

ENGINEERING WATER AND SANITATION AID PROJECTS IN THE SOUTH PACIFIC

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ABSTRACT

In these times of global awareness, citizens and governments in the developed world, feel a responsibility towards developing countries to aid their plight to access clean water and sanitation. Globally there are many aid organisations fundraising for and running water and sanitation infrastructure projects in developing nations. Most with the best intentions and motivations for the communities they serve. However, development projects are never as simple as implementing the solution and leaving. With most projects there are multiple factors at play which can affect a long-term successful outcome.

It is assumed that any water or sanitation aid project will have a positive impact on the health and prosperity of a community in need. However, if poorly planned or executed, development projects can be ineffective, or even have a detrimental effect on the community in the long-term. Poorly executed projects can be environmentally unsustainable, culturally inappropriate and create dependence on assistance from foreign governments and NGOs. Aid organisations need to carefully consider the way in which they implement projects to maximise the small window of opportunity and minimise the risk of project failure. Many projects, even well implemented ones, fail due to poor maintenance of the infrastructure in the years after the project has been completed.

As a newly developed voluntary organization, of professional qualified engineers, Engineers Without Borders New Zealand (EWBNZ) is open to learn from the experience of others, including the obstacles and outcomes in water and sanitation projects. EWBNZ focuses on problem solving and practical solutions with sustainable outcomes.

This paper discusses some of the issues and difficulties which have been experienced by individuals and organizations when implementing water and sanitation (wash) aid projects in developing countries. In particular, with a focus on the situation, problems and logistics of completing aid projects in the area of the world known as Oceania. The intention is to begin developing a best practice guideline that can be used in water and sanitation aid, based on lessons learnt from past projects. In particular this paper discusses the contribution an engineering mentality can make to the following traditional areas of development studies:

1. Sustainability and Appropriate Technology
2. Logistical and Financial issues
3. Engagement of the local community

KEYWORDS

Development Aid, Sustainability, Best Practice, Sanitation, Water Supply.

DEFINITIONS

NGO	-	Non Governmental Organization
EWBNZ	-	Engineers without Borders NZ
MDGs	-	Millennium Development Goals
WASH	-	Water and Sanitation

1 INTRODUCTION

In September 2000, leaders from countries all around the world came together at the United Nations Headquarters in New York to adopt the United Nations Millennium Declaration. This declaration committed the participating nations to reducing extreme poverty globally. Eight goals to be achieved by the year 2015 were set in place and came to be known as the Millennium Development Goals (MDGs). These goals were:

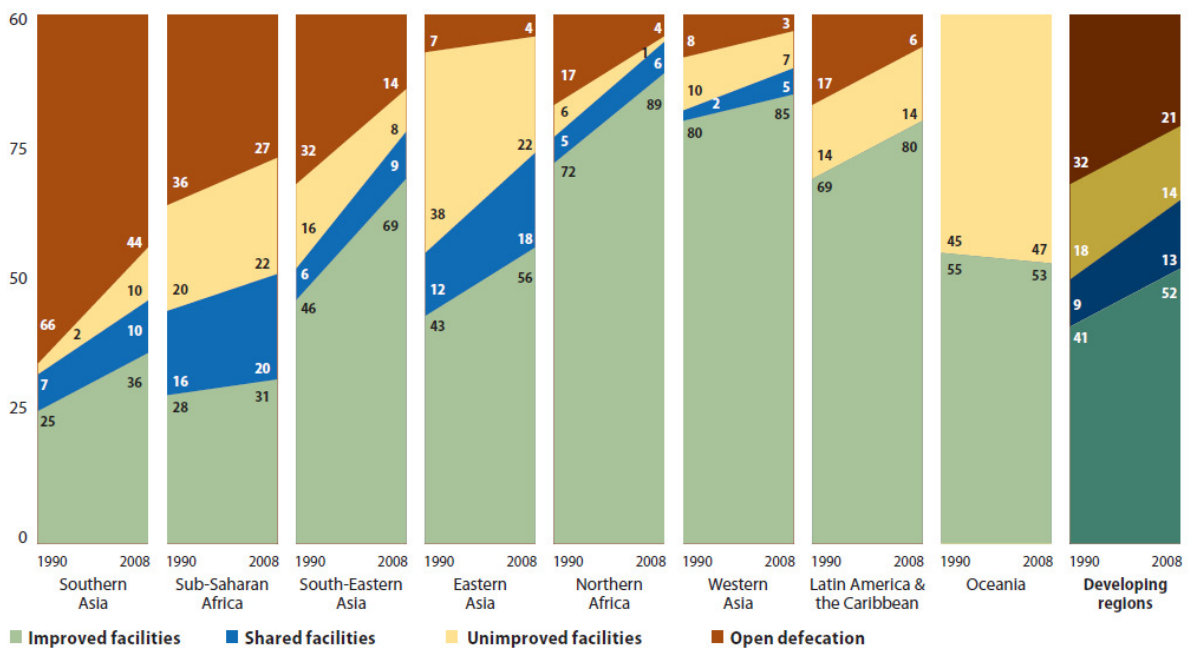
1. Eradicate extreme poverty and hunger.
2. Achieve universal primary education.
3. Promote gender equality and empower women.
4. Reduce child mortality.
5. Improve maternal health.
6. Combat HIV/AIDS, malaria and other diseases.
7. Ensure environmental sustainability.
8. Develop a global partnership for development.

