
**World Water Forum College Grant Program
2017-2019 Grant Proposals**



College	Loma Linda University
Faculty	Dr. Andersen
Project #008	Community Collaboration for Water Access



Loma Linda University School of Public Health

Community Collaboration for Water Access

Marci Andersen, Faculty

Sarah Snyder, MPH student

Project Strand: Global



Summary

A 2016 survey of hand pump wells in Béré, Chad identified and cataloged wells based on their issues. In collaboration with delegates and communities in Béré, Chad, this project will select wells for improvement and assign them to a category system with three levels according to the required intervention. Category one will secure the well head to reduce water contamination from ground runoff. Priority will be given to wells with likely contamination from ground runoff, those prone to flooding, and areas of waste contamination. The selected wells will be reinforced to improve well head protection, and the community will create a maintenance plan. Category two will test water for wells with discoloration or unpleasant taste. Water will be tested for metals iron oxidizing bacteria and other salient water quality parameters to drinking water quality. Data will be recorded and shared with the community delegate, with a briefing of results and recommendations. Category three will assess broken wells to determine the problem, a local team will fix the well heads or pumps. The delegates will be given a summary of the problem, how it was fixed, and prevention methods. The communities will create a maintenance plan. The social participation only level will be available to any delegate and community that does not have a well qualifying for the intervention. Education will promote community involvement, and instructions will be given for maintenance and use.

Application Strand	Region
Global: Community Collaboration for Water Access	Chad, Sub-Saharan Africa

Contact Information

Faculty Project Manager	Marci Andersen
Phone Number	(909) 558-4988
Email	sandersen@llu.edu
Student Project Manager	Sarah Snyder
Phone Number	(971) 612-3249
Email	ssnyder@llu.edu
College	Loma Linda University
Department	School of Public Health
Make Check Payable To:	Loma Linda University School of Public Health
Address	24951 North Circle Dr. Loma Linda, CA. 92354
Phone Number	(909) 558-4988
Email	llusphpio@llu.edu

School and Department Overview

Loma Linda University began in 1906 as a school of nursing, but quickly expanded to include medicine in 1910. From the beginning, Loma Linda University focused on health and whole person care (City of Loma Linda, 2016). Since its beginning, Loma Linda University has grown into a thriving institution with eight schools, multiple specialty hospitals in the area, and over 4,000 undergraduate, graduate, and professional students (LLUH, 2015). Loma Linda University Health continues to grow, with the recent edition of a school of religion, and a new hospital under construction (LLUH, 2015).

Loma Linda University School of Public Health was established in 1967, as the fourth school of Loma Linda University (LLUH, 2015). The school offers both masters and doctoral degrees, and emphasizes leadership, collaboration, and health for the whole community both locally and on a global scale. Through small classes, active community involvement, and opportunities to collaborate with other organizations and projects for a field practicum, students learn a variety of practical skills that prepare them for life in a wide variety of situations (LLUSPH, 2017).

Project Description

Introduction – Water Related Issue

This project addresses water access, maintenance, and community buy-in for hand pump wells in rural communities in Chad, Africa. The government and a variety of NGOs and other organizations have installed hand pump wells in this area over the years. Some of these wells are still in good condition, but some have stopped providing water to the communities they were intended to serve. An initial assessment of the pump wells in the area of Béré, Chad was conducted in 2016 to collect baseline information regarding well function. The assessment looked at the 38 hand pump wells in the region, recorded their geological location, the name of the well, and a description of well function. Eight wells were identified to be in good working condition. One well did not have any associated description. Eight wells were described as not working at all, some of them even after previous attempted repairs. Five wells were found that produce water that could not be used for drinking, primarily as a result of discoloration or bad taste. The remaining 16 wells were described as having red or yellow water, but it was not specified that the community members were unable to drink it.

