GAMBIA LIFEWATER PROJECT

Summer 2013 Case Study Report prepared for Child Relief International

A Water Charity Initiative

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This case study documents the handpump crisis in rural Gambia, West Africa, and the Gambia Lifewater Project's efforts to combat it. Moreover, it chronicles the organization's strategies, challenges, and accomplishments in securing rural water security for remote villages. Special focus is placed on the group's Summer 2013 pump rehabilitation campaign. Included in the appendix is a work log of the charity's project sites in 2013.

1. Context: Background information, climate, concerns, issues

Waterborne Diseases and the Global Water Crisis

In the developing world, access to clean water is key to reducing poverty and hunger, improving child and maternal health, and securing human dignity and freedom. Rural communities without protected water sources have no choice but to rely on contaminated surface water and uncovered shallow wells and scoop holes for their water needs. This practice exposes them to serious—and frequently fatal—waterborne diseases like dysentery and diarrhea. After pneumonia, diarrhea is the second-leading killer of children globally. Every year, it kills 1.5 million children under the age of five, a higher human toll than HIV/AIDS, tuberculosis, and malaria combined.[1]

The disease burden of diarrhea and other waterborne illnesses hampers the health of local populations, and the lack of adequate amounts of clean water severely limits agricultural potential and economic opportunities. For poor agrarian communities, being without clean water means living in ill-health, vulnerability, and insecurity. Sadly, this is the grim reality for more than 768 million women, children, and men in the Global South today.[2]

Over the last few decades, foreign aid agencies have provided remote villages with clean water, largely through the digging of concrete-lined wells, and the installation of manually-operated handpumps. With these new sources of potable water, locals no longer have to draw their water from dirty sources.

These pumps have helped hundreds of thousands of villages throughout the developing world access clean water. But due to poor maintenance and repair strategies, the lack of spare parts, and high repair costs, these handpumps are breaking. While the majority of pumps were installed by humanitarian organizations years ago, very few have taken the responsibility to repair or maintain them or train locals to do so. As a consequence, many pumps break down or develop mechanical problems within their first few years of operation. Today, in Africa alone, 40 percent of all handpumps lie in disrepair and are abandoned.[3] The remaining 60 percent that do function are largely comprised of more recently installed pumps, or are maintained at high cost.

With such a large proportion of handpumps breaking or broken, a closer look into the effectiveness of foreign aid and development programs in the water sector is warranted. Despite the millions of dollars spent on providing poor villages in the developing world with clean water, gains have been short-lived, and sustainable clean water access still proves elusive for countless communities.

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[1] UNICEF/WHO. Diarrhoea: Why Children are Still Dying and What can be Done. 2009. Pg. 1.

[2] UNICEF United States Fund. "Clean Drinking Water." 2013. <http://www.unicefusa.org/work/water/>.

[3] Fairwater. "Fairwater Supports BlueZones in Africa." <http://www.fairwater.org/>.

Rural Gambia: Socio-Economic Background

The Gambia is the smallest country in mainland Africa, located in West Africa and geographically surrounded by Senegal. The country's relative political stability has not translated into prosperity or general well-being for Gambia's estimated 1.8 million people. The nation ranks 168th out of 187 countries and territories represented in the 2011 UN Human Development Index, and nearly 36 percent of Gambians live in severe poverty.[4] Communicable and waterborne diseases are prevalent and poverty is especially apparent in rural populations. The World Health Organization (WHO) estimated that in 2008, diarrheal diseases were responsible for the deaths of some 880 Gambian children under the age of five years.[5]

Due to chronic government underinvestment and inattention to rural water infrastructure, many poor, agrarian communities continue to struggle in securing reliable access to clean water. Unpredictable rains and drought experienced over the last three decades are also significant stressors. Furthermore, rapid population growth and increased demand for livestock, agricultural, and domestic water needs strains limited water resources.

From the 1980s, governmental and aid agencies have installed handpumps in an effort to address rural clean water shortage. However, these pumps, designed for use in India, have a shockingly high failure rate in Africa. Past studies indicate that 40 to 80 percent of all handpumps in Africa break down within three to five years. Lack of spare parts and the absence of an effective village-based strategy to maintain or repair pumps often lead to pump failure and subsequent abandonment. The Rural Water Supply Network estimates that 36 percent of hand-pumps in sub-Saharan Africa are now defunct.[6]

In recent years, the Government of the Gambia has prioritized the construction of multi-village solar powered water supply systems in large, rural villages throughout the country. However, smaller, more remote villages are overlooked and are left to rely on ageing handpumps, which often break.

Furthermore, limited access to water exacerbates existing social inequalities; a 2006 UNICEF report reveals women are more than five times as likely as men to collect drinking water for the household.[7] Average time spent traveling to a water source is approximately 21 minutes, and pumping for water may be equally as time-consuming.[8] A deteriorating or broken pump leaves communities few options to access water. Women and girls—those traditionally responsible for fetching water—have to pump longer or walk further to find other water sources, resulting in less time and energy for school, farm-work, child-care, income generating activities, and recreation.

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[4] UNDP, Human Development Report 2011. <http://hdrstats.undp.org/images/explanations/GMB.pdf>.
[5] Sanitation and Water For All, "The Gambia Government 2012 HLM Statements of Commitment 2012."
<http://www.sanitationandwaterforall.org/files/The_Gambia_-_Statement_to_2012_HLM_EN.pdf>
[6] Harold Lockwood. "How to Improve Development Assistance in the Rural Water Sector." 25 Jul. 2010. Johns Hopkins University Global Water Program.
<http://globalwater.jhu.edu/magazine/article/how_to_improve_development_assistance_in_the_rural_water_sector/>.
[7] UNICEF, "The Gambia Multiple Indicator Cluster Survey: 2005/2006 Report."
<http://www.unicef.org/gambia/MICS_III_Main_Report_final_version.pdf>.
[8] Ibid.

A broken hand-pump can also lead locals to open covered wells, risking contamination of the water source and increasing exposure to waterborne diseases such as bacterial and protozoal diarrhea, hepatitis A, typhoid fever, amoebic dysentery, and giardiasis.[9] The World Health Organization (WHO) estimates that diarrheal diseases were responsible for the deaths of some 880 Gambian children under the age of five years in 2008.[10]

Mark II Handpumps

The vast majority of pumps installed are German-made versions of the popular Mark II handpump. Dutch, Indian, and French-designed variations are also available, albeit in smaller quantities and of inferior quality. However, the main drawback of the Mark II is that it is comprised of many moving parts, which wear down from regular use and abuse. The country also suffers from a poorly-developed supply chain—Most German replacement parts are available from a single distributor in Banjul, Gambia's capital city, and at monopoly prices, these imported parts are extremely expensive.

If pump parts are not regularly replaced, this leads to mechanical failure. When pumps break, government and NGO assistance is usually unavailable. Villages are subject to the mercy of mechanics, who often use second-hand parts and overcharge. Communities either cannot afford repairs or are tired of paying for poor quality, expensive repairs for pumps that keep breaking down.

Desperate for water, locals sometimes pull out broken pumps, and revert back to using non-sterilized buckets and rope to draw water. In the process they contaminate protected water sources and return to using dirty water, exposing themselves to waterborne diseases. Thus, the cycle of poverty and ill health continues.

The Gambia Lifewater Project

Founded in August 2011, the Gambia Lifewater Project (GLP) provides under-served villagers with more dependable sources of clean water for domestic, agricultural, and animal husbandry needs. The organization rehabilitates broken handpumps and performs preventative maintenance and servicing for ageing ones. The humanitarian group provides repairs at no cost to local communities in three districts[11] in Gambia's Central River Region and is the only organization in this area working on manual handpump repair. From 2011 to 2013, the organization has repaired and installed 39 pumps in 23 villages, improving clean water access for more than 13,000 women, men, and children.

By improving water availability for underserved rural communities, GLP seeks to decrease the incidence of waterborne illnesses, improve local quality of life, and dramatically lessen the burden of water collection, especially for women and girls.

