



## Agriculture

### User

NRCS, a nationwide organization that helps farmers boost productivity while maintaining our natural resources

### Partner

Stone Environmental, Inc.

### Challenge

Deliver advanced agronomic and water quality modeling analyses to farmers and ranchers

### Solution

ArcGIS® for Desktop  
ArcGIS for Server  
ArcGIS API for Silverlight  
Microsoft® SQL Server®  
Agricultural Policy/Environmental Extender (APEX) Model

### Results

Enabled farmers to easily analyze their land to determine conservation practices while optimizing production

# Putting Agronomic Analysis in the Hands of Farmers

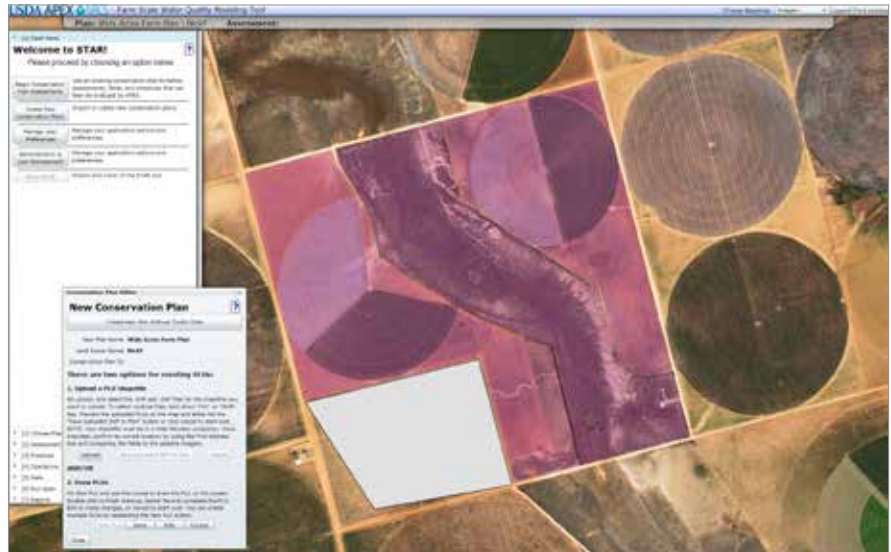
As stewards of our resources, farmers and ranchers understand the importance of both production and resource conservation. However, it is not always clear how to protect our natural resources while maintaining productivity. The United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) works with farmers and ranchers to ensure the health of our natural resources and the sustainability of agriculture.

## The Challenge

NRCS helps farmers and ranchers develop a conservation strategy. Whether it be to improve the health of soils and water or restore wetlands and wildlife, NRCS strives to boost productivity while protecting our natural resources. To analyze the high variability in soil type, terrain, cropping patterns, and weather, the Texas A&M University Blackland Research & Extension Center developed a spatial agricultural water quality model, the Agricultural Policy/Environmental Extender (APEX). However, the tool is too complex for most; only trained scientists have been able to use it, leaving out those that can greatly benefit from it—the farmers and conservation planners.

## The Partner

Stone Environmental Inc., based in Montpelier, Vermont, provides scientific tools, information, and analyses to help clients solve complex environmental and data challenges. Stone's data and modeling expertise, along with its long-term relationship with the USDA and Texas A&M University's Spatial Sciences Lab, made the company an obvious choice to develop a more user-friendly farm modeling system.



“The STAR user interface makes the powerful, albeit complex, APEX tool intuitive to use. It allows conservation planners in Vermont to easily optimize which conservation practice alternatives to offer to agricultural producers by quantifying estimated nutrient reductions associated with those alternatives and by providing these estimates in a geospatial context. It is a game changer for Vermont.”

**Michael Middleman**  
 Partner Liaison  
 Vermont Agency of Agriculture  
 Food & Markets

## The Solution

To make the data from the APEX tool more widely available, Stone, in collaboration with Texas A&M University’s Spatial Sciences Lab and Blackland Research & Extension Center, developed the Systematic Tool for Analyzing Resources (STAR) application. The pilot was developed to support the Vermont NRCS and the Vermont Agency of Agriculture Food & Markets (VAAF), both of which facilitate, support, and encourage the growth and viability of agriculture. The web-based modeling tool is built on Esri’s ArcGIS platform and simulates the impacts of alternative conservation practices applied across individual farms to help producers and conservationists conduct more efficient resource assessments. The STAR application incorporates all of the APEX model’s required data, including soils, topography, hydrology, and climatology databases. Based on the location of the field, all the model parameters are extracted using a variety of GIS processing tools for input into the APEX model. After developing a baseline using existing field conditions and current farming practices, the STAR tool quickly provides data comparing the current situation with other alternative farming and conservation practices.

## The Results

The STAR application provides farmers and ranchers with a powerful yet user-friendly tool to optimize production, improve water quality, and conserve soils. These producers now have the ability to analyze and compare the impacts of implementing conservation practices, like contour cropping, terraces, cover cropping, filter strips, and conservation tillage, anytime, anywhere, and on any device. The STAR application delivers complicated, multivariate analysis in an easy-to-consume format, in a fraction of the time required for previous practices. Using STAR, Vermont NRCS and VAAF are able to easily compare the impacts of current farming practices and cropping systems with conservation alternatives and identify more viable options. Conservation planners are able to use the tool to deliver quantifiable farm management data in a geospatial context, allowing farmers to easily identify best practices to lessen erosion and nutrient loss while improving production and streamlining farm management.



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