

Applications of Remote Sensing and GIS Technologies in Groundwater Hydrology: Past, Present and Future

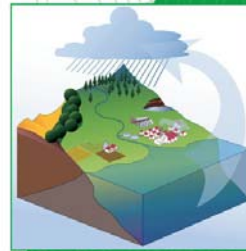
Madan Kumar Jha (Kharagpur, India) and Stefan Peiffer (Bayreuth, Germany)

with contributions by Jörn Hoffmann, Guido Wimmer and Anna Burchart

2006. 201 p., 27 illus, 7 in color., Softcover
ISBN-10: 3-00-018890-8
Price: 20.00 EUR incl. carriage charges

Applications of Remote Sensing and GIS Technologies in Groundwater Hydrology: Past, Present and Future

Madan Kumar Jha
Stefan Peiffer



Bayreuth Center of Ecology and Environmental Research

Bayceer

Groundwater is one of the most valuable natural resources, which supports human health, economic development and ecological diversity. Unfortunately, overexploitation and unabated pollution of this vital resource is threatening our ecosystems and even the life of future generations. Unlike surface water hydrology, the applications of remote sensing (RS) and GIS technologies in groundwater hydrology have received only cursory treatment, mostly focusing on a specific aspect only, and are less documented. Consequently, a general and widely available reference in this field is lacking. This book bridges this gap. It provides comprehensive and thoroughly up-to-date information about the applications of RS and GIS technologies in groundwater hydrology, highlights the constraints and challenges, and discusses their future prospects along with the future research and development needs in this area. It also describes the fundamentals and importance of these emerging technologies as well as the significance, problems and sustainable management of freshwater in general and groundwater in particular. This book will be useful to the students and researchers of civil, agricultural, environmental, and water resources engineering fields as well as to the water resources planners and managers, especially of developing nations.

Order Form

Contact:
Dr. Madan Kumar Jha
madaniit@rediffmail.com

Yes, please send me

_____ copies
Jha and Peiffer, Applications of Remote Sensing and GIS Technologies in Groundwater Hydrology: Past, Present and Future
ISBN 3-00-018890-8, EUR 20.00

Check/Demand Draft Enclosed

Name/ First Name _____

Dept. _____

Institution _____

Street _____

City, Code _____

Country _____

E-mail _____

Signature _____

Mail this form to:

Dr. Madan Kumar Jha
Associate Professor
Agricultural and Food Engineering Department
Indian Institute of Technology
Kharagpur - 721 302, West Bengal (India)

Contents:

- 1. GROUNDWATER: A VITAL BUT DEPLETING RESOURCE**
 - 1.1 Global Perspective of Freshwater Crisis
 - 1.2 Indian Perspective of Freshwater Crisis
 - 1.3 Concept of Sustainable Development
 - 1.4 Sustainable Groundwater Management
 - 1.5 Groundwater Management vis-à-vis RS and GIS Technologies
 - 2. OVERVIEW OF REMOTE SENSING TECHNOLOGY**
 - 2.1 Historical Perspective
 - 2.2 Defining Remote Sensing
 - 2.3 Principles of Remote Sensing
 - 2.4 Components of Remote Sensing Systems
 - 2.5 Classification of Remote Sensing Systems
 - 2.6 Characteristics of Remote Sensing Data
 - 2.7 Advantages of Satellite Remote Sensing
 - 2.8 Application Potentials of RS Technology
 - 3. OVERVIEW OF GIS TECHNOLOGY**
 - 3.1 Historical Perspective
 - 3.2 Defining Geographic Information System (GIS)
 - 3.3 Basic Concepts of GIS
 - 3.4 Components of GIS
 - 3.5 GIS Design and Implementation
 - 3.6 Integration of RS and GIS Technologies
 - 3.7 Application Potentials of GIS Technology
 - 4. RS AND GIS APPLICATIONS IN GROUNDWATER HYDROLOGY**
 - 4.1 Exploration and Assessment of Groundwater Resources
 - 4.2 Selection of Sites for Artificial Recharge and Water Harvesting
 - 4.3 GIS-Based Subsurface Flow and Transport Modeling
 - 4.4 Groundwater-Pollution Hazard Assessment and Protection Planning
 - 4.5 Estimation of Natural Recharge Distribution
 - 4.6 Hydrogeologic Data Analysis and Process Monitoring
 - 5. SATELLITE REMOTE SENSING IN HYDROGEOLOGY: CURRENT STATUS AND FUTURE**
(Jörn Hoffmann)
 - 5.1 Introduction
 - 5.2 Current Applications
 - 5.3 Satellite Sensors of Hydrogeologic Importance
 - 5.4 Future Perspectives
 - 6. EVALUATION OF GROUNDWATER VULNERABILITY USING GIS TECHNIQUES**
(Guido Wimmer and Anna Burchart)
 - 6.1 Introduction
 - 6.2 Aims of Groundwater Vulnerability Evaluation
 - 6.3 Hölting Method for Groundwater Vulnerability Evaluation
 - 6.4 A Case Study
 - 6.5 Advantages and Major Problems
 - 6.6 Recommendations
 - 7. STATUS QUO OF RS AND GIS APPLICATIONS IN GROUNDWATER**
 - 7.1 Slow Acceptance of RS Technology
 - 7.2 Quest for More and Better Field Data
 - 7.3 Groundwater Modeling with GIS
 - 7.4 Comparison of Interfacing Methods
 - 7.5 Guidelines for GIS-Based Modeling of Nonpoint Source Pollution
 - 7.6 Hydrologic Database and Spatial Decision-Support System
 - 7.7 Words of Caution
 - 8. FUTURE NEEDS FOR RS AND GIS RESEARCH AND DEVELOPMENT**
 - 8.1 Remote Sensing Technology
 - 8.2 GIS Technology
 - 9. CONSTRAINTS FOR RS AND GIS APPLICATIONS IN DEVELOPING NATIONS**
 - 9.1 Major Constraints
 - 9.2 Possible Remedies
 - 9.3 Wake-Up Call
 - 10. EPILOGUE**
- APPENDICES**
- Appendix-A:** List of Books on Groundwater
 - Appendix-B:** Salient Books on RS and GIS Technologies
 - Appendix-C:** Journals for Publishing Groundwater-Related Research
 - Appendix-D:** Important Websites for RS and GIS Resources

REFERENCES

SUBJECT INDEX