systems

WASH Participation

USAID/Suva has requested WASH assistance to help determine effective approaches to achieve the goals of their proposed project. They have requested the services of two consultants to spend six weeks in the Solomon Islands. One of the consultants will be a sanitary engineer with experience in water system operations and maintenance, and the second will be a community participation specialist with a health background. Their specific tasks are to:

1. Review information relevant to the RWSS Project undertaken by the SIG and the new project proposed by USAID.
2. Meet with AID and SIG staff to clarify task requirements and gather information on current and proposed water supply projects in the country.
3. Visit a number of WS systems installed by the SIG to determine the current status of existing projects and to investigate ways of improving the success of these systems. Particular attention is to be paid to system O&M, community participation in water systems, construction and maintenance, and the impact of these factors on water system related diseases.
4. Recommend methods and procedures for improving participation by the communities in water projects.

5. Develop a maintenance management program suitable for rural water supply schemes.
6. Recommend types of training programs needed to enable villagers to maintain their water systems.
7. Suggest ways of relating water systems caused diseases to poor system design, construction and maintenance.
8. Recommend practical information systems on WS&S projects that will provide SIG managers with usable data on field conditions.
9. Prepare a draft report for USAID/Suva describing the findings and recommendations resulting from the consultants' visit. A copy of this report is to be left with the mission prior to departure from the country.

APPENDIX 2

Provincial Level Interview Guide



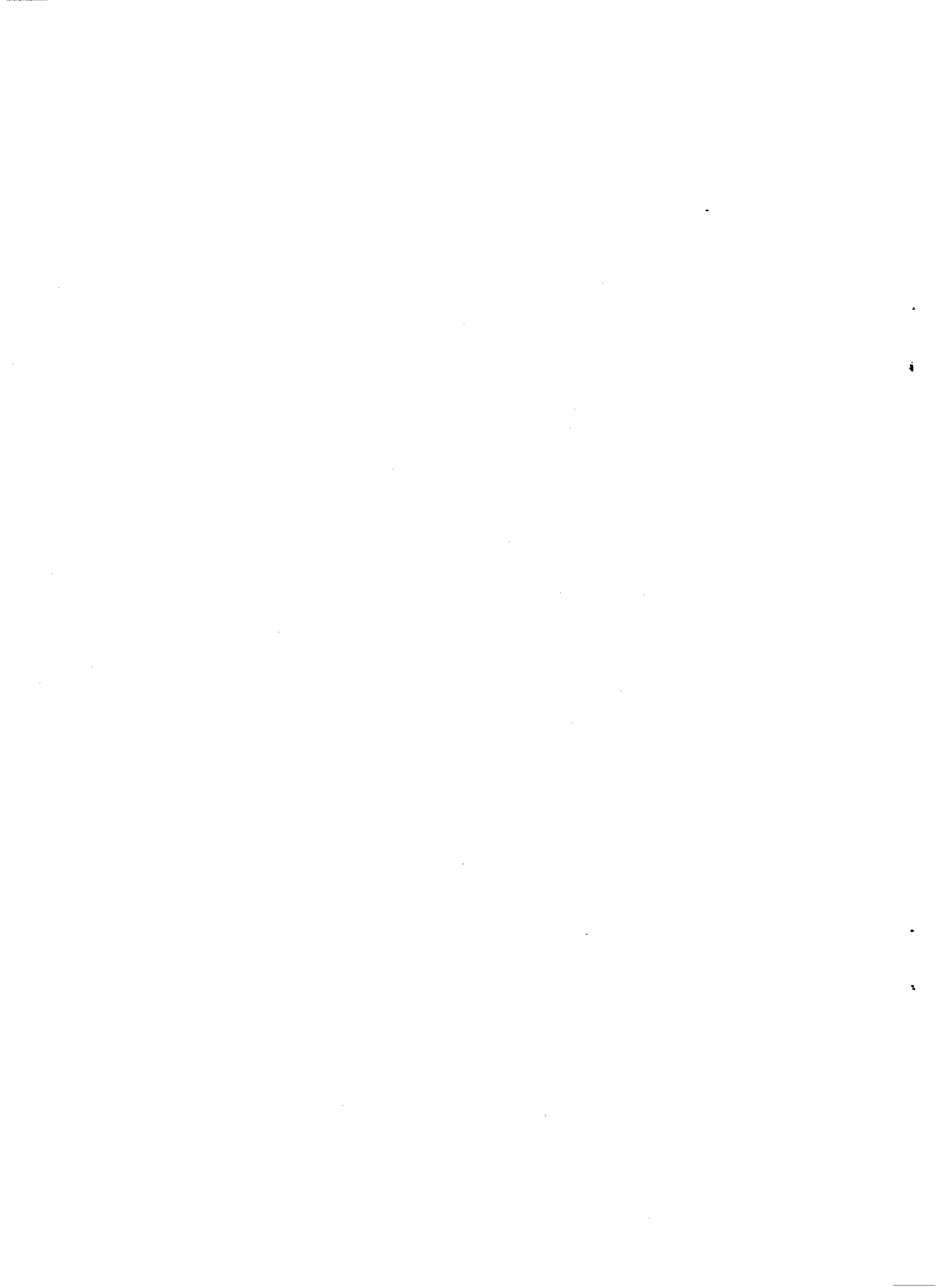
Provincial Level Interview Guide
Respondent: Provincial Health Inspector

