

A Successful Model for Appropriate Rural Community Water Supply and Sanitation in Papua New Guinea.

Chris Jensen & Michelle Abel

mabel@adra.org.pg

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Abstract

Through strong relationships with the rural communities ADRA PNG runs one of the largest water and sanitation programs in PNG. ADRA's rural water supply program has developed a successful demand-driven model for the implementation of rural community water programs that focus on three things: behavior change in the area of community sanitation; an appropriate level of technology; and empowering management processes. Integral to the ADRA PNG model are health behaviour change, community requests for assistance, and contributions of funds and labour from the partner community. The model also incorporates the construction of demonstration VIP Latrines in each community where a water project is built. Our strategic plan for the water and sanitation sector has focused our health education and behaviour change on two priorities; hand washing and promotion of toilet use. Hygiene and sanitation behavior changes programs must be integrated into the water supply project construction. It is best to keep these programs simple and focused on no more than five behavior change goals – such as washing hands, use of toilets, cutting the grass in the village or avoiding stagnant pools of water through poor drainage.

Introduction

The Adventist Development and Relief Agency (ADRA) in Papua New Guinea (www.adra.org.pg) have been operating since 1990. A humanitarian agency of the global Seventh-day Adventist Church, ADRA has been established to carry out development and relief activities without prejudice. As at August 2005 ADRA PNG employs 80 full time staff, along with hundreds of volunteers, working in the sectors of HIV/AIDS Counseling/Testing & Education, Water & Sanitation, Adult Literacy, Disaster Response and Economic Development.

The country of Papua New Guinea has some of the most unique challenges to development; more than 800 traditional languages and cultures, steep geography that is prone to landslides, inclement weather - equatorial heat and high levels of rainfall, along with prevalent malaria, typhoid and other water-borne diseases. Poor economic and health indicators along with increasing governance, law & order and security issues create extra complexities. Many commentators such as Hughes (2003), Manning & Windybank (2003) have documented these confronting ongoing issues. Despite some degree of demonstrated social and economic achievement since independence, it has been the rural communities of PNG who have suffered more acutely. This has been well documented in a study by AusAID, 'Enclaves or equity' (Baxter, 2001).

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Papua New Guinea largely remains dependant on aid funding from multilateral organizations and other countries. The most visible of these has been the Australian government. Until recently larger scale funds from have not been readily available to non-government organizations in Papua New Guinea, but have been channeled through private sector contractors. There has been much discussion as to the effectiveness of this, but suffice to say that new opportunities for the not-for-profit sector and church-based organizations have allowed more targeted community level activities. It's these small strategic interventions that are more likely to meet the felt needs of communities.

Through strong relationships with the rural communities ADRA PNG runs one of the largest water and sanitation programs in the country. Since the early 1990s ADRA PNG's water systems have evolved to meet felt and real needs of community partners through three things: a focus on behavior change in the area of community sanitation; an appropriate level of technology; and empowering management processes.

Problem description

The rural communities of PNG comprise nearly 85% of the total population of 5.2 million (2002 Census). These communities do not receive adequate levels of government services. Many people must walk over steep terrain for several hours to reach the closest aid post. There is a serious need in rural communities in PNG for access to potable water supply. In urban areas 61% of households are connected to mains water. In rural areas 70% of communities do not have access to safe drinking water. So the majority of PNG people do not have access to safe drinking water (*PNG Demographic and Health Survey, 1996 and Baxter 2001*).

The impact of poor hygiene and sanitation is becoming increasingly documented, and research is showing that it is not solved by simply introducing a potable water supply. Numerous studies and observations indicate that the provision of water supply without hygiene promotion and sanitation reduces the impact on people's health and well-being and may cause damage to the quality of the environment (*World Bank WSP: Learning the Fundamentals of Hygiene Promotion, Nov 2000*).

Diarrhoea is one of the top three killer diseases in developing countries. Improvements to water supply and sanitation help cut the incidence of diarrhoea, but these technologies only have an impact on health because they make better hygiene possible (*UNICEF Water, Environment and Sanitation Technical Guidelines Series, 1999*). ADRA PNG has targeted positive behaviour change in the area of hygiene and sanitation in the partner communities. International research shows that hand washing with soap and water after contact with faecal material can reduce diarrhoeal diseases by 35% or more, and that using a clean pit latrine and disposing of children's faeces in it can reduce diarrhea incidence by 36% or more (*Almedom, et al Hygiene Evaluation Procedures, London School of Hygiene and Tropical Medicine, 1997*).

