

## Community Engagement in the Developing World

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# Community Engagement in the Developing World

## Introduction

Baylor University has a long standing program doing service projects in the developing world. Our engineering program has been involved with this since 2005.

We have done projects in Kenya, Rwanda, Honduras, and Haiti. In each of the countries our engagement with the local community in the area has been different. The level of engagement has had a significant impact upon the sustainability of the projects. Our model for how best to do this engagement has changed as we have learned from experience.

We have learned that for our projects to be sustainable there needs first to be a partnership with a local organization who can sustain the technology after we have left. We also need to develop a mechanism within our university where we can sustain the program itself.

In Kenya we worked with one local group, but did not maintain contact with them very well after the project was over. The technology no longer worked after a couple of years. The problem was not the technology, but our lack of involving the local community in a sufficient way for them to have a stake in the technology still working.

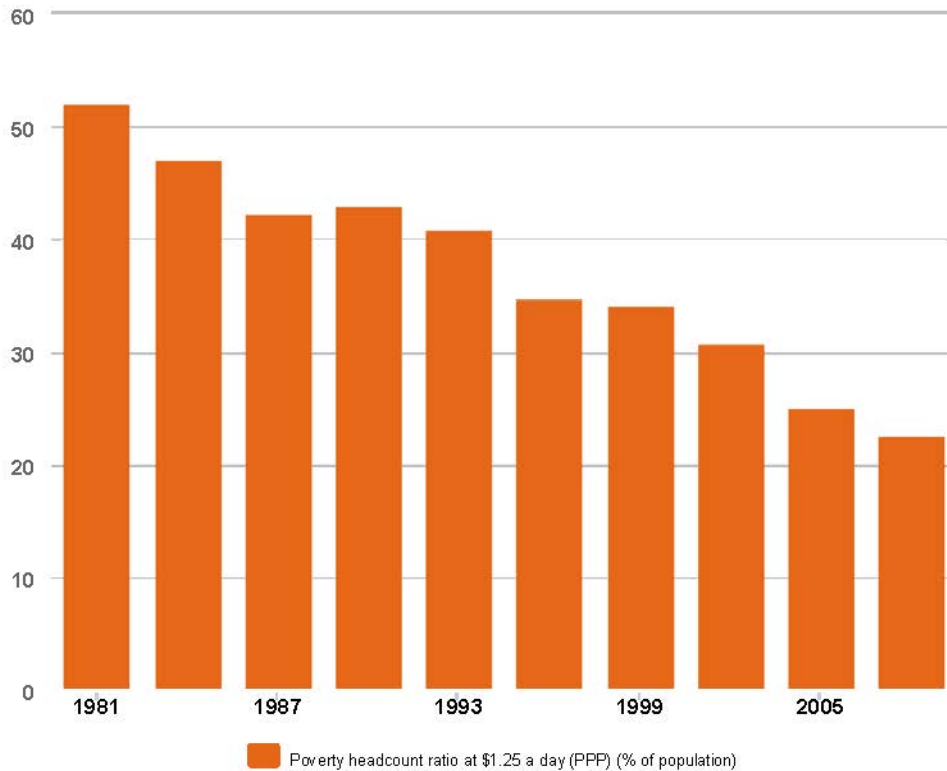
Our projects in Honduras involved different types of student involvement. Some of them were volunteers doing this not for credit. The student leader did this as part of his Master's project. We were involved with a local group that initially appeared very interested. However they were not interested in turning the project into a sustainable business.

In Rwanda we have worked with a local church denomination that is very interested in working with us. Some of the projects were not sustained as there was a change in local leadership at the school where we had done projects. However, each year we ask the local Bishop what he wants done and concentrate on doing something that fulfills his goals for his people. This working model where we work with the local leadership, rather than doing something for them, has great potential. One sustainable issue we still have is the high cost of taking a student group to Africa. While we wish to continue the work in Rwanda, we believed we needed to also do projects more locally where we could more easily involve more students.

Two of our professors have a long standing relationship with a local non-profit group that has been in Haiti for 20 years. Adding technology projects to the other projects they already do appears to be a logical step. They are intimately involved with the local people which will make a big difference. In May 2013 we did a solar project that was well received. We worked side by side with local Haitians on portions of the project. This work has great promise for being sustainable, for it is working with (not for) the local people and is close enough to the United States so that its costs are more manageable.

