Backcasting Land Use Change Using GIS and Neural Networks

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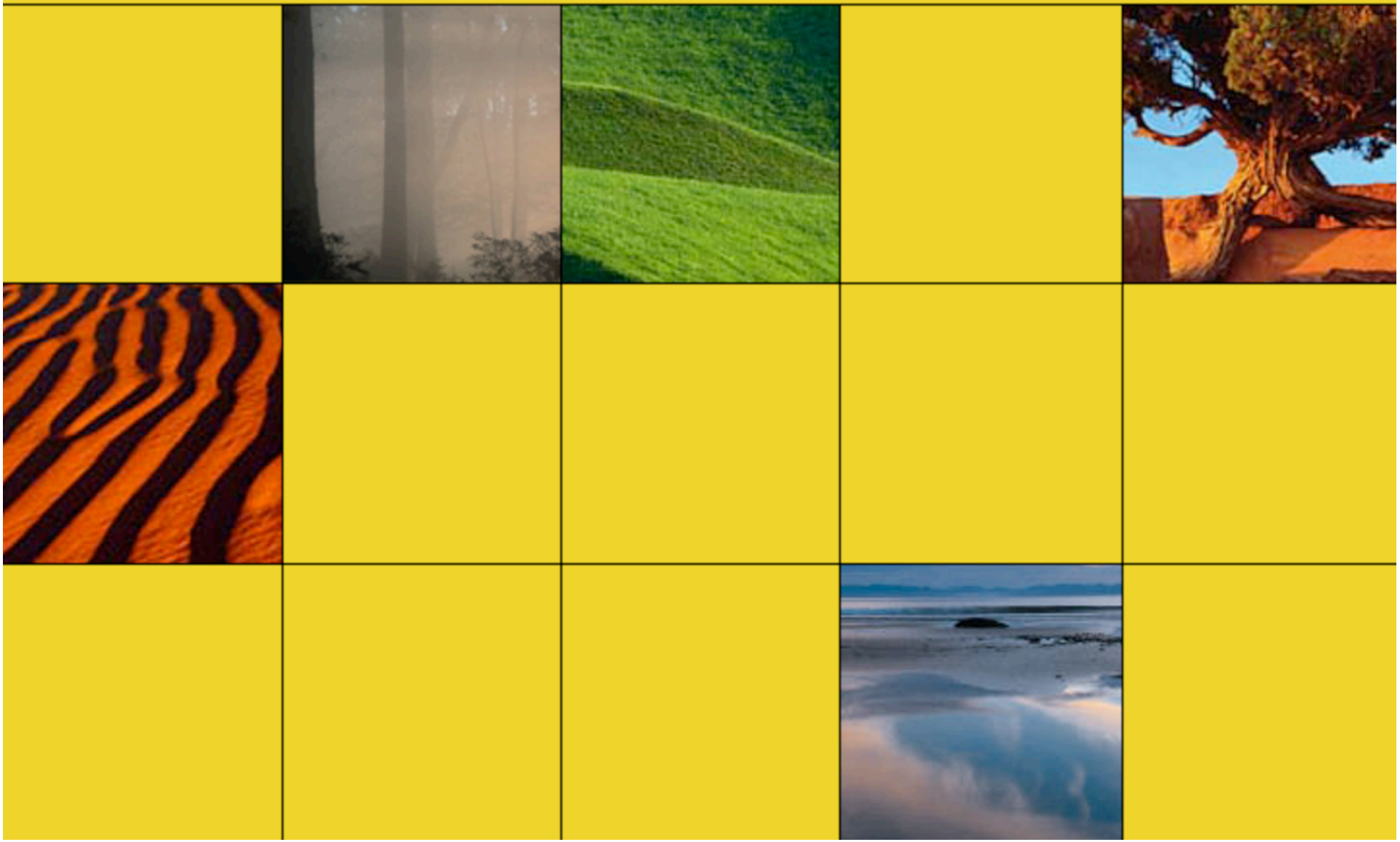
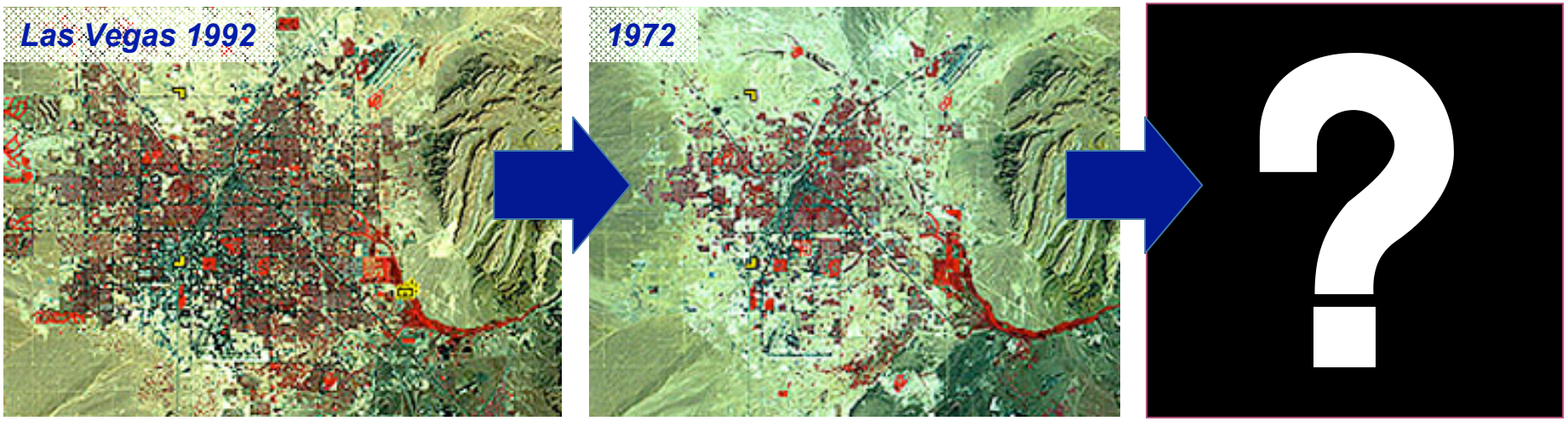


