

# Foreword

**T**HIS SPECIAL ISSUE of *Photogrammetric Engineering and Remote Sensing (PE&RS)* focuses on geographic information systems (GIS). It will not be news to readers of this journal that there is a direct relationship between the quality and effectiveness of decision-making and the quality of data and analytical tools available to decision-makers. Environmental management, planning, and policy decisions are almost always based on examining and analyzing the interplay of the many different factors that bear on a particular issue. Decisions concerning preservation of prime agricultural lands, for example, must be based on evaluation of a range of institutional, political, economic, and environmental data and concerns. Automated geographic information systems can enable decision-makers to deal more effectively with such issues.

Geographic information systems are powerful tools for integrating and analyzing data derived from such disparate sources as remotely sensed imagery, soils surveys, land ownership maps, utilities maps, water sampling stations, topographic maps, and the census. In such systems, geographically referenced data are spatially registered so that multiple themes of data can be compared and analyzed together. Virtually any data that are, or can be, mapped (that is, are geographically referenced) can be "digitized" and stored in a computer. Data stored in a GIS can be rapidly manipulated, reconfigured, updated, compared, displayed, and mapped in a format and at a scale designed to meet a specific need. Geographic information systems allow decision-makers to analyze complex spatial interrelationships between variables that affect a particular problem. It is important to note that such systems not only facilitate more timely, efficient, and cost-effective decision-making, they also foster better decision-making since they enable users to conduct unique, and otherwise often infeasible, analytic tasks.

It is noteworthy that establishment and effective application of a GIS must be a multidisciplinary endeavor. There are important contributions to be made by cartographers, photogrammetrists, remote sensing specialists, surveyors, geographers, computer scientists, planners, natural resources managers, engineers, administrators, and many others. We now recognize that institutional, political, and economic considerations may be at least as important as technical issues as we strive to build and utilize geographic information systems. It seems clear that, in the future, the interests of members of the American Society for Photogrammetry and Remote Sensing (ASPRS) increasingly will be linked, integrated, and applied through GIS.

The acronym "GIS" is probably familiar to most readers of *PE&RS* since ASPRS has been a leading disseminator of information about geographic information systems. In 1981 ASPRS was a co-sponsor of the Pecora VII Symposium on Remote Sensing: An Input to Geographic Information Systems in the 1980's. The Society sponsored its first national symposium devoted specifically and exclusively to GIS technology in April, 1986. Along with the American Congress on Surveying and Mapping (ACSM), ASPRS has established a joint Geographic Information Management Systems (GIMS) Committee to advance GIS science and applications. The proportion of GIS-related technical

papers presented at ASPRS/ACSM conventions is increasing annually, and such papers are now being collected in separate GIS-oriented proceedings volumes. These constitute part of an important series of publications on GIS being developed by ASPRS and ACSM, including, most recently the book, *Geographic Information Systems for Resource Management: A Compendium*, edited by William J. Ripple. This special issue of *PE&RS*, focused on GIS, coincides with the Society's Second International Conference on Geographic Information Systems (GIS '87) being held 26-30 October 1987 in San Francisco.

Geographic information systems technology is becoming more sophisticated, less expensive, and widely adopted. Systems are being rapidly established by public agencies, research laboratories, academic institutions, private industry, the military, and public utilities. Perhaps the most striking characteristic of the GIS arena is the rapidity with which changes are occurring.

This special issue of *PE&RS* will provide readers a broad perspective on many important issues currently being dealt with by GIS developers, researchers, and users. Topics covered range from administrative and institutional considerations in establishing a GIS, to data structures, modeling, error assessment, and expert systems.

