

8-1-2008

## Back to the Future Part 2: Surveying Geospatial Technology Needs of Georgia Agriculture and Natural Resources Extension Professionals

Krista L. Merry

*University of Georgia*, [kmerry@warnell.uga.edu](mailto:kmerry@warnell.uga.edu)

Pete Bettinger

*University of Georgia*, [pbettinger@warnell.uga.edu](mailto:pbettinger@warnell.uga.edu)

William G. Hubbard

*University of Georgia*, [whubbard@arches.uga.edu](mailto:whubbard@arches.uga.edu)



This work is licensed under a [Creative Commons Attribution-Noncommercial-Share Alike 4.0 License](https://creativecommons.org/licenses/by-nc-sa/4.0/).

---

### Recommended Citation

Merry, K. L., Bettinger, P., & Hubbard, W. G. (2008). Back to the Future Part 2: Surveying Geospatial Technology Needs of Georgia Agriculture and Natural Resources Extension Professionals. *The Journal of Extension*, 46(4), Article 11. <https://tigerprints.clemson.edu/joe/vol46/iss4/11>

This Research in Brief is brought to you for free and open access by the Conferences at TigerPrints. It has been accepted for inclusion in The Journal of Extension by an authorized editor of TigerPrints. For more information, please contact [kokeefe@clemson.edu](mailto:kokeefe@clemson.edu).



August 2008 // Volume 46 // Number 4 // Research in Brief // 4RIB1



PREVIOUS  
ARTICLE



ISSUE  
CONTENTS



NEXT  
ARTICLE



## Back to the Future Part 2: Surveying Geospatial Technology Needs of Georgia Agriculture and Natural Resources Extension Professionals

### Abstract

Land conversion and habitat fragmentation are affecting natural resources. Land use/land cover change models can play an important role in understanding these impacts and illustrating the land conversion process to the public. A two-phase needs assessment was conducted to understand the perspectives, attitudes, and needs of planning and education officials. The second phase targeted Extension professionals in Georgia. The majority of Extension professionals surveyed felt that land use/land cover change projections would be valuable in their extension efforts. They felt that projections would be best distributed via Web-based access to maps and through research centers or workshops.

### Krista L. Merry

Research Coordinator  
Warnell School of Forestry and Natural Resources  
[kmerry@warnell.uga.edu](mailto:kmerry@warnell.uga.edu)

### Pete Bettinger

Associate Professor  
Warnell School of Forestry and Natural Resources  
[pbettinger@warnell.uga.edu](mailto:pbettinger@warnell.uga.edu)

### William G. Hubbard

Southern Regional Extension Forester  
College of Agriculture and Environmental Sciences  
[whubbard@arches.uga.edu](mailto:whubbard@arches.uga.edu)

University of Georgia  
Athens, Georgia

## Introduction

Land use change and habitat fragmentation are the components of global change with the greatest potential to affect terrestrial ecosystems (Sala et al., 2000; Vitousek, 1994). Fragmentation of rural lands also affects the sustainability of both environmental services and economic benefits (ECOP, 2004). In the fall of 2004, the USDA CSREES Renewable Resources Extension Act Focus Fund provided a grant for a project entitled "Visualizing Impacts of Local Land Use Decision and Plans on Forest Resource Management: Setting the State for Community-Based Forestry Decision-Making." Throughout 2005, the project team collected and synthesized information related to forest fragmentation and land cover change models, developed an assessment system for the set of models that were located, and selected a sub-set for further investigation. The goal of the project was to develop a nationally focused education program that will apply geospatial technologies to develop scenarios of future landscape (land cover) change, and disseminate the results of these scenarios as geospatial visualization products.

One cannot model land cover change effectively without recognizing trends and changes in land use and modeling them correctly. While land cover and land use are related, they arise from different socioeconomic, biophysical, and ecological factors. As a result, any referral to land cover change is attempting to define "land cover" as a result of "land use." This article reports the results of a needs assessment conducted on Georgia county Extension agents. It is a companion article to

"Back to the Future Part I" (Merry, Bettinger, & Hubbard, 2008), which reported on the results of a similar survey of Georgia land use planners.

Following the advice of a project advisory team, two needs assessment surveys were conducted: the first of planning professionals in Georgia and the second of Extension professionals in Georgia counties. The goal of the survey was to identify the demand for education and outreach programs for land cover change modeling. Specifically, the survey sought to gather information on:

- Perceived drivers of land cover change in Georgia;
- The familiarity of Extension professionals with geospatial technologies, including land cover modeling and GIS;
- The interest in such geospatial technologies; and
- Which outreach methods (e.g., Website, research center, hard copy maps and atlases) and programs were considered most desirable for use in the land planning process.