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[9] "The Peace Corps Welcomes You to the Gambia." p. 42. <http://files.peacecorps.gov/manuals/welcomebooks/GMWB635.pdf>.

[10] Sanitation and Water For All, "The Gambia Government 2012 HLM Statements of Commitment 2012." <http://www.sanitationandwaterforall.org/files/The_Gambia_-_Statement_to_2012_HLM_EN.pdf>

[11] These three districts are Niamina Dankunku, Niamina West, and Upper Baddibu

GLP envisions a future where all Gambians have access to clean water and a future where no rural community suffers from water shortages, broken water infrastructure, or waterborne diseases. The charity imagines a Gambia where all citizens have their domestic, agricultural, and livestock water needs met by reliable access to a safe and adequate water supply.
Strategies Described: Approaches taken, Agencies, and Actors Involved

2. Approaches Taken

The Gambia Lifewater Project is a small, community-based organization that aims to rehabilitate breaking and broken handpumps. It surveys rural villages and identifies and inspects Mark II handpumps. With the approval of village leadership, the organization purchases new replacement parts and uses a government-certified mechanic to provide preventative maintenance and repairs, extending the life of Mark II pumps for another three to five years.

While the lion's share of GLP's work revolves around fixing Mark II pumps, it is also beginning to install new pumps as well. Some villages have pumps that are damaged beyond repair. Others have just one pump that might break down at any time. For these water-vulnerable communities, the Gambia Lifewater Project replaces old Mark II pumps with more reliable and durable Bluepumps, which are donated from Fairwater, the Dutch manufacturer of the pump. These improved designs have 20 year projected lifespans, are far simpler to maintain, have higher water output, and do not regularly require spare parts. To date, the Gambia Lifewater Project has received three donated Bluepumps, and all three recipient communities prefer the new Bluepumps over the breakdown-prone Mark IIs.

In 2011, the group began its foray into pump repair by fixing three Mark II pumps in three villages. In Summer 2012, the organization operated in 10 villages, fixing 17 Mark II pumps and installing 3 Bluepumps. One of the Mark II pumps was previously worked on the year prior. In 2013, GLP worked in 17 villages, rehabilitating 23 Mark II pumps, including five previously fixed pumps that had developed new problems.

2011		2012		2013	
Village name	# of pumps	Village name	# of pumps	Village name	# of pumps
Sare Lefa	1	Sare Lefa	1	Demba Kunda	1
Fula Kunda	2	Dankunku	2	Sowe Kunda	1
		Choya	2	Fula Kunda	2
		Sare Sambel	1	Dankunku	2
		Naani Kunda	2	Touba Murit	1
		Touba Murit	1	Dakar	1
		Madina Wallom	2	Babou Jobe	1
		Sinchu Njabo	1	Dalaba	2
		Kani Kunda Suba	4	Kerr Lein	2
		Kani Kunda Tendala	4	Choya	1
				Kabamba	1

				Sare Yarro	1
				Papa	2
				Madina Wallom	1
				Sare Bakary	1
				Sare Saidou	2
				Sare Mesirah Alieu Gano	1

As the group continues repairing pumps, it strives to uphold best practices for transparency and accountability, including documenting parts purchases with receipts and recording pictures, videos, and video testimonials at pump repair sites. In 2013, GLP also purchased a global positioning system (GPS) device to mark each new project location. All of this information is made available to donors and funding partners like Water Charity, SONEVA Slow Life Trust, and Child Relief International.

However, the GLP is a very small organization with extremely limited assets. Plans to scale up, especially in fundraising, are being developed. But depending on resources available, GLP has had to adopt different strategies on pump repair. In 2011, the charity bought spare parts and paid a mechanic to do the pump repair work for three Mark II pumps in two villages.

In 2012, while GLP staff had very large ambitions, a rather modest budget allowed the group to carry out only necessary repairs for broken or breaking components on Mark II pumps. To save costs, generic axle bearings and grease was purchased. While on repair treks, the group at times ran out of components. For instance, lacking replacement pump chains, the GLP had to leave old, worn down chains in place on some pumps. While the chains still functioned, they were obviously wearing through and could snap at any time. Unfortunately, there are always more pumps in need of repairs than the organization is able to do, and GLP must decide which are most cost-effective and feasible to fix. However, this means that some communities are left with breaking and broken pumps and must deal with the associated health and social ramifications of insecure water supplies.

In 2013, GLP was fortunate enough to receive a significant increase in funding from Child Relief International that allowed the organization to broaden from solely fixing broken pumps to also performing preventative maintenance. Parts that were not completely broken were replaced. Instead of purchasing just a small number of critical parts such as cylinder components, axle bearings, handle axles, and chains, GLP also replaced rod couplings and check nuts, as well as hardware. Moreover, for severely damaged Mark II pumps, GLP also bought replacement conversion heads, water tanks, riser pipe holders and gaskets, pipe sockets, handles, cylinder end pieces, and rod guiding plates, in addition to tools and neo-fermit and anti-seize pastes (to protect parts again corrosion). By greatly expanding its stock of repair parts and supplies, GLP drastically raised its ability to perform higher quality repairs, leaving less worn out parts behind that could cause mechanical issues later. This elevated thoroughness of repairs translates directly into more robust rehabilitations and most importantly, more reliable water supplies for local communities.

Another aspect that crucially factors into GLP's approach is that most Mark II pumps in Gambia are German-built versions. As previously mentioned, Indian and Dutch versions have also been installed in country, but German variations are usually favored for their technical superiority and longer life. The major differences between these distinct Mark II adaptations can be found in handle and chain dimensions and the cylinder design. Handles and chains of different make can often be modified to functionally interchange with one another. However, the most important discrepancy between manufacturers is the cylinder—the pumping mechanism that draws water from the bottom of the well to the above-ground water tank and spout. Indian and Dutch versions are not only notorious in their quick failure rate, but also do not have readily available spare parts. Once a problem develops in these cylinders, there is no way to professionally and reliably fix them.

In contrast, German cylinders can be serviced with replacement gaskets, rubber cups, and springs manufactured by German Water and Energy (GWE). These parts form a cylinder repair kit that is a compatible with older German-made Grundfos and Pumpenboese two-strap cylinders[12]. Although they are difficult to find, they are usually available from Jagne's Electrical and Construction Company (JECCO), GWE's sole distributor agent in Gambia.

Because of their reliability and spare part availability, for Mark II pump repairs GLP stocks German parts and works exclusively with German cylinders. In a minority of cases, GLP has replaced broken Dutch and Indian cylinders with refurbished and retrofitted German cylinders. However, due to the prohibitive cost of new German cylinders and the scarcity of second-hand cylinders, at this time, GLP is unable to fix the high number of defunct Dutch and Indian pumps in its project area.

Characteristic of its humanitarian focus, GLP does not charge a fee for replacement parts. But increasingly it asks for a token contribution from beneficiary communities. This can range from as low as USD $3 to $30, depending on the size of a project village, how many pumps are being repaired, and how expensive a repair job is. Such a small payment does not do much towards paying for hundreds of dollars in parts typically given to each village, not to mention covering additional expenses like transportation, communication, and staff salaries. But it is a practical method for gauging expressed interest from villages. The idea is that if communities are willing to pay for water infrastructure, they will value handpumps more and take better care of them.

However, willingness to pay does not always come hand in hand with an ability to pay, especially for a country with rampant rural poverty. As a result, GLP remains open to evaluating other methods and strategies for fostering community ownership. It is important to note that no village has ever been denied repairs if they are not able to pay any amount.

But GLP has passed villages for repairs if local leadership is apathetic to maintaining community pumps. In comparison, the group remains extremely responsive to locals' expressed interest and need for pump maintenance. Many community members have phoned or visited the organization's home base at Sare Lefa village asking for assistance and offering fuel, donkey

[12] GWE also manufacturers a different type of repair kit for its newer four-strap cylinders. These four-strap cylinders are much newer that the older, two-strap ones. A different type of repair kit is needed for these designs. GLP has provided repairs for only one four-strap GWE cylinder.

carts, motorbikes, and other means of transportation to take GLP personnel and staff to repair sites. For most requests, GLP is able to conduct preliminary assessments, usually followed by repairs.

