

Laser Scanning For The Environmental Sciences

For microbiology and environmental microbiology courses, this leading textbook builds on the academic success of the previous edition by including a comprehensive and up-to-date discussion of environmental microbiology as a discipline that has grown in scope and interest in recent years. From environmental science and microbial ecology to topics in molecular genetics, this edition relates environmental microbiology to the work of a variety of life science, ecology, and environmental science investigators. The authors and editors have taken the care to highlight links between environmental microbiology and topics important to our changing world such as bioterrorism and national security with sections on practical issues such as bioremediation, waterborne pathogens, microbial risk assessment, and environmental biotechnology.

WHY ADOPT THIS EDITION? New chapters on: Urban Environmental Microbiology Bacterial Communities in Natural Ecosystems Global Change and Microbial Infectious Disease Microorganisms and Bioterrorism Extreme Environments (emphasizing the ecology of these environments) Aquatic Environments (now devoted to its own chapter- was combined with Extreme Environments) Updates to Methodologies: Nucleic Acid -Based Methods: microarrays, phyloarrays, real-time PCR, metagenomics, and comparative genomics Physiological Methods: stable isotope fingerprinting and functional genomics and proteomics-based approaches Microscopic Techniques: FISH (fluorescent in situ hybridization) and atomic force microscopy Cultural Methods: new approaches to enhanced cultivation of environmental bacteria Environmental Sample Collection and Processing: added section on air sampling

Structure from Motion with Multi View Stereo provides hyperscale landform models using images acquired from standard compact cameras and a network of ground control points. The technique is not limited in temporal frequency and can provide point cloud data comparable in density and accuracy to those generated by terrestrial and airborne laser scanning at a fraction of the cost. It therefore offers exciting opportunities to characterise surface topography in unprecedented detail and, with multi-temporal data, to detect elevation, position and volumetric changes that are symptomatic of earth surface processes. This book firstly places Structure from Motion in the context of other digital surveying methods and details the Structure from Motion workflow including available software packages and assessments of uncertainty and accuracy. It then critically reviews current usage of Structure from Motion in the geosciences, provides a synthesis of recent validation studies and looks to the future by highlighting opportunities arising from developments in allied disciplines. This book will appeal to academics, students and industry professionals because it balances technical knowledge of the Structure from Motion workflow with practical guidelines for image acquisition, image processing and data quality assessment and includes case studies that have been contributed by experts from

around the world.

This text presents the current knowledge of environmental colloids and includes reviews of the current understanding of structure, role and behaviour of environmental colloids and particles, whilst focussing directly on aquatic systems and soils. In addition, there is substantial critical assessment of the techniques employed for the sampling, size fractionation and characterisation of colloids and particles. Chemical, physical and biological processes and interactions involving colloids are described, and particular attention is paid to quantitative approaches that take account of particle heterogeneity and polydispersity. Presents critical reviews of the state-of-the-art knowledge of environmental colloids. Critical assessment of techniques employed for the sampling, size fractionation and characterisation of colloids and particles are given. Theoretical and experimental aspects of the methods as well as the required developments and possible recommendations are discussed. Each chapter gives a brief introduction general enough for the non-specialist. Written by a internationally recognized group of contributors.

This book places the main actors in environmental microbiology, namely the microorganisms, on center stage. Using the modern approach of 16S ribosomal RNA, the book looks at the taxonomy of marine and freshwater bacteria, fungi, protozoa, algae, viruses, and the smaller aquatic animals such as nematodes and rotifers, as well as at the study of unculturable aquatic microorganisms (metagenomics). The peculiarities of water as an environment for microbial growth, and the influence of aquatic microorganisms on global climate and global recycling of nitrogen and sulphur are also examined. The pollution of water is explored in the context of self-purification of natural waters. Modern municipal water purification and disease transmission through water are discussed. Alternative methods for solid waste disposal are related to the economic capability of a society. Viruses are given special attention. By focusing on the basics, this primer will appeal across a wide range of disciplines.

"Geospatial Information" is spatial data concerning a place or, in space, collected in real time. Geospatial techniques together with remote sensing, geographic information science, Global Positioning System (GPS), cartography, geovisualization, and spatial statistics are being used to capture, store, manipulate and analyze to understand complex situations to solve mysteries of the universe. These techniques have been applied in various fields such as meteorology, forestry, environmental management, agriculture, health, homeland security etc. around the globe. This volume presents case studies and examples from various parts of the world and provides a broad overview of various approaches; data sets; data acquiring, monitoring and dissemination methods; satellites and sensors; tools and techniques used; integrating tools, techniques and application to various fields for the sustainable management of environmental resources in the context of global environmental change and natural hazards. The objective of this book is to provide state-of-the-art

information to academics, researchers and industry practitioners who are involved or interested in the study, use, design and development of advanced and emerging geospatial technologies around the world with ultimate aim to empower individuals and organizations in building competencies for exploiting the opportunities of the knowledge society. All the chapters are peer-reviewed and evaluated and are an inter- and multi-disciplinary source of information, making an effort to link various geospatial techniques to make the earth an habitable place. The contributors have tried to focus their respective views on the current problems that need urgent attention. Consequently, we see this book as a comprehensive information base, which includes work of expertise in their specific fields of research.