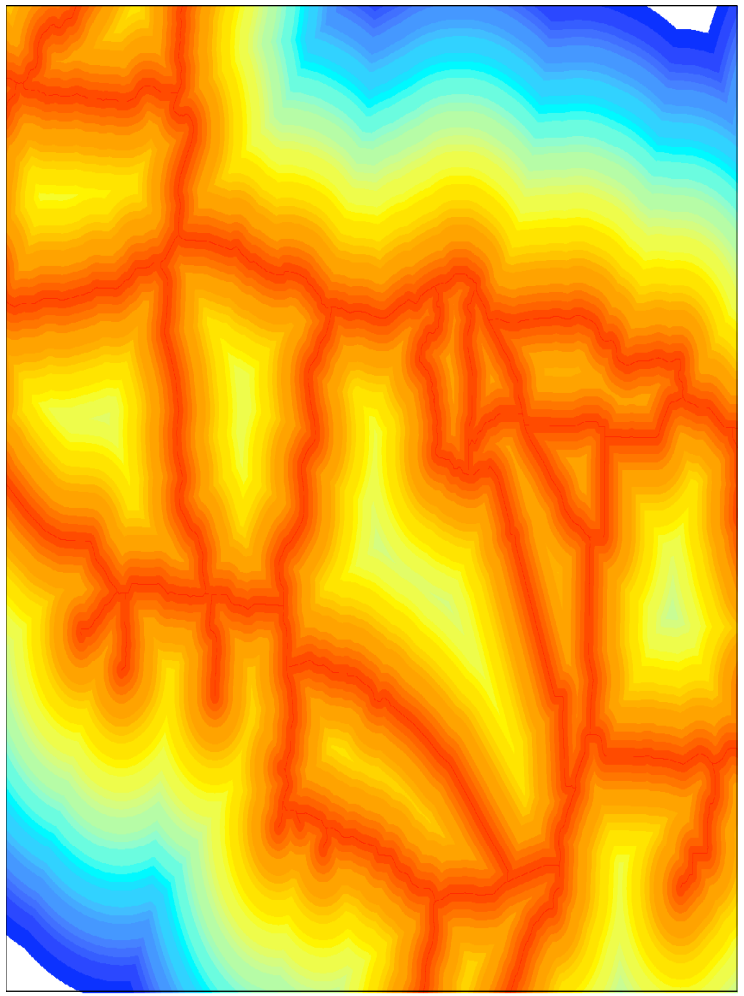
Introduction: Why "backcast"?

- Landscape analysis limited by availability of historical maps and remotely sensed images
- Recent recognition of importance of land use legacies
- Valuable in evaluating reliability of forecasted information



Methodology

- Previously developed Land Transformation Model (LTM) was significantly modified to produce a model to "backcast" land use change—LTM-Legacy
- Sixteen predictor variables created using GIS
  - Distance to roads, rivers, each of 4 land uses, etc.
  - Slope, soil permeability, max pH of soil, USGS ecoregions, etc.
  - Land use density
- Used to train artificial neural networks (ANN) to recognize patterns involved in the conversion of urban, forest, agriculture, and shrub land uses



Distance to Roads

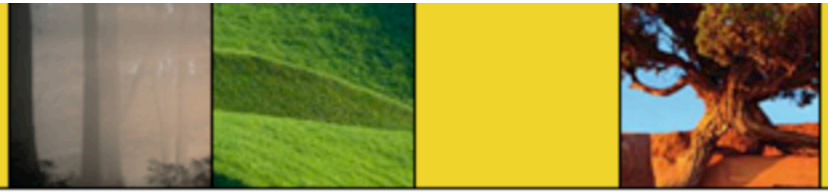
Methodology

- Backcasts based on two proxy datasets
  - Total housing units data for each time period derived from the *U.S. Census*.
  - The *National Agriculture Statistics Service* (NASS) data for Land in Farms for each county converted from acres to 30-m cells.

- Transitions in forests and shrubland calculated from ratios of known change (1978-1998)

Conclusions

- Represents first step in linking recreations of historical land use scenarios to a Variable Infiltration Capacity model for the Great Lakes Basin
  - Predicts water and energy fluxes within an area of interest
- Through reconstructing time history of water and energy balances over the basin
- Using several climate scenarios, future water cycle variations in response to land use and climate change can be predicted



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