Agencies Involved

The Gambia Lifewater Project's success rests on maintaining amenable relationships with Government of the Gambia officials, parts suppliers, and donors. From 2011 to 2012, the charity operated completely independently in Gambia, but was finally able to start building relationships with Gambia's Department of Water Resources in 2013. The Department provides 84 area mechanics throughout the country with the training and tools to maintain Mark II pumps. However, it does not have the funds to supply them with new replacement parts for repairs. It occasionally provides secondhand parts, but rather than focusing on maintaining old pumps, the Department's priority is on drilling new boreholes and wells and installing new Mark II pumps and solar pumping systems.

The Gambia Lifewater Project's efforts to rehabilitate neglected pumps aligns with the Department's goal to increase rural water access and provides extension services in a chronically underserved region of the country. Despite the Government's interest in fix breaking and broken pumps, it does not have the capacity or resources to do so. In 2013, Head of Rural Water Supply Al Haggi Jabbi met with GLP and voiced his support for the group's work. Although the Department does not control the import and pricing of pump parts, work supervisor Lamin Danso helps deliver materials from the parts supplier in Banjul upcountry to Soma. This assistance has significantly cut down on the time and money the organization has had to spend on traveling for supplies. GLP also relies on Mr. Danso for technical advice on pump repairs.

GLP purchases parts from Jagne's Electrical and Construction Company (JECCO), the sole distributor of GWE handpumps and spare parts in the whole country. It is the only entity that directly imports German-made Mark II handpump components. Tracing the supply chain to JECCO has helped GLP avoid dealing with middlemen.

Although, GLP currently possesses the capacity to repair Mark II pumps in rural villages independently, the ability to bring Bluepump technology to rural Gambia centers on a strategic partnership with Fairwater Foundation and SWE-GAM. Fairwater Foundation is the charitable arm of Fairwater, the manufacturer of Bluepumps. GLP has been able to secure a number of pumps paid for by Fairwater's corporate sponsors for installation in developing countries. SWE-GAM, a Swedish and Gambian-owned company, is Fairwater's local Gambian implementing partner that installs and repairs Bluepumps in country. Through the generosity of Fairwater and its donors, GLP is able to introduce a preferential pump that is far more technologically sustainable and robust than the Mark II pump. The Bluepump is not only more durable, the output volume is higher, and it is easier for locals to use. Ideally, GLP would like to raise funds and transition to replacing Mark IIs with Bluepumps and eventually developing new water points with the Bluepumps.

Outreach to other NGOs and interested grant-making organizations working in the domain of water supply and rural development of water infrastructure is ongoing. GLP has received past

financial support from SONEVA Slow Life Trust, the Elmo Foundation, and Child Relief International, in addition to a number of individual donors. These funds have been disbursed through Water Charity, a registered 501(c)3 incorporated in the State of California.

Staff Members

The GLP field team is small, but agile. Jeremy Mak, a Master's student at Syracuse University and former Peace Corps Volunteer, manages project coordination and fundraising. He has more than 8 years' experience in international development and water and sanitation. His Gambian counterpart Jaye Jallow leads community relations and communications. Native to the area and fluent in the local Fula, Wolof, and Mandinka languages, Jaye helps villagers understand GLP's mission and assists in pump repair and installation planning. Jeremy and Jaye survey local villages and conduct preliminary inspections on pumps in need of servicing or replacement. Demba Jaow, a trained and certified local technician, supervises Mark II repairs. By retaining in-house technical expertise to repair pumps and purchasing parts directly from suppliers, the organization is able to keep expenses down while remaining as cost-effective as possible.

3. Challenges

The Gambia Lifewater Project operates in a very turbulent environment chock full of challenges and frustrations, such as limited resources, aid dependency, and theft. Some are within the organization's ability to control, but many are not. First and foremost, the number one challenge is operating on a tight budget in Gambia's handpump market. GLP aims to reach as many people as possible per dollar, but due to the sole distributorship of German pump parts, the organization has to pay inflated prices. GLP compared ex works price quotes from GWE's factory in Germany with JECCO's prices in Gambia. Parts are marked-up as high as 300 percent.

Table 1: Comparing in-country German pump parts prices from JECCO to factory direct prices from GWE

Item	JECCO Price Gambian Dalasis	JECCO Price USD	GWE Price Euros	GWE Price USD	Markup
Cylinder Repair Kit	1,992.38	54.54	12	15.87	304%
Chain	1,630.13	44.62	14	18.51	241%
Axle	905.63	24.79	12	15.87	156%
Handle	8,271.38	226.37	108	142.8	159%
Cylinder	21,155.40	579.08	237	313.36	185%

In an effort to lower the local prices of German pump parts and increase their availability, the Department of Water Resources has attempted to break JECCO's sole distributorship rights multiple times. By having numerous suppliers importing and selling pump parts throughout the country, villagers would have an easier time accessing critical spare components and fixing broken pumps.

Without the resources or facilities to buy factory direct or receive freight purchases from Germany, GLP has had to rely on JECCO for parts. The high cost of pump parts leaves very little for staff compensation, equipment, medical and first aid supplies, and transportation.

Excited to have received more funding support in 2013, GLP team members weighed options whether to purchase a horse and horse-cart or a motorbike to help with transporting supplies and personnel to work sites. But due to budget constraints and the increasing number of requests from communities for help, the group chose to spend funds on pump parts rather than buying a horse or motorbike. But this relegated the team to rely on much slower donkey carts or hiring horse-cart or motorbike owners or van drivers for transportation. Sometimes, the team would spend up to 7 hours a day on donkey carts, just traveling to work sites. Other times, drivers either did not show up or cancelled last minute. Had GLP possessed better means of transportation, pump repairs would have taken much less time to complete. Of course, buying a horse and horse cart or a motorbike would have left less funds for repairs, the organization could have conducted more village assessments in farther areas and also avoided exhaustion and fatigue from tiring commutes. In addition to long hours traveling over poor roads in sun and rain, the actual task of pump repair is very physically intensive and draining.

In 2013, another issue financially was that fund disbursement proved to be a lengthier process than anticipated. $10,000 in funds from Child Relief International were split up into five $2,000 installments, which were planned to be transferred from Water Charity to GLP in Gambia through Moneygram. However, GLP's spending rate exceeded Water Charity's usual fund disbursement timetable. When parts were available, money to buy them was not, and vice versa—This inconvenience created a bottleneck of delays, and ultimately, 15 percent of funds were returned back to Child Relief after GLP completed its work schedule and suspended its activities for the rest of the rainy season. Had a quicker fund disbursement schedule been in place, or if installments were larger amounts, GLP could have served more identified villages with pump repairs. On the other hand, GLP had specifically requested a $2,000 maximum amount per installment, as carrying and storing a larger amount without access to a safe or lockbox presented a considerable security liability.

Additional challenges include local indifference and misunderstanding with regard to pump repair and maintenance. Many communities do not take care of their handpumps and abuse/misuse them, and when offered free pump repairs, some communities decline them, or are simply uninterested. Some villages with broken pumps do not return phone calls and offers for free pump repairs. In 2012, GLP crossed the Gambia River and fixed a number of pumps in Kani Kunda Tendala and Kani Kunda Suba in Upper Baddibu District. Passing through the same area in 2013, the charity saw that some of these pumps developed new problems. Village leaders were nonresponsive to multiple offers to fix these pumps. For these communities, the organization has no choice but to attend to other villages that are easier to work with.

Other communities sometimes demand more services than GLP can offer. For example, Si Kunda and Kalikajara are two communities whose pumps broke down years ago and were subsequently stolen. Both villages had to turn their once covered wells into open wells. Each village's well cover accommodated two pumps. In 2012, GLP offered to give each village a Bluepump. Leaders from the villages agreed, but the day before the pumps were to arrive, they

reneged and insisted that they receive two pumps each. Not having the number of Bluepumps available to meet these demands and unable to convince the communities otherwise, GLP installed the Bluepumps in other villages, Madina Wallom and Choya. To this day, Si Kunda and Kalikajara leadership has not approached GLP to help them with pump repairs, and unfortunately, the villagers there still drink from dirty, open wells.