Two of these MDGs are closely related to improving water and sanitation facilities. Diarrhea kills more children every year than AIDS, malaria and measles combined and it is estimated that children are twice as likely to get diarrhea if they are living in a household with no toilet [2]. Goal 4 is to reduce the under-five child mortality by two thirds between 1990 and 2015 [1]. Goal 7, to ensure environmental sustainability, this involves halving the proportion of the population without sustainable access to safe drinking water and basic sanitation between 1990 and 2008 [1].

The percentage of the global population using an improved water source increased from 77% to 87% between 1990 and 2008 and is close to reaching the 88.5% target set by the MDGs. However, in Oceania the percentage of the population using an improved water source fell from 51% to 50% between 1990 and 2008. This makes it appear near impossible for Oceania to reach the 75.5% in 2015 as no improvement has been made over a 20 year period. A large discrepancy is seen between urban and rural areas within Oceania, with 92% of the urban population compared to 27% of the rural population using improved water sources [3].

As shown in the figure below, Oceania was also the only region to reduce the percentage of the population with improved sanitation practices between 1990 and 2008. The percentage of the population using improved facilities fell from 55% to 53% in the near 20-year period [3].

Proportion of population by sanitation practices, 1990 and 2008 (Percentage)



Note: Data for Latin America & the Caribbean and Oceania are not sufficient to provide regionally representative estimates of the proportion of the population who use shared sanitation facilities.

Figure 1: Proportion of Population by sanitation practices, 1990 and 2008 [3]

Considering there are only 5 years left to achieve the Millennium Development Goals, it can be seen that there is an unlimited need for water and sanitation (wash) aid projects in the south pacific. However, quickly implemented and poorly maintained projects can have detrimental long term environmental, social and economic impacts on the community in need.

In times of relative economic instability around the world, due to the global financial crisis, aid funding has become increasingly difficult to source due to cuts in discretionary spending. It is therefore essential that every aid project provides value for money as any wasted funding means other projects cannot be completed.

As a newly developed voluntary organization, of professional qualified engineers, Engineers Without Borders New Zealand (EWBNZ) can provide a unique and potentially highly valuable set of skills to all wash projects in the south pacific. Through discussion with other Nongovernmental Organizations (NGOs) completing wash projects in the pacific and review of past projects completed by EWBNZ, this paper considers a range of issues involved in wash projects and how integrated planning and sustainable engineering can support project objectives. Interviews were conducted with members of Engineers Without Borders New Zealand, Engineers Without Borders Australia, NZAid, New Zealand Red Cross, ADRA and World Vision to profile a range of water and sanitation projects completed in the South Pacific.

2 SUSTAINABILITY AND APPROPRIATE TECHNOLOGY

The definition of sustainability used in this paper is the quadruple bottom line definition which takes into account the environmental, social, cultural and economic aspects of sustainability. The four factors are often marginalized due to financial, time and capacity constraints. This may result in wash aid projects being compromised.

Integral in all three of these issues is the use of “appropriate technology”. Appropriate technology is defined as technology that is selected with specific consideration of the culture, environment, social and economic circumstances of the area in which the technology is being implemented [4]. Appropriate technology is often considered the simplest or cheapest form of technology, but this is not necessarily true. It is often useful to look at what types of technology were successfully implemented in previous projects.