## Methods

A needs assessment questionnaire was designed by the research team at the University of Georgia and distributed to 155 Agriculture and Natural Resources Extension agents in Georgia counties. Georgia's 159 counties are divided into four different districts served by the University of Georgia's Cooperative Extension Service. Each district's Agriculture and Natural Resources Program Development Coordinator was contacted via email and asked to distribute the survey to Agriculture and Natural Resources Extension Agents in their district. In November 2006, a link to the electronic survey was sent via email to Georgia Extension agents. A follow-up email was sent out 2 weeks later. Finally, an additional reminder was sent out 2 days prior to the close of the survey.

The survey was designed using an online survey tool. Extension agents were provided with a brief explanation of the goals of the survey as well as an overview of the project. Extension agents were given the option to participate or to exit the survey. Those who chose to participate were asked to answer 22 questions (Appendix).

## Results and Discussion

Of the 155 Extension agents sent the survey, 130 chose to participate (84%). Participants had the option to skip questions during the survey; therefore, not all questions had 130 responses (Appendix). Nearly 60% of survey participants identified the counties they serve as "rural" counties. Thirty-four percent of respondents identified their county as "mixed" and 6% as "urban." In 15 years, 35% of respondents felt their county would be "mixed," 33% "rural," and 25% "urban" (Table 1).

**Table 1.**  
Percentage of Responses by Land Use Type Currently and in 5, 10, and 15 Years

	Urban		Rural		Mixed		I Don't Know	
	%	n	%	n	%	n	%	n
Now	6	8	59	74	34	43	0	0
5 years	8	9	48	58	44	53	0	0
10 years	14	17	40	47	44	52	2	2
15 years	25	29	33	39	35	41	7	8

Sixty-nine percent of respondents recognized land cover change as a problem for their county. For those who did not identify land cover change as a problem in their county, 57% felt that it would be a problem in five years, 60% in 10 years, and 67% in 15 years (Table 2).

**Table 2.**  
Percentage of Responses of Land Use Being a Problem Currently and in 5, 10, and 15 Years

	Yes		No		I Don't Know	
	%	n	%	n	%	n
Now	69	86	30	38	0	1
5 years	57	43	37	28	5	4
10 years	60	43	24	17	17	12

15 years	67	50	11	8	23	17
----------	----	----	----	---	----	----

## Geographic Information Systems in Georgia Counties

In order to fill the potential land cover needs of the Extension community in Georgia, it is important to know their familiarity with Geographic Information Systems (GIS) and whether their county planning offices have an in-place GIS infrastructure. The survey was developed to inform the development of training programs for Extension agents. In order to develop the most appropriate training programs, it was necessary to determine if Extension professionals have access to GIS technologies. Limited access to GIS may make it necessary for Extension training programs to be hosted through a research center or in collaboration with county planning departments or regional development centers.

Only 26% answered that their county did have a GIS department or staff. Thirty-six percent of respondents indicated that their county did use GIS as a tool in making planning decisions. Thirty-four percent answered that county planners did not use GIS in planning decisions, while nearly 30% were unsure whether or not GIS was used in making planning decisions.

## Extension's Role in the Planning Process

When asked whether or not they were involved in the planning process for their county. Thirty-three percent of respondents indicated that they were, while 67% answered they were not involved. Of those who did indicate that they were involved in the planning process, several ways in which they participated were provided.

Many respondents indicated that they served on long-range planning and comprehensive plan development committees. One respondent indicated playing a role in helping the regional development center in developing a comprehensive plan. A few participants answered that they served on tree ordinance committees. Others indicated that they served as advisors on land zoning and planning issues. Several Extension professionals identified their advisory roles in terms of agricultural zoning and farmland conservation issues. Specifically, several respondents highlighted their roles as advisor on agricultural issues including advancements in agricultural technology and trends.

## Planning and Natural Resources

When asked if natural resource issues were incorporated in planning for their county, 47% of participants suggested that they were, while 18% of respondents suggested that they were not. Thirty-five percent were unsure whether or not natural resource issues were taken into account during planning.

Several different natural resource issues were identified as part of the planning process in Georgia counties. For example, one respondent pointed to the collaboration between themselves and other agencies in developing educational outreach programs, which include agricultural and natural resource issues, for planning professionals and municipal officials in their community. Several respondents answered that their county strictly adheres to tree ordinances, as well as sediment and erosion control regulations. Other respondents pointed to watershed protection, stream buffers, stream and river management, and other water quality issues. Additional natural resources issues included in responses were land use set backs, greenspace, farmland preservation, and best management practices.