At times, village leaders mistakenly assumed that just because their handpump(s) produce water, that they do not need servicing. Most leaders are men, who traditionally do not fetch water and often do not visit the community pump at all—so those making decisions about the maintenance of local pumps can be very far removed from experiencing the hardships of using broken ones. Although serious handpump issues were seen by GLP at Jawlaba and Pinai villages, the group's services were rejected by local leadership.

Some lay members of beneficiary communities also wrongly assume that when GLP performs pump repairs, the old, worn parts that are replaced are still in good condition. Some believe that low quality parts are being installed in their place. To resolve this misunderstanding, GLP allows villagers to inspect all parts and leaves old parts with a village leader, usually the *alkalo*, or local chief.

In 2013, poor timing proved to be an extremely cumbersome obstacle. Jeremy could only manage time off from graduate school during the summer months. Unfortunately, this period coincides with Gambia's rainy season, when local farmers like Jaye and Demba must tend to their fields and plant coos, corn, and peanuts. It was very difficult to pull the two Gambian team members away from their livelihoods, especially given that all food grown during the rainy season must carry their families until the next rains. In addition to a busy workload, the rainy season also makes rural transportation very difficult. Strong rains can wash away roads, and indeed many pathways are difficult to travel. The team has been caught in downpours and in dust storms on the way to repair sites and during actual rehabilitations.

Another obstacle is pump theft. Rather than helping communities fix broken pumps, one of the area mechanics in GLP's program region has for years pulled out, stolen, and sold defunct pump parts for personal profit. In 2013, GLP reported this illicit activity to the Department of Water Resources. An official stated that this mechanic would be stripped of his tools, with possible further consequences. While this unscrupulous mechanic may be blacklisted, others are out there. Pump parts are popular on the black market—pipes serve as strong pull poles for carts, and other metal components can be melted down to form farm implements. Theft is a constant worry. GLP recommends to communities with broken pumps to not have any mechanic disassemble them until an assessment be made. Prior to GLP retrofitting a broken pump that had been pulled out in Babou Jobe Village, a critical piece had gone missing.

An extra challenge was trying to obtain second-hand German cylinders, which are much cheaper than new four-strap ones. GLP's contacts in the Department of Water Resources were able to assist in locating four such cylinders, but only one was in good condition. This single cylinder replaced the damaged Indian cylinder at Madina Wallom. Other replacements were needed at Modikaya, Colley Kunda, and Choya, but as they were unavailable, GLP could not repair the

pumps in these communities. While Choya has a functioning Bluepump, Colley Kunda and Modikaya's other water sources are only open wells.

Next, GLP has also been approached by dishonest authorities trying to personally benefit from the organization's work. Action Aid, a large NGO, commonly grants schools and communities funds for local projects. One school in Kerr Lein Village was given monies to fix a defunct pump. Officials asked GLP to assist, but low-balled the figure Action Aid had actually given the community, intending to take some of the funds for themselves. GLP decided to not be involved.

Another persistent issue is that maintenance of Mark II pumps is very difficult to upkeep. As they are comprised of many moving parts, numerous components can develop problems shortly after repairs. Coupled with misuse and abuse, the lifespan of these pumps in Gambia is very limited. While locals undoubtedly benefit from pump rehabilitations, the gains of Mark II pump repair may not last as long as expected. Eleven of the pumps serviced in 2012 broke down again, and GLP could return to fix only three of them. Similarly, in 2013, the cylinder of the Mark II pump at Choya broke within weeks after the chain was replaced.

While the technologically superior Bluepumps are ideal replacements for ageing Mark II pumps, GLP does not have the funds to influence their availability. Instead, the organization has to rely on an inconsistent supply of donated pumps from Fairwater. Elevating fundraising capacity is a strategic and critical goal, which will, in the future, allow GLP to purchase Bluepumps en masse and execute large-scale installation plans throughout Gambia's Central River Region.

Lastly, GLP has no means to monitor pump repairs and follow-up on activities when Jeremy is not in country. Jaye and Demba have no formal training in reporting and/or basic camera and computer skills. Because of poor communications, it is problematic for Jeremy to arrange activities remotely. Also, GLP does not have the funding resources to offer year round pump repairs.

4. Outcomes: Accomplishments and Future Plans

In 2013, the charity rehabilitated 23 handpumps in 20 villages, benefitting 9,000 people and reaching twelve new communities. In its history, it has fixed 36 Mark II pumps and installed three Bluepumps in 23 villages. Perhaps most notably, the organization has restored thirteen pumps that were completely broken and abandoned. GLP is the only entity working on fixing and maintaining handpumps in this region. It has begun developing a donor base, as well as garnering the support of local Gambian authorities.

The Gambia Lifewater Project constantly evaluates its programs and identifies areas in need of improvement, and is strategizing ways to scale up, including creating an online presence and fundraising through media. The organization is always looking for ways to more effectively increase clean water access in Gambia's rural Central River Region. However, the charity is mindful of its limitations. It realizes that the time horizon on the lifespan of Mark II pumps is quickly approaching, and that communities need more durable solutions for sustainable water access.

Appendix I: Gambia Lifewater Project Finances 2013

Gambia Lifewater Project Summer 2013 Budget			
Item	**Price**	**Quantity**	**Total**
Mark II Replacement Parts	-	-	$7,200
Camera and GPS Document Supplies, Batteries	-	-	$250
Local Transportation	-	-	$150
Mark II Mechanic Per Diem – Demba Jaow	$100	3 months	$300
Program Coordinator Per Diem – Jaye Jallow	$100	3 months	$300
Communication (cellphone scratch cards and internet time)	$50	3 months	$150
Bonus – Jaye Jallow	$75		$75
Bonus – Demba Jaow	$75		$75
Total			$8,500

Appendix II: Gambia Lifewater Project 2013 Pump Rehabilitation Log
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Update 1
6/25/13

I hope this email finds you well. I'm writing to happily inform you that in just the past week, we've fixed 8 handpumps and maintained/adjusted 2 others, benefiting an estimated 4,484 people. We've also surveyed many other pumps for repairs and possible Bluepump installations. Transportation is more difficult that we anticipated, and we have to compete with the busy rainy/planting seasons, but we're confident we can continue critical work to improve rural water security.

Here is a quick list of what we've done:

Pump 1
6/19/13
Sare Demba Village
Alkalo Al Haggie Mombuya Jallow
14 compounds / 240 people
GPS coordinates: N 13 degrees 32.769'
W 015 degrees 18.875'

Synopsis: Demba Kunda's 5 year old solar borehole connection breaks from time to time, forcing villages to walk to nearby Sowe Kunda for drinking water. They have 2 open wells and 1 handpump that was installed in 1999, which has had no maintenance or repairs on it in 14 years. We replaced cylinder seals, gaskets, and springs; axle bearings, the axle, the chain, and new bolts and nuts. We also added new teflon seals between the pipes to prevent leaks. We might be able to convert one of the open wells to a Bluepump.

Demba Kunda 6/19/13 Pictures:
https://plus.google.com/photos/101278235198628512970/albums/5928512825111315073?authkey=CKC9q8ag3tG4cA

Demba Kunda 6/19/13 Video: http://www.youtube.com/watch?v=Teb2a9KtRUg

Pump 2
6/19/13
Sowe Kunda
Alkalo Cherno Sowe
8 compounds / 100 people
GPS coordinates: N 13 degrees 32.737'
W 015 degrees 18.455'

Synopsis: Sowe Kunda's Mark II handpump was also installed in 1999, with no repairs since. Here, we also replaced cylinder seals, gaskets, and springs; axle bearings, the axle, the chain, and put in new bolts and nuts, along with teflon pipe seals. We pulled out the village's other pump donated by the Saudi Development Fund, as well, (GPS coordinates N 13 degrees 32.795' / W 015 degrees 18.430') but it had a new GWE cylinder for which we didn't have the parts. However, we did adjust the cylinder and added pipe seals so that it produced more water.

