



A ministry of SonSet Solutions

An Internet of Things Platform  
Enabling Pump Uptime

# Introduction

At SonSet Solutions, we solve problems. It's what we do. We provide technology-based solutions for missions and non-profit organizations who want to spread the gospel effectively but lack the proper equipment for certain tasks. We provide equipment to those like-minded missions organizations. We have a diverse range of technology-based solutions to help spread the gospel across all fronts. One of the solutions that we offer is SonSetLink™— a technology platform to enable pump uptime, which is the time that a well remains functional.

Many organizations install wells in rural communities, but few of them have a way to monitor these pumps. They often have no way of knowing when to fix their wells until it is too late.

In addition to causing water problems in the village, broken pumps put a rift in the relationship between the village and the missions organization, which hinders the organization's ability to effectively share the gospel.

SonSetLink technology is designed to solve that problem. It's a platform that accurately monitors pump performance and behavior. If the stakeholders of SonSetLink technology can regularly check on the pump performance of each well, they can detect a potential break in the pump before it happens.

Not only will the organization maintain the village's supply of clean water, but they will also preserve the conduits of trust that allow the gospel truth to flow to all the nations.



Figure 1: a LifePumpLink, powered by SonSetLink technology, is installed in Kenya.

# Problem

## The Situation

Picture this if you will: you have no first-world luxuries. Your nearest water source is a community hand pump that is several kilometers from your house. It takes at least 30 minutes to walk one way to the well, and you often wait 30 minutes in line just to use the well. You do this at least twice a day. You are spending a large portion of your day just drawing water, forcing you to make other time sacrifices in your day. Often, your daughters have to leave school early to collect water for the family before the evening meal. If they don't leave school early, they may not get back until after dark, which is incredibly dangerous.

What happens when well-intentioned ministry workers come to your village to provide a closer, more efficient pump? They claim their pump will ensure that you will not have to worry about water contamination ever again, and that you will now be able to access water with minimal effort. Would you accept their offer with open arms? Of course you would.

You let them install the pump, and everything is great. Your water problems are solved. Because they did an act of service for you, they earned your trust. Within the trust established between you and them, the ministry workers share with you the gospel message. Since you trust them at their word, you eagerly hear and respond to the gospel.

Their lives were changed by the gospel. You want change, too.



Figure 2: village leaders pray over a newly installed India Mark II hand pump, equipped with a SonSetLink, in Tanzania.

For several months, everything is at peace. Then, disaster strikes. You go to the well to collect water and you pump and pump, but the well yields nothing in return.

Because of this, your world comes apart. You get sick again. Your daughters begin missing school. You do not have time to read the Bible that you received because you now have to walk much further to collect water. Why would these benevolent foreigners install a well that they knew would break so quickly? This negative thought opens a floodgate of negative emotion directed against these ministry workers. Since they gave



you a subpar product that did not function as it should, you get the impression that they do not care about you. Because you do not believe that they care about you, you begin to reject the gospel message that they seemingly sincerely shared with you. The foreign mission workers have now betrayed your trust.

## Most Missions Organizations Can't Solve This Problem

This exact story may not be real, but the situation happens more often than it should. The reasons for these actions center on trust. When a mission or nonprofit organization steps in and provides service for a village, they establish trust with that community. However, if the service is defective, the villagers will no longer trust the organization. This lack of trust harms evangelistic efforts. The communities who are affected by inadequate service projects shun gospel-sharing missionaries for the same reason that they shun the service project missionaries: a lack of trust.

Most mission workers have pure intentions. Within their power, most mission or nonprofit organizations do their part in meeting the needs of the communities they serve. Although they provide the pump initially, they are unable to upkeep it for many reasons, including extremely remote sites, lack of a supply chain for spare parts, lack of funding for ongoing maintenance, and no knowledge that the pump has broken down. Without a monitoring system, it is difficult for the organization to know the pump is about to break. Therefore, they usually cannot prevent their pumps from breaking down.



Figure 3: A safe water well is drilled in Malawi.

## The Negative Cycle

When a pump breaks, it starts a negative cycle of problems that is difficult to reverse. Broken trust is the main catalyst in this cycle. Without trust, developing communities will not accept help from outside sources. Without outside help, developing communities can remain in a negative cycle of suffering from inadequate water sources. These communities suffer the consequences of poor water sources, such as sickness from water-borne diseases, as well as time spent walking to and from water sources. One study has estimated the number of people who rely

on microbiologically or chemically unsafe water to be 1.8 billion, or about 28% of the global population (2012). Unless these developing communities accept help, the need for safe water cannot be met. The World Health Organization reports that by 2025, half of the world's population will be living in water-stressed areas (2019).