## World Poverty

One of the motives for our work in the developing world has been to help people get out of extreme poverty. Compared to the West, the developing world is a place with low income, low amounts of technology, and frequently unstable or corrupt governments. The figure below shows the progress that has been made on a global level in decreasing the rate of extreme poverty (living on less than \$1.25 per day).



Created from: World Bank, World Development Indicators

Figure 1 Poverty levels over time. Source World Bank<sup>1</sup>

While world poverty is decreasing when based on the percentage of people living below \$1.25 per day, this is a bit misleading. The decrease in extreme poverty has not been uniform around the world. This is shown in the table below from the World Bank<sup>1</sup>.

Poverty Head Count Ratios at \$1.25 per day (2010) <sup>1</sup>	
Area	Percentage of Population
East Asia and Pacific	12.5
Europe and Central Asia	0.7
Latin American and Caribbean	5.5
Middle East and North Africa	2.4
South Asia	31.0
Sub-Saharan Africa	45.8

The poorest area remains Sub-Saharan Africa where 45% of the people still live in extreme poverty.

### Community involvement

In traditional design the engineers try to design what the customer wants. When working with local communities, it is not obvious whom are the real customers. Local non-profits are frequently acting in the name of the local community. An important question to ask is if the local community really wants what the non-profit is asking the engineer to do.

In their book *Service Learning: Engineering in Your Community*<sup>2</sup>, William Oakes and Marybeth Lima raise several issues that need to be addressed when working in poor communities, whether in the United States or in the developing world. They make the point that engineers and engineering students frequently do not seriously think about how their design might impact a community. The social implications of their designs are not one of the criteria used to assess its success.

Oakes and Lima make the point that engineering in poor communities needs to be done in a democratic way. This does not require that everyone votes on every proposal. It does mean that the local community needs to be involved in the decision making process concerning the project.

This issue has been addressed in a previous ASEE paper by William Fry<sup>3</sup>. He writes:

“technology is *appropriate* in the sense that it mitigates the harmful social consequences of moving too quickly from indigenous, labor intensive technology to high capital intensive technology. Technology appropriate to orderly, sustainable or even humane development (a) gives “special consideration...to *context of use*, including environmental, ethical, cultural, social, political, and economical aspects”;(b) seeks *simplicity* (as opposed to what Langdon Winner terms manifest and latent complexity); (c) chooses *decentralization* over authoritarian centralization; (d) employs *labor intensive* as opposed to *capital intensive* strategies; and (e) addresses itself to the *unique characteristics* of the surrounding community. Working with the marginalized and the poor does not imply charity. Rather, a true partnership with the community that is being served must be forged through a model where the community is involved in decision-making and management of projects. We understand this to be true for our broader view of appropriate technology, and note that this applies, not only to engineers or

engineering projects, but to all who develop, sell, manage, and otherwise proliferate technology.”

For the solution to be sustainable the solution must meet a felt need. The local community must be interested in maintaining the equipment (and know how to do so). However, the local community may not know enough to make specific design related decisions. This is because the engineers know a lot more about what does not work than what does work.

### **Examples of international community involvement**

One example of our community involvement was with the Sunrise School in Musanze, Rwanda. We have been there five times working on different projects. Maintaining sustaining contact with the local community is critical if the projects are to be sustainable. Figure 2 below shows a portion of the school.



Figure 2 Sunrise School in Musanze, Rwanda

The school requested our help with water issues and electricity. In spring 2010 we tested their sources of water as well as their water after they had boiled it to purify it. A photo of one of our students testing the water is shown Figure 3 below.



Figure 3 Testing water quality in Musanze, Rwanda

Unfortunately, the water after boiling had more bacteria in it than before they boiled it. We repeated the test with the same result. We analyzed their process in detail and found out that the boiled water was put in open air vats that were not sufficiently cleaned. They also removed the water by dipping water pitchers (again not very clean) into them to get the water. These results surprised the people at Sonrise School. They said this was an issue that they could deal with.

Unfortunately, when we were there in 2012 we repeated these tests and found the same results. This shows how hard it is to have projects be sustainable. While the leadership appears committed to fixing this problem, it was somehow not fully communicated to all of the workers who were actually handling the water.

When we were there in 2009 we repaired a chlorine based water purifier that someone else had installed and which was no longer working. It worked well until 2012 when they ran out of chlorine tablets. There were no locations in the country where the chlorine tablets could be obtained. We made several experiments trying to get powdered chlorine to work but were not successful. This is an example of a system that is not sustainable (it needs a regular infusion of chlorine tablets from the outside). We will work with them so that they will have a purifier that works with a different technology that is sustainable. This second example shows that even if the local community is engaged, not all solutions will be sustainable.

