

**PROCEEDINGS**  
**AWRA ANNUAL SYMPOSIUM**  
**GIS AND WATER RESOURCES**



*Edited By*

**CHERYL A. HALLAM**  
U.S. Geological Survey  
Reston, Virginia

**JAYNE M. SALISBURY**  
Oklahoma State University  
Stillwater, Oklahoma

**KENNETH J. LANFEAR**  
U.S. Geological Survey  
Reston, Virginia

**WILLIAM A. BATTAGLIN**  
U.S. Geological Survey  
Denver, Colorado

*Sponsored By The*  
**AMERICAN WATER RESOURCES ASSOCIATION**

*Host Organizations*

**FLORIDA STATE SECTION, AWRA**  
**FLORIDA STATE UNIVERSITY STUDENT CHAPTER, AWRA**  
**UNIVERSITY OF CENTRAL FLORIDA STUDENT CHAPTER, AWRA**  
**UNIVERSITY OF FLORIDA STUDENT CHAPTER, AWRA**

*Co-Sponsoring Organizations*

**ST. JOHNS RIVER WATER MANAGEMENT DISTRICT, PALATKA, FLORIDA**  
**SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT, BROOKSVILLE, FLORIDA**  
**SOUTH FLORIDA WATER MANAGEMENT DISTRICT, WEST PALM BEACH, FLORIDA**

*Financial Contributors*

**LAKE WORTH DRAINAGE DISTRICT, DELRAY BEACH, FLORIDA**  
**SOUTHERN STATES UTILITIES, INC., APOPKA, FLORIDA**

*In-Kind Contributors*

**SUWANNEE RIVER WATER MANAGEMENT DISTRICT, LIVE OAK, FLORIDA**  
**NORTHWEST FLORIDA WATER MANAGEMENT DISTRICT, HAVANA, FLORIDA**

**SEPTEMBER 22-26, 1996**  
**FORT LAUDERDALE, FLORIDA**

## TABLE OF CONTENTS

### PROCEEDINGS GIS AND WATER RESOURCES

#### SECTION 1 DATABASE ISSUES

##### Implementing a GIS Within a Resource Management Department

- *Robert Presley* ..... 3

##### Maintaining a GIS: Critical Issues

- *Shane A. Imwalle* ..... 9

##### Using a GIS to Analyze Remotely Sensed Images and Provide Information to an Intelligent Data Base

- *Roger Ruggles, Laura Lindquist, Kenneth Rutt, and John Szekalski* ..... 19

##### Effect of Spatial Resolution on Estimating Hydrologic Response and Economic Value of an Urban Forest

- *James E. Mitchell* ..... 29

##### Development of a GIS Database for Lake Ecosystem Studies

- *Weihe Guan and Leslie Moore* ..... 37

##### The Development and Use of GIS Coverages for the Little Washita River Watershed

- *P. J. Starks, J. D. Garbrecht, F. R. Schiebe, J. M. Salisbury, and D. A. Waits* ..... 47

##### Oklahoma Rural Water Survey Update

- *Dave Goughnour and Brad Nesom* ..... 57

##### A Geographic Information System for Navigation Feature Data

- *Michael Myers* ..... 67

##### An Integrated Decision Support System for Corps of Engineers' Environmental Restoration Projects

- *Kelly A. Burks and Michael F. Passmore* ..... 77

#### SECTION 2 WATER QUALITY

##### Using GIS and Regression to Estimate Annual Herbicide Concentrations in Outflow from Reservoirs in the Midwestern USA, 1992-93

- *William A. Battaglin and Donald A. Goolsby* ..... 89

##### Watershed-Scale Nonpoint Source Pollution Modeling and Decision Support System Based on a Model-GIS-RDBMS Linkage

- *Jaewan Yoon* ..... 99

Adaptive Short-Term Water Quality Forecasts Using Remote Sensing and GIS	
– <i>Ming-Der Yang, Carolyn J. Merry, and Robert M. Sykes</i> .....	109
Improving Regional Water Resources Planning with GIS and Internet – The Dallas/Fort Worth Experience	
– <i>John Promise, Samuel Brush, Scott Rae, and Sandy Blanchard</i> .....	119
Providing Access to Safe Drinking Water in Less Developed Countries	
– <i>Laura Grosso</i> .....	129
SEDMOD: A GIS-Based Method for Estimating Distributed Sediment Delivery Ratios	
– <i>Robert H. Fraser, Paul K. Barten, and C. Dana Tomlin</i> .....	137
A GIS Based Assessment of Surface Water Runoff Containing Turf Management Chemicals from Golf Courses	
– <i>Brendan F. Kelly, Wei-Ning Xiang, and Craig Allan</i> .....	147
GIDM: A GIS-Based Model for Dairy Waste Management Analysis	
– <i>C. W. Fraisse, K. L. Campbell, J. W. Jones, and W. G. Boggess</i> .....	155
Using GIS for Modeling Tile-Drained Watersheds of East-Central Illinois	
– <i>Sharyl E. Walker, J. Kent Mitchell, M. C. Hirschi, and R. A. C. Cooke</i> .....	165