Hand pump wells have been widely used in the developing world, particularly in Africa and North and Central America. These pumps are inexpensive and can provide access to potable water with relative consistency for minimal cost and labor. Unfortunately, hand pump wells require frequent maintenance and replacement of parts. For the India Mark II Pump, one of the most common models in use, monthly checks and maintenance are recommended, as well as a yearly replacing of seals and ball bearings (Rural Water Supply Network, 2008). The rural communities in Béré, Chad, do not have regular maintenance plans in place for their hand pump wells.

The population of Béré, Chad is 14,666 people, and the only source of water to this municipality is hand pump wells and dug wells (World Population Review, 2017). Fixing six of the eight wells that are mechanically broken and creating maintenance plans for the remaining wells could significantly impact the rates of water access in this area. Testing water samples from the wells described as having discolored water or unpleasant taste can prepare the way for a future project to address these issues to further increase the access to water in Béré, Chad.

Content Strand – Communications

The goal of this project is to promote communication and collaboration in the communities of Béré, Chad regarding the use and maintenance of their hand pump wells. We address this issue through planning monthly meetings with the community delegates for the duration of the project, as well as at least one community meeting in each community itself. These meetings will focus on discussing the issue of water stress in the area, providing education on well maintenance and the health value of a consistent water source, and gathering innovative ideas from the communities and their delegates to create a plan for each community to use and maintain their hand pump wells at their full potential.

Research and Data Collection

Research and data collection for this project will take place on site in Béré, Chad. Previously collected data will be used in the initial phases of the project for well description and location purposes. Site visits to each well will involve assessing the location and status of the well, and recording field notes. For the 16 wells that were described as having water discoloration or bad taste, water samples will be collected and transported to the office of Project 21 in Béré for testing and recording of data. After data has been collected, it will be sent to the faculty project manager who will collaborate with individuals from Loma Linda University's environmental health and geology departments to analyze the results and prepare brief descriptions and recommendations for the communities.

Anticipated Outcome

Goal: To improve the water access of the communities of Béré, Chad, through well repair and creation of maintenance plans.

Short-term outcome: Increased access to water as a result of fixing six of the eight mechanically broken wells and reinforcing and protecting the well head on 12 of the wells.

Long-term outcome: Increased community ownership and involvement in the process of maintaining their wells as maintenance plans are followed.

Project Projection Benefits

This project focuses on water access and communication to maintain access in the years to come. The project will be beneficial to the population of Béré, Chad. This population will be informed

as to what was wrong with the wells that are fixed through this project, and what they can do to prevent similar problems from recurring in the future. They will be guided to create specific plans to maintain their wells as a community, and come together to ensure that their water supply is protected. Policy makers in Chad will be encouraged to view this project as an example of water access maintenance that can be implemented throughout the country.

Team Experience and Technical Capabilities

- Marci Andersen, MPH faculty project manager: Global Health
- Sarah Snyder, RN student project manager: Global Health
- Ethan Allen, M.Sc, environmental consultant: Hydrogeology, Water Quality, Wellhead Protection
- Michael Andersen, P.Eng, engineering consultant: Civil Engineering

Faculty Roles:

- The faculty team will support the student in program development, networking and adapting project details as necessary, analysis of data, and project publication

Student Roles:

- Collaboration and interaction with community members and delegates
- Site visits to each well, collection of water samples
- Testing of water samples in recording of data
- Negotiation with International Aid Services to repair the mechanically broken wells

Consultant Roles:

- Provide expertise and advice regarding program development
- Provide technical support and communication with faculty and students via telephone or email
- Review water quality and field data and provide analysis, description, and recommendations for appropriate intervention

Milestones, Deliverables & Measurable Outcomes

Date	Milestone	Deliverable	Outcome
July, 2018	Meeting in each community	Connection and buy-in from each community in Béré	Community members see the project as their own and perceive benefit from it

