# Making Clean Water in Developing Countries Sustainable

Matthew Eshleman   **R. David MacBride**   **Owen McCullum**

The Need

The Global Water Crisis claims 3.4 million lives each year. NGO's have provided pumps to access clean water and are now focused on making these pumps sustainable long-term. PumpMinder's goal is to assist its client, Water4, in evaluating their sustainability model which requires local communities to pay for water. This provides funds for needed repairs and maintenance and creates an opportunity for local small business.
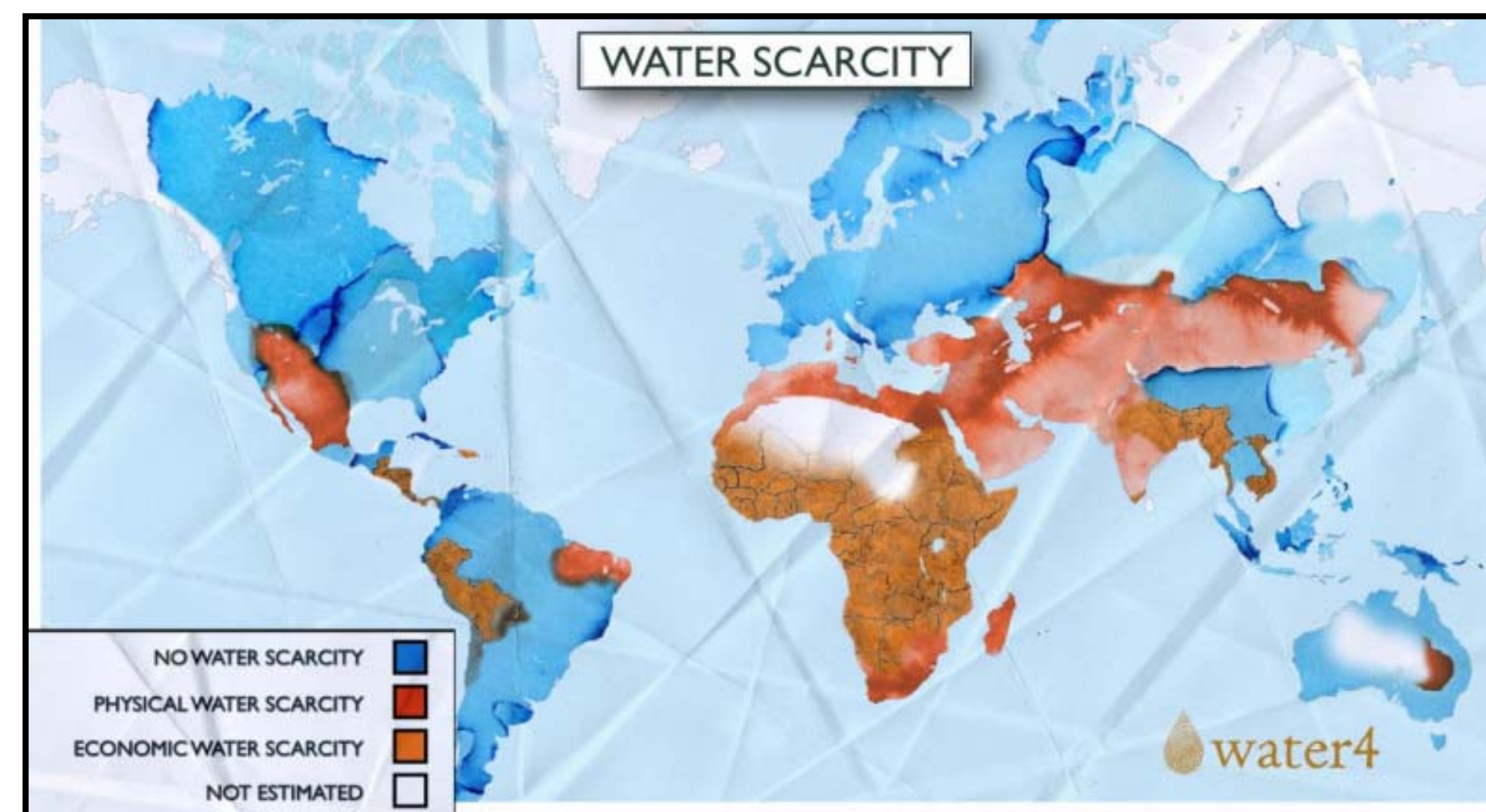
Our System

Our system uses a water presence sensor, clock, PIC microcontroller, and an external computer to track and show the number of hours water has been pumped each day to a precision of three decimal places. Pressing a system button uploads the system data to a hardwired laptop. Our power supply is four AA batteries which are intended to last well beyond a month's duration.

We delivered ten 3.1 prototypes to Water4 in November 2017. Version 4.0 is in development and will enable data communication to a smartphone.