## Computer Modeling and the Planning Process

Forty-two percent of respondents suggested that their county did not use land cover change models in their planning process. Fifty percent of participants were unsure if land cover change models are used in planning. Nevertheless, 85% of respondents felt that land cover change model projections would be helpful to the planning process or their Extension effort.

Participants identified land cover projections as useful tools for their county to educate the community about land cover change, to develop new programming efforts, and to aid in the development of comprehensive plans and land use regulations. Approximately 62% were unsure if they would purchase projections for their county and the majority, and 82% were unsure the maximum amount they would spend on future land cover projections. Forty-one percent of respondents identified 10 years into the future as the most valuable projection increment. When asked what projection time step would be the most useful, 60% of participants felt that 5-year increments would be the most useful.

## Education and Technical Assistance

Participants were asked to consider the value of several education and technology transfer methods for delivering land cover change projections to their counties. Eighty percent indicated that they liked the idea of using Web-based maps, 79% liked the idea of digital maps, 73% liked the idea of printed maps, and 70% liked the idea of printed atlases for each county (Table 3).

Eighty-one percent of respondents preferred workshops as the Extension training method for disseminating land cover change projections for their counties (Table 4).

**Table 3.**  
Percentage of Respondents by Potential Tools for Distributing Land Cover Projections

	Strongly Dislike		Dislike		No Opinion		Like		Strongly Like	
	%	n	%	n	%	n	%	n	%	n
Web-based access to maps	0	0	2	2	19	22	55	65	25	29
Digital Maps/ GIS database (computer files)	0	0	0	0	21	25	51	61	28	34
Printed hard copy maps for your county	0	0	4	5	23	27	49	58	24	29
Printed atlas for each county	0	0	5	6	25	30	55	65	15	18
Printed Statewide Atlas	1	1	6	7	38	45	48	57	8	10

**Table 4.**  
Percentage of Respondents by Potential Technical Assistance Programs, % (n)

	Strongly Dislike		Dislike		No Opinion		Like		Strongly Like	
	%	n	%	n	%	n	%	n	%	n
Research center	1	1	5	6	50	60	41	49	3	4
Workshops	0	0	1	1	18	22	63	76	18	21
Distance education	0	0	14	17	34	41	41	49	10	12
Consulting packages	1	1	12	14	47	56	35	41	5	6

### Perceived Drivers of Land Conversion in Georgia

Several different perceived drivers to land cover change were offered by survey participants. The most common perceived driver of land use change in Georgia counties is residential development. This development seems to be the result of several different demands on the landscape: increases in population, population migration from adjacent states, and single-family home development in rural areas. Another driver to land cover change in Georgia counties identified by Extension agents was spillover from large cities like Atlanta, Columbus, and Macon. Additionally, rapidly developing counties like Cherokee, Gwinnett, and Forsyth are influencing development in adjacent more rural counties.

Several respondents pointed to shifts in the attitude of the new generation of farmers in Georgia. Specifically, Extension agents identified a lack of interest in farming as well as a lack of "ties to the land." A few participants attributed this lack of interest to the minimal profit to be made farming, either due to land values or changes in agricultural demand. A new generation of farmers is selling off their agricultural land for development. In addition, agricultural lands are being converted to different forms of agricultural production. For instance, participants identified large sales of forested land by timber companies and the clearing of timberland for cattle operations.

We found some very strong similarities between the survey of Extension agents and the previous survey of land use planners (Merry, Bettinger, & Hubbard, 2008). For example, the percentage of respondents who consider changes in land use being a problem now in their area (as well as being a problem in 15 years) is almost exactly the same. This is in spite of the fact that only 6% of Extension agents (vs. 23% of the land use planners) identified their area as currently being urban. Further, 23% of the Extension agents (vs. 46% of the land use planners) suggest that their area will become urban within 15 years. While the differing definitions of "urban" between the two groups of professionals may explain some of these differences, both groups agree that land cover change is a problem in their county.

As for potential tools to assist with land use planning in light of land use changes, both Extension agents and land use planners had almost the same positive opinion of Web-based access to maps, digital maps, and GIS databases. However, land use planners exhibited a stronger positive desire for these tools than Extension agents. Land use planners also exhibited a stronger dislike for printed county or statewide maps than did Extension agents. Both groups seem to agree that some form of digital, on-line support was preferred over traditional, hard copy maps.

While both groups also had the same positive response for research centers and workshops as technical assistance programs, land use planners exhibited a stronger desire for these than did the Extension agents. In addition, land use planners exhibited a stronger dislike for distance education and consulting services than did Extension agents. So it seems that the most desirable form of assistance for these two groups would be research centers or workshops that enabled Extension agents or land use planners to learn how to use, and to access digital maps or GIS databases related to changes in land use.