July, 2018	Establish preliminary schedule with International Aid Services (IAS)	Calendar with each well repair scheduled	Working relationship with IAS
August 2018	Visit to each well site	Field notes; mapping	Potential for further analysis with collected data
August/September 2018	Water sample collection	Water samples	Documentation of water sampling for future use
August/September 2018	Water sample testing	Water sample data	Documentation of water sample results
September 2018	Selection of the wells for each level	List of wells with rationale with cost-benefit analysis for each decision	Detailed prioritization of wells
October 2018	Data analysis	Water sample results	Summary of primary problems, prevention and treatment recommendations
November 2018	Completion of well head improvement*	Photograph of each improved well	Ability to compare between improved and unimproved well heads and evaluate durability and perceived water quality
November 2018	Completion of well repairs*	Report of the problem, how it was fixed, and future recommendation for each well	Increased water access in communities
November 2018	Recommendations	Brief report for each community	Community empowerment through the knowledge of what the problem is and how it can be fixed
December 2018	Dissemination to the community	Education materials	Increased community knowledge regarding well maintenance and use
January/February 2019	Re-test of water samples	Comparison results for water testing	Compare analysis of water between wet season and dry season
Spring 2019	Final report	Final document sent to MWD/WWF	Project results disseminated to MWD
Fall 2019	Publication	Submitted manuscript	Published paper

*Well repair projects will not be started until wet season has ended and the ground has begun to dry out; this will promote faster drying time for cement.

Estimated Quantitative Benefits

This project aims to repair six broken wells, and guide 21 communities (total population 14,666) to create maintenance plans for their wells. Communities will be educated on the importance of maintaining their wells and basic procedures to keep them in good order, as well as the health benefits and convenience of maintaining a consistent water source.

Financial Criteria

Budget Overview

Description	Amount	Notes
Grant Funds Requested	\$9,851.60	N/A
Additional Funding Sources	\$13,000.00	In-kind donations
Project Total	\$22,851.60	Indirect and direct costs

Signature Block

Loma Linda University			
	Name/Title	Signature	Date
Faculty Project Manager	Marci Andersen		December 15, 2017
College Contracts Officer/Administrator	Michael A. Kirby, PhD Assoc. VPRA		December 15, 2017
Student Project Manager	Sarah Snyder		December 15, 2017

Local Water Agency	
Name of Agency	Adventist Health International/Bere Adventist Hospital
Contact Person	Olen Netteburg

Title	Country Director, Adventist Health International; Administrator, Bere Adventist Hospital
Signature	See letter of support
Date	December 15, 2017

References

City of Loma Linda. (2016). Our history. Retrieved December 15, 2017, from http://www.lomalinda-ca.gov/our_city/our_history.

Loma Linda University Health (LLUH). (2015). LLU student head count profile fact sheet for academic year 2014-2015. Retrieved December 15, 2017, <https://home.llu.edu/about-llu/quick-facts/llu-student-headcount-profile-fact-sheet-for-academic-year-2014-2015>.

Loma Linda University School of Public Health (LLUSPH). (2017). Healthy communities begin with you. Retrieved December 15, 2017, from <https://publichealth.llu.edu>.

Rural Water Supply Network. (2008). Installation & Maintenance for the India Mark II Handpump. Retrieved December 14, 2017, from http://www.rural-water-supply.net/_ressources/documents/default/1-328-34-1384355371.pdf.

World Population Review. (2017). Population of cities in Chad (2017). Retrieved December 14, 2017, from <http://worldpopulationreview.com/countries/chad-population/cities/>.

Project Budget

Budget Item Description	Price/Rate	Unit	QTY	WWF	In-Kind	TOTAL COST
Salaries and Wages						
Consultant - environmental	\$120	hour	40		\$4,800	
Consultaant - engineering	\$120	hour	40		\$4,800	
Professor	\$25	hour	100		\$2,500	
Intern	\$400	each	2	\$800		
SUBTOTAL				\$800	\$12,100	\$12,900
Travel						
Mileage	\$0.30	kilometer	500	\$150.00		
Maintenace Fees	\$50	month	12	\$600		
SUBTOTAL				\$750.00		\$750.00
Supplies						
Office Supplies	\$100	each	1	\$100		
Ink	\$15	cartridge	1	\$15		
SPSS subscription	\$99	month	6	\$594		
Wheel barrel	\$40	each	1	\$40		
Cement	\$18	each	24	\$432		
Shovel	\$10	each	1	\$10		
Test strips	\$20	bottle	2	\$40		
Test tubes	\$5	each	35	\$175		
SUBTOTAL				\$1,406		\$1,406
Contractual/Construction						
Well Repair	\$1,000	each	6	\$6,000		
Well Head Reinforcement	\$75	each	12		\$900	
SUBTOTAL				\$6,000	\$900	\$6,900
Total Direct Costs				\$8,956.00		\$8,956.00
College Overhead	\$1,000	each	1	\$895.60		\$895.60
Total Estimated Costs				\$9,851.60	\$13,000	\$22,851.60