2.1 ENVIRONMENTAL SUSTAINABILITY

For water and sanitation projects the effects of the new infrastructure on the local and regional environment are normally of a secondary consideration. The health benefits to the community of installing running water and adequate sanitation are very high and as such it is hard to weigh these benefits up against any negative environmental impacts on the area.

Sanitation

In sanitation projects the overall environmental effect is normally a positive one considering that the existing sanitation system is often an “over the lagoon” long drop type system, with no treatment or containment before release to the environment. In this situation most sanitation improvement projects will have positive environmental benefits. However some solutions may be more appropriate than others, depending on scale. For example, composting toilets may be a more environmentally friendly solution to standard flush toilets but not if the site is restricted by area or the loadings are very high.

If flush toilets are used consideration must be given to the effect of this additional water demand on water supply. A standard 6 litre flush toilet meets the appropriate technology requirements as it is a cheaper and simpler option, however a specialized water saving toilet may save the community money in the long term through less water use and increased capacity. This solution may also be more environmentally sustainable option as there will be lower demand on the area’s water supply.

Water

Traditional water schemes implemented in the south pacific have involved the use of diesel pumps to lift water to a holding tank. This solution is not very attractive as this requires the community to continually purchase

diesel at high cost. Often a community has a working water supply but cannot afford to purchase the diesel to run it. Aid work in the Pacific has focused on assisting to help the region kick the diesel habit which is both expensive and has negative environmental impacts associated with climate change. However careful consideration must be given to the alternative technology which is selected, the banks of battery's required to run a solar powered pump can be costly to replace and have a significant harmful effect on the environment if they are not disposed of in an appropriate manner. Careful consideration of disposal and replacement cost should be addressed during the initial scoping of a project.

An issue quite prevalent in water projects which is often not considered during the design phase is that with increased availability of water there is usually a significant increase in the demand. The community may begin to use the water supply to wash their clothes, take showers and raise crops or livestock which they would not have done previously. The implemented water supply may not have been designed to cope with this increase in demand and as such can produce poor quality water due to over use and usage during rainy periods. Additionally unless the system has a back up the implications of system failures are more significant.

From the projects studied and the experiences of aid workers interviewed, there was often very little funding available for studying the sustainability and reliability of the water source in water aid projects. By supplying an area with running water, the demand on the environment will increase as will the reliance of the community on the water infrastructure. This is a difficult problem to address as there is very limited funding available for scoping studies and risk or resource management studies. However, without proper consideration of the long term sustainability of the water supply the water aid projects could have a significant detrimental effect on the local environment as well as the community in question.

It would be ideal to have thorough scoping and risk management exercises performed on every water and sanitation project, however there is often little or no funding available for these studies. This is where greater involvement of the engineering industry can be beneficial. These studies are routinely performed on all engineering projects and as such there is a wealth of knowledge and experience to draw from in the engineering industry throughout the South Pacific.

2.2 SOCIAL SUSTAINABILITY

Social sustainability is a very important side to every wash project. It is often assumed that in wash projects the social impact on the community is purely a positive one. The positive social impacts of water supply projects are seen as; improved health of the community and reduced labour for the women who would normally carry the water from a source some distance from the village. The positive social effects of sanitation projects are seen as to direct health benefits of improved sanitation.

It is also standard for education programs to partner wash aid projects. This is an essential part of these projects as it ensures that the new infrastructure gives maximum benefit to the community. Commonly these education programs focus on better health through proper washing, drinking clean water and adequate sanitation.

Using an engineering background there is the opportunity to educate the community in the basic scientific and engineering fundamentals behind a water scheme and the maintenance of the infrastructure. There are a lot of concepts involved which we take for granted as inherent understandings. These concepts can be completely foreign to the communities we they are being implemented. Some examples of these are the concepts of:

- Baffles in a tank dropping out raw water sediment
- Debris in the water clogging the intake of a water supply
- Small leaks in pipework equating to a large wastage of water in the long term

It can be hugely beneficial to engage the community in some practical experiments to illustrate some of these concepts, such as:

- Having them set up baffles in a tank and seeing the sediment drop out
- Having them clog up an intake with debris and watch the water supply run out
- Getting them to measure how much water the leaks produce over a day and then showing them the equivalent total water wasted over the year

Using practical demonstrations to give the community a real understanding of why and how the system must be maintained can make the huge difference to the sustainability of the infrastructure in the long term.