Sowe Kunda 6/19/13 Pictures:
https://plus.google.com/photos/101278235198628512970/albums/5928575811442887505?authkey=CIGWhsOT4si3bQ

Sowe Kunda 6/19/13 Testimonial Video: http://www.youtube.com/watch?v=q-gSl5-ZN1E

Pumps 3 and 4
6/20/13 and 6/22/13
Fula Kunda
Alkalo Cherno Jallow
16 compounds / 460 people
GPS coordinates N 13 degrees 33.735'
W 015 degrees 19.425'

Synopsis: Fula Kunda's 2 pumps were installed on a single well in 1992. This well is very heavily stressed. The village has an open well, but being 18 meters down to the water level, drawing water by buckets is very arduous. Water quality changed about 2 years ago, and we suspect that sulfites from laundry (which is done right next to the well), is seeping back into the water source. Villagers now go to nearby Dankunku to fetch drinking water, but still use these pumps for washing, bathing, and cooking. We supplied replacement parts for both of these pumps in 2011, but after inspecting the pumps and pulling out the pipes, discovered that the mechanic we entrusted to do the work, not only did not install new parts, but willingly broke part of the cylinder on one of the pumps. This break causes it to leak, so that the pipes don't hold water and each time someone tries to draw from it, they have to bring water up from the water

table (aka priming the pump).

Although we changed the cylinder parts and axles and added teflon seals, the pump with the broken cylinder end piece still leaks. We're looking for a replacement part now. Also, the centralizers have been taken off (probably by the now-disavowed mechanic), so that the pipe rods rub directly against the pipes, wearing down the rod couplings and bolts. We are looking for these replacement parts as well.

Fula Kunda 6/20/13 Pictures:
https://plus.google.com/photos/101278235198628512970/albums/5928558781395907201?authkey=CLuFxO-k1enUbA

Fula Kunda 6/20/13 Video: http://www.youtube.com/watch?v=kzMOIKY2m78

Fula Kunda 6/22/13 Pictures:

Fula Kunda 6/22/13 Video 1: http://www.youtube.com/watch?v=U8sU1m7fZQA
Fula Kunda 6/22/13 Video 2 Pipes: http://www.youtube.com/watch?v=lxzip_XsT-o
Fula Kunda 6/22/13 Video 3 Cylinder: http://www.youtube.com/watch?v=GIWuQyHRibA

Pump 5
6/20/13
Dankunku Forestry Station
Forestry Officer Lamin Tamba
Dankunku residents 2,000 (estimated)
GPS Coordinates N 13 degrees 34.286'
W 015 degrees 19.423'

Synopsis: The pump in Dankunku's Forestry Station is used by the village when the solar borehole is turned off or when it breaks. It also is used to water an adjoining women's dry season garden. However, the axle bearings have worn out. We put in new bearings and a replacement handle axle.

Dankunku Forestry Station 6/20/13 Pictures:
https://plus.google.com/photos/101278235198628512970/albums/5928531754131655953?authkey=CJqGivSApebNNg

Pump 6
6/22/13
Touba Murit
Alkalo Ablie Nget
32 compounds / 480 villages
GPS coordinates: N 13 degrees 35.053'
W 015 degrees 19.382'

Synopsis: We rehabilitated this pump last summer, putting in new chains, bearings, an axle, and a repair kit. At that point, this pump was the only source of clean water in the village (3 open wells) However, the bearings broken about 6 months ago again. We replaced the bearings, but couldn't take the casing bearing out of the handle, so switched the handle with one that the village had from a pump that they had previously pulled out from another village well. The community also got a new handpump installed at another end of the village, but this pump provides better tasting drinking water.

Touba Murit 6/22/13 Pictures:
https://plus.google.com/photos/101278235198628512970/albums/5928528961378707377?authkey=CPPky7HRorKrbg

Touba Murit 6/22/13 Video 1 Before: http://www.youtube.com/watch?v=aVfpCrnEomM
Touba Murit 6/22/13 Video 2 After: http://www.youtube.com/watch?v=OoEnWKDYa-Q
Touba Murit 6/22/13 Video 3 Testimonial: http://www.youtube.com/watch?v=Z_EMJx1DNM8

Pump 7
6/23/13
Dakar Village
Alkalo Sara Bah
5 compounds / 50 people
GPS coordinates: N 13 degrees 34.021'
W 013 degrees 20.284'

Synopsis: Dakar is a very small Fula village who received a handpump as part of the 1999 ADB/Government of the Gambia Emergency Flood Relief program (like Sare Demba and Sowe Kunda) The community's water source turned saline about 2 years ago (it is located close to the river). Like Fula Kunda, residents here also fetch their drinking water from Dankunku, but the pump is still used for laundry and bathing. The handle bearings were broken and the handle swung wildly from side to side. We put in new bearings, a new handle axle, and a new chain.

Dakar 6/23/13 Pictures:
https://plus.google.com/photos/101278235198628512970/albums/5928541873598655569?authkey=CN_Wn6SHiImYpQE

Pump 8
6/23/13
Dankunku School Garden
Principal Kawsu Danfa
654 students
GPS coordinates: N 13 degrees 34.384'
W 015 degrees 19.589'

This lower basic and secondary school has 654 students from 13 villages. They have two pumps, one of which we fixed with new chains, bearings, an axle, and new hardware. The concrete skirt of the other handpump (which is non-operational) is breaking and we deemed it not safe for us to

stand on to pull out the pipes until the school fixes the base. When they fix it, we will look for a new handle and housing for it.

Dankunku School Garden 6/23/13 Pictures:
https://plus.google.com/photos/101278235198628512970/albums/5928538652584971569?authkey=CN3jla3AwLbyrwE

(Very minor adjustment for Naani Kunda's pump, doesn't count as a pump job)
6/23/13

Naani Kunda
Alkalo Demba Jallow
19 compounds / 500 people
GPS coordinates: N 13 degrees 34.690'
W 015 degrees 19.449'

Bolt tightening, grease

Naani Kunda 6/23/13 Pictures:
https://plus.google.com/photos/101278235198628512970/albums/5928519347089796993?authkey=CLzBgv_us-u_dw

Next steps:

In addition to continuing Mark II repairs (eying Dalaba School, Babu Jobe, and Kerr Lein communities next), we've also identified a number of pumps beyond repair or open wells that are prime candidates for Bluepump installations:
Mt. Carmel School Garden, Gynalko Village
Dankunku Health Center
Mali Kunda broken Afridev, 2 broken Mark IIs
Sowe Kunda breaking Saudi pump
Sare Demba open well
Fula Kunda open well
Si Kunda 2 open wells
Kalikajara 2 open wells

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Update 2
7/15/13

I'm happy to report that we've rehabilitated 4 completely inoperable and abandoned pumps, in addition to putting on the finishing touches for two others that I wrote to you about last time. Sadly, for every pump we fix, thereare many more that we inspect that we can't due to lack of spares (Dutch Mark II's) or non-interchangeable parts (newer and older versions of the German Mark IIs). We've literally crossed 9 pumps that we couldn't immediate fix. Also, we've seen or heard about an additional 5 pumps that we've fixed last year that have issues again. But we're in a

better position this year to not just fix what's wrong, but to provide preventative repairs, and are eying up to another 8+ pumps for repair. The head of the Government of the Gambia's Rural Water Supply Al Haggi Jabbi heard about our work, and even came to see us. I still haven't heard information about the Bluepumps, but remain optimistic that we'll be able to get some. Excluding minor work that we did on pumps in Naani Kunda and Kerr Lein, so far, with your help we have rehabilitated 12 pumps in 9 villages, expanding our work to 6 new villages. This summer, we have reached as estimated 6,241 people! However, many challenges lie ahead. Here is a summary of our work since my last update:

Pump 9
6/29/13
Babou Jobe Village
Alkalo Modou Jobe
66 compounds / 1,150 people
N 13 degrees 35.610'
W 015 degrees 17.809'

Before we arrived, this pump's cylinder shaft snapped, requiring welding. The pump pipes had been pulled out and the well abandoned about 3 months ago, putting much more stress on the village's only other operating pump. (A third pump has fallen into disrepair and has turned into an open well). We totally rehabilitated this pump by putting in new cylinder parts, bearings, handle axle, and chain, in adding to teflon seals, 1 new rod coupling, and 3 new centralizers. Note: This pump conversion head doesn't have a built in guard plate. A protective plate that kept objects from falling into the pipes is missing, so in the event a child sticks something in the pump housing, there could be an issue with this pump again.