Strategy

ADRA's rural water supply program has been funded for many years by AusAID and has developed a successful demand-driven model for the implementation of community water programs. Integral to the ADRA PNG model are health behavior change, community requests for assistance, and contributions of funds and labor from the partner community. The model also incorporates the construction of demonstration VIP Latrines in each community where a water project is built. Over the past 15 years ADRA PNG has implemented over 290 community gravity-feed water projects in many parts of PNG, providing benefit to more than 85,000 people.

Our strategic plan for the water and sanitation sector has focused our health education and behavior change on two priorities; handwashing and promotion of toilet use. That's not to say that water itself is not vital, but rather to say that a focus on water supply alone will not have the desired developmental impact. Also it's clear that promoting handwashing cannot happen without a clean water source close to the community.

ADRA has found a combination of technical and social issues determine the degree of project success. It is essential that project design is technically feasible. ADRA has seen many water projects implemented by district-level governments that did not have the technical capacity to adequately design systems, or were installed through electoral development funds with short-term political objectives. Many of these technical issues are simple: water sources must be permanent; pipe diameters must be adequate; fittings must be installed correctly; drainage outlets and taps must be located correctly; provisions for cleaning the system must be adequate; sediment filtering must be adequate; and the construction of storage to prevent pollution or damage during floods must be correct. It is also vital that the design of the water system is simple and easy for maintenance.

Water projects can be designed very well technically but still fail. Many water systems in PNG fail for lack of appreciation for cultural values rather than technical reasons. Our experience has shown that when communities raise funds to contribute towards the cost and provide the labor for the construction the project is more likely to be sustainable. We believe this is because community participation in a water project increases local ownership and results in communities actively maintaining and developing their own water project after ADRA involvement ceases. Examples observed include communities converting a tap stand into a shower, repairing small cracks in ferro-cement holding tanks after small earthquakes and planting gardens on the drainage outlets. Village Water/Health management committees are established during project implementation to coordinate the project in the community. These committees sign a Partnership Agreement with ADRA PNG; collect the financial contribution; determine the location of taps in the village; and manage the community funds and maintenance issues after the project is completed. ADRA PNG requires that at least two women must be members of the five member committee.

During 2001 ADRA PNG conducted a review of 29 water projects implemented by ADRA PNG in the Bulolo District, Morobe Province between 1995 and 2001. All the water systems were in good condition and still in use, but only approximately 50% of the communities demonstrated improved hygiene and sanitation practices. ADRA PNG introduced health education into our implementation model in the late nineties – the 50% of communities referred to above had worked with ADRA since that change.

Description of Interventions, Approaches or Projects

The process begins by the community representatives making contact with our head office in Lae, Morobe Province. We have never advertised or sought communities for projects. We receive requests by mail or in person to ask for further information. The informal meeting allows both parties - community and ADRA staff - to understand issues relevant to each particular project. While issues facing implementation and logistics are similar, social matters are unique in each community and require experience and information from many sources to expedite the project.

Any project that requires community participation must have community demand. Without demand there can be little ownership and sustainability. The project forms are in the local language *Tok Pisin*, and give a good indication of community demand and district government support.

If the community representatives accept the project procedures, they pay a fee of K500 (US\$167) for the feasibility study. ADRA PNG has charged communities the non-refundable fee for a technical feasibility for the past five years. The premise to these funds is that everything has a cost and that every service has a cost. If the fee is too high the local politicians/businessman become involved if the fee is too low then there is no value to the communities 'purchase'.

At every stage in the program personal contact is the key to working in partnership with the community. Preparing the communities can involve up to three community visits. Following the application procedure and payment a community assessment is conducted. Capacity assessment is a preliminary survey that is conducted on the intended water project communities to assess and recommend the viability of the water project; socially and technically. Indications of viability are focused on the water source reliability and demand, head height, geographical and social implications related to the intervention. There may be outstanding issues, land control or internal political struggle that become apparent quickly to our experienced staff. At all time our team has the right to suspend the project until the community resolves a concern that affects the project. We have many applications at various stages of the process. That requires flexibility and adaptability in our management and planning to incorporate the needs of our partners.