1. Province population.
2. Number of villages.
3. Number of health inspectors.
4. Number of direct workers in EHD.
5. Number of construction teams.
6. Duties of health inspector and actual percent of time devoted to each duty.
7. Number of water systems completed since start of the program in 1979. Is there a written record?
8. Number of toilet facilities constructed since start of program in 1979. Is there a written record?
9. What is policy of province on the minimum village population to be eligible for a water system?
10. In 1985, how many water systems were targeted for construction? How many were actually completed? Reasons for non-meeting of targets?
11. How many systems are planned for construction in 1986?
12. In 1985, what was the total allocation for rural water supply systems and what were the sources of the funds?
13. Total funding allocation for sanitary latrines and source of funding.
14. What is the proposed budget for 1986 and sources of funding, for water supply systems and latrines?
15. What percent of the total number of villages is now served with an improved water supply system?
16. What percent of total households has toilets?
17. Actual process being followed from the time a village requests a water system up to completion of construction.
18. Does the province have an official policy on village contributions for water system construction?
19. What contributions have villages made to the construction of water supply systems?
20. Are meetings held with villagers at any time during the survey or construction? What is discussed during these meetings?
21. How does the EHD find out whether a village water system is no longer functional or in need of major repairs?
22. How often do EHD personnel visit completed water systems?
23. What problems does the EHD have in carrying out its duties and responsibilities?
24. Does the province have a budget for rehabilitating or repairing damaged systems?
25. Is SIDT actively participating in the implementation of RWSSP in the province? Do they coordinate their activities with EHD?

From Provincial Malaria Office: annual number of malaria parasite positive smears, from 1980 to 1985.



APPENDIX 3
Officials Visited



Persons Seen:

1. Mr. Philip Funifaka
Permanent Secretary of Health
Ministry of Health and Medical Services
2. Dr. Nathan Kere
Undersecretary of Health/Health Improvement
3. Mr. Tom Lolamae
Chief Health Inspector, MHMS
4. Dr. Robinson Fugui
Senior Health Inspector and Director, RWSSP
5. Mr. Sam Faluaburu
Permanent Secretary, Guadalcanal Province
6. Mr. Brown Saua
Permanent Secretary of Home Affairs
7. Mr. Abraham Baaenisia
Director, SIDT
8. Mr. John Roughan
Technical Advisor, SIDT
9. Mr. Philip Theodi
Provincial Health Inspector
Guadalcanal Province
10. Mr. Moses Jerry Harisimae
Provincial Health Inspector
Malaita Province
11. Mr. Tepano Boboi
Permanent Secretary
Malaita Province
12. Mr. Deo Moga
Deputy Premier, Malaita Province
13. Dr. Simon Ball
Chief Medical Officer
Malaita Province
14. Mr. Jack Siwaianao
Provincial Health Inspector
Central Province
15. Mr. Joshua P. Lui
Provincial Health Inspector/Sanitation
Western Province

16. Mr. Collen Bisafo
Provincial Health Inspector/Water Supply
Western Province
17. John Bowara
Assistant Permanent Secretary
Western Province
18. Dr. Juliene
Chief Medical Officer
Western Province
19. Mr. Alban Leaga
Provincial Health Inspector
Temotu Province
20. Mr. Stanley Seni
Provincial Health Inspector
Isabel Province
21. Dr. Ezekiel Nukuro
Chief Medical Officer
Isabel Province
22. Mr. Barnabas Tanobuka
Senior Nursing Officer
Isabel Province
23. Mr. Jason Leguhavi
Provincial Premier
Malaita Province
24. Mr. Reuben Natowane
Permanent Secretary
Isabel Province
25. Mr. Emmanuel Rarumae
Provincial Health Inspector
Makira - Ulawa Province
26. Mr. Shetdrack Fanega
Chief Planning Officer
Ministry of Economic Planning
27. Mark Otter
Australian Development Assistance Bureau
Honiara, Solomon Islands
28. Mr. Hal Pattison
U.S. Representative to the Solomon Islands
29. Dr. David Parkinson
WHO Representative

