

Project Title: A Spatial Index for the Leachability of Chemicals in Nebraska

- Your name: Mohanasundaram
- Affiliation: Postdoctoral Research Associate
- Funding amount: \$180,666
- Duration: 2-years

Objectives

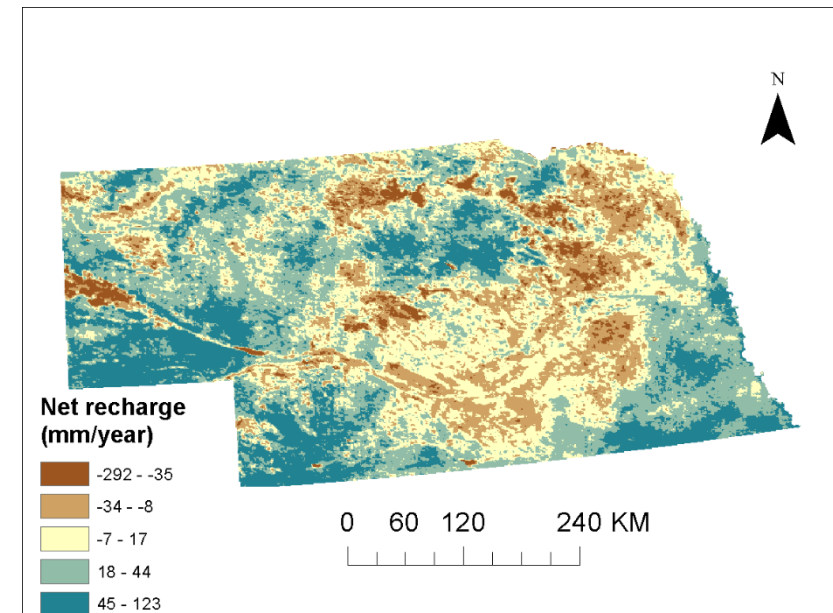
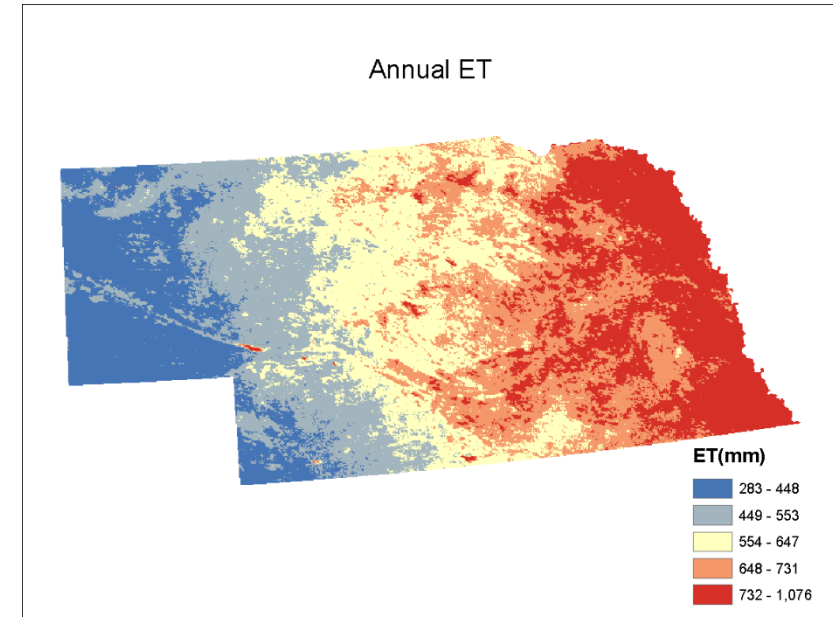
- 1. Develop a GIS-based soil database for Nebraska and obtain the depth averaged soil properties to the mapped depths
- 2. Update the chemical database for compounds registered in Nebraska
- 3. Develop a recharge map for Nebraska
- 4. Compare a model accuracy against a numerical model HYDRUS-1D for validation

Tasks Undertaken (to meet objectives)

- Task 1: Soil database from STATSGO and SSURGO has been constructed for the entire State of Nebraska
- Task 2: Chemical database has been partially updated and yet to be updated for other chemicals
- Task 3: Annual average ET and recharge map has been created based on remote sensing based estimation techniques
- Task 4: CLERS model was run for the given chemicals based on [Stenemo et al., 2007](#)

