

## CE 890 Graduate Seminar

**SPEAKER:** Philip Gabriel Mzava (Advisor: Dr. David R. Steward )  
**TOPIC:** “Groundwater Elevation Estimation Model in the Sloping Ogallala Aquifer”  
**DATE:** March 10, 2010  
**TIME:** 4:00 p.m. (refreshments at 3:45 p.m.)  
**PLACE:** 2144 Fiedler Hall

### ABSTRACT

Groundwater is an important source of fresh water supply. About 30% of all the fresh water on earth readily available for use is from underground storages (Aquifers). This amount is significant because the remaining 69% is ice, and the remaining 1% is made of surface water storages. Groundwater flow and storage are continually changing in response to human and climatic stresses. Wise development of groundwater resources requires a more complete understanding of these changes in flow and storage and their effects on numerous surface water features.

A one-dimensional model was developed to study the flow of groundwater in the sloping Ogallala Aquifer at a steady state during predevelopment condition. The sloping base was approximated using a stepping base model. GIS applications were applied during data collection and preparation, and later during interpretation of model results. Analytical and numerical methods were employed in the development of this model which was used to try to understand the behavior of groundwater flow, including surface water-groundwater interactions, recharge patterns, and factors that control the observed behaviors.

The Ogallala Aquifer has a larger saturated thickness in the south western part of Kansas, with average saturated thickness of 100m, this result to a big discharge per width of around 17 m<sup>2</sup>/d in that region. It was also found that groundwater leaves Ogallala Aquifer on the eastern side with discharge per width between 0-3 m<sup>2</sup>/d. The study computed the discharge to streams necessary to satisfy long term conservation of mass, a very large baseflow to the Cimarron River of approximately 25 cfs was observed as it exits Ogallala Aquifer, and a baseflow of approximately 1 cfs to the Arkansas River was observed to largely occur in the eastern side of Ogallala Aquifer. A discharge of approximately 7 cfs to the Springs Creek was observed in the southern end of Ogallala Aquifer. There seemed to be recharge of the groundwater from streams at some points in the aquifer, this needs further investigation.