### **Use of technology**

In general, the more technology the people of a country have access to, the richer will be that country. Some well-meaning people therefore try to put high technology into developing countries in order to move them ahead faster. This is a method we have used in our engineering service projects with very mixed results.

We have been greatly impressed with book *Humanitarian Engineering*<sup>4</sup> by Carl Mitcham and David Munoz. When we read this book in spring 2013 we were astounded as it describes many of the things we were trying to do with our international service projects. They defined humanitarian engineering “is the artful drawing on science to direct the resources of nature with active compassion to meet the basic needs of all – especially the powerless, poor, or otherwise marginalized.”<sup>4</sup> They made the point that humanitarianism is not humanism, though humanists can be humanitarians. Humanitarians can also come with a religious motivation. This makes the point that we are not just doing engineering in a poor country, but we are doing it with the explicit goal of making a difference in the lives of the poor and marginalize.

However, it is not enough just to have good motives. The excellent book by Steve Corbett and Brian Fikkert make some important points about working in the developing world<sup>5</sup>. Their book, *When Helping Hurts*, makes the point that many things well-meaning people do to help those in the developing world only make things worse. For example after the earthquake in Haiti several years ago many people and organizations gave food to help the people survive. Giving such aid freely in times of disaster is very appropriate. However, in this situation people continued to give free rice after the emergency began to subside. The result was that the local rice farmers were devastated. Then when the food gifts eventually slowed down, there was no local agricultural industry left that could help them.

The use of technology needs to be thought through very carefully. Some high technology tools have been embraced in the developing world. For example, the author has travelled into some remote areas in Rwanda, Kenya, Honduras, and Haiti. Yet everywhere he has gone there have been local people using cell phones. Many people without electricity in their homes have cell phones. This has resulted in some new business opportunities, such as cell phone charging stations.

High technology can be used in the design stage without causing any sustainable problems during implementation. For example, when working with the Sonrise School in Rwanda, we used Google Earth to measure elevation changes so that appropriate water pumps could be installed. The figure below is a Google Earth view of the school.





Figure 4 Google Earth view of Sonrise School in Musanze, Rwanda

In the actual implementation you may need to use low technology tools. At the Sonrise School we installed a solar powered water purifier for their secondary school. Part of our installation is shown below in Figure 5.



Figure 5 Unused hand railing used as a ladder.



Sometimes we had to do things that our own university risk management may not approve. These panels had to be bolted to the roof. Here one of our students is installing the bolts in the cafeteria.



Figure 6 Installing the solar panels.

### **Moving toward an entrepreneurial approach**

We have begun to move our international service projects to a more entrepreneurial approach, in hopes that this will be more sustainable. We have had one failure and a current set of projects that look to be sustainable.

Our first attempt was in Honduras. We were motivated to do this by the influential book by C.K. Prahalad<sup>6</sup>. A key part of this is to see the poor as customers. We created a small scale hydro-electric system for us in rural Honduras. While the electrical system worked fine, it was not sustainable because the local community was suspicious of any outside business that made a profit from their neighbors. This was an example of where the local community really wanted the electricity that this business could offer, but was not willing to become involved with a local business to make this happen. This shows the need to really understand the needs of the local community to make projects successful.

We are in the beginning stages of working in rural northeast Haiti. This has the promise of being more sustainable than some of our other efforts. We are working with a local (to our university) non-profit that has been working in this part of Haiti for 20 years. However, they have not done

any engineering projects so far. They also have close ties with local people and organizations in the village.

In spring 2013 nine students and two professors went to Haiti. We worked on a variety of projects. One was testing water in their river and at several pump sites. We verified that a couple of their wells were now contaminated and should no longer be used. We tested several differing filtration devices that could be used in individual homes to purify the water. We tested water from the flowing river and from the edge of river. Both were contaminated, but the water from the edge of river had more bacteria. One of our students is taking a river sample in the photo below.



Figure 7 Sampling water from the edge of the river.

One of the goals of our local partner is to create a small industry making family level water purification devices. This was a key reason why we tested several different methods while we were in Haiti.