The feasibility study confirms size of community, clinometer reading gives distance and altitude for head or water pressure, number of tap stands required and other specific technical issues. A feasibility report is generated and project staff will determine whether or not the project can go ahead. Technical reasons why a project may not go ahead include inadequate flow rate of the water source, distance between source and village is too great (generally no further than 3.5 kilometers - as one of the biggest costs in the project is the cost of poly-pipe) or inadequate head for successful gravity-feed. Another significant issue is land ownership and the approval of the traditional landowner has to be received in writing before the system will be built. If it is feasible to build a water supply with the community a project staff member will visit the community to arrange for the signing of the Partnership Agreement, assist with establishing the Village Water Committee and arrange local labor. The Partnership Agreement is to make clear the expectations of ADRA PNG and the local village for implementation. Local people are asked to contribute some hand tools, river sand, accommodation and food for ADRA staff, as well as K4 (US\$1.67) per beneficiary as cash contribution. Total contributions in kind and cash are near 15% of the K50,000 (US\$16,700) total project costs.

The contribution could possibly inhibit timely implementation – however, it is vital for sustainability that the community feels ownership of the water project. The majority of communities who have worked with ADRA PNG over the past decade have been willing to pay a financial contribution. Once the community has paid contributions and materials are ready, a final contact with the community has to be established. Either a community member visits the office or an ADRA staff member visits the villages in question to finalize dates for implementation. Again the process is personnel intensive; follow-up is required to confirm details such as dates for implementation and methods for carrying materials in from the nearest road access.

Our implementation process has been refined over the past 15 years. The ADRA gravity-feed methodology is simple, both in concept and construction. It is important right from the beginning to protect the water source. The source is usually a spring that flows from the side of a hill/mountain. It is diverted, a concrete channel is created and then the source is re-diverted to flow on the channel and into a sediment filter. The channel is then protected by stones on the sides and above; then concreted over to totally protect the source from any animal or human interference.

The sediment filter is a small cylindrical tank made of concrete with F52 mesh and half-inch chicken wire as reinforcing and 40mm thick cement walls. It is between 0.8 – 1.0m high and similar in diameter. It has intake for the flow from the source as well as an outlet for flow onto the community below the intake. There is also a capped pipe connecting to the bottom of sediment filter to allow the filter to be drained and cleaned.

From the sediment filter the pipe flows through polypipe (class 12), a strong, flexible UV water potable pipe. The pipe is buried to at least one foot deep in a trench from the sediment filter to the storage tank. The storage tank (8,000 – 14,000 liters) is cylindrical, usually 1.5-2.0m high, and about the same in diameter. The tank construction begins with the base that is dug down 200mm or so and filled with rocks, allowing for the circumference to be mainly concrete. The total circumference has the sheet of F52 reinforcing placed around it. To the inside and outside a half-inch chicken-wire is wired into place. Seven coats of dry mix cement (3:1 mix, final coat at 2:1 mix) are placed on the bird wire, 4 inside and 3 outside. The final concrete is at least 40mm thick. If there should ever be a large earthquake and cracks appear the tank can be drained, another coat of cement placed as required and the tank will be fully repaired. The cement is mixed with a chemical designed to waterproof cement, and the final coat contains a product that puts a physical waterproof layer on the concrete.

The roof of the tank is made in a similar design to the walls. It is made from F52 reinforcing sheets, cut to fit, and hand wired with bird wire inside and outside. There is a hole created in the roof that allows for maintenance in the future. Once the tank is completed the communities are instructed to place a small amount of concrete around this lid to fix it to the roof to prevent tampering or vandalism.

The tank size is based on a minimum of 20L/day/person and to allow half the water to be used in the morning peak period, and the other half of the water to be used in afternoon peak period. The storage capacity of the tank must meet the peak usage of the water. The advantage of these kind of tanks is that the components are easily transported into any rural community (as cement, tie wire and reinforcing), it is very inexpensive, it does not require molds, extremely strong, easily repaired, and communities easily learn skills of maintenance.