30. Rubbey Tituet
Ministry of Economic Planning

31. Hilary Rofeta
Planning Officer
Ministry of Health



APPENDIX 4

Village Survey Questionnaire



Village Survey Questionnaire

Province: _____ Respondent: _____
Name of Village: _____ Type of system: _____
Year completed: _____ Population served: _____
Status of water system: _____ Drainage problem: _____
Defects noted: _____

A. Operation and Maintenance

1. Who owns the Village Water System? _____
2. What contribution did the village make towards the construction of the water system? _____
3. Is the system providing enough water throughout the year? (If not, when is water limited?) _____
4. Is there anybody in the village who has been designated as caretaker of the water system? (If yes, how was he chosen, was he trained in water system maintenance, and what incentives are provided to him? _____

5. Has the water system ever needed repairs? _____

If yes: a. were they minor or major? _____
b. who undertook the repairs? (if undertaken by somebody outside the village, what was village participation in the repair job? _____

If no, how will the village have the system fixed if repairs are needed in the future?

Minor repair: _____

Major repair: _____

6. Is there a village fund to cover the costs of repairing the water system? (If yes, how is the fund raised?) If no, is there any other village fund for other community projects and how is this fund raised? _____

If there is no village fund, is the village willing to raise money for the purchase of tools and spare parts? _____

7. Was the village ever consulted on the number and location of standpipes? _____

8. Is there a village council? _____
If yes, how many members? _____
How often do they meet? _____

9. Is there a separate village committee that oversees the operation of the water system? _____
If yes, how many members? _____ How often do they meet? _____
What are discussed in the committee meetings? _____

10. Is there a community work day? _____
If yes, what activities are undertaken? _____
Does everybody generally participate? _____

B. Health

1. Is there a trained village health worker in the village? _____
2. Do you think the water supply system has improved the health of the village people? _____
If yes, how? _____
3. Do you think children are healthier now (less illness) than they were before the water system was constructed? _____
If yes, how so? _____
4. Is the malaria situation in this village improving or getting worse? _____
If worse, do you think the water system was responsible for it? _____
5. How many houses in the village have toilets? _____
6. Now that water is available at the village, what do people, especially the women, do with their extra time? _____
7. When was the last time the health inspector visited your village? _____
What did he do during this visit? _____
8. How many children died last year, and from what causes? _____
9. What are the most common diseases among children in this village? _____
10. How far do the village people have to go for medical help? _____

APPENDIX 5

Villages and Water Systems Visited



Guadalcanal

<u>Village</u>	<u>Year Constructed</u>	<u>Type of System</u>	<u>Status</u>	<u>Population Served</u>	<u>System Defects</u>	<u>Drainage Problems</u>
1. "Bachelors" Village	1984	Gravity	Functioning	10(2)	none	none(c)
2. Maravorn	1984	Gravity	Functioning	30 est.	leaking taps	major
3. Naro	1984	Open dug well	Non-functioning	10	water can't be used for household use	minor
4. Mangakiki	1982	Gravity	Functioning	80	none	none
5. Verahue	1984	Gravity	Functioning	150	none	minor
6. Numbu	1983	Gravity/ S.B.	Functioning	120	none	none
7. Mulu School	1984	Solar pump	Functioning	80	none	minor
8. Biau	1983	Rain catch tank	Functioning	70	none	minor
9. Makila	1980	Handpump	Non-functioning	40	Broken pump	minor(c)
10. Vutu	1983	Handpump	Non-functioning	30	Broken pump	none
11. Vutu Trg Ctr	1986	Handpump	Under construction	21	None	moderate
12. Marasa	1985	Gravity/ Stream	Functional	192	Leaking main valve 2 st. pipes broken	minor
13. Babanakera clinic & school	1981	Gravity/ Stream	Functional	400	Some taps with no water because of low pressure; land disputes	