A common ethical conflict encountered during aid projects is gender equality. The communities in question generally have traditional male dominated social structures. One of the millennium development goals discussed in the introduction is promoting gender equality and empowering women. As such, aid organizations should take every opportunity to promote gender equality in the communities they work with. A specific way in which this could be promoted in water projects is having the women take ownership of the water supply scheme. This is often well received and can raise the status in the community empower the women. This arrangement often aids the long term maintenance of the system as well as promoting more equal opportunities for the women in the community.

Undeniably the impacts of the community are inherently positive in wash projects due to the health benefits; however there have been cases of unforeseen social effects on the community which have arisen from some of these projects. One such example was a water project implemented in a village in the Solomon Islands. This project installed a simple gravity fed water supply and a number of pipe stands around the village. It was found that having these separate sources of water around the village completely changed the social interaction of the village women. "Clicks" were forming around the different pipe stands where normally the women would travel together to gather water as a group. The elders of the village had all but one pipe stand removed to avoid this negative effect on the social structure of village.

Consideration must also be given to the cultural aspects of wash projects. This is a particular issue when designing toilet blocks as many cultures have requirements surrounding separation of men and women which can lead to increased design cost. Appropriate technology comes into this issue again as the most appropriate design is not necessarily the cheapest or simplest option but the most culturally suitable and appropriate for the community.

For EWBZ, as an engineering based organization, most of the volunteers and designers working on the projects will not have had a lot of experience analyzing complex social issues. There could be a need to EWBZ to run educational workshops to foster an awareness and understanding of the social aspect of all aid projects. Another way to foster capacity in this area would be to form relationships with other groups which have experience in this area and can provide assistance and input on the design projects.

Other social issues relating to community engagement and aid dependence are discussed in section 3 local community engagement.

2.3 ECONOMIC SUSTAINABILITY

Economic Impacts on the Community

A number of the projects studied involved working with a community to reduce their power and diesel bills. The communities often had a working water scheme but could not afford to pay for the power or diesel required to run it. In one instance a school was shut down due to excessive power bills which could not be paid. These were often the result of previous aid projects which had not taken into account the economic impact of running the system on the community in question. Often aid projects will teach the community to put aside money regularly for running costs and maintenance bills. In this situation the cash flow of the community must be taken into account. A lot of the communities are not cash based societies and as such the seemingly small amount of money required on a monthly basis may be 10% of their total cash income. This is a significant portion of total income for anyone to have to pay for water.

Another factor which comes in to play is disputes between the tribes over who pays for the running and repair of the system. A number of cases were seen where the tribes would not be able to resolve who should to pay for the diesel required to run the system and as such opted to collect the water manually.

When scoping a project a considerable amount of time must be given to the financial commitment of the community/region to run and maintain the infrastructure. A large number of well implemented projects fail because the community cannot afford the regular costs to maintain the water system provided for them. This is where appropriate technology comes into play again; the best solution is going to be the one that the community will be able to maintain in the long term.

A number of positive economic effects can be found in well implemented water and sanitation aid projects:

- Increased productivity resulting from improved community health
- Opportunities for women to partake in economic activities as they do not have to spend as much time collecting water every day
- Opportunities to grow crops and livestock through the increased availability of water
- Building of capacity and skills within the community during construction leading to opportunities for the community members to sell their labour in the region

As the positive effects listed above change the economic situation of the community, it becomes absolutely vital that the sustainability of the infrastructure is ensured. Particularly in water projects, if the community is relying on the supply it for their economic wellbeing, failure of the supply could have a disastrous effect on the community.

Economic Impacts on the area

One issue that is often underappreciated in aid projects is the fact that by installing a water supply or sanitation scheme free of charge, you may be under-cutting the local industry thereby having a negative economic impact on the area. Local business cannot compete with foreign aid organizations coming in and providing services free of charge. This is why it is very important to source as much local labour and materials as possible and only provide items which cannot be sourced in the region. This issue is closely related to local community engagement and logistics and is discussed further in sections 3 and 4.

2.4 SUSTAINABILITY SUMMARY

It is very difficult to predict what environmental, social and economic impacts, positive or negative, a project will have on a community in the long term. Generally the more that is known about the community or area where the project is being implemented the better these effects can be predicted. This is why long term relationships with one community are a huge benefit to the projects, a real knowledge and understanding of the community can be developed and incorporated into the proposed designs.