The negative cycle does not have to continue indefinitely. That is why SonSet Solutions has created technology to help

monitor water pumps. We want to ensure that ministries can effectively share the gospel with the people they serve. By monitoring wells at all times, organizations can view pump performance data to determine how and when to upgrade and repair their pumps. That way, not only will these developing communities have safe water, but they will maintain trust with mission organizations who are willing to serve and present the gospel to them.

## The Negative Cycle

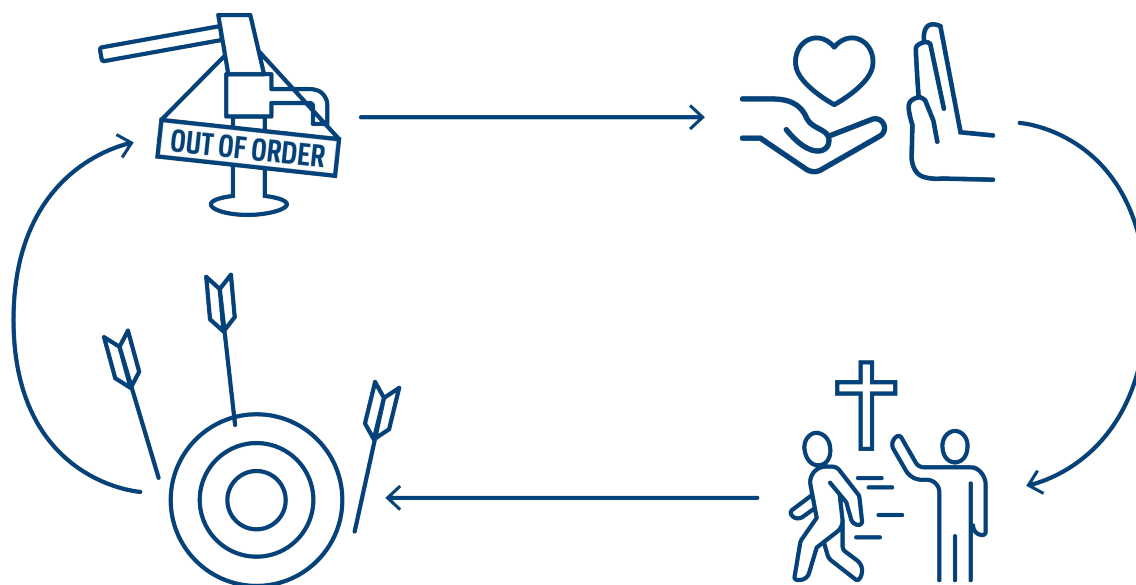


Figure 4: A broken pump leads to broken trust and damaged relationships, disrupting impactful ministry. This cycle will continue if trust is not restored.