<u>Village</u>	<u>Year Constructed</u>	<u>Type of System</u>	<u>Status</u>	<u>Population Served</u>	<u>System Defects</u>	<u>Drainage Problems</u>
14. Veragorisi	1981	Gravity/ Stream	Functional	Included in No. 13 data, same system		major
15. Verapoi	1981	Gravity/ Stream	Functional			
16. Matanabamka	1981	Gravity/ Stream	Functional			
17. Tasali	1984	Gravity/ dammed stream	Functional	26	1 standpipe broken pipe broken	moderate

Malaita Province

Number of villages: 1,543
Population: 58,855

<u>Village</u>	<u>Year Const.</u>	<u>Type of System</u>	<u>Status</u>	<u>Population Served</u>	<u>System Defects</u>	<u>Drainage Problems</u>
South Malaita						
1. Sita	Ongoing	Rainwater catchment	Non-functioning	3 houses	design defect	-
2. URA	1985	Hydraulic Ram	Functioning	200 people	low pressure; defective ram	none
3. Radifasu	1977	Gravity	Functioning	200+	none	none
4. Gwaidinale	Ongoing	Hydraulic Ram	Functioning	70	none	none
5. Abalolo	1985	Gravity	Functioning	150	none	minor
6. Lalana	1981	Gravity	Functioning	500 est.	Low pressure (tank being constructed)	minor
North Malaita						
7. Akwe	1982	Gravity	Functioning	300	water running continuously, broken pipes	moderate
8. Sisifiu	1985	Gravity	Functioning	200	none	minor
9. Raufoki	1981	Gravity	Functioning	100	Sometimes dries up	moderate
East Malaita						
10. Dingo-dingo	1984	Gravity	Non-functioning	20	Design defect-village higher than source	none
11. Anorara	1984	Gravity	Functioning	25	none	none

<u>Village</u>	<u>Year Constructed</u>	<u>Type of System</u>	<u>Status</u>	<u>Population Served</u>	<u>System Defects</u>	<u>Drainage Problems</u>
12. Nafinua	1984	Gravity	Functioning	40	none	minor
13. Kwai Island	1985	Dug well w/pump	Functioning	700	loose handle	none
14. Fote	1974	Gravity	Functioning	100+	leaking taps, low pressure	major
West Kwarai						
15. Dala South	1980	Gravity	Functioning	300	none	none
16. Boboitolo	1983	Gravity	Non-functioning	500	design	major defect-village higher than source
17. Kwaitabaa	1983	Gravity	Functioning	30	leaking tap	moderate
18. Bio	1983	Gravity	Functioning	200	none	minor
19. Kilosakoalo	1984	Gravity	Functioning	500	low water pressure	minor
20. Tautaumalafo	1982	Gravity	Functioning	30	low water pressure	moderate
21. Ambo	1982	Gravity	Functioning	1000	leaking pipe	none
22. Ngalesagore	1981	Gravity	Functioning	100	none	minor

Western Province

<u>Village</u>	<u>Year Const.</u>	<u>Type of System</u>	<u>Status</u>	<u>Population Served</u>	<u>System Defects</u>	<u>Drainage Problems</u>
Choiseul Bay						
1. Panarui	1984	Gravity/ stream	Functioning	Primary school	none	major
2. Vavudo	1984	Gravity/ stream	Functioning	100+	none	minor
3. Tabasaru	1984	Gravity/ stream	Functioning	300	none	minor
4. Pinadora	1985	Gravity/ spring	Functioning	110	none	minor
5. Qualovoque	1985	Gravity/ stream	Functioning	School	none	none
6. Choiseul B Second School	Ongoing	Hydraulic ram	Non-functioning	200	system renovation going on	-
Gizo						
7. Sageragi	1980	Gravity/ stream	Functioning	60	none	none
8. Pailoque	1984	Gravity/ stream	Functioning	200	Two broken pipes leaking taps	none
9. Numanda	1985	Gravity/ stream	Functioning	200	water turbid during rainy season	none
10. Fishing Village	1985	Gravity/ stream	Functioning	100	Occasional water shortage	major
11. Nusabaruko	1985	Gravity/ stream	Functioning	100	Occasional water shortage	minor