3 LOGISTICS AND FINANCIAL ISSUES

3.1 LOGISTICAL CHALLENGES

Time Frame

It was found that most of the logistical challenges encountered in the projects studied stemmed from restricted time frames. A range of factors affected the time required to complete the project and often inadequate consideration was given to these issues prior to project implementation. Some of the factors which resulted in restricted project time frames were;

- Time commitment of the volunteer was inadequate for project implementation
- Weather constraints of the area – i.e. delayed construction or transport due to the rainy season
- Funding constraints meaning the project must be completed on a very tight schedule
- Transportation of supplies takes much longer than anticipated in some areas, such as in one project a boat with supplies took five months instead of one.
- Additional delay of local customs offices on imported materials

A restricted time frame on aid projects can lead to a number of issues. The most paramount of these being that the project is poorly implemented due to rushed construction. Also a problem is that there is often not enough time to find the best price/best source of local materials. Rushed projects struggle with local community engagement and proper education about the water or sanitation system and how to properly maintain it. Delays in time always lead to increased cost in implementing the project and as such a waste of aid funding.

Remoteness

In implementing wash projects in the south pacific, the remoteness of the location and the risks associated with this remoteness is often underappreciated and as such not adequately planned for by engineers operating from New Zealand. In many instances, when projects are completed on islands some distance from the main hubs, the transport and supply chains into and out of the area are very limited.

As discussed in Economic Sustainability above, in order not to bypass or undercut the local industry, purchasing materials through local supply chains is very important. However, if a project completed is in a very remote location the availability of construction items can be a problem. In very remote locations it is often the case that if you don't take something with you it isn't there.

When the planning of a project must take into account that equipment and materials can get broken or lost in transit. Entire pallets of materials can be lost or damaged while being shipped into the region. Anything that you are bringing in with you on the project will most likely not be able to be sourced locally. Running out of clips which would normally be 10c at the local hardware store could mean a 3 week delay on the project.

Linked with the issue of remoteness is also the issue of local infrastructure and how the quality of this infrastructure affects the implementation of the project. The timing of a project is greatly affected by the infrastructure in place in the area. In some areas the roads cannot be used after heavy rains which can lead to weeks of delay in the project. It is the engineer's responsibility to fully scope and understand these constraints and the risks they pose to the project before the project is underway.

Communications

Setting up a channel of communication with the community and partner organization on the ground is essential to the project's success. Miscommunication about the needs and capability of the area can lead to poorly planned and executed projects. Effective communication with the community is vital for maintaining both the built infrastructure and the relationship that was established during the project for future work with the area.

Adequate Local Information

Another challenge which is often a huge obstacle in effectively planning a wash aid project is very limited information on the area, particularly in remote locations on pacific islands. This was seen particularly in water projects where information such as rainfall data for the area and the location, quality, availability and reliability of water sources is more often than not unknown. This makes the planning and design of water projects very difficult.

One classic example of this was a water supply project completed recently in Vanuatu. The active volcanoes on these islands produce constant acid rain which lowers the pH of the water sources considerably. As such good quality water sources are difficult to find. The design of the project was completed from New Zealand using the most appropriate known water source in the area. However when the volunteer when to implement the designed solution, a new water source was found that was unknown to most of the villagers. The flow and quality of this new water source far exceeded the original source and as such a complete re-design of the system had to be completed on site. This delayed the project considerably and caused stress amongst the community who did not take well to large design variations and delays in the project. The volunteer who was sent over was meant to be overseeing construction of the project but instead was returned to the design phase.

Local Government

Local government involvement is an issue which needs to be considered on every wash project. Of particular importance in wash projects is the ownership and maintenance of the water scheme after the aid organization has built it. Most often the community feels that they own the infrastructure, especially if the project was lead by the community. However issues have arisen when the local water board also feels that they should own the water supply. The legal issues of ownership and maintenance must be firmly established at the beginning of the project as these problems are very difficult to solve when the project has been finished and each party has played a role in the implementation.

Solutions to Logistical Challenges

A considerable amount of time and effort must be put into risk analysis, scoping of the project, gathering information of the region and establishing a realistic time frame needed to properly implement the project. There are many factors that could affect the time frame required for the project and the logistics of implementing the project. This phase of the project is often undervalued but is vital to the long term success of the project. If you have a good grasp on the skills of the local people and issues in the region before you go to the location, you can know much better how to manage your time when you are over there.