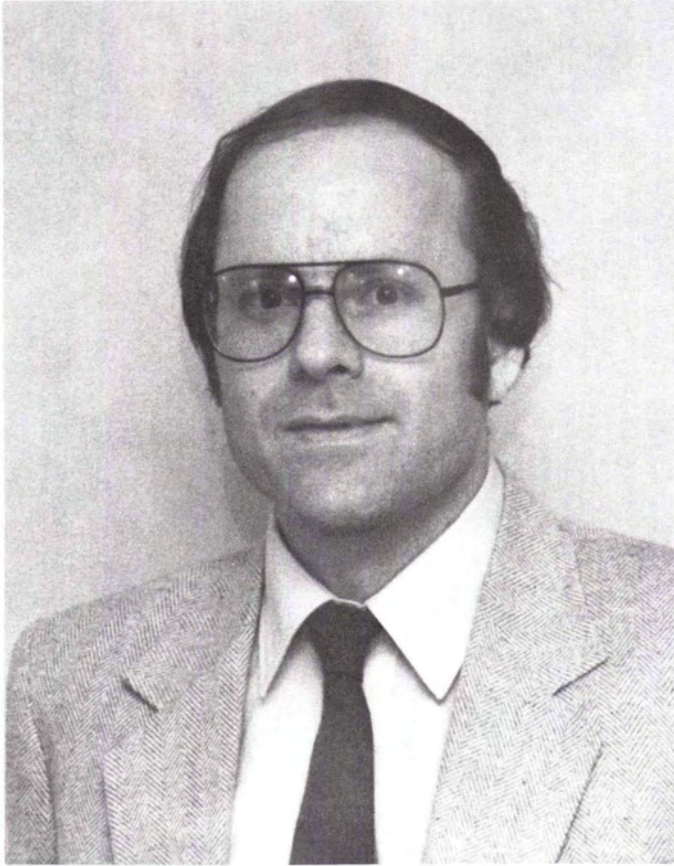
A special effort has been made to publish this information in a timely manner. This issue of *PE&RS* has, as a consequence, evolved in a somewhat atypical fashion. The technical articles were selected from papers presented initially at either the ASPRS/ACSM Annual Convention or the Eighth International Symposium on Computer-Assisted Cartography (AUTOCARTO 8) held concurrently 29 March-3 April 1987, in Baltimore, Maryland. These papers, supplemented by several invited commentaries and one contributed manuscript, address some of the most important developments and challenges currently confronting the GIS community. These issues are certain to be discussed in depth at the ASPRS/ACSM GIS '87 conference in San Francisco and at other forthcoming GIS symposia.

Papers incorporated in this issue of the journal were selected by William J. Ripple (Oregon State University), James W. Merchant (University of Kansas), and Roy A. Mead (U.S. Forest Service). Thanks are due Donald F. Hemenway, Jr., ASPRS Director of Communications, for providing the impetus, coordination, and leadership for this project. We also gratefully acknowledge the assistance of Roy A. Mead (U.S. Forest Service), Veit S. Ulshoefer (Oregon State University), and Joseph A. Bernert (Oregon State University) for reviewing several of the manuscripts. Thanks also go to our organizations, the Environmental Remote Sensing Applications Laboratory, Oregon State University, and the Department of Geography, University of Kansas, for supporting our editorial activities as a service to ASPRS. Last, but certainly not least, we extend special thanks to all of the authors who contributed to this volume. Their efforts made it possible for us to meet an extraordinarily constrained timetable in order to bring this special issue to you in October.

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## Guest Editors



**William J. Ripple**

William J. Ripple is currently a Research Associate with the Environmental Remote Sensing Applications Laboratory (ERSAL) at Oregon State University in Corvallis, Oregon. Mr. Ripple is also a member of the Oregon State University Graduate Faculty with a courtesy appointment in the Department of Geography. He has an education in physical geography with a B.S. from South Dakota State University, a M.S. from the University of Idaho, and a Ph.D. from Oregon State University. Mr. Ripple has ten-years experience in the research and applications of geographic information systems and remote sensing for the study of vegetation and other natural resources.

Since 1977, he has worked at the USGS Eros Data Center, the South Dakota Land Resource Information System, the University of Idaho, and, in his present position at Oregon State University. Mr. Ripple is currently the Secretary/Treasurer for the Columbia River Region ASPRS and Publications co-Chair of the Geographic Information Management Systems (GIMS) committee for ASPRS-ACSM.



**James W. Merchant**

James W. Merchant is Assistant Professor in the Department of Geography, University of Kansas. He also serves as Senior Research Investigator with the Kansas Applied Remote Sensing (KARS) Program, University of Kansas Space Technology Center. Mr. Merchant has been engaged in basic and applied research in remote sensing and geographic information systems (GIS) since 1971, and has been affiliated with the KARS Program for over fourteen years. He holds a B.A. in Geography from Towson State University, Towson, Maryland, and both the M.A. and Ph.D. in Geography from the University of Kansas.

Mr. Merchant was a cofounder and first Executive Director, and currently serves as a member of, the Kansas Commission on Applied Remote Sensing. He was also a cofounder of the Center for Advanced Land Management Information Technologies (CALMIT), an interuniversity consortium headquartered at the University of Nebraska-Lincoln (UNL) and including UNL, the University of Kansas, Kansas State University and the University of Nebraska-Omaha. CALMIT was developed to link remote sensing and GIS programs at the participating universities and to enhance interaction between CALMIT university affiliates, public agencies and industry.