<u>Village</u>	<u>Year Constructed</u>	<u>Type of System</u>	<u>Status</u>	<u>Population Served</u>	<u>System Defects</u>	<u>Drainage Problems</u>
12. Mandau	1983	Diesel pump	Non-functioning	600	Pump worked only 6 months, never repaired	-
13. Buni	1983	Hand-pumps (4)	Non-functioning	200+	lasted 2 years only	-
14. Kena	1984	Gravity/stream	Functioning	300	none	none
15. Varanga	1984	Gravity/stream	Functioning	60	none	none
Munda						
16. Hapaar-Saikile	1985	Gravity/stream	Functioning	100	none	none
17. Olive	1985	Gravity/stream	Functioning	240	Occasional water pressure	none
18. Nasajupe	1982	Diesel pump	Non-functioning	600	motor broke down after 2 years, never repaired	-
19. Ughele	1985	Gravity/stream	Functioning	700	none	none
20. Egholo	1983	Gravity/stream	Functioning	200	leaking spring box	none
21. Kekehe	1975	Pump*	Functioning	80	low water pressure	moderate
22. Dunde	1975	Pump*	Functioning	1000	low water pressure	major

*Part of Munda water system

Isabel Province

<u>Village</u>	<u>Year Const.</u>	<u>Type of System</u>	<u>Status</u>	<u>Population Served</u>	<u>System Defects</u>	<u>Drainage Problems</u>
1. Kulogaru	1982	Gravity/ stream	Functioning	80	none	none
2. Nareabu	1982	Gravity/ stream	Functioning	500	occasional low water pressure	none
3. Tasia Trg Ctr	1979	Diesel pump	Non-functioning	100	broken motor	none
4. Tataba	1982	Gravity/ spring box	Functioning	200	low water pressure, broken tap handle	none
5. Medoru	1981	Gravity/ stream	Functioning	150	leaking taps and pipes	major
6. Japnana	1969	Gravity/ spring box	Functioning	19	none	moderate
7. Lepi	1982	Gravity/ spring box	Functioning	90	leaking pipes	major
8. Volavu	1984	Gravity/ stream	Functioning	400	no water at certain months of the year	none
9. Thathaje	1984	Gravity/ stream	Functioning	60	none	minor
10. Sepi	1981	Gravity/ spring box	Functioning	300	none	none
11. Suva	1985	Gravity/ stream	Functioning	200	turbid water leaking pipe	moderate
12. Horara	1984	Gravity/ spring	Functioning	50	no water 3 months per year	none

<u>Village</u>	<u>Year Constructed</u>	<u>Type of System</u>	<u>Status</u>	<u>Population Served</u>	<u>System Defects</u>	<u>Drainage Problems</u>
13. Nagolao	1982	Gravity/ stream	Functioning	460	leaking submarine pipe; salty water	major
14. Huli	1976	Gravity/ stream	Functioning	300	under rehabilitation to include head	moderate
15. Tanamuki	1968	Gravity/ stream	Functioning	200	leaking taps; low water pressure	major
16. Poro	1983	Gravity/ stream	Functioning	500	low water pressure; faulty dam construction	major
17. Jirigi	1984	Gravity/ spring	Functioning	35	none	none
18. Magalau	1985	Gravity/ spring	Functioning	200	none	none

APPENDIX 6

Data on the RWSS Program

Data on the RWSS Program

Population Served

Year	Water			Sanitation		
	Targeted	Achieved	Percent	Targeted	Achieved	Percent
1979	10,000	8,000	80	1,000	100	10
1980	15,000	17,000	113	2,000	200	10
1981	15,000	17,000	115	3,000	400	13
1982	20,000	21,400	107	4,000	200	5
1983	25,000	20,900	84	5,000	1,000	20
1984	25,000	15,000	60	5,000	500	10
1985*	15,000	6,100	41	3,000	88	3
Total	125,000	105,400	84.3	23,000	2,500	10.8

Funding *(000's)

Year	1979/ 1980	1981	1982	1983	1984	1985
Ext.						
Donor	319	260	547	404	105	693
SIG	<u>60</u>	<u>114</u>	<u>130</u>	<u>185</u>	<u>120</u>	<u>70</u>
Total	379	374	677	589	225	463

*Does not include provincial contributions of direct labor and transport of materials and labor from EHD stores in province to job site. These figures are not readily available.