Aid projects need to be planned with ruthless detail, as with any engineering project which would be completed in a developed country. The more information that can be gathered about the area in which the project is being implemented the better. If there is not enough time and budget to gather an appropriate level of information about the region then the scope of the project may have to be re-considered. This is why long term relationships with a specific community or area can be vital. Establishing a relationship and channels of communication with a community, gathering adequate information on the area and scoping all the risks and challenges that could be encountered is a time-consuming task. Effective reporting on completed projects and collaboration between aid organizations with the same goals can make this process much more efficient.

It can be vital to a projects success to have other disciplines input into the project. Aid projects need to be given as much detailed analysis as any engineering projects completed in a developed country, if not more. Every project may need input from disciplines such as planning and quantity surveyors. Often there is detailed work which needs to be completed which aid volunteers do not have time or skills to complete to standard. This is where having an engineering consultancy involved in the project can be hugely useful.

Some projects completed by EWBAUS have been put out to tender for engineering firms to bid for, these consultancies complete the engineering, quantity surveying and planning work as an “in-kind” donation to EWB. Volunteer organizations often struggle with time and resources to effectively implement aid projects. This arrangement between aid organizations and engineering consultancies has the potential to greatly increase the effectiveness of the aid projects where planning capacity and specific technical skills are lacking.

3.2 FINANCIAL RISKS

In times of economic uncertainty, funding for aid projects is becoming increasingly difficult to source. It has been increasingly difficult to get sponsorship from corporate organizations due to cuts in discretionary spending. This means that now more than ever it is essential that aid projects provide value for money and that the aid spending is not misused [5].

As the supply of funding is tight, it is a necessary to choose projects wisely and implement more long term sustainable projects rather than short term solutions. Ineffective use of the funding available means that other valuable projects which may have gone ahead will not be able to find funding. This is why effective project planning and implementation is essential.

Where funds are limited or unstable the project time frame is often reduced or restricted from what is ideally required for the project. The shorter timeframe of the project the greater the risks are of poor implementation or inadequate community engagement leading to a failed long term project.

Particularly in projects where local materials and labour is to be used it is very hard to know how much things will cost when you are over there which makes it difficult to develop an accurate financial plan. More often than not the materials are more costly in the remote location than in back NZ. However purchasing items in NZ and shipping them to the location often means multiple handling fees which could be even more expensive. This means that labour intensive solutions can be more cost effective than materials intensive solutions; however this is not always the case.

As the funding for projects is very tight there is a greater need to develop thorough and accurate cost estimates for aid projects in the pacific in order to ensure value for money on every project. Engineers are well practiced in developing detailed and accurate cost estimates for large scale engineering projects and as such have often have a good capability in this area. Accurate cost estimates also arise from detailed knowledge of what will be required in the design, construction, commissioning and maintenance phases of the project which comes from a technical background inherent in EWB NZ.

4 AID DEPENDENCE

Of concern in every single aid project is the issue of aid dependence. Some communities can come to completely rely on aid organizations after a project has been completed for them. Aid dependence is closely linked with local community engagement, capacity building and post-project maintenance.

4.1 LOCAL COMMUNITY ENGAGEMENT

In every project there are always challenges surrounding local community engagement. Engagement of the local people and community buy-in to the project is essential to ensure the project is giving the community what they want, as well as what they need and not breeding aid dependence. If the community feels the aid organization is giving them something for free, there is no incentive for them to do projects for themselves in the future. Projects where the community is not asked to contribute financially tend to encourage aid dependence. It is important to understand what the community is asking for and make sure you are providing them with something that they want and need. If you are not providing the community with something they have asked for and they are not properly engaged in the project then they will not take ownership of it after completion.

The following steps can help ensure community ownership the project:

- Respond to invitations for projects rather than going out looking for projects
- Work with the community to develop a “vision” or long term plan
- Allow the community or local partner organization to lead the project
- Spend more time on the ground with the community so as to fully understand their needs
- Make sure the community plays an active role in decision making
- Get the local people to do as much of the project as possible, only help them with things that they cannot do themselves
- Communities should pay for a certain amount of the project or be in charge of finding their own funding for certain aspects of the project
- Showing progress of the project visually throughout construction, so that the community can feel involved in the progress of the project

Commodity Fetishism

A problem which commonly arises in community lead aid projects is “commodity fetishism”. This arises when the community knows they are getting equipment for free and as such they will ask for a more high tech solution rather than the most suitable solution. This can be seen in projects where the community asks for water pumps which will be costly to maintain over of a gravity water supply which is seen as low-tech. There is a tricky balance which must be found between giving the community what they want so that they are fully engaged in the project and providing them with the best and most appropriate solution, which is not necessarily what they are asking for.