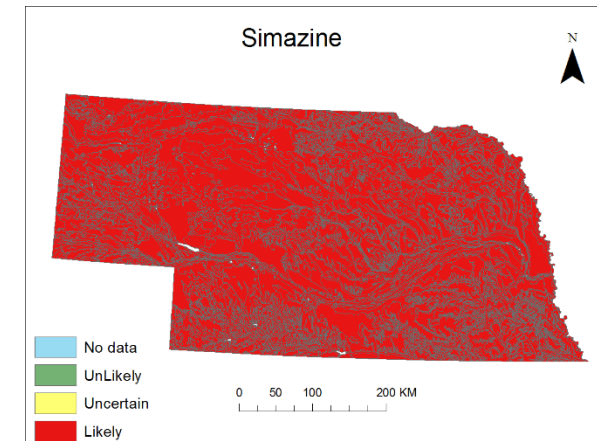
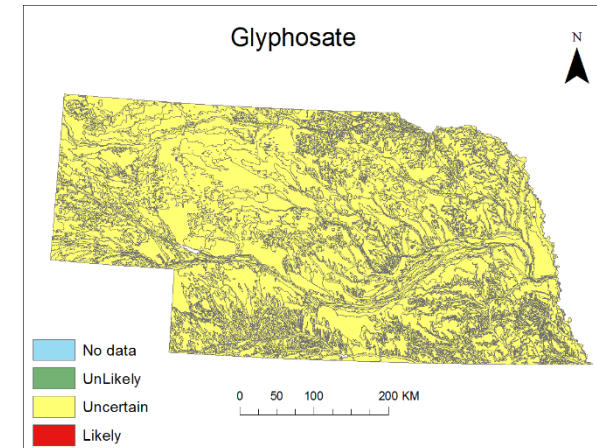
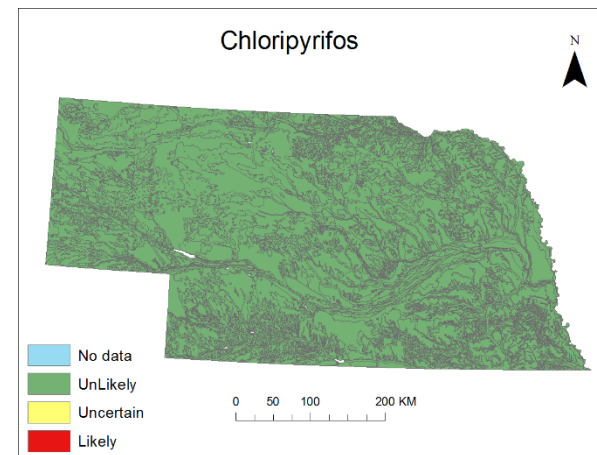
Principal Findings

- 1. Annual average ET was estimated based on complementary relationship and disaggregation methods
 - Annual average ET for the state - 600 mm/year
- 2. Annual average recharge was estimated based on water balance approach at the watershed scale level
 - Annual average net recharge for the state – 30 mm/year
- 3. CLERS model was run for the given standard chemicals with soil, chemical and recharge datasets
- 4. Relative leaching assessment of different chemicals were carried out with CLERS model and yet to be compared with HYDRUS-1D results for validation



Significance/Impact of your Findings

- State wide variation of evapotranspiration was estimated and validated against the water balance data
- State wide variation of recharge was estimated from the water balance approach and validated with water balance data
- The current version of PYTHON based CLERS model was applied for the entire state to assess the leaching of few chemicals in Nebraska
 - Ex: Chloripyrifos categorized as a non leacher while Simazine classified as leacher categories and Glyphosate in the uncertain class.



Future Funding Plans

- As soils is not always homogeneous in profile, mass fraction models have to be revised by considering heterogeneity into account
- The advantage of mass fraction models for heterogeneous soil system includes,
 - Precise assessment of leaching of chemicals
 - Locating depth of center of mass of chemicals
- NET-Nebraska Environmental Trust
- As we already have soil and chemical databases built from the current project, it is easy to test the proposed models