APPENDIX 7

Recorded Malaria Cases, by Province, 1980 to 1985



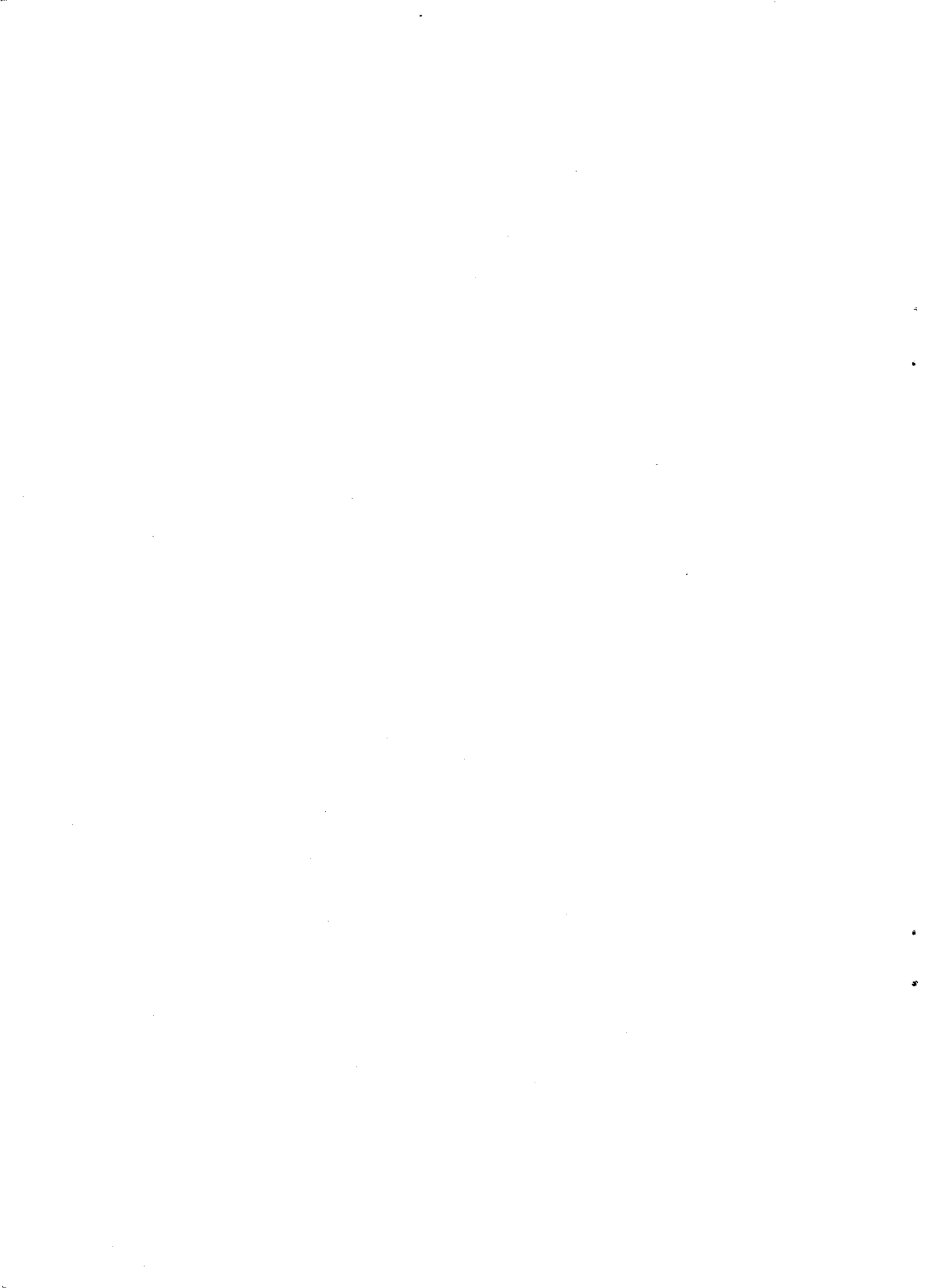
Recorded Malaria Cases, by Province
1980 to 1985*

<u>Province</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>
Malaita	8,528	14,610	21,737	22,496	19,631	8,301
Guadalcanal	15,767	30,592	29,280	44,667	32,306	17,439
Western	3,203	5,484	7,176	4,869	7,296	4,950
Central	3,735	5,419	6,267	7,274	8,269	7,127
Isabel	1,442	1,288	796	1,279	2,577	703
Ternotu	1,995	2,595	4,499	3,843	3,320	1,954
Makira	1,897	1,995	3,207	2,461	1,828	1,829
Total	36,569	61,983	72,962	86,889	75,227	42,303

*Based on parasite positive smears. Source: Provincial Malaria Offices



APPENDIX 8
Management Information Systems



Management Information Systems

The primary purpose of a management information system is to keep project managers and other interested parties regularly informed as to the status of the project. Secondary purposes are to enable personnel newly assigned to the program to quickly gain information about their new responsibilities and give first line supervision an opportunity to re-evaluate the methods they are using to implement the project.

The most successful management information systems are those that follow these five rules.