Poly pipe is used from the storage facility to pipe the water to the sites chosen by the Village Water Committee. It is common to have one tap for 4-5 families. In design and implementation simplicity and flexibility are key factors for cost effectiveness and sustainability. Every project is inspected after construction to check that it meets minimum standards and community expectations. Every project requires a Completion Report to be carried out and kept on file.

The purpose of hygiene promotion activities is to encourage individuals to practice behaviors that will allow themselves and others to live in a clean environment. Successful hygiene promotion requires strategies that facilitate a process where people assess, make considered choices, demand, effect and sustain hygienic and healthy behaviors.

Hygiene and sanitation promotion activities begin following a successful feasibility study and decision to build a water system in the community. At this early stage it is important to collect information about the community, including the current beliefs and practices concerning hygiene and sanitation in the community, the size of the community, the economic well-being of the community, and the roles and expectations of men and women in the community. This information is collected by project health personnel in the form of a baseline survey. Data collected is disaggregated by sex to ensure adequate gender analysis.

The rural communities do not demand health behavior change. Their request is focused more on the need for clean, drinkable water that's convenient to collect. Before the water system begins the health team visit the community to complete the baseline surveys. Along with the survey the team also completes an environmental walk and situational analysis to define key issues that need to be discussed in the behavior change training. Before leaving the community the staff meet with the community members to hold a focused group discussion and, most importantly, answer questions. The health team use the information from the beneficiaries to carry out a collection of participatory exercises targeted at the issues raised from the baseline survey. The series of exercises have been put together in a manual that is used a resource by the health team to carry out the participatory training. The program has been designed to incorporate the needs of illiterate people and takes about three days.

The training uses PHAST tools that require participatory assessment of community knowledge about hygiene and sanitation issues, and allow communities to set target behaviours for change. It is recommended that only between two and five behaviours be targeted for change by the community, and these behaviours are the ones identified by the community through a "Community Hygiene Matrix" as the easiest to do with the greatest impact (World Bank Water & Sanitation Programs: *The Hygiene Report*, Nov 2001). These activities are discussed with the community leaders and village water/health committees when the ADRA staffs return every six months.

Working with the communities to achieve their goals is our strategy for a successful project. The community is required to pay a small amount for a feasibility study and in turn nearly 5% of the total budget costs. This makes communities take part in the process of "owning" the project and demonstrates their commitment to the project.

Lessons Learned

Keep the technology as simple as possible. Avoid systems with costly inputs.

Find the balance between facilitation and placing responsibility and decision making with the community. That's not easy given that the project is by definition a fixed budget to achieve milestones in a fixed time.

Water supply is not enough. All management processes must empower and give beneficiaries control and choices. Development is about people not infrastructure.

Community-initiated demand and working alongside local people to achieve their goals requires innovative designs and strategies to deal with the logistical, cost and sustainability factors of achieving a practical community water system.

Water supply is not enough. Health behavior change must be the program priority. Our focus has been washing hands and promotion of toilet use.

Program interventions must be participatory and not condescending. Keep the message simple and allow for special needs to allow women & illiterate be involved in the program.

Proposed Best Practices

The materials used in the construction of the gravity-feed water systems have to be carried into the project site by community members. All construction is done by hand onsite with community labor. Simplicity and flexibility are key factors for cost effectiveness and sustainability in design and implementation. By providing the labor the communities easily learn how the water system is constructed, 'own' the process and how to maintain the system.

The local communities in remote parts of PNG need to operate in their own way, in their own time. Decision-making processes are different in each community, and the implementation model must reflect this. Implementation schedules are adjusted to suit the pace of communities as they move through the different stages of the model. This results in several projects at different phases of implementation at the same time. ADRA field workers are from local communities and their specialist cultural experience is invaluable to the success of the model.

Hygiene and sanitation behavior changes programs must be integrated into the water supply project construction. It is best to keep these program simple and focused on no more than five behavior change goals – such as washing hands, use of toilets, cutting the grass in the village or avoiding stagnant pools of water through poor drainage.

Appendix

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