Budget Justification

Salaries and Wages

Consultant – Environmental/Geological

Ethan Allen M.Sc., is principal of Core Geoscience Services Inc. and has over 10 years of experience as an environmental geochemist and geological consultant. Ethan will provide consultation on data collection and analysis via telephone and email, specifically regarding water sampling and testing on an in-kind basis. As an Alumni of Loma Linda University's Earth and Sciences program, he will also be used as a collaborating partner/liaison with this department for additional expert assistance as needed. He is also very familiar with international/ developing countries needs and issues.

Consultant – Civil Engineering

Michael Andersen, P.Eng, is a civil engineer and drainage expert with 10 years of experience and is currently a drainage specialist. Michael will provide guidance and consulting via telephone and email or in person with the School of Public Health professors on this project. He has consulted on previous water projects in Chad, including an onsite visit to the current project area. Thus he will be able to provide expert advice on the engineering and water management issues in the context of the local area.

Professor – Global Health

Marci Andersen, MPH, is the practicum coordinator for the Loma Linda University School of Public Health. Marci will work with the student project management to develop and refine all elements of the project. Regular contact will be maintained via telephone and email, and the professor will advise on any adjustments to the program or cultural concerns relating to the program. Additionally, she will liaise with other professors and staff at Loma Linda University, as well as the expert consultants. She will coordinate any necessary personnel for data analysis, purchase of supplies in the U.S., and communication with the World Water Forum and Metropolitan Water District.

Intern

Two Masters in Public Health Students will be selected, with the assistance of the project faculty, to participate in this project as a part of their field practicum. They will provide assistance in the implementation of the project in Chad, providing valuable legwork to the project as they learn and implement their academic knowledge. They will be responsible for their travel costs to and from the country, but their housing and other necessities while in Chad will be covered. Cost based on a 3-month stay in Chad.

Travel

Mileage

Kilometers are the common measure of distance used in Chad. Travel to and from meetings with the delegates, visits to each well site, and meetings with each community will total an

estimated 500 kilometers over the duration of the project. The price per kilometer was based on current fuel prices in Chad, roughly \$1.00 per liter, and an estimated eight kilometers per liter fuel consumption for a full size pickup truck.

Maintenance Fees

Bere Adventist Hospital owns a full-size pickup that will be used by this project to transport personnel and supplies out to each well for data collect, community networking, and construction needs. The hospital will provide this vehicle for project use at a flat rate of \$50 per month. This amount will assist in covering the routine maintenance of the vehicle such as oil change, unexpected maintenance or repair, and the yearly vehicle tax. Any related expenditures exceeding this amount will be counted as an in-kind donation by the hospital.

Supplies

Office Supplies

Office supplies for the project will include paper to print education materials for communities, results and recommendations sheets for the delegates, and data and field notes as necessary; pens, scissors, a stapler, binders for organizational purposes, and other basic necessities.

Ink/Toner

Ink/toner will be purchases in the U.S. to be used in the Project 21 printer and taken to Chad with a description of intent, as it is difficult to purchase there. Price is based on averaged current ink/toner prices in the U.S.

SPSS Subscription

The student project manager will use funds to purchase a 6-month SPSS subscription for a laptop to use in data input and analysis for the water testing.