Our largest project was to install a solar powered electrical system in a community training center in the village. This center is already being used by many people. Now that it has electricity and lights it will be used even more intensely. Before we left Haiti we trained both the local people and our U.S. partners on how to run the system. So far (7 months later) everything is still working well. We plan on going back to Haiti in May 2014 to continue with several other similar projects in the community.

The photo below shows our students working on the solar panels on the roof of the community training center.



Figure 8 Working on the solar panel installation

### Reaction of our students

Even though we have had many failures, we keep doing these projects for several reasons. We think we have finally figured out a way to work with a local community in a sustainable way. In this way we are now making a difference in the lives of poor people in the developing world. We also are seeing our students changed. Some student comments are shown below:

From our 2009 Rwanda trip

- I believe that my trip to Rwanda really showed me how materialistic my life is. The engineering project at the Sonrise School illustrated to me how little I truly know about real world engineering. However, I was able to learn so much by tackling a challenging project and getting my hands dirty. Most importantly though, I discovered that I can make an impact in the world using my natural abilities and engineering education.
- The opportunity to travel to Rwanda during May of 2009 allowed me to grow not only as an engineer, but also as a person. Furthermore, my eyes were opened to the vast cultural and other differences around the world. I now realize how engineering is interrelated with government, economics, religion, culture, education, and business. I will forever remember the lessons I learned during my time in Rwanda and am driven to build upon this experience to make the largest impact I can throughout my professional career and my personal life.

From our 2010 Rwanda trip

- This was the greatest day of my life.

- There is little doubt in my mind that the lives of both Baylor University team members and students at the Sonrise School in Musanze, Rwanda were completely transformed. We left Waco two weeks ago as seven individuals in search of ourselves and returned to Waco as a team of individuals whose lives have been changed. We also gained invaluable experience in another cultural landscape and gained knowledge of dealing with the circumstances present in developing countries.

## **Forming community**

As we have learned from our activities, we have a mixed record with creating communities. It is clear that our students have been formed into communities. One illustration of this is that several students from the 2013 Haiti trip have already volunteered for the 2014 Haiti trip. Their work together has the potential to change their lives in a major way.

With respect to the places we have worked, we believe we are part of the communities in Rwanda and Haiti. In both places we have continued contact with our local partners that can have long term results. While the technology things in Rwanda were not very sustainable we believe the sense of community will continue and will help us in future activities there. With respect to Haiti we have, in effect, joined a community of Americans and Haitians that already was well established. This should help us greatly in our future engineering service projects.

## **Lessons learned**

We have learned several important lessons with respect to community engagement in the developing world. Among them are:

- Develop long term relationships in the community. This will greatly improve the likelihood that your work will be sustainable.
- Spend enough time in the community to make sure that what the leaders want to see happen is also what the local people want to see happen. Sometimes leadership can be self-appointed and not necessarily represent the real concerns of the people.
- Spend enough time with the local leaders to make sure you understand what they want to see accomplished in their community. A sustainable project is one that they want, not just one you want to do. Do not be too eager to suggest specific solutions. Many people in the developing world are so eager to get western help they may agree (at least on the surface) to whatever you suggest. Once you get to know the local people you can really find out what problems they would like to see addressed. They may not know how to fix it, but they know what problems are really important to them. In the case of the example from Honduras we provided a solution (a local for profit business) that did not really address their real concerns. A better approach was what we have done in Rwanda, which is to ask the Bishop each year where he would like to receive help.
- These projects can be done to a local group, for a local group, or with a local group. The first one is patronizing. The second one may still deal with a real problem. However, if you do a project for some group, they may not buy into it enough to be willing to sustain it. The best situation is when you do something with the local group. While you will be providing something they do not have (engineering expertise) they should also be involved with the work in some way.

## References

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<sup>1</sup> World Bank Development Indicators, from web page worldbank.org on 2/11/14..

<sup>2</sup> Service Learning: Engineering in Your Community, Marybeth Lima and William Oakes, Oxford University Press, June 2013.

<sup>3</sup> William Fry, ASEE paper 2012

<sup>4</sup> *Humanitarian Engineering*, by Carl Mitcham and David Munoz, Morgan and Claypool, 2010

<sup>5</sup> *When Helping Hurts* by Steve Corbett and Brian Fikkert, Moody Publishers, Chicago, Illinois, 2012.

<sup>6</sup> *The Fortune at the Bottom of the Pyramid: Eradicating Poverty Through Profits*, by C. K. Prahalad, Pearson Prentice Hall, 2009.