**IMPROVING GREEN WATER IRRIGATION FOR SUSTAINABLE AGRICULTURE**

**Metis Project 3 – Business Analysis - Lara Miller**

**Project Background**:

How much water is used to produce a crop is commonly referred to as its water footprint. A crop’s water footprint can be broken down into two primary components: green water and blue water. The green water footprint is the amount of water directly consumed in crop production (eg. rainwater or soil moisture); the blue water footprint is the amount of irrigation needed to supplement plant growth in crop production (eg groundwater pumped in to fields when rainwater is not sufficient). The agricultural industry has traditionally relied on a at least a portion of its water consumption coming from irrigation – or blue water – which has depleted many aquifers and decreased surface water quality in many rivers and ultimately making long-term agricultural production potential unsustainable.

The mission of the Food and Agriculture Organization (FAO) of the United Nations is to achieve food security for all ending the enduring problem of hunger. A 2017 FAO report, **Water for Sustainable Food and Agriculture,** found that agriculture accounts for 70 percent of global freshwater withdrawals and that by 2050 about 60 percent more food will be needed to sustain the growing global population. Conserving water is a key requirement for improving agricultural productivity that can meet the expected increase in global food supply needs. The FAO would like to improve the climate resiliency of local agricultural economy and the overall sustainability of global food supply. They are investigating which countries are the highest priority for deploying green water irrigation improvements, such as water harvesting and storage systems. This project will help the FAO identify countries where funding for green water irrigation improvements will be most impactful. I will be evaluating how to classify countries with similar crop profiles.

**Impact Hypothesis:**

By identifying watersheds and countries with similar crop production profiles, I can compare blue and green water use efficiencies. This will allow the FAO to direct funding to places where green water irrigation improvements are most needed improving the long-term sustainability of global crop production.

**Data:**

Water consumption of crop on watershed level (blue and green water, uncertainty, incl. shapefile) and monthly irrigation water consumption. The data contain production and water consumption data for 160 crops in watersheds (>12,000 acres) with global coverage.

Data Citation: Pfister, Stephan; Bayer, Peter (2019), “Water consumption of crop on watershed level (blue and green water, uncertainty, incl. shapefile) and monthly irrigation water consumption”, Mendeley Data, V3, doi: 10.17632/brn4xm47jk.3

**Solution Path**

Specifically, I will be using exploratory data analysis to identify preliminary criteria for distinguishing crop profiles. The results of the preliminary data analysis could be used to build out a clustering algorithm to help differentiate watersheds into groups based on their crop production, crop types, and water consumption. Once I have groups of countries with similar crop profiles, water use efficiencies of crops can be compared and places for improvement identified.