The LandSHIFT Model: Use and Applications in Oklahoma

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INTRODUCTION

The relationship between human land-use activities and the environment is often described as a coupled human-natural system. Land-use and land-cover change is an important outcome of that relationship with competition between differing human uses and management styles for land parcels. One of the few large scale approaches that integrates functional components to represent both human and environmental aspects of land-use change, is the LandSHIFT model

BACKGROUND

The LandSHIFT model is a highly modularized large scale land use model that can be adapted to various study regions and several spatial scales. LandSHIFT's main field of application is the simulation of spatially explicit, mid- to long-term scenarios of land-use change involving multiple biophysical (e.g. climate) and socioeconomic (e.g. population growth) factors. LandSHIFT output consists of time series of grid maps with projected land-use/land-cover information that can serve as basis for further impact analysis of research questions related to climate change. These analyses can help to identify where conflict might occur over limited resources, such as water in Oklahoma, due to demands from irrigated agriculture, animal husbandry, and urban growth or demands for cropland and urban land.

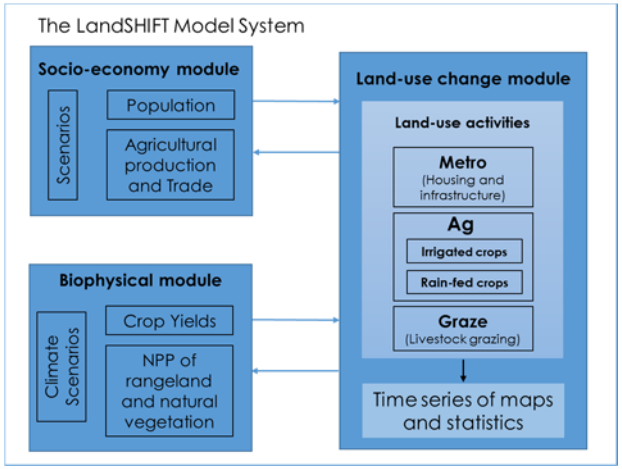

Figure 1 Structure of the integrated modeling system LandSHIFT, adapted from Schaldach and Koch (2009)

OBJECTIVES

Here we present the LandSHIFT the first steps of an implementation of LandSHIFT for Oklahoma for the purpose of modeling potential future changes in land use under various climate scenarios.

Disclaimer: This research is funded under NSF Award IIA-1301789.

INPUTS

Here are some of the inputs for the LandSHIFT model that will be used for this application.

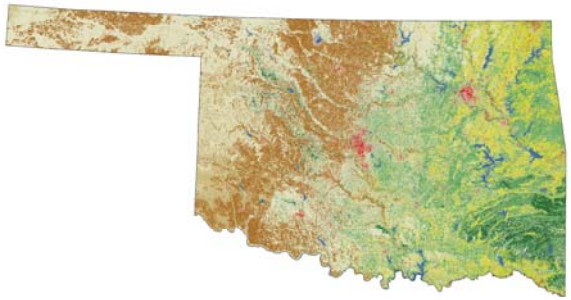

Figure 2 Raster of land-cover in Oklahoma from National Land Cover Database 2001.

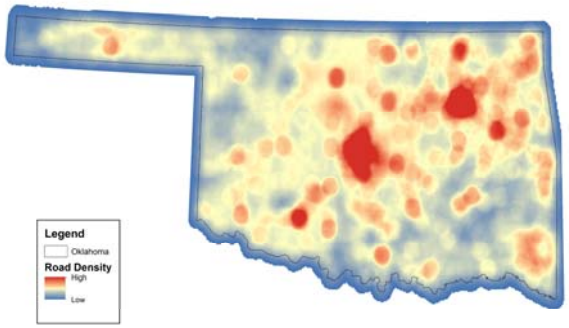

Figure 3 Raster of road density in Oklahoma created from Tiger 2000 road network file.

FUTURE OUTCOMES

We expect that climate will have an effect on crop yields and that farmers will be interested in other land use options. We are unsure on the effect that population growth and urban areas will have on agricultural areas.

We are interested in working with crop modelers to calculate winter wheat yields, both rain-fed and irrigated, under various climate scenarios.

INPUTS CONT.

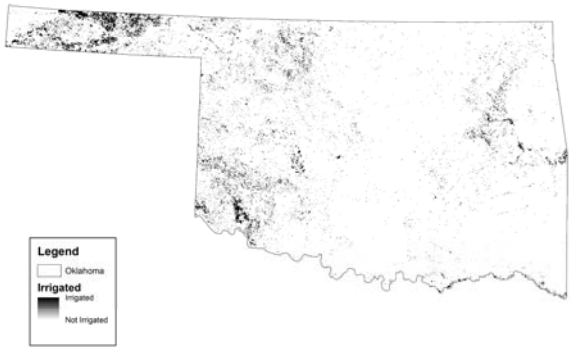

Figure 4 Raster of irrigated land in Oklahoma from Center for Sustainability and the Global Environment (SAGE) University of Wisconsin-Madison.

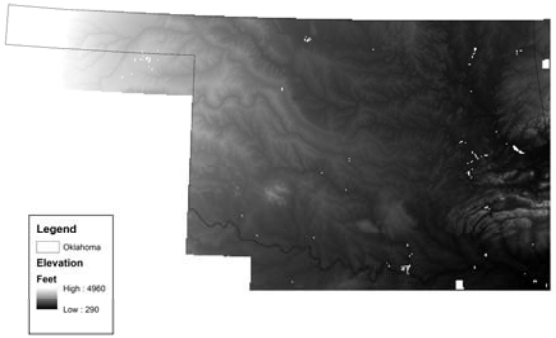

Figure 5 Raster of elevation in Oklahoma from the National Map.

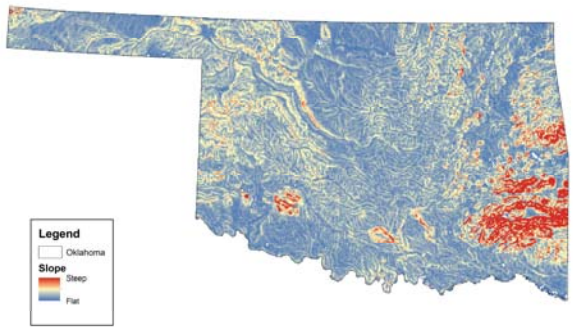

Figure 6 Raster of Slope in Oklahoma created from elevation raster.