Babou Jobe 6/29/13 Pictures:
https://plus.google.com/photos/101278235198628512970/albums/5928583038460304145?authkey=CPvpmOmR3OKieA

Babou Jobe 6/29/13 Video 1: http://www.youtube.com/watch?v=yxT2X0wX4Gk
Babou Jobe 6/29/13 Video 2: http://www.youtube.com/watch?v=F8miCMdIT8U
Babou Jobe 6/29/13 Video 3: http://www.youtube.com/watch?v=-sHlw3AGEoM

Pumps 3 and 4
7/3/13
Fula Kunda
Alkalo Cherno Jallow
16 compounds / 460 people
GPS coordinates N 13 degrees 33.735'
W 015 degrees 19.425'

We wrote about these pumps last time, and had to go back twice more to make it right. On our third servicing, we put in new rod couplings and centralizers on both, and on the left pump, added a replacement 3 meter pipe rod and a new cylinder end piece, effectively sealing the pipes

and making it much easier for locals to pump water (as they no longer had to prime the pipe from leaks).

Fula Kunda 7/3/13 Pictures:
https://plus.google.com/photos/101278235198628512970/albums/5928568128534166225?authkey=CPGlx_Dw1-75DQ

Fula Kunda 7/3/13 Video 1 - Cylinder End Piece:
http://www.youtube.com/watch?v=B1gh41Tg3WE
Fula Kunda 7/3/13 Video 2 - Pipes and Centralizers:
http://www.youtube.com/watch?v=RnIeFHIz2v0
Fula Kunda 7/3/13 Video 3 – Testimonial: http://www.youtube.com/watch?v=MoE088OMCgk

Pump 10
7/5/13
Dalaba Lower Basic School
Principal Lamin Fatty
285 students / 7 teachers
GPS coordinates: N 13 degrees 35.522'
W 015 degrees 12.996'

This pump broke in September 2012 and had been pulled out since. We put in new cylinder parts, new bearings, axle, chain, teflon seals, 3 centralizers, and a replacement coupling.
Note: Water tank needs a new pipe holder joint. We got a hold of an old water tank in hopes of using it as a replacement, but it turned out to be too worn out. We'll look for the right part on the next trip to the capital. Here, Action Aid gave the school some funds to help fix the pump, and we took a token 2,000 dalasis as a contribution, which I split with Demba (our mechanic) and Jaye (our local coordinator).

Dalaba Lower Basic School 7/5/13 Pictures:
https://plus.google.com/photos/101278235198628512970/albums/5928543040213476081?authkey=CJGR6NW_1NWa7QE

Pump 11
7/8/13
Kerr Lein Village Gambian German Well No. 313
Mombiran Faal 7388987
77 compounds / 1,800 people (estimated)
GPS coordinates: N 13 degrees 36.408'
W 015 degrees 16.932'

Here we added new cylinder and pump housing repair kits (axle, bearings, chain), 2 new couplings, 1 new centralizer, and new teflon seals.
Note: Welded handle is prone to future breakage.
Kerr Lein 7/8/13 Video – Testimonial: http://www.youtube.com/watch?v=g7oHi9dEDUE

Pump 12
7/8/13
Kerr Lein Front Pump
GPS coordinates: N 13 degrees 36.335'
W 015 degrees 16.936'

This pump was completely inoperable when we got there. We helped the village weld a Dutch handle so it would fit into the German housing, added new cylinder parts and housing parts (axle, bearings, chain), and new teflon seals.
Note: Welded handle is prone to future breakage.
Additionally, we also cut the spout of a working pump in Kerr Lein to make more clearance so that locals could fit used cooking oil containers under them to fill.

Kerr Lein 7/8/13 Pictures:
https://plus.google.com/photos/101278235198628512970/albums/5928719716027522145?authkey=CLbkp4KYv6q5IQ

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Update 3
7/19/13

Since I wrote to you 4 days ago, we've been able to fix another 3 pumps (1 needs some additional parts), as well as survey two other pumps for possible repairs. This work has benefited 1,026 people, bring our total beneficiary count for this summer to 7,267 in 12 villages. I know it's been only a few days since I wrote you last, but I came into town to buy some pump parts. Fast internet is available, so I figured to write. We're on track to exceed our original goal of fixing 20 pumps.

Pump 13
7/15/13 2:15pm
Choya
Alkalo: Sorry Jamanka
Point of Contact: Omar Bah 7211732
21 compounds / 400 people (estimate)
GPS coordinates N 13 degrees 33.372'
W 015 degrees 14.886'

Choya has a double pedestal well. Last year, we replaced one of their broken pumps with a Bluepump, as well as welding the handle for their other pump and adding new bearings, a handle axle, and cylinder parts. A few months ago their chain snapped, rendering the Mark II pump inoperable. We put in a replacement chain and some new bolts.

Choya 7/15/13 Pictures:
https://plus.google.com/photos/101278235198628512970/albums/5928733107097654593?authkey=CJuYmJKer_W3ygE

Choya 7/15/13 Video 1 – Bluepump Check-up:
http://www.youtube.com/watch?v=iwENwqqtrGk
Choya 7/15/13 Video 2 – Testimonial: http://www.youtube.com/watch?v=VyWKLKUL-kg

Pump 14
7/17/13 2:15pm
Kabamba
Alkalo: Fatim Jallow
Points of Contact: Manlafi Jallow, 7095611; Samba Jallow, 3079657
10 compounds / 300 people (estimate)
GPS coordinates N 13 degrees 37.000'
W 015 degrees 16.422'

Kabamba is one of the more isolated villages we've been to. They have just one handpump, which was installed as part of the African Development Bank and Government of the Gambia's Emergency Flood Relief plan in 1999. The village fixed the handle once before, but the pump still had problems drawing adequate water. The village actually opened the well 6 months ago. Upon hearing that we were going to come fix the pump, they closed it again. We put in a new repair kit (new bearings, handle axle, chain, and bolts), new cylinder parts, and new teflon seals.

Note: We are working on procuring a new handle and new conversion housing (pumphead) for the village. The conversion housing is worn out so much that the handle axle is sunken past the point where it is supposed to, leaving the handle somewhat loose.

Kabamba 7/17/13 Pictures:
https://plus.google.com/photos/101278235198628512970/albums/5928801053948759905?authkey=CJuy6J3f5tC1PQ

Kabamba 7/17/13 Video – Testimonial: http://www.youtube.com/watch?v=e1-6TX0bkFg

Pump 15
7/17/13 Sare Yarro
Alkalo: Saikou Njai
Points of Contact: Imam Lamin Camara, 6288990; Dawda Conteh, 6871016
9 compounds / 162 people (estimate) + 164 people from neighboring Modikaya Village
GPS coordinates N 13 degrees 38.221'
W 015 degrees 16.921'

This pump was installed in 1992, and for 21 years, was never serviced. The pump starting having issues 3 months ago with a loose handle. We put in a new repair kit (new bearings, handle axle, chain, and bolts), new cylinder parts, and new teflon seals.

Note: Modikaya, the next village over, depends on this pump as theirs is broken. (We pulled out Modikaya's pump to inspect it, but the cylinder is Dutch (we don't have the parts for it).

Sare Yarro 7/17/13 Pictures:
https://plus.google.com/photos/101278235198628512970/albums/5928738734820995697?authkey=COiVhaewzvTVcw

Sare Yarro 7/17/13 Video – Testimonial: http://www.youtube.com/watch?v=wsBB0HZ9xik

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Update 4
7/26/13
Here's a quick update on our last pumps. This last stretch of villages are amongst the hardest to get to. Our trip there was a mix of walking on foot, riding donkey carts and motorbikes, and bicycling.