### SECTION 3 GROUND WATER

Integration of GPS, GIS, and Data Management Using ARC/INFO	
– <i>Cynthia Moore, W. Francis Mizell, and Wesley Harrell</i> .....	177
Applying Geographic Information Systems to Ground Water Assessments	
– <i>Christopher J. Richards, Honesto P. Roaza, and Thomas R. Pratt</i> .....	183
Groundwater Evaluations with EarthVision Geospatial Three-Dimensional Representation	
– <i>Ronald S. Kaufmann and Orlando Rodriguez</i> .....	193
Application of a Geographic Information System to Identify and Prioritize Sources of Nonpoint-Source Pollution in a Karst Watershed in Tennessee	
– <i>Thomas D. Byl, Howard Hankin, J. R. Mimms, George Hofstetter, and Brad Hazlett</i> .....	201
Development of a Ground Water Vulnerability Map for Pesticide Contamination for the Arkansas Delta Using GIS	
– <i>H. S. Lin, H. D. Scott, and K. F. Steele</i> .....	211
Predicting Areas of Public Water Supply Problems – Floridan Aquifer, Northeast Florida	
– <i>Paula Fischl</i> .....	221

## SECTION 4 STORM WATER

Using GIS Data for Comprehensive Storm Water Management	233
- <i>Stephen P. Phipps</i> .....	
Applying GIS Technology to Storm Water Problems	243
- <i>Joseph W. Adcock, Blake Guillory, and JoEllyn M. Miller</i> .....	
An Integrated Approach and GIS Applications in Drainage Master Planning	251
- <i>Gabor M. Vasarhelyi</i> .....	
ArcView Applications in Stormwater and Wastewater Management	259
- <i>Uzair M. Shamsi and Bruce A. Fletcher</i> .....	
GIS Based Riparian Greenway Planning	269
- <i>Wei-Ning Xiang, Bridget O'Connell, Caroline A. Wright, Brendan F. Kelly, and Gary Addington</i> .....	
GIS/Water Resources Tools for Performing Floodplain Management Modeling Analysis	275
- <i>Clarence H. Robbins and Stephen P. Phipps</i> .....	
Developing a User-Friendly Tool for BMP Assessment Model Using a GIS	285
- <i>Richard Z. Xue, Timothy J. Bechtel, and Zhenqun Chen</i> .....	
GIS as an Aid in the Evaluation of Drainage Facilities at the Albany County Airport, New York	295
- <i>Paul VanGelder and Michael Miller</i> .....	
Geographic Information Systems (GIS) and Image Processing for Stormwater Management Modeling Using XPSWMM in Tallahassee, Florida	305
- <i>Raúl M. Mercado</i> .....	

## SECTION 5 WATERSHED STUDIES

GIS and Watershed Analysis: Not Just for Mapping Anymore!	317
- <i>Wayne L. Wold</i> .....	
Linking GIS and Geomorphologic Field Research at Walnut Gulch Experimental Watershed	327
- <i>Scott N. Miller, D. Phillip Guertin, and David C. Goodrich</i> .....	
Application of GIS and Remote Sensing for Watershed Assessment	337
- <i>Lloyd P. Queen, Wayne L. Wold, and Kenneth N. Brooks</i> .....	
Fractal Properties in Topographic Index Using GRASS	347
- <i>Sanghyun Kim and Jacques Delleur</i> .....	
New Digital Landscape Parameterization Methodologies	357
- <i>Jurgen Garbrecht, Patrick J. Starks, and Lawrence W. Martz</i> .....	

Watershed Boundaries and Digital Elevation Model of Oklahoma Derived from 1:100,000-Scale Digital Topographic Maps	367
– <i>Joel R. Cederstrand and Alan Rea</i>	
Use of a Global Positioning System and an Acoustic Doppler Current Profiler to Map River and Lake Bathymetry	373
– <i>Nancy T. Baker and Scott E. Morlock</i>	
Physical Characterization of the Navarro Watershed for Hydrologic Simulation	383
– <i>Jeffrey D. Colby</i>	
Hydrologic Modeling to Aid in Locating Monitoring Sites	393
– <i>W. D. Rosenthal and D. W. Hoffman</i>	
Watershed Characterization by GIS for Low Flow Prediction	399
– <i>Glenn S. Warner, Andrés R. García-Martinó, Frederick N. Scatena, and Daniel L. Civco</i>	
Use of ARC/INFO, EPA-SWMM, and UNIX Text Processing Tools to Determine Flood Extent	407
– <i>T. B. Cera, T. K. Tremwel, and R. W. Burleson</i>	
GIS Prediction of Rainfall and Runoff Volumes in Eastern Puerto Rico	417
– <i>Andrés R. García-Martinó, Glenn S. Warner, Frederick N. Scatena, and Daniel L. Civco</i>	
Soil Water Modeling Using a Water Resource Decision Support System with Calibrated WSR-88D Precipitation Estimates and Meteorological Inputs	427
– <i>David R. Legates, Kenneth R. Nixon, Thomas D. Stockdale, and Geoffrey Quelch</i>	
GIS Modeling and Visualization of the Water Balance During the 1993 Midwest Floods	437
– <i>W. Scott White, Paweł J. Mizgalewicz, David R. Maidment, and Merrill K. Ridd</i>	
Runoff and Sediment Yield in a Fire Impacted, Mountain Watershed: Fluvial Hydrologic Modeling in a GIS Environment	447
– <i>Mohammad Sayeeduzzaman and Frank H. Weirich</i>	
Mapping Subsurface Drainage Systems with Color Infrared Aerial Photographs	457
– <i>Ashok Verma, Richard Cooke, and Leon Wendte</i>	
The Distribution and Expansion Rate of <i>Phragmites australis</i> in Six Chesapeake Bay Area Marshes	467
– <i>Dan Rice and J. Court Stevenson</i>	
Paper Title Index	477
Author Index	481

# **AWRA**

**AMERICAN WATER RESOURCES ASSOCIATION  
950 HERNDON PARKWAY, SUITE 300  
HERNDON, VA 20170-5531  
(703) 904-1225 / FAX: (703) 904-1228**

**ISBN 1-882132-39-4**