Wheelbarrow

A wheelbarrow will be necessary for moving cement and securing the well heads. Cost based on current prices.

Cement/Bentonite chips

Cement will be used to reinforce ad/or secure the wellheads for eligible wells. Prices are based on current per-bag prices for cement in Chad. Each wellhead secured will take an estimated two bags of cement, for a total of 24 bags to secure an estimated 12 wellheads. The estimation comes from preliminary discussions of the current data with the environment and engineering consultants, research of well issues in this region and personal knowledge of the area.

Shovel

A shovel will be purchased in Chad for use in mixing and moving cement, and securing the well heads.

Test Strips

Test strips will be purchased in the U.S. and taken to Chad for testing well samples for the presence of heavy metals. Price is based on current per-bottle estimates. An estimated two bottles (50 strips each) will be needed to allow for initial trial testing, some wasted strips due to human error, and testing of up to 38 wells.

Test Tubes

Test tubes with stoppers will be purchased in the U.S. and taken to Chad for holding water samples from wells for water testing. Price is based on current internet estimates in the U.S.

Contractual/Construction Work**Well Repair**

International Aid Services will collaborate with the project to repair six broken wells. The organization's current estimate is \$1,000 for general repair of the pump mechanisms for each well. Estimated cost is off of the current data of wells that were recorded specifically as broken and an estimation of other that may take structural components addressed to fix the problems (such as ground water contamination at the level the well is currently drilled to etc.)

Well Head Reinforcement

In order to secure the well heads, labor is involved to assess the well, mix the cement, lay the cement, monitor it during drying, and ensure stability after drying. All labor for this process must be contributed in-kind by the community benefitting from the well. This is specifically planned this way to ensure community buy-in and engagement in fixing and maintaining their wells.

College Overhead

Loma Linda University requests a standard 10% overhead fee for services, recourses, and supplies provided for the project.

Letter of Support



B.P. 52 Kélo
République du Tchad

www.adventisthealthinternational.org

tel : 00235-91916032

12 December, 2017

To whom it may concern,

I am the hospital administrator and physician at Béré Adventist Hospital in Béré, Chad. I have reviewed the proposal Community Collaboration for Water Access, and I support the importance, relevance, and practicality of this project for the communities of Béré, Chad. I look forward to working with Loma Linda University students and faculty in Chad to make this project a reality. Water scarcity and water stress is a concern in Chad, and this project will increase the water access of many people. I request that the World Water Forum fund this project due to the tremendous benefit that its results will have for the people of Béré, Chad. Please let me know if you have any questions regarding this matter.

Sincerely,

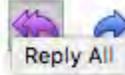
A handwritten signature in black ink, appearing to read "Olen Netteburg".

Olen Netteburg, MD
Country Director, Adventist Health International
Administrator and physician, Béré Adventist Hospital

Letter of Support - 2

MWD grant summary

Whitney, Debra (Deb) [dwhitney...]



Actions

To: Snyder, Sarah (LLU)

Cc: Benita Horn [bhorn@mwdh2o.com]

Monday, December 11, 2017 6:29 AM

Sarah

I support the viability of the application for Bere, Chad region.. This is an exciting research proposition and I wish you good luck in your endeavor. If the college is selected I would be happy to review your work and provide feedback. If more scientific research is required I would submit your research study to our technical assistance division in Denver to see if one of our research scientists would be interested in reviewing your work. If a researcher accepts the work I would then need to determine the research cost. If there is money within my budget to support the work I would then enter in an agreement with the researcher using Water Conservation Field Services funds. This research review is NOT guaranteed as part of your agreement with MWD nor the Bureau of Reclamation. This would only be provided based on the availability of funds and a researcher who would be interested in conducting the review.

Deb

Certificate of Participation

presented to

SARAH SNYDER

LOMA LINDA UNIVERSITY

Thank you for participating in the

**Southern California World Water Forum
College Grants Program on Innovative Conservation Technology,
Communication and Policy.**

October 13, 2017



worldwaterforum
Metropolitan Water District of Southern California College Grant Program



water for people