Pump 16
7/24/13
Papa Village
Alkalo Sara Bah
30 compounds / 250 people (estimate)
GPS coordinates: N 13 degrees 36.655'
W 015 degrees 14.656'

Synopsis: Papa's double pedestal pump was put in in 1995. One of the pumps broke about 2 years ago (chain). They also have another handpump well, which broke 5 years ago, whose parts were removed and stolen. The community actually doesn't drink from the handpump, but from another open well, as they say the handpump well water was never good tasting. (But the open well water is murky and soapy looking).
Our intentional was to fix both of the pumps on this well. We began by pulling out the right-side pump with the broken chain. Upon pulling out the cylinder, we discovered that the pump end piece was also broken. Not having a spare end piece at the moment, we moved onto the other pump. We placed in a new handle (both pump handles are worn out), new bearings, new teflon seals, new hardware, a new handle axle and chain, and new cylinder parts. We're trying to purchase a new end piece for Papa today.

Papa 7/24/13 Pictures:
https://plus.google.com/photos/101278235198628512970/albums/5928814156234995889?authkey=CKLD_9mG7vGrFA

Papa 7/24/13 Video 1: http://www.youtube.com/watch?v=aKNeAzLylSY
Papa 7/24/13 Video 2: http://www.youtube.com/watch?v=c9ccZ8nbYHc

We also finished up Pump 14 at Kabamba, adding a new conversion head, pipe guide, and handle. The old handle's bearing seatings were worn out, and the conversion head socket for the axle was damaged. This updated conversion head does not have a built in rod guide, hence the plate which has installed (it keeps any objects that are placed into the housing from falling down into the cylinder).

Kabamba 7/24/13 Pictures:
https://plus.google.com/photos/101278235198628512970/albums/5928731070512691233?authkey=CLCCrPjdjLGjAw

We aim to go back and finish up Papa and Jawlaba, a neighboring village, before attending to two remote villages, Mesirah Gano and Modikaya. We'll then swing back to Dalaba and Madina Wallom and a couple other villages before crossing the river to finish up some pumps there and closing for the summer

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Update 5
7/29/13

Pump 17
7/28/13
Papa Village
Alkalo Sara Bah
30 compounds / 250 people (estimate)
GPS coordinates: N 13 degrees 36.655'
W 015 degrees 14.656"

Just a quick update. Yesterday, we made it back to Papa (after a 2.5 hour donkey ride!), to finish up their second pump (Pump #17) with a new cylinder end piece, new centralizers and one new rod coupling, new cylinder gaskets and springs, new teflon seals, a new conversion housing and guide plate, a new handle, and new chain and handle axle, and new bearings.

This is our most comprehensive repair for any pump that we've done, but it was completely necessary. For this is a very remote and hard to reach village, much development projects have passed it by.

We had also planned to fix two pumps at neighboring Jawlaba, but the village chief sent word for us not to touch the village pump (as he didn't understand our work and thought nothing was wrong with it--he clearly hadn't visit the pump in some time!) He didn't even bother to greet us, so we had to leave. The school pump's concrete slab was shaking and unstable, and I didn't want to risk my team's safety. Unfortunately, we had to pass the village.
We're aiming to finish fixing the school pump at Dalaba (Pump 10) on Wednesday, as well as another pump inside Dalaba village, and also move to Madina Wallom. Later this week, we're aiming to get a new handle for another village Mesirah Gano.

Papa 7/28/13 Pictures:
https://plus.google.com/photos/101278235198628512970/albums/5928747058455273697?authkey=CN_h47bsgI_S1gE

Papa 7/28/13 Video 1 – Morning Commute: http://www.youtube.com/watch?v=RIr6GotfRxM
Papa 7/28/13 Video 2 – Follow-up 1/4: http://www.youtube.com/watch?v=1lyK5H_tkH4

Papa 7/28/13 Video 3 – Follow-up 2/4: http://www.youtube.com/watch?v=4AU_erSc1Yw
Papa 7/28/13 Video 4 – Follow-up 3/4: http://www.youtube.com/watch?v=qfqWPyhD8w0
Papa 7/28/13 Video 5 – Follow-up 4/4: http://www.youtube.com/watch?v=8SKLlcHXHkE

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Update 6
8/2/13

We've reached around 8,017 people after finishing up our 18th pump at Dalaba 2 days ago. Villagers contacted us about a week ago, as water had been pouring out the top of the water tank for some time. It turns out that children had lodged various items into the tank (rocks, sticks, candy wrappers, etc.), which we were able to take out.

Although it was pump put in by the Gambian-German Well Project, the handle was Dutch, with a wider connecting point. We had to take it to a blacksmith to smooth it down to fit the new chain. We also added new cylinder seals, gaskets, and springs; new rubber centralizers and couplings; new chain; new bearings; new teflon seals.

Pump 18
7/31/13 10:25am
Dalaba Village
Alkalo: Ello Bah
Point of Contact: Yuba 7346816
34 compounds / 500 people (estimate)
GPS coordinates N 13 degrees 35.607'
W 015 degrees 12.949'

Dalaba 7/31/13 Pictures:
https://plus.google.com/photos/101278235198628512970/albums/5928757131653174801?authkey=CPfx8ZqCz_S3HA

Dalaba 7/31/13 Video 1 Before:
http://www.youtube.com/watch?v=qRhQjL8RnfQ&feature=youtu.be
Dalaba 7/31/13 Video 2 During: http://www.youtube.com/watch?v=-LBpAF5jmE4&feature=youtu.be
Dalaba 7/31/13 Video 3
After: http://www.youtube.com/watch?v=ga3x1dsPvb4&feature=youtu.be

Also, we tried to put in a new riser pipe holder at Dalaba Lower Basic School (Pump 10), but didn't have the tools to take out the recessed bolts. We're working on getting it. We had also planned on pushing to Madina Wallom, but it started raining. I did manage to swing by briefly--it's a Dutch cylinder, which we can't fix. But I think the problem at Madina Wallom might just be a broken chain. I won't know for sure until we open it up.

But while we were at Dalaba, a local asked us to help his village Colley Kunda fix its pumps. He took me there yesterday. The Dutch pumps broke down about 10 years ago, and the village has

opened the well, pulling water by ropes and buckets. I'm working on getting second-hand German cylinders if possible.

Colley Kunda 8/1/13 Pictures:
https://plus.google.com/photos/101278235198628512970/albums/5928520737822727025?authkey=CLOT_-HNgtP1eg

Colley Kunda 8/1/13 Video 1:
http://www.youtube.com/watch?v=EwsuDO5TqmY&feature=youtu.be
Colley Kunda 8/1/13 Video 2:
http://www.youtube.com/watch?v=IIowSMJXBtU&feature=youtu.be
Nearby Sare Saidou / Wellingara Modou is also drinking out of open wells as their pumps are broken. I wasn't able to take pictures of this village, because it was pouring. I also swung by Jamara Nema and Jamara Mandinka, also in need of serious repairs (housing and handles, etc).

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Update 7
8/6/13

Great news! We've fixed our 19th and 20th pumps at Madina Wallom and Sare Bakary villages, reaching another 373 people, and hitting our initial goal of 20 pumps this summer! But there's much more to do! We've also heard that Choya's Mark II pump has broken (We put in a replacement chain, but the Dutch cylinder has stopped working).

Pump 19
8/4/13
Madina Wallom
Alkalo Wallom Jallow 7581961
8 compounds / 153
GPS coordinates: N 13 degrees 33.794'
W 015 degrees 14.345'

This pump, first installed in 1999, was not working when we inspected it on 8/4/13. Last year, we put in a new handle axle and new bearings, but its Indian cylinder has stopped working. It originally had a German cylinder, but the Indian one replaced it in 2012 (before our work there).

We placed in a second-hand German cylinder with a new endpiece, a pipe cap, and new cylinder rubber gaskets and springs. We also added new centralizers and rod couplings, teflon seals, and new hardware, and a new chain. The bearings we installed last year are still good, but we gave the community 2 spare bearings for future repairs.