Client

Student Team

. Matthew Eshleman   . R. David MacBride
. Owen McCullum

Advisors

. Tom Austin   . Chad Brubaker
. Dr. Randy Fish   . Jon Naugle (Water4)

The Goal

. Estimate the volume of water drawn from a pump by measuring how much time water is flowing

. Use data concerning how often pumps need to be repaired and the useful life of the pump, to set water costs per unit volume such that communities have enough funds to maintain and upgrade pumps and pay the person who collects the water use fees

. Reconcile total fees collected each month with the total volume of water pumped as recorded by the PumpMinder system.
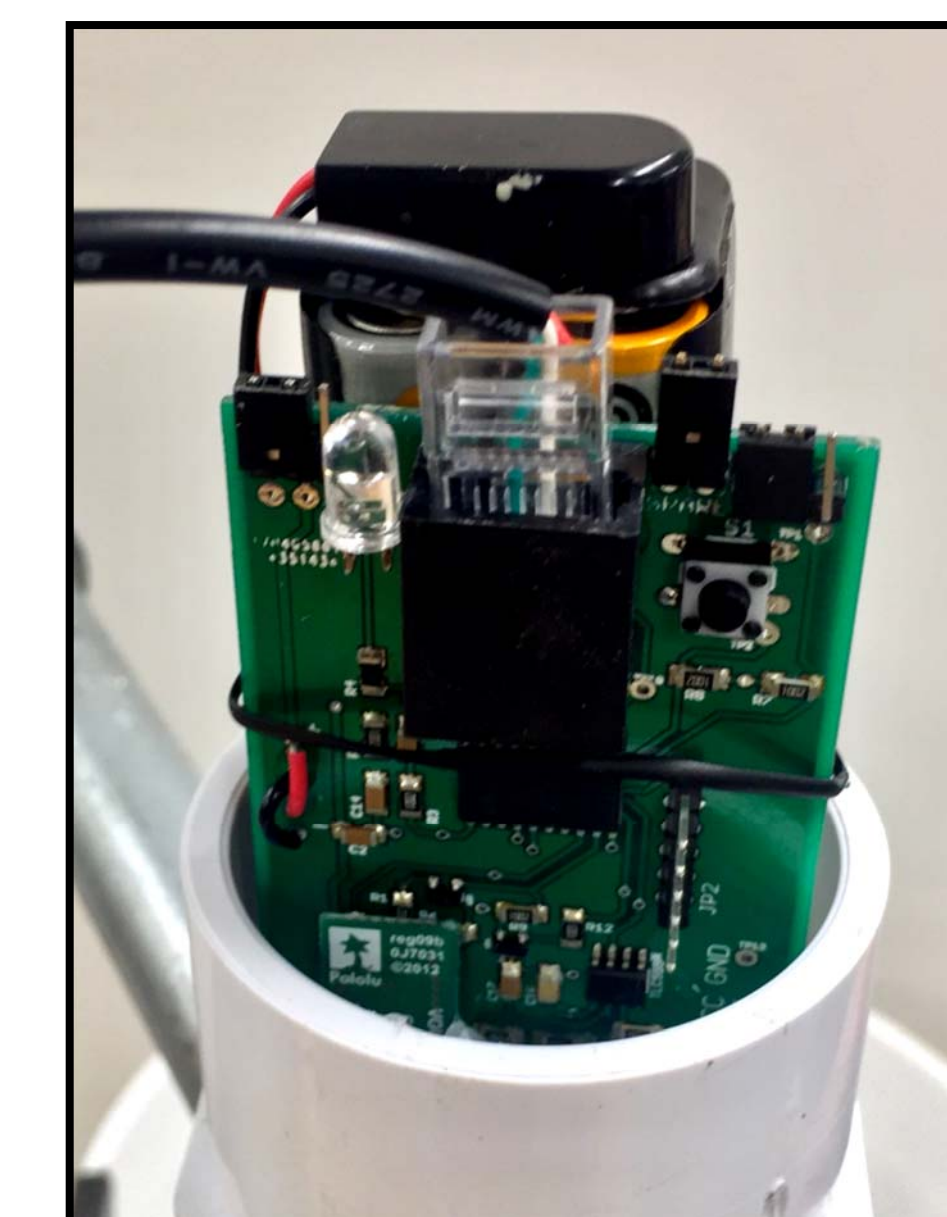
Further Information

For more information about Water4:

www.water4.org

For more information about PumpMinder:

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Inside view of PumpMinder

PumpMinder Attachment to Model Pump

Future Goals And Development

. Iterative approach to client's requests
. Improved accessibility
. Increased battery lifespan
. Decreased cost

. Mass Production
. Bluetooth or USB connectivity to smart devices
. Tampering protection