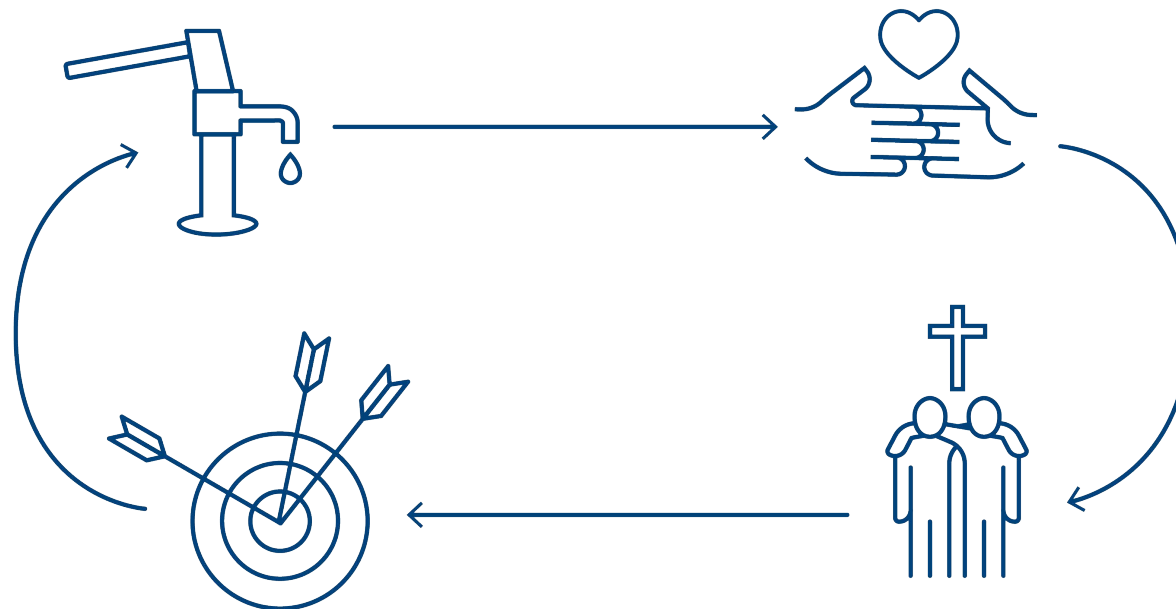
# Need

If the spread of the gospel is being hindered by pumps breaking, what is the most pressing need in this situation?  
The need can be summed up in two words: pump uptime.

## The Virtuous Cycle

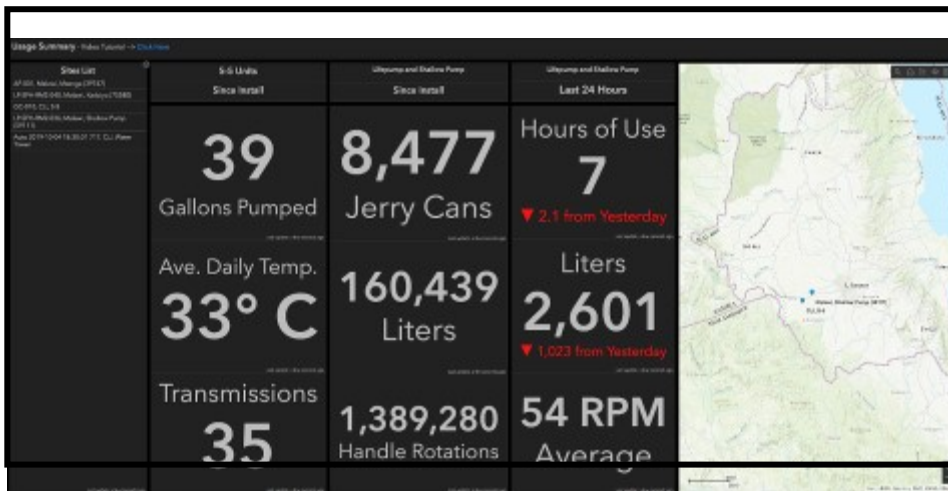
Pump uptime creates a virtuous cycle: a reliable safe water source gives a community stability in their health and daytime routines, which allows them to build gains as a community. These gains are often in the form of health, irrigated gardens for selling produce, new houses or structures built with clay bricks, church buildings or additions, etc. As gains are achieved, and the water source remains reliable, they can continue building and moving forward. A reliable source of safe water brings stability. When pumps keep pumping, the virtuous cycle remains intact.

## The Virtuous Cycle



# Maintaining Pump Uptime

To maintain pump uptime, ministry organizations need the ability to detect pump problems before they escalate. Through preventative maintenance, and repairing pumps before downtime occurs, the safe water keeps flowing reliably.



SonSetLink is an Internet of Things (IoT) platform that helps our partners maintain pump uptime. By detecting pump problems early, our partners can take action to prevent complete pump failure. With daily data transmissions, SonSetLink notifies of regular pump usage which establishes

helpful usage trends. The reported data gives insight into pump malfunction, so our partners can mobilize maintenance teams and repair broken pumps. Our partners can compare and contrast normal pump usage to abnormal pump usage.