Madina Wallom 8/4/13 Pictures:
https://plus.google.com/photos/101278235198628512970/albums/5928790331721153537?authkey=CNmr-_iykbPeugE

Madina Wallom 8/4/13 Video 1 - Before:

http://www.youtube.com/watch?v=GZx7Lymd4XI&feature=youtu.be
Madina Wallom 8/4/13 Video 2 - During:
http://www.youtube.com/watch?v=R96hygjvSGo&feature=youtu.be
Madina Wallom 8/4/13 Video 3 - After:
http://www.youtube.com/watch?v=mbbgQ5bn9nE&feature=youtu.be

Last year, we also installed a Bluepump in Madina Wallom at another well, which had stopped working. We inspected it and found it in good condition. Nearby Jamara also brings its cows here to drink. This is what I call the "waterhole effect." Where water is clean and easily accessible, water-stressed communities will gravitate towards it.

Bluepump Check-up: http://www.youtube.com/watch?v=3_m3dD1R9-c

Pump 20
8/4/13
Sare Bakary
Alkalo Siring Sowe
8 compounds / 220 people (estimate)
GPS coordinates: N 13 degrees 32.958'
W 015 degrees 14.933'

Sare Bakary's pump was installed in 2004. The community has had to prime the pumpevery morning since last year due to worn cylinder parts. We put in new cylinder parts for the community's 4 strap cylinder (a newer German cylinder that we're not as familiar with, but for which we had replacement parts), new bearings, a new axle, new chains, teflon seals, and 1 centralizer.

We have parts to fix another 3 or so pumps (hopefully Mesirah Gano and the 2 pumps at Sare Saidu), but are in URGENT need of funds as we race against the clock to fix as many as we can in the next 3 weeks. Today, I traveled to the Department of Water Resources' Farafenni camp to pick up a water tank and other parts for Colley Kunda and other villages. I owe him about $300 to $400 in parts--these will be itemized in the next receipt you'll get, probably on Monday, when I pay him. I've also given him a list of additional required parts for him to pick up for me next week.

In addition to those, I'm estimating that we can fix another 5 - 10 pumps. Our limitation is that many of these repairs call for costly cylinder replacements (Modikaya, Colley Kunda, and Choya), or handles (Mesirah Gano and Kani Kunda Suba) or conversion heads (Jamara). We'll do what we can, but I'm not sure if can get to all the villages we'd like to on this trip.

Sare Bakary 8/4/13 Pictures:
https://plus.google.com/photos/101278235198628512970/albums/5928775077561110977?authkey=COfps9mvzPjTnwE

Sare Bakary 8/4/13 Video - Testimonial:
http://www.youtube.com/watch?v=Kd2o1InfDUQ&feature=youtu.be

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Update 8
8/16/13

In the past two days, we fixed 2 pumps (Pumps 21 and 22) in Sare Saidou, a village of about 550 people. The twopumps broke, and the community has been drinking out of dirty, open wells for more than a year. Descriptions below and pictures attached. We also made adjustments to the pump at Sare Bakary (Pump 20).

Pumps 21 and 22
8/14/13
Sare Saidou
Alkalo Momodou Jallow
Point of Contact: Village Development Committee Chair Yaya Jallow 7179909
24 compounds / 554 people as of May 2013
GPS coordinates: N 13 degrees 36.231'
W 015 degrees 14.111'

These two pumps were installed in 1987. Lighting broken the cement slab, which was replaced in 2008. One pumpstopped working in 2012, and the imam took of the chain for the remaining pump, as children kept abusing it. Since then, villagers have been drinking from 2 open wells.

We added new chains, bearings, cylinder parts, rod couplings, centralizers, and teflon seals to both pumps. For one, we put in a new handle axle, and for another, we put in a new water tank and riser pipe holder, as it was corroded from rust. For the pump with the new water tank (the one on the right in the video), we also rethreaded and cut the rod to fit.

The villagers no longer have to drink dirty water!
Sare Saidou 8/14/13 Pictures:
https://plus.google.com/photos/101278235198628512970/albums/5928829835989132977?authkey=CJzRn4zlhM_RqAE

Sare Saidou Videos:
Before: http://www.youtube.com/watch?v=TUA2-d-Strg
During 1: http://www.youtube.com/watch?v=24BtYuWlAEU
During 2: http://www.youtube.com/watch?v=SmnonPUth5E
During 3: http://www.youtube.com/watch?v=VSZZ_AGedBA
During 4: http://www.youtube.com/watch?v=6pHciV0ZMAE
Open Well: http://www.youtube.com/watch?v=lXuX-FxAx7M
After: http://www.youtube.com/watch?v=U5rWK6omxvI

Yesterday, we also went back to Sare Bakary (Pump 20), as the alkalo informed us the pump cylinder was leaking and villagers had to prime the pump in the morning, an arduous task. We lifted out the pipes, took out broken superfluous seals, and put in an old gasket to make the pumping action smoother (we left the new one with the alkalo). The new plunger gaskets are still stiff, but hopefully after they break in, the chain and plunger will drop more naturally. Now there is a delay. But the cylinder no longer leaks. Small beading occurs, but this should go away after the gaskets break in. This pump was particularly problematic, as it is the GWE 4-strap version, and we're more accustomed to working with the older 2 strap version.

I informed the alkalo that we could lift the pipes again (we had already 3 times), but we agreed that if there was a problem that needed adjustment, they would inform our mechanic Demba independently, as he lives in the next village, which is a 5 minute walk away. I couldn't promise to go back, as my time is limited, and we have many more other pumps to fix.

Sare Bakary 8/15/13 Pictures:
https://plus.google.com/photos/101278235198628512970/albums/5928771264541555793?authkey=CPy73pHYyImSgAE

Sare Bakary 8/15/13 Videos:
Before: http://www.youtube.com/watch?v=Rk5OMyoZNjw
Pipe Lifting: http://www.youtube.com/watch?v=iIt9uOSID9M
Water Seal Testing: http://www.youtube.com/watch?v=65yMvsNqKHo
After: http://www.youtube.com/watch?v=0hhLst-jKrA

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Update 9
8/20/13

Two days ago, we reached Sare Mesirah Alieu Gano, probably the smallest, most remote village we've worked in yet. The pump was installed in 1992, and for 21 years, has not received any new parts or proper servicing. We found the handle bearings broken and the handle visibly wearing down. When we were pulling out the pipes, a coupling broke loose, separating the rods. Had we not shown up, the pump would have most definitely had broken, leaving this village without a clean source of water.

The broken bearings made the handle eat away at the conversion housing and the rod guiding plate. We put in a second-hand conversion head that we took from Papa, but added a separate rod guiding plate, in addition to a new handle, new handle axle, new bearings, a new chain, and new hardware. We also put in new cylinder gaskets and springs, and a cylinder end piece. The old end piece was working, but we did this as a precautionary measure. The new end pieces are solid, without weak welding points.

Pump 23
8/18/13
Sare Mesirah Alieu Gano
Point of Contact: Alkalo Alieu Gano 7361822

7 compounds / 150 people (estimate)
GPS coordinates: N 13 degrees 37.946'
W 015 degrees 16.709'

Sare Mesirah Alieu Gano 8/18/13 Pictures:
https://plus.google.com/photos/101278235198628512970/albums/5928782206413630769?authkey=CLTWuonqyMP0Xw

Videos are below:
Sare Mesirah Alieu Gano 8/18/13 Video 1/5: http://www.youtube.com/watch?v=JNBIpxwP29s
Sare Mesirah Alieu Gano 8/18/13 Video 2/5: http://www.youtube.com/watch?v=BIc3secup6o
Sare Mesirah Alieu Gano 8/18/13 Video 3/5: http://www.youtube.com/watch?v=ahIilsdzolE
Sare Mesirah Alieu Gano 8/18/13 Video 4/5: http://www.youtube.com/watch?v=ujxwq2pzJQg
Sare Mesirah Alieu Gano 8/18/13 Video 5/5: http://www.youtube.com/watch?v=Wss43bHpk_A