The awareness of environment protection is a great achievement of humans; an expression of self-awareness. Even though the idea of living while protecting the environment is not new, it has never been so widely and deeply practiced by any nations in history like it is today. From the late 90s in the last century, the surprisingly fast dev

Biomass has been an intimate companion of humans from the dawn of civilization to the present. Its use as food, energy source, body cover and as construction material established the key areas of biomass usage that extend to this day.

Given the complexities of biomass as a source of multiple end products, this volume sheds new light to the whole spectrum of biomass related topics by highlighting the new and reviewing the existing methods of its detection, production and usage. We hope that the readers will find valuable information and exciting new material in its chapters.

This timely book will introduce its readers to the

This book focusses on new technologies and multi-method research designs in the field of modern archaeology, which increasingly crosses academic boundaries to investigate past human-environmental relationships and to reconstruct palaeolandscapes. It aims at establishing the concept of Digital Geoarchaeology as a novel approach of interdisciplinary collaboration situated at the scientific interface between classical studies, geosciences and computer sciences. Among others, the book includes topics such as geographic information systems, spatiotemporal analysis, remote sensing applications, laser scanning, digital elevation models, geophysical prospecting, data fusion and 3D visualisation, categorized in four major sections. Each section is introduced by a general thematic overview and followed by case studies, which vividly illustrate the broad spectrum of potential applications and new research designs. Mutual fields of work and common technologies are identified and discussed from different scholarly perspectives. By stimulating knowledge transfer and fostering interdisciplinary collaboration, Digital Geoarchaeology helps generate valuable synergies and contributes to a better understanding of ancient landscapes along with their forming processes. Chapters 1, 2, 6, 8 and 14 are published open access under a CC BY 4.0 license at link.springer.com.

The aim of the book is to present the emerging environmental issues in organization and management of complex supply

chains. The book includes set of solutions which show different stakeholders' viewpoints on sustainability. The scope of book takes into consideration how the emerging environmental regulation might be transformed into business practices. Therefore, the authors present the innovative approach to eco-friendly organization and coordination of logistics processes and supply chain configuration. A broad scope of practical solutions from different countries and industries is provided

This is the first text to focus on virtual reality applications for design of the built environment. This guide explores the use of virtual reality at the practical level. It provides an overview of industrial applications of virtual reality and explores relevant scientific research. Virtual Reality in the Built Environment is a guide to the practical uses of virtual design, construction, and management. Providing an overview of industrial applications for virtual reality and exploring relevant research, this book is an accessible and innovative resource for architects, designers and built environment professionals--bridging the gap between technological vision and current practice. Author Jennifer Whyte shows how interactive, spatial, real-time technologies can radically improve modelling and communication of ideas, enable participation in the design process, and facilitated planning and management at the urban scale. The experience of lead users of virtual reality is used as the basis for understanding its promise and problems. Explanations of the underlying principles of this exciting interactive medium, a discussion of the cognitive, technical and organizational issues it raises, and international case studies illustrating practical applications are all included in this guide. The author also provides a companion web site which provides online learning materials, including test-yourself questions, virtual reality models, and links to relevant sites, making it a valuable design resource and a stimulus for innovation.

The 13th International Conference on Human-Computer Interaction, HCI International 2009, was held in San Diego, California, USA, July 19-24, 2009, jointly with the Symposium on Human Interface (Japan) 2009, the 8th International Conference on Engineering Psychology and Cognitive Ergonomics, the 5th International Conference on Universal Access in Human-Computer Interaction, the Third International Conference on Virtual and Mixed Reality, the Third International Conference on Internationalization, Design and Global Development, the Third International Conference on Online Communities and Social Computing, the 5th International Conference on Augmented Cognition, the Second International Conference on Digital Human Modeling, and the First International Conference on Human Centered Design. A total of 4,348 individuals from academia, research institutes, industry and governmental agencies from 73 countries submitted contributions, and 1,397 papers that were judged to be of high scientific quality were included in the program. These papers - dress the latest research and development efforts and highlight the human aspects of the design and use of computing systems. The papers accepted for presentation thoroughly cover the entire field of human-computer

