

Proposal: TWRI Mills Scholarship

1. Title: Energy, agriculture and municipal demand for groundwater: planning for the future of San Antonio Region

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4.

Recently hydraulic fracturing technique for oil and gas withdrawal has been big issue for economic opportunity, water resource use, and environment in north east and south central Texas. The technique uses million of gallons of water to frack a well, while the source is mostly groundwater. In Texas, groundwater is considered a private property, and therefore fracking companies must buy or lease the water used for fracking operations, or haul in the water from another location. This is furthering the economic benefit to landowners who are meeting hardships with agricultural activities because of extreme events in drought. However, there is minimal oversight by Groundwater Conservation Districts (GCD) to manage the aquifers to meet current and desired future use. Since the use of hydraulic fracturing boomed so quickly, specific legislation and regulation had to be made quickly.

Despite the overall low share of groundwater resources for hydraulic fracking, the impact of water use is significant in highly active oil and gas operation sites of South Central Texas. This part of the state is known by frequent drought. Recent studies showed the rate of groundwater withdrawal has been higher than the rate of recharge in this area, hence the aquifer in the area may have negative drawn down affects. The major aquifer in this area is the Carrizo-Wilcox aquifer. It provides water to more than 202,000 people in South Central Texas Region and additional of 2,200,000 people in San Antonio areas. The aquifer provides water supply for irrigated agriculture, ranching, industries and municipalities.

At this moment, there has not current research on dynamics of water demand for hydraulic fracking and other uses to the current and future groundwater resource scarcity as it relates to total water supplies and uses for the San Antonio region and the associated uses in the Frio-Nueces, Guadalupe and Blanco rivers including cities like Victoria and Corpus Christi considering the growing population and fracking demands in the area.

Based on this research gap, the objective of the study is to develop a dynamic economic optimization model for Carrizo Wilcox Aquifer (southern) area that look into water demand for fracking and other uses with the goal the net present benefit of groundwater use. The approach will simulate a wide variety range of recharge and fracking scenarios for the Carrizo Wilcox

Aquifer with the GAM hydrology water model then embed resultant information in a dynamic optimization model to look at both the economic and aquifer characteristics consequences of aquifer water use over time. This type of study can be beneficial to the Texas groundwater resources management in south central region. It can serve as an input for GCD and water agencies to establish the future desired condition in groundwater resource use. It also be useful for understanding the consequence of current fracking rate and drought condition to the economic activities using groundwater in dry area.

5.

B.S.C Economics; Addis Ababa University, July 1999

MSc. In Agricultural Economics; Texas A&M University, August 2013

PhD in Water Management and Hydrological Science, May 2016 (expected)

6.

The fund received from TWRI Mills scholarship will primarily be used for paying in-state tuition fee. Currently I am full time student in WMHS without funding and the scholarship help to pay my tuition which I expect to be my last academic year. Smaller portion of funds will be allocated to the travel expenses to GCDs. I am working on groundwater well data collected from TWDB. However there are data gaps in some of groundwater wells with few observations. GCDs have more complete and additional well data. Getting those data and discussion with technical staffs at the district level improves accuracy and quality of research. Matching fund can be processed and committed through my committee chair in the Department of Agricultural Economics.

7.

After graduation my career goal is to be a research fellow in research institute for water resources. I would like to work on developing and improving modeling approaches to water resources for sustainable use. My previous work experience policy research institution as a research assistant, consolidate future such career path. If research position in not available I would seek for opportunities in non-governmental organization and consulting firms that work on benefit cost analysis, natural resource valuation, and water policy analysis.