

Special Issue on Geographic Information Systems

Foreword

I was pleased to serve as the guest editor for this Ninth Annual Special GIS Issue of *Photogrammetric Engineering & Remote Sensing*. In keeping with the tradition of the previous issues, I believe that the five peer reviewed articles selected for this issue represent an important snapshot of the current state of the art in the use of GIS and remote sensing technology to meet the needs of society. In many ways these articles demonstrate a maturing of the field of GIS and the way that it has become an accepted approach to managing a diverse range of spatially referenced information to address practical problems. Since the inception of the special GIS issues, various commentators have expressed the need to see a closer coupling of GIS and remote sensing, a substantial improvement in modeling capabilities, extension of capabilities, improved user interfaces, and ease of use. I believe that the articles in this issue clearly demonstrate that many of these limitations have been substantially improved by the midpoint of the decade.

The first two papers focus on the need to incorporate more robust modeling procedures into the GIS analysis. George Hepner and his colleagues present an important application of GIS modeling to hazards vulnerability along the U.S. and Mexico border. In order to overcome severe data limitations, they rely on a quantitative model that develops estimates of hazard risks in Mexico. These inputs are then combined with other human and physical factors to create a Composite Mapping Analysis. This Composite Mapping Analysis incorporates scaling and weighting criteria rather than simple binary overlays to generate detailed assessments of vulnerability in both countries.

The second article, by Brean Duncan *et al.*, involves a micro-level assessment of the location of Florida Scrub Jays at the Kennedy Space Center. The authors demonstrate how spatial statistics should be utilized in the collection and representation of spatial data. They then utilize GIS spatial analysis and overlay operations to develop a spatially explicit habitat suitability index. This model is then statistically evaluated with known data and maps of correspondence, and residuals are generated. This article sets a good standard for an appropriate way to incorporate statistical analysis and GIS operations in research.

The next two articles examine the application of specific GIS operations to improved data collection and management. Roy Welch and his colleagues demonstrate how GPS, digital remote sensing, and aerial photography can be integrated to generate improved vegetation mapping in remote areas such as the Florida Everglades. They utilize helicopter based GPS receivers and laptop computers to build real-time ground control data. The paper represents the current state of the art in creating GIS databases from such diverse data sources.

The fourth paper, by Lynn Usery *et al.*, provides insight into how GIS has become an indispensable factor in modern

farming. The power of GIS to record, store, analyze, and display provides a tool for implementation of precision farming practices, such as variable rate treatment. The article demonstrates that GIS analysis is becoming widely adopted in farm management in a manner similar to its routine use within the forestry industry. The article also provides an analysis of a useful survey of the use of GIS and the requirements of precision farming experts in 18 states.

In the final article my colleagues and I review the use of GIS and remote sensing within a large Department of Energy facility. The article reviews the evolution of GIS and remote sensing systems over the past decade and demonstrates how the current hardware and software capabilities can be incorporated into a user friendly system that has a high degree of platform independence. The system that is described utilizes a simple desktop browsing and query system as the front end to applications that retrieve bibliographic and other data, view aerial photography, and perform sophisticated site selection modeling. The system is representative of the current state of the art in integrated systems that provide a close coupling of GIS, remote sensing, and database operations.

Each of the articles included in this special issue was reviewed by at least three authorities in the relevant research areas. They were selected from a set of articles that were submitted specifically as a result of a call for papers that appeared in the February 1995 issue of *Photogrammetric Engineering & Remote Sensing*. In order to meet the deadlines for publication, the reviewers were forced to provide extremely rapid turn around of the articles and the authors had to quickly incorporate recommended changes and submit the final materials. I am grateful to all the authors who submitted articles, the excellent set of reviewers, and the excellent support of Jim Case, Editor-in-Chief of *PE&RS*.

—David J. Cowan, Guest Editor

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