1. They are easy to understand and use.
2. Only pertinent information is included.
3. Reports cause action to be taken.
4. The amount of detailed information included becomes more general as it is forwarded to higher levels of management.
5. Information is fed back to the preparer of the report.

Currently, information provided by and to RWSS Program Management is limited to the following:

1. The annual budget request made by each SHI to the PHI detailing material requirements for the coming fiscal year.
2. The annual report made by each SHI to the PHI outlining the previous year's accomplishments, including:
 - number of water systems constructed
 - number of sanitation facilities completed
 - problems encountered implementing the program.
3. The PHI prepares an annual summary report from the SHI submittals for distribution to various SIG ministries and provincial authorities. This report includes physical accomplishment of the program plus financial data.

It is recommended to the SIG that they take the following steps to strengthen their current reporting techniques.

1. The principal health inspector should prepare instructions for the senior and assistant health inspectors on the preparation of the reports outlined in item numbers 2 to 5 below. Examples of the reports that are required for submittal by the SHI and PHI should be prepared by the principal health inspector as guidelines.
2. The chief health inspector and the undersecretary of health/health improvement should review and critique the instructions prepared by the PHI before they are sent to the provincial health personnel.
3. The chief health inspector should plan a national workshop that would be held approximately two months after the provincial health inspectors receive the instructions for the MIS. This would give them an opportunity

to comment and offer recommendations on the data collected and reports prepared to support the MIS. It would be valuable if this workshop is planned and conducted by a consultant who has experience in designing management information systems.

In addition to EHD personnel, representatives from the Ministries of Home Affairs and Economic Planning should attend the workshop. The SIG should seek funding support for the workshop from external agencies.

4. A second workshop should be planned two years after the first to review the status of the management information system and to consider modifications that appear warranted after the initial two years experience with the system.

The recommended modifications to current reporting are:

1. Each province should assemble a master list of all villages in the province including village population, location, status of water and sanitation systems (if any), and plans for construction of new systems if any are scheduled. As this task will involve extensive work in some provinces, the work should be carried out by the SHI and his assistants over a number of months. Once done, the master list will facilitate the introduction of new personnel to the EHD and simplify the preparation of other reports.
2. The senior health inspectors should submit quarterly reports to the PHI and permanent secretary of his province with the following information:
 - number of new water projects started this quarter
 - number of rehabilitations projects started
 - number of projects completed year to date
 - number of projects planned for year
 - man hours spent on each project
 - number of latrines constructed year to date
 - number of workshops held and their purpose
 - number of field visits made
 - problems encountered.
3. The PHI should use the quarterly reports to compile a brief description of the status of the project for the chief health inspector, provincial permanent secretaries and other concerned SIG officials. A sample of a quarterly report is given in Figure 3 on the following page. It should summarize the information provided by the provinces.
4. Each SHI should continue to submit an annual report summarizing the previous year's work with emphasis placed on accomplishments against targets and reasons for not reaching stated goal if appropriate.
5. The PHI should continue to prepare his annual report and expand it to include data on provincial funds used for the RWSS program. It is important that the total financial commitment made for the program be readily available for inspection by the SIG and program donors.