interaction, addressing major advances in knowledge and effective use of computers in a variety of application areas. Comprehensive Remote Sensing covers all aspects of the topic, with each volume edited by well-known scientists and contributed to by frontier researchers. It is a comprehensive resource that will benefit both students and researchers who want to further their understanding in this discipline. The field of remote sensing has quadrupled in size in the past two decades, and increasingly draws in individuals working in a diverse set of disciplines ranging from geographers, oceanographers, and meteorologists, to physicists and computer scientists. Researchers from a variety of backgrounds are now accessing remote sensing data, creating an urgent need for a one-stop reference work that can comprehensively document the development of remote sensing, from the basic principles, modeling and practical algorithms, to various applications. Fully comprehensive coverage of this rapidly growing discipline, giving readers a detailed overview of all aspects of Remote Sensing principles and applications Contains 'Layered content', with each article beginning with the basics and then moving on to more complex concepts Ideal for advanced undergraduates and academic researchers Includes case studies that illustrate the practical application of remote sensing principles, further enhancing understanding

Civil and environmental engineers work together to develop, build, and maintain the man-made and natural environments that make up the infrastructures and ecosystems in which we live and thrive. Civil and Environmental Engineering: Concepts, Methodologies, Tools, and Applications is a comprehensive multi-volume publication showcasing the best research on topics pertaining to road design, building maintenance and construction, transportation, earthquake engineering, waste and pollution management, and water resources management and engineering. Through its broad and extensive coverage on a variety of crucial concepts in the field of civil engineering, and its subfield of environmental engineering, this multi-volume work is an essential addition to the library collections of academic and government institutions and appropriately meets the research needs of engineers, environmental specialists, researchers, and graduate-level students.

The book presents a collection of papers focused on recent progress in key areas of photogrammetry for environmental research. Applications oriented to the understanding of natural phenomena and quantitative processes using dataset from photogrammetry (from satellite to unmanned aerial vehicle images) and terrestrial laser scanning, also by a diachronic approach, are reported. The book covers topics of interest of many disciplines from geography, geomorphology, engineering geology, geotechnology, including landscape description and coastal studies. Mains issues faced by the book are related to applications on coastal monitoring, using multitemporal aerial images, and investigations on geomorphological hazard by the joint use of proximal photogrammetry, terrestrial and aerial laser scanning aimed to

the reconstruction of detailed surface topography and successive 2D/3D numerical simulations for rock slope stability analyses. Results reported in the book bring into evidence the fundamental role of multitemporal surveys and reliable reconstruction of morphologies from photogrammetry and laser scanning as support to environmental researches.

WATER RESOURCES AND ENVIRONMENT provides a detailed introduction to the full range of advanced, multidisciplinary techniques used in the study of water resources from understanding individual aquifers to the protection and management of water in a sustainable way, compatible with the preservation of the environment. Based on a masters course from UNESCO's International Hydrological Program, this textbook is accompanied by color figures and graphics, illustrating clearly the content of the text and showing real examples from the field. Each chapter also contains a list of exercises and practical activities as well as case studies.

Gravel-Bed Rivers: Processes, Tools, Environments presents a definitive review of current knowledge of gravel-bed rivers, derived from the 7th International Gravel-bed Rivers Workshop, the 5-yearly meeting of the world's leading authorities in the field. Each chapter in the book has been specifically commissioned to represent areas in which recent progress has been made in the field. The topics covered also represent a coherent progression through the principal areas of the subject (hydraulics; sediment transport; river morphology; tools and methods; applications of science). Definitive review of the current knowledge of gravel-bed rivers Coverage of both fundamental and applied topics Edited by leading academics with contributions from key researchers Thoroughly edited for quality and consistency to provide coherent and logical progression through the principal areas of the subject.

This volume presents a collection of papers presented at the 14th International Symposium of Robotic Research (ISRR). ISRR is the biennial meeting of the International Foundation of Robotic Research (IFRR) and its 14th edition took place in Lucerne, Switzerland, from August 31st to September 3rd, 2009. As for the previous symposia, ISRR 2009 followed up on the successful concept of a mixture of invited contributions and open submissions. Half of the 48 presentations were therefore invited contributions from outstanding researchers selected by the IFRR officers, and half were chosen among the 66 submissions after peer review. This selection process resulted in a truly excellent technical program which, we believe, featured some of the very best of robotic research. Out of the 48 presentations, the 42 papers which were finally submitted for publication are organized in 8 sections that encompass the major research orientations in robotics: Navigation, Control & Planning, Human-Robot Interaction, Manipulation and Humanoids, Learning, Mapping, Multi-Robot Systems, and Micro-Robotics. They represent an excellent snapshot of cutting-edge research in robotics and outline future directions.

