**Well Water Quality Analysis in Charlestown in Southern Rhode Island**

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Groundwater is an important contribution to Rhode Island’s water supply system and it is the only source of water to the people living in southern part of the state. Coastal aquifers are under stress due to the fact that the population is increasing towards the coastal cities and there are other anthropogenic as well as natural such as sea level rise, global warming.

We have got some well water monitoring data from the town office of Charlestown and have already analyzed the data for salinity issue. The preliminary analysis shows that there is a potential problem of saltwater intrusion and also de-icing salt applied on roads in winter. Due to time constraints and lack of adequate knowledge on the data analysis, there are still some interesting relations to be analyzed.

Recently, the town office of Charlestown has provided us some more well water sample data they received from the Department of Health of Rhode Island. The recent data includes the depth of the wells from the water were sampled and their vertical log profile data. Therefore we are proposing the following activities to be carried out as an independent study. I prefer working with two professors at URI for this project: one having sound knowledge of water quality and the other with data analysis skill.

The main activities to be carried out are:

**1. Spatial interpolation of the water quality data**

We have already modeled the water quality data for some indicators to look at the spatial distribution. However, due to inadequate samples, those maps are not convincing. Also, our plan is to use free and open source software for interpolation and the proposed interpolation technique is inverse-distance weightage which is widely used in water quality mapping. In R program, there are packages such as maptool, gsstat, raster which deal with the interpolation.

2**. Principal component analysis**

We analyzed the data dealing with single indicator at once. There are few tools such as Principal Component Analysis which integrates different data at once and select few indicators that has higher capacity to describe the existing water quality status. We need to cluster the data into few locations before the analysis. There are few packages in R which deal with the PCA such as Vegan, prcomp, princomp etc.

**Timeframe:** 3 months in fall 2018

**Expected outputs**: 1 manuscript to be submitted to a journal and a conference presentation