**Figure 3. Rural Water Supply and Sanitation Program
Quarterly Progress Report**

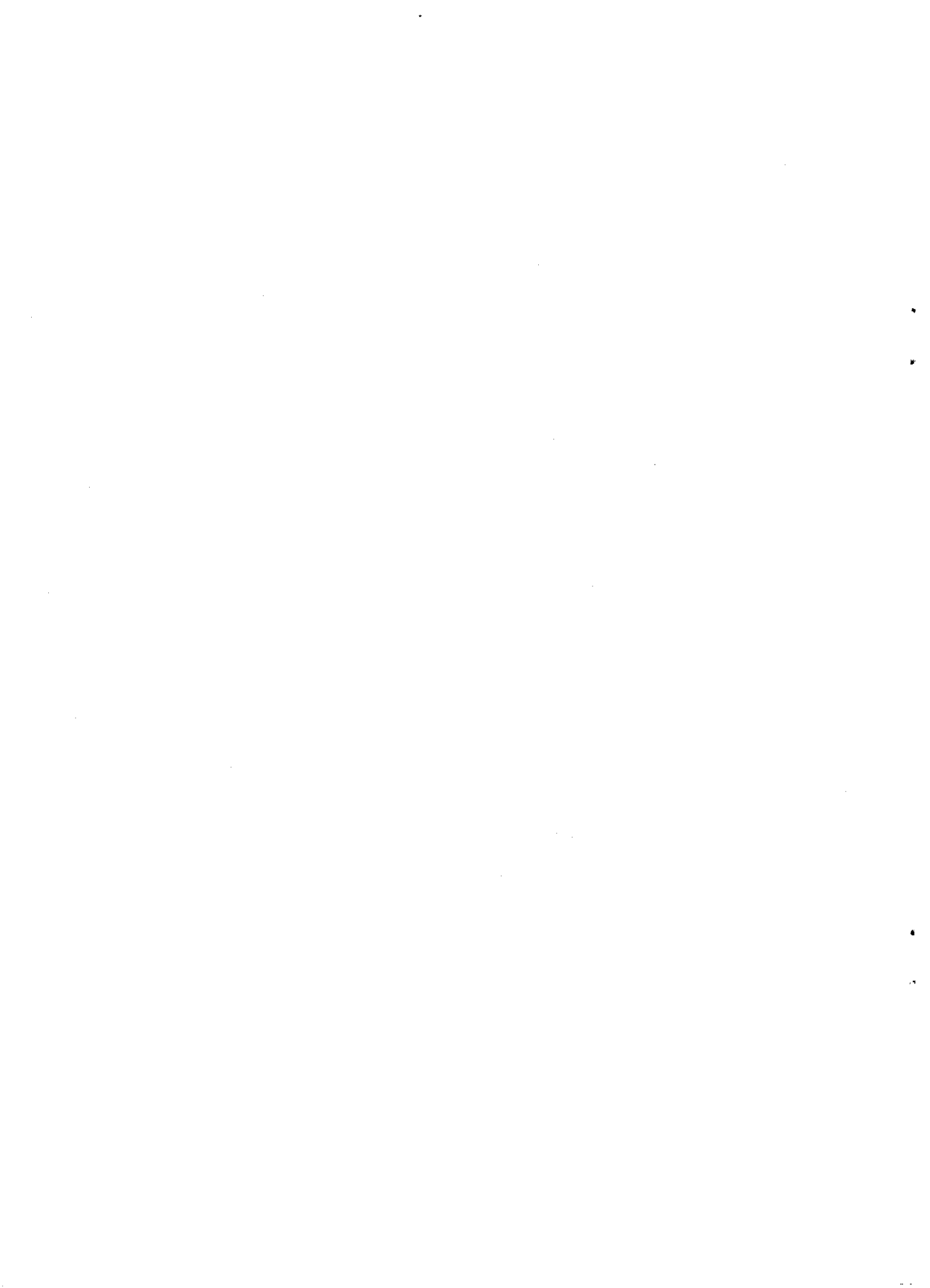
<u>Province</u>	<u>Number of Water Projects Started this Year</u>	<u>Number of Water Projects Completed Year to Date</u>	<u>Number Planned for Year</u>	<u>Total Man Days on Water</u>	<u>Number of Latrines Con- structed Year to Date</u>	<u>Workshops Held Year to Date</u>
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Totals



APPENDIX 9

Maintenance Management Systems



Maintenance Management Systems

Maintenance management systems (MMS) should follow the same guidelines as those for any MIS (see Appendix 8). As noted in this report, several of the provinces do keep some records of maintenance complaints, but the MOH does not collect and disseminate this information.

The data on maintenance activities to be collected need not be submitted separately from that recommended for the MIS. It can readily be incorporated into the MIS reports.

Maintenance reports should be prepared according to the schedule given below and contain the noted information.

1. Each SHI should submit a quarterly maintenance report to the PHI containing the following data for each complaint.

- village name
- date of request for maintenance
- person submitting request
- description of complaint
- responsibility for repair (village or province)
- action taken and date
- total man hours spent (transport and work on-site)
- parts used (if any)
- estimate total cost of repair
- summary data on total number of complaints, manpower used and total cash.

2. The PMI should prepare a quarterly progress report summarizing the reports from the SHI's. It will contain the following data for each province.

- total number of complaints reported that quarter
- number resolved by province
- number returned to village for action
- number unresolved by province
- total cost of maintenance

3. The SHI and PMI should use the quarterly reports to prepare annual maintenance reports with emphasis on:

- total complaints for previous years
- number returned to village for action
- number unresolved
- total cost of maintenance
- amount budgeted for maintenance
- previous 3 years maintenance cost (for easy comparison on progress)

The annual reports should be made available to all appropriate SIG officials and donor agencies.

The consultants believe that a maintenance program must be implemented as soon as possible in order for the SIG to preserve its investment in the program.