Biological Environmental Science is an introductory textbook for undergraduate students who desire a one semester course or, alternatively, a springboard course for advanced environmental offerings. This book features timely issues such as global warming, air, ground and water pollutions, population growth, species extinction and environmental poli

This volume constitutes the results of the International Conference on Underwater Environment, MOQESM'14, held at "Le Quartz" Conference Center in Brest, France, on October 14-15, 2014, within the framework of the 9th Sea Tech Week, International Marine Science and Technology Event. The objective of MOQESM'14 was to bring together researchers from both academia and industry, interested in marine robotics and hydrography with application to the coastal environment mapping and underwater infrastructures surveys. The common thread of the conference is the combination of technical control, perception, and localization, typically used in robotics, with the methods of mapping and bathymetry. The papers presented in this book focus on two main topics. Firstly, coastal and infrastructure mapping is addressed, focusing not only on hydrographic systems, but also on positioning systems, bathymetry, and remote sensing. The proposed methods rely on acoustic sensors such as side scan sonars, multibeam echo sounders, phase-measuring bathymetric sonars, as well as optical systems such as underwater laser scanners. Accurate underwater positioning is also addressed in the case of the use of a single acoustic beacon, and the latest advances in increasing the vertical precision of Global Navigation Satellite System (GNSS) are also presented. Most of the above mentioned works are closely related to autonomous marine vehicles. Consequently, the second part of the book describes some works concerning the methods associated with such type of vehicles. The selected papers focus on autonomous surface or underwater vehicles, detailing new approaches for localization, modeling, control, mapping, obstacle detection and avoidance, surfacing, and software development. Some of these works imply acoustics sensing as well as image processing. Set membership methods are also used in some papers. The applications of the work presented in this book concern in particular oceanography, monitoring of oil and gas infrastructures, and military field.

Generating a satisfactory classification image from remote sensing data is not a straightforward task. Many factors contribute to this difficulty including the characteristics of a study area, availability of suitable remote sensing data, ancillary and ground reference data, proper use of variables and classification algorithms, and the analyst's e

Ecosystem Service Potentials and Their Indicators in Postglacial Landscapes: Assessment and Mapping provides valuable guidance for anyone involved with ecosystem service potential monitoring, use and management--from landscape ecologists and environmental managers, to policymakers and environmental economists. The book highlights effective measurement tools for evaluating the overall potential of ecosystem services from multiple perspectives. Beginning with an introduction to ecosystem services and the theoretical assumptions and objectives associated with their assessment, the book goes on to outline interdisciplinary methods of evaluation and analysis that are fully supported and illustrated throughout using an insightful case study focused on Wigry National Park. A range of different spatial reference units are also discussed, followed by chapters on both analytical and synthetic approaches to identifying service supply potential. In addition, the use of services and the impact of these uses on the assessment of potential is included, along with a discussion of the future shape of ecosystem service assessment. Outlines a transdisciplinary, holistic approach to assessing the overall potential of ecosystems and landscapes to support different ecosystem services Proposes a range of direct, indirect, simple and complex measurement indicators for multifaceted estimation

and mapping Presents tools and guidelines to help shape effective decision-making processes in nature conservation and environmental planning

Laser Scanning for the Environmental Sciences John Wiley & Sons

This book provides an overview on the evolution of laser scanning technology and its noticeable impact in the structural engineering domain. It provides an up-to-date synthesis of the state-of-the-art of the technology for the reverse engineering of built constructions, including terrestrial, mobile, and different portable solutions, for laser scanning. Data processing of large point clouds has experienced an important advance in the last years, and thus, an intense activity in the development of automated data processing algorithms has been noticed. Thus, this book aims to provide an overview of state-of-the-art algorithms, different best practices and most recent processing tools in connection to particular applications. Readers will find this a comprehensive book, that updates the practice of laser scanning for researchers and professionals not only from the geomatic domain, but also other fields such as structural and construction engineering. A set of successful applications to structural engineering are illustrated, including also synergies with other technologies, that can inspire professionals to adopt laser scanning in their day-to-day activity. This cutting-edge edited volume will be a valuable resource for students, researchers and professional engineers with an interest in laser scanning and its applications in the structural engineering domain.