## Conclusions

Extension professionals across Georgia recognize land cover change as a problem for the state. Several factors have resulted to land conversion, including changes in the agricultural industry, population migration, and shifts in land values. The majority of Extension professionals in Georgia agree that land cover change projections would be very useful in their outreach and training efforts for the counties they serve. While they were not certain whether or not land cover change models are used by their county or if they would purchase projections, they were in agreement that they would be valuable tools in their Extension toolkit.

Clearly, an opportunity exists to create training and outreach programs for Extension professionals to train the planning community in incorporating land cover change models into their planning process. These new technologies may seem intimidating to the untrained users. The key to a successful outreach education or training program will be overcoming people's aversion to using computers or learning to use new technology. Web-based access to map output and digital maps for each county were the preferred tools for distributing projections.

The survey reported here also suggests the important function of collaboration between the land conversion community and Extension to increase the planning capacity of Georgia counties and develop solutions together. While several Extension professionals serve on committees and advisory panels on land use and natural resource issues, an opportunity exists to integrate new geospatial technologies into the planning discussion through research centers or workshops that are consistent with the needs of Georgia land use planners.

## References

Extension Committee on Organization & Policy (ECOP) - Forestry Task Force. (2004). Sustaining the nation's forest and rangeland resources for future generations. Agriculture and Extension Communications, Virginia Tech, Blacksburg.

Merry, K., Bettinger, P., & Hubbard, W. (2008). Back to the future part 1: Surveying geospatial technology needs of Georgia land use planners. *Journal of Extension* [On-line], 46(3) Article 3RIB6. Available at: <http://www.joe.org/joe/2008june/rb6.shtml>

Sala, O. E., F. S. Chapin, J. J. Armesto, E. Berlow, J. Bloomfield, R. Dirzo, et al. (2000). Biodiversity--Global biodiversity scenarios for the year 2100. *Science*. 287, 1770-1774.

Vitousek, P. M. (1994). Beyond global warming: Ecology and global change. *Ecology*. 75, 1861--1876.

### Appendix

#### List of needs assessment questions

I. General	N
Do you consider your county currently "urban," "rural," or "mixed"?	100
How about in 5 years? 10 years? 15 years?	100
Is growth and land use / land cover change currently a problem in the county you serve?	100
If not, do you envision being a problem in 5 years? 10 years? or 15 years?	79
II. Using GIS in your county / municipality	
Does your county / municipality have a GIS department and / or GIS staff?	125
Does your county / municipality utilize GIS for making planning decisions?	125
Are you involved in the planning process for your county / municipality?	125
If yes, how?	41
Does your county / municipality incorporate natural resource management issues into your planning process?	125
If yes, how are natural resource management issues incorporated?	50

<b>III. Using land use / land cover change models in your county</b>		
Does your agency or department currently use land use / land cover change models to predict the future landscape of your area?		125
If yes, could you provide contact information (department, name, email, phone number)?		9
Would projections of land use or land cover change be of value to your planning or extension effort?		124
How much (maximum) might your county / municipality be will to pay for one land use or land cover change scenario projected into the future?		120
How far into the future would the projections be necessary to be of value?		113
What increment of years would be of value in these projections		111
Please rank these tools for their value in distributing land use or land cover change projections to your county / municipality: (strongly dislike, dislike, like, strongly like)		120
<ul style="list-style-type: none"> <li>a. Web-based access to maps</li> <li>b. Digital map / GIS database (computer files)</li> <li>c. Printed hard copy maps for your county</li> <li>d. Printed atlas for each county</li> <li>e. Printed statewide atlas</li> </ul>		
Please rank the following extension outreach programs for their value in distributing land use or land cover change projections for your county / municipality: (strongly dislike, dislike, like, strongly like)		120
<ul style="list-style-type: none"> <li>a. Research center</li> <li>b. Workshops</li> <li>c. Distance education</li> <li>d. Consulting packages</li> </ul>		
What, in your opinion, are the drivers of land use change in your county / municipality (i.e., what is causing land use / land cover change in your county?)		95
Would you support the creation of a statewide or national research center to assist in the development of land cover projections for your county / municipality?		120
Please provide any comments of suggestions in the space below.		9

*Copyright* © by *Extension Journal, Inc.* ISSN 1077-5315. Articles appearing in the Journal become the property of the Journal. Single copies of articles may be reproduced in electronic or print form for use in educational or training activities. Inclusion of articles in other publications, electronic sources, or systematic large-scale distribution may be done only with prior electronic or written permission of the *Journal Editorial Office*, [joe-ed@joe.org](mailto:joe-ed@joe.org).

If you have difficulties viewing or printing this page, please contact [JOE Technical Support](#)