Good vehicle maintenance includes keeping track of your car mileage. When your car reaches certain mileage points, you check it to make sure that it is fully operational. The same concept applies to SonSetLink technology. SonSetLink enables tracking of several aspects of each individual pump, which includes but is not limited to:

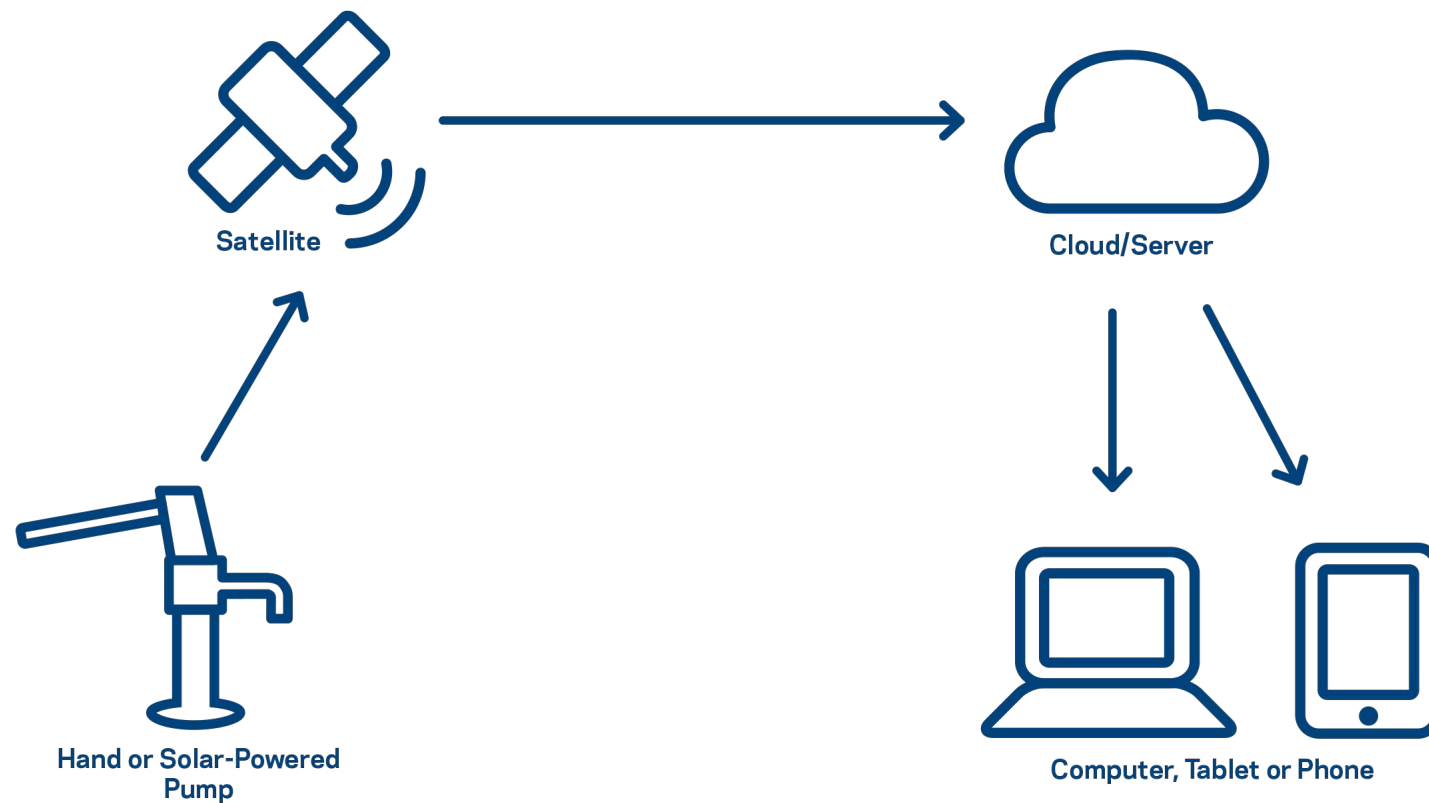
- daily time-in-use
- daily gallons pumped
- dry time
- total cumulative runtime

These data are sent to the stakeholders of SonSetLink technology. With our SonSetLink our partners can take preemptive action to do the following:

- ∧ maintain uptime
- ∧ prevent pump failure
- ∧ keep the virtuous cycle intact

# Solution

How does SonSetLink work? In simplest terms, it uses satellite to relay information from the wells back to a database and provides the data to an application for viewing by all of the SonSetLink technology stakeholders.





## Components

We can break the platform into five main components:

- Hardware
- Cloud connectivity
- Back-end database
- Notification system
- Data dashboards/Mobile app

## Hardware

The hardware is the “edge device”; it is the technology on the edge of the Internet of Things network. It consists of sensors on the pump that record the data throughout the day. Each day, a tiny microprocessor collects and packages the data to transmit it to the cloud.