This book deals with recent advances in coastal marine environmental management and governance. Various chapters consider new aspects of conservation, assessment of ecosystem health status, environmental survey and protection, frameworks of ocean service and governance, new applications of geo processing and GIS technology, beach management, aquaculture site selection, assessment of water quality (brine disposal and temperature dispersion from nuclear power plants), exploration and management of coastal karst, changing perceptions of dune management, advances in interpretation of sea-level indicators and real time environmental monitoring. New advances in both environmental management and governance are of the utmost importance for sustaining critical coastal marine areas. Offering such a diverse collection of works from coastal scientists around the world, who discuss many techniques and methods at the forefront of management and governance, this publication will be of interest to coastal researchers, coastal zone managers and regulatory agency personnel.

Nowadays, the innovation in space technologies creates a new trend for the Earth observation and monitoring from space. This book contains high quality and compressive work on both microwave and optical remote sensing applications. This book is divided into five sections: (i) remote sensing for biomass estimation, (ii) remote sensing-based glacier studies, (iii) remote sensing for coastal and ocean applications, (iv) sewage leaks and environment disasters, and (v) remote sensing image processing. Each chapter offers an opportunity to expand the knowledge about various remote sensing techniques and persuade researchers to deliver new research novelty for environment studies.

This book is intended for those with an academic, scientific and practical interest in river conservation and management. It provides an overview of how changes in legislation, policies, institutional responsibilities, science, technology, practical techniques and public perception have influenced how rivers have been managed over the past 20 years and the challenges that lie ahead during the next 20 years. The book is based on the international conference River Conservation and Management:20 Years On held at York. Thirty-one chapters, with contributions from North and South America, Europe, Asia and Australasia provide a wide-ranging perspective on this complex but profoundly important subject. Following an introduction that chronicles the most important contextual changes, the book is organized into four broad topics: Catchment management, ecosystem integrity and the threats to river ecosystems – this covers progress on understanding and addressing the pressures affecting rivers, many of which will be amplified by climate change and increasing human demands for water; Methods and approaches – illustrating some recent techniques that have been developed to assess condition and conservation status across different types of river; Recovery and rehabilitation – providing an insight into the principles, practice, public involvement and institutional networks that support and make improvements to modified river reaches; Integrating nature conservation into wider river management –demonstrating the importance of integrated planning, involvement of local communities and the use of adaptive management in achieving multiple environmental and economic benefits along rivers used for different purposes. The final chapter discusses the challenges faced in dealing with an uncertain future. More than 1200 different references and numerous web-site citations provide the reader with an invaluable source of knowledge on the subject area.

This book is a printed edition of the Special Issue "UAV Sensors for Environmental Monitoring" that was published in *Sensors*

This book describes six months of initial intensive activities within a motivating multidisciplinary project to achieve sustainable social, economic, and environmental revitalization in the historic core of Multan City, Pakistan. The project is managed by Fondazione Politecnico di Milano within the framework of the "Pakistan-Italian Debt for Development Swap Agreement" and has five components: a livelihood improvement program, a living conditions improvement program, revitalization of physical assets, establishment of a Pakistan-Italian resource centre in Multan, and an Italian collaboration program for training and capacity building. All aspects are covered in this book, which provides a comprehensive account of progress in this excellent example of cross-cultural cooperation between a Western and an Eastern country in regenerating an historic populated site.

This book focuses on the principles and technology of environmental perception in unmanned systems. With the rapid development of a new generation of information technologies such as automatic control and information perception, a

new generation of robots and unmanned systems will also take on new importance. This book first reviews the development of autonomous systems and subsequently introduces readers to the technical characteristics and main technologies of the sensor. Lastly, it addresses aspects including autonomous path planning, intelligent perception and autonomous control technology under uncertain conditions. For the first time, the book systematically introduces the core technology of autonomous system information perception.

3D surface representation has long been a source of information describing surface character and facilitating an understanding of system dynamics from micro-scale (e.g. sand transport) to macro-scale (e.g. drainage channel network evolution). Data collection has been achieved through field mapping techniques and the use of remotely sensed data. Advances in this latter field have been considerable in recent years with new rapid-acquisition methods being developed centered around laser based technology. The advent of airborne and field based laser scanning instruments has allowed researchers to collect high density accurate data sets and these are revealing a wealth of new information and generating important new ideas concerning terrain characterisation and landform dynamics. The proposed book collates a series of invited peer reviewed papers presented at the a conference on geoinformatics and LIDAR to be held at the National Centre for Geocomputation based in the National University of Ireland, Maynooth. Current constraints in field survey and DEM construction are reviewed together with technical and applied issues around the new technology. The utility of the data in process modelling is also covered. The book will be of great value to researchers in the field of geomorphology, geostatistics, remote sensing and GIS and will prove extremely useful to students and practitioners concerned with terