Title: A Pricing Model to Assess the Effect of Groundwater Availability on Land Valuation

Statement of Critical Regional Water Problems:

The availability of water in the Texas Panhandle is a major concern, as is the conservation of the limited supply of water in the region. The Texas High Plains area has a semi-arid climate and average low rainfalls which results in little surface water being available year-round for agriculture. Thus, more than 90% of the water used in agriculture in the High Plains area comes from the Ogallala Aquifer (Stewart, 2003 and Jenson, 2004). The aquifer covers about 36,080 square miles and it currently has a supply of water of approximately 6.1 million acre feet of water, which is expected to decline to 4.8 million acre feet by 2060 (Jenson, 2004). From 1994 to 2004, the aquifer declined at an average of 1.28 feet per year (Jenson, 2004). Adding to the problem is the low recharge rate of the aquifer in the High Plains area (Postel, 1998). In the southern region, the recharge rate has been reported to be as low as 0.024 inches per year from precipitation (Ryder, 1996).

The use of low-energy-application (LEPA) and low-energy-spray-application (LESA) have allowed for more efficient use of water in the region (Howell, 2001). However, producers have had the benefit of increased technology in drilling and installing these systems, which has led to increased irrigation use. In the southern High Plains, which uses intense irrigation, the decline in the water table has been estimated to be between 50 and 100 feet (Ryder, 1996). A contributing factor to the increased use of groundwater comes from the state laws covering the right of capture of ground water beneath the land, by which the land owner may capture the water beneath the land regardless of the effect on nearby or distant users of the water supply (Stewart, 2003). A survey conducted in 2003 showed that of 63,602 operating wells, only 4,530 wells had a meter installed (NASS, 2004). Finally, recent trends in purchasing "water rights" and the potential uses of the water associated with these rights threaten to result in further depletion.

Nature, Scope, and Objectives of Research:

The proposed research is aimed at evaluating the effect that the availability of groundwater in the Texas High Plains area has on the value of the property overlying the aquifer. This is critical for a number of reasons, including possible reductions in tax bases for property tax evaluation, the value of land in purchase and sale transactions, the taxes associated with capital gains and losses for federal tax purposes, and to provide a possible further incentive to encourage greater conservation of ground water. Additionally, policy alternatives will be considered and evaluated in an effort to increase greater efficiency in conservation.

Our plan is to develop a hedonic pricing model in order to determine and valuate the various components that make up the price per acre for agricultural land. This will include such factors as average precipitation, availability of groundwater measured in the form of the saturated thickness, pumping lift, soil type and quality, the suitability of the land for various crop and pasture types, agricultural use of the land (i.e. crops versus livestock), and existing improvements to the land, such as existing wells and structures. This hedonic pricing model will then be incorporated into a regression analysis in association with estimated property values, taxable values, and actual sales prices of parcels recently sold in order to determine the effect

each component in the pricing model has on the dollar value per acre of agricultural land in the Texas High Plains.

This study will provide a basis for determining the value that is added by the amount of available water, which then can be compared to the rates being paid per acre for "water rights." This will also provide a means for estimating the changes in land value due to future declines in the level of the Ogallala Aquifer. The specific goals of this study are to establish a hedonic pricing model, determine the dollar value associated with each acre-foot of available water, and create a predictive model for estimating property values that specifically incorporates water availability in the price of valuation. We then plan to show how the value associated with water availability can be used as a further incentive for continued and increased water conservation as well as presenting new water policy issues.

Results Expected from this Project:

This proposed study will result in a better understanding of what economic value in terms of land value that water availability has in the Texas Panhandle. This in turn will make it possible to further assess the effects of future declines in the level of the Ogallala Aquifer. Additionally, the proposed study will provide a tool for valuing and estimating land values given different scenarios concerning water availability and aquifer depletion. This could help policymakers in future formulation of conservation and tax revenue plans for the region. The study will also yield a usable pricing model for land valuation as well as determining the actual value per acre foot of water that is available, which can then be incorporated in future land valuations. The study participants hope to gain a peer-reviewed article from the study, as well as a foundation for a dissertation for the principal investigator.

Literature Cited:

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