4.2 CAPACITY BUILDING

Capacity building within the target community is a huge part of any aid project. Developing skills and knowledge is a vital tool in preventing aid dependence. If the people within the community have built the water supply or sanitation scheme themselves they will be able to properly maintain it and may be able to implement the scheme again elsewhere. They will be able to benefit their own community though these skills and may even be able to sell their labour to other communities, having a positive economic effect on the community.

EWBNZ volunteers are well placed to effectively build skills, capacity and knowledge in the local community, due to their practical engineering backgrounds. Volunteer engineers can look to impart some of their knowledge through practical applications and help community members to attaining certification for some of the practical skills they are learning.

Engineers in the field must be aware that due to the level of their practical skill there is a risk they will do too much for the community and opportunities for the local people to learn and build their own skill may be missed.

4.3 MAINTENANCE AND PROJECT FOLLOW UP

Maintenance of the water or sanitation infrastructure is one of the most important issues in wash projects, particularly in water supply. A very high proportion of successful projects fail in the long term due to maintenance issues. If the community does not have the skills and capacity to properly maintain the infrastructure then they become highly dependent on the aid organization who implemented the project to return and keep it up.

Training the local people in operation and maintenance and ensuring that they have a long term maintenance plan is essential for the success of wash projects. Without this there is a high probability that the project will be a relative waste of time and money.

A good way of ensuring adequate training is completed to maintain the system is to use the infrastructure as an incentive for training. In some projects studied the community was not allowed to buy the materials for the project until they had completed all the training required to maintain the system after the project was complete. Educating the community members before the construction phase also gives the people a better understanding of how the system works while they were building it.

Forming a long term relationship with a community is another way of ensuring the infrastructure is properly maintained. Doing more than one project with the same community means that the previous project can be monitored to ensure the community is looking after it properly. Establishing effective lines of communication is essential for project follow up and forming a continuing relationship with the community. However this can be very difficult when working in remote area, and the aid organization must be proactive about following up on the project.

Having an engineering consultancy on board with a project helps with project follow up and maintenance of the system in the following ways:

- It is in the consultancies best interest to ensure the project is successful in the long term
- The consultancy will have better capacity and means to maintain contact with the remote community
- The knowledge/information about the community is maintained and can be easily reused for follow up projects which cuts down on costs and time.

5 CONCLUSIONS

Aid funding in NZ is moving away from “value added” schemes to sustainable economic development programs. This means a move away from community development based projects to activities which produce measureable results for businesses and individuals by improving infrastructure and related services. This means that future aid projects will have a large sustainable development focus and will require increased technical skills and engineering support.

This is where EWBNZ’s unique set of skills will be of great value. There is a specific niche in the aid market for EWBNZ to work alongside other NZ NGOs, providing the technical support and the engineering background which the majority of New Zealand NGOs lack. Through their association with a wide range of engineering specialties and industries EWBNZ can provide capacity in project scoping, environmental risk assessment and management detailed planning, data gathering and analysis. All of these activities are commonplace in engineering projects.

Due to their technical and practical engineering backgrounds, EWBNZ volunteers are well placed to provide the following benefits to aid projects:

- Comprehensive technical expertise leading to more appropriate technology applications
- Skills in compiling detailed and accurate engineers estimates for projects
- Inherent practical skills of the volunteers leading to enhanced skills development within communities
- Engineering knowledge and understanding providing high-quality technical education programs
- Improved maintenance planning through detailed understanding of the implemented technology

There is an increasing need for adequate scoping and risk assessment of aid projects. This aspect of aid projects is commonly undervalued and underfunded in the preliminary stages of aid projects. If anything these projects need more thorough scoping, planning and risk analysis due to the delicate nature and complex issues involved.

EWBNZ looks to bring in engineering consultancies and contractors on design and construction based aid projects. Having these parties involved in projects gives huge benefits in terms of technical capacity, communications, knowledge retention and long term community relationships. There is a vast wealth of knowledge held by the engineering industries in the south pacific. Tapping into this capacity is vital to ensure the success and sustainability of future aid projects in the south pacific.

There are also areas where engineering volunteers may lack skills and capacity in terms of understanding the social and economic impacts of aid projects. This is where EWBNZ can benefit from relationships with other NGO's who may have more experience and a greater understanding of these issues.

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