We have several different models of edge devices:

- Hand Pumps
  - ◊ India Mark II
  - ◊ Afridev
  - ◊ LifePump
- Solar-powered Pumps
- Depth Sensors for Tanks
- Vehicle Tracker

## Cloud Connectivity

Once the microprocessor packages the data, a satellite modem sends the data to a satellite. This satellite sends the data back down to a ground station connected to the internet. The data is then relayed to our database.

## Back-end Database

We use a SQL database for storing and processing the data.

Upon receiving the data from the cloud, our API makes the data available to all of the shareholders.

## Notification System

Our notification system allows our partners to know when there is a significant change in the behavior of a well. Our platform logic continuously analyzes the incoming data. We process and check each data message against various thresholds of expected usage. If red flags are found, we can notify on-the-ground personnel via SMS text messages or email. These instant alerts allow maintenance teams to prioritize their workflows and target the most critical issues.

## Data Dashboards/Mobile App

Our data dashboards and mobile app provide a convenient way to view the data stored in our database. They present the data on clean, friendly user interfaces. An image of one data dashboard can be seen below:

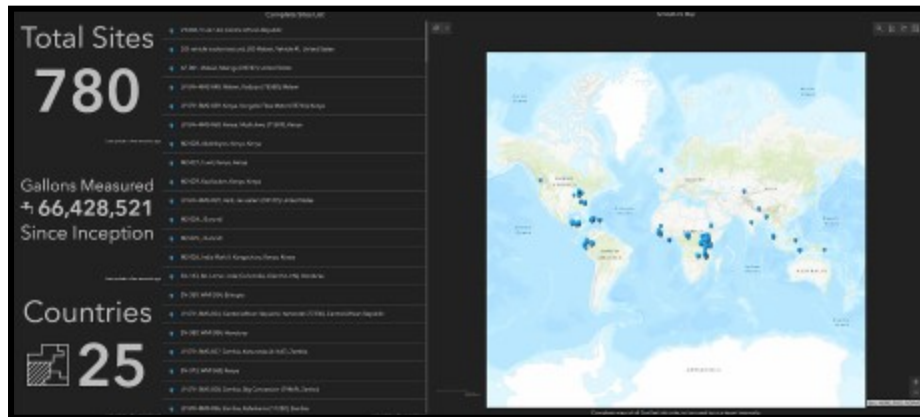


Figure 9: The dashboard can show all locations at once as well as how many gallons have been pumped. Here is a comprehensive view of sites, gallons, and countries all at once.

## Annual Cost of Monitoring

The annual cost of monitoring is priced at a very reasonable \$80. Because data transmissions only happen once a day, the cost of the data relay process is very inexpensive relative to its impact on the lives of others.

## Examples of Success

An example of SonSetLink technology positively impacting both a village's water situation and its ministry opportunity comes from missionary Eddie Andersen. Eddie is a missionary in Northern Kenya and had drilled a well in a village that pumped over 30,000 liters a day. However, a road worker accidentally cut off one of the main pipelines, rendering the pump useless. Even though the well had ceased functioning the day of the break, Eddie did not fix the pump until months later. This was not due to willful ignorance; he simply did not know that the pump was broken. After the villages told him their problem, he fixed the pump, but since then Eddie has invested in SonSetLink technology, which allows him to prevent this from happening again. "That makes a world of difference," Eddie says, "so now... I have an alarm that goes off and says, 'Okay, get down there and check it' and I can go down and check out the system, make sure that things are fixed before even the town knows (2018)."

Another example of the positive impact and opportunities opened up by SonSetLink technology is a story shared by a missions organization named Unreached Peoples Mission (UPM). UPM has used SonSetLink technology on some pump wells they installed in Tanzania as an inroad for the gospel. Through their clean water and church planting missionary-pastors, UPM has reached several lives with the gospel, one of them being an unlikely soul by the name of Benedict. Before UPM had reached out to his village, Benedict was a witch doctor and no friend

of the gospel message. In fact, when he first heard that foreigners were preaching the Word of the Lord, he checked it out with the intentions of stopping the other locals from receiving it. Instead, not only did Benedict receive the gospel message, he destroyed his idols and other witchcraft equipment. His conviction was so strong that he attended the UPM missionary training center in Itigi, Tanzania, and became a pastor of a growing church (2020).

These are just two of the examples of how SonSetLink technology has positively impacted the lives of people being served. As the user base for SonSetLink expands, even more people can be reached with the gospel and safe water.



