7.7  GIS TOOLS FOR REGIONAL RESEARCH

County-Level Geographic Information Systems (GIS)

Project Proposal Submitted To:
Precision Resource Management
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Abstract

GIS has become an important resource for natural resource managers, agriculturalists, local
governments, planners, regulatory agencies, utility providers, law enforcement, and emergency
responders. University researchers amass voluminous site-specific and county-specific data that
could be of benefit to local and community stakeholders. The goal of this proposed project is to
develop regional GIS databases that could be used for research projects in agriculture and natural
resources and also serve this data to the local level.
INTRODUCTION

Geographic Information Systems (GIS) have become an important resource for natural resource managers, agriculturalists, local governments, planners, regulatory agencies, utility providers, law enforcement, and emergency responders. GIS serves as a tool to query, analyze, and map spatial data to allow improved management of resources and support the decision making process. A variety of publicly-available spatial datasets including aerial photo imagery, boundaries, transportation networks, streams, topography, and land use exist for the entire state of Kentucky. These electronic resources are maintained by local, state, and national entities and can be downloaded for local use or accessed through the Internet.

Like many new technologies, the adoption of GIS is limited by a lack of understanding of the application and usefulness of the software. A lack of human and financial resources often creates levels of “haves” and have-nots” among end users. The software applications can be complex and even basic procedures are typically difficult for new or inexperienced users. Because the datasets originate from differing sources, the file format, coordinate system, and quality also vary making them difficult to integrate into a useable system.

OBJECTIVES

The goal of this proposed project is to establish regional research opportunities by creating easily accessible GIS databases of available spatial data. The program will be piloted in approximately 15 different counties. The pilot programs will be chosen to represent a variety of geographic regions with different potential GIS applications including agriculture, forestry, urban development, land-use planning, utility management, emergency response, and youth programs.
A wide range of GIS adoption levels exist geographically across the State. For example, multiple counties in western Kentucky have early adopters of precision agriculture technologies while precision agriculture has limited early-adoption applications for agriculturalists in eastern Kentucky. Other GIS applications, such as precision forest management, are more applicable in eastern Kentucky than western Kentucky. Because of this diversity, we have identified Extension Agent cooperators in counties throughout the State. There is also a wide range of levels of adoption of GIS among local governments, planners, regulatory agencies, and other entities that typically is a factor of the level of urbanization of the community. For that reason, our intent is also to provide a data clearinghouse to counties that have not widely adopted GIS and to aid the initiation of resource management research projects based on the specific need of the county.

A diverse group of county Extension Agents will be selected based on GIS experience and geographic location. Ten agents have already committed to participate in this program (letters attached). These cooperators were participants in previous GPS/GIS training sessions or have a major interest in applications of GIS. A total of at least 15 cooperators will be identified if this project is funded. A consideration in selecting local cooperators will be the level of computer experience. The complexity of most GIS software packages would limit the capability of beginning computer users to effectively be a resource for their community on this new technology.
The project goal will be achieved through the following specific objectives:

1) Assemble and organize standard spatial datasets for each selected county cooperator;
2) Conduct intensive In-Service training sessions for the cooperators on GIS and basic GIS analysis; and
3) Assist the cooperators in conducting local training and informational sessions on GIS for local stakeholders.

BACKGROUND

GIS user training was initiated among early adopters of precision agriculture. Educational programs were conducted in multiple locations across the State using a mobile computing lab consisting of 12 laptops, 12 PDAs, and 12 handheld GPS receivers. In-service training sessions for Extension Agents were also conducted and typically consisted of a 6 hour introduction to GIS. Because of the time constraints, a limited overview of the software tools and applications were presented with brief opportunities for hands-on learning. These previous programs were also focused primarily on agricultural applications of GIS. Since GIS can also be used as a tool in other areas relating to natural resource management, land-use planning, and economic development, the outreach programs for the proposed project would include applications and examples from each of these areas.

A program similar in scope to what is being proposed has been underway in McLean County. That program has been very successful. Greg Henson, county agent for agriculture and natural resources has gathered many spatial data sets for that county and built a comprehensive database of spatial data, which has been available for distribution via CD. In addition, project investigators have helped conduct GIS demonstration and training sessions for farmers,
community officials, emergency response personnel and utility providers. As a result of these programs, several of the trainees are beginning to use the data for research and development efforts within the county, and they are looking to the county agent as a valued resource. The tremendous success of this program can be duplicated in counties throughout Kentucky.

PROCEDURES

Objective 1: Assemble and organize standard spatial datasets for each selected county cooperator.

A variety of useful publicly-available spatial datasets exist statewide including aerial photo imagery, county and city boundaries, streams and rivers, transportation networks, soils, geology, and census information. Because these data originate from and are maintained by various local, state, and national entities, it is sometimes difficult to integrate them into a common GIS. One of the common difficulties is that the data may be in different coordinate systems and projections.

A “standard” set of basemap datasets will be assembled for each participating county. Because not all county government and business offices have high speed internet connectivity, we will assemble the data using UK internet resources. These data will be organized for display according to varying uses including agriculture and natural resource management, economic development, land-use planning, and emergency response. If the cooperator has adequate data connectivity, we will provide assistance in connecting to Internet sources of GIS data. We will also assist the cooperator in identifying local sources of publicly-available data such as local government agencies, utility providers, educational institutions, and agricultural service providers. These basemap data would be provided in a distributable format on CD with a free
GIS viewer for dissemination to local users. Much of the basemap assembly activities will be performed by a student worker who will be trained by Project Investigators.

**Objective 2: Conduct intensive In-Service training sessions for the cooperators on GIS and basic GIS analysis.**

We propose to conduct a three-day intensive training session for the Extension Agent Cooperators focusing on basic GIS tasks and analysis. The training would combine the use of instructor-led presentations, hands-on exercises, and individual participant training based on expected applications for their local users. The existing mobile computing laboratory would be utilized to conduct this training in combination with field data collection exercises. The ESRI software suite will be utilized in the training since all branches of local and state government have access to it in Kentucky. The Project Investigators will use a team approach to leading these training sessions. These trainings will be conducted using existing Extension funding and structure.

**Objective 3: Assist the cooperators in conducting local research and development programs using GIS for local stakeholders.**

Upon completion of the intensive GIS training, the local cooperators will be equipped to conduct in their local groups including farmers, natural resource managers, city and county officials, and utility providers. Resources from the Biosystems and Engineering Department, including the mobile computer laboratory and GIS personnel, will be made available for these local programs.

As part of this project, the distributable GIS data CDs that were assembled as part of Objective 1 can be given to participating researchers or government personnel for use in basic mapping tasks. An introduction to the online and CD-based training modules can also be
presented generating a local awareness of this resource and encouraging regional research projects.

**EXPECTED BENEFITS**

The primary benefit of the project will be complete GIS databases that can be utilized by regional research projects. Another benefit will be an increased awareness and adoption of GIS in local communities throughout the state and an understanding of the potential benefits to local stakeholders including natural resource managers, agriculturalists, local governments, planners, regulatory agencies, utility providers, law enforcement, and emergency responders. A network of local Extension Agents knowledgeable about GIS and its applications will be established that are equipped to research and develop based on local need, using this new technology.

**DELIVERABLES**

For each county with a participating cooperator, a set of basemap datasets will be assembled and organized and can be utilized for a variety of uses including agriculture and natural resource management, economic development, land-use planning, and emergency response. This basemap data would be provided in a distributable format on CD with a free GIS viewer for dissemination to local users.