## User Base

SonSet Solutions has teamed up with 12 partner ministries who are using SonSetLink in 20+ countries around the world. World Vision, Amazi Water and Design Outreach have all used SonSetLink to monitor pumps. There have been at least six applications of SonSetLink technology across different models of pumps, some of which include: Afridev, India Mark II, and LifePump.



# Impact

## Our Impact Goals

We believe in making an impact with our technology. Not just physically, but spiritually as well. That is why we choose to partner with like-minded organizations who share our gospel-focused values. This is our way of breaking the negative cycle and starting the virtuous cycle. By doing so, we are bringing communities one step closer to the gospel.

By providing these organizations and missionaries with our technology, we are doing more than improving the quality of life of the people our partners serve. We are playing a part in re-establishing the trust that was previously broken by faulty wells. By re-establishing trust, we are reopening gateways for sharing the gospel.

These benefits expand out to impact every aspect of life including:

- Safe water
  - ◇ Fewer diseases
  - ◇ Fewer children ill, reduced diarrhea
- Shorter commute time
  - ◇ More time saved during the day

- ◇ More time available to read the Bible
- ◇ More time available for family
- Reliable water source
  - ◇ Compounding community gains
  - ◇ More projects accomplished (buildings, economy, school)
  - ◇ Entrepreneurship

## Re-establishing Trust

One of the most important elements required to reestablish trust with the villagers is to be able to show that you actually care about them. The best way for organizations to accomplish this is to check up on the wells frequently. If an organization only shows up during dire times, they will not be viewed positively by the villagers. On the other hand, if the missions organizations regularly check up on their wells in addition to their people, that displays the love of Christ to the people they are serving. Through SonSetLink technology, these organizations can monitor their wells. By monitoring the wells, they also show care for the people. Finally, by showing care for the people, these organizations are showing the love of Christ. Therefore, SonSetLink technology acts as a conduit for the gospel and the love of Jesus Christ.



## Example of Opened Trust

A perfect example of this conduit in action with safe water is an instance where SonSet Solutions partnered with Pokot Outreach Ministries (POM), and POM had installed a pump in a rural village in Kenya. The Pokot people expressed their gratitude. "Thank you! Our lives are already changing because of this!" Villagers would walk nine miles just to get this water.

As shocking as that may sound, the villagers would much rather walk nine miles to access this water than the alternative. Their alternative, which was less than a quarter-mile away from the new source, was a six-foot-deep hole contaminated with animal feces. It was also drying up, which made it unviable.



"We feel better and have already seen fewer cases of typhoid since using this new pump," one of the Pokot men told our team. POM's next ambition was to have a national pastor begin a church in a nearby village and bring them the living water of Jesus. POM has seen great success over the years with this process of meeting the physical needs of people first and then finding open hearts for meeting spiritual needs. The team members of SonSet Solutions felt honored to be a part of a ministry such as this (2020).

## Get Involved

If you feel called to support us in this area of work, go to: <https://SonSetSolutions.org/give-to-a-project/>, and click on the "Give to SonSet Solutions" button. Under the "Special Note" section, designate account number "661197 - Community Development." Alternatively, you can support this work by sending a check to:

SonSet Solutions  
P.O. Box 2709  
Elkhart, IN 46515-2709

For more info on SonSetLink, visit our website at: <https://sonsetlink.org/>.

If you have any specific questions about SonSetLink technology, don't hesitate to call us at +1 (574) 970-4252 or email us at [SonSetLink@SonSetSolutions.org](mailto:SonSetLink@SonSetSolutions.org).

For tours, visits and shipping, our address is:

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## References

(2018, October 02). Retrieved June 11, 2021, from <https://youtu.be/LdNgsXtbKzw>

Hall, E. (2020, December 18). "Our Lives are Already Changing". Retrieved from <https://sonsetsolutions.org/our-lives-are-already-changing/>

Hall, E. (2020, December 18). Witch Doctor to Preacher. Retrieved from <https://sonsetsolutions.org/witch-doctor-to-preacher/>

Onda K, LoBuglio J, Bartram J (2012) Global Access to Safe Water: Accounting for Water Quality and the Resulting Impact on MDG Progress. Int J Environ Res Public Health 9(3): 880–894.

World Health Organization. (2019, June 14). Drinking-water. Retrieved from <https://www.who.int/news-room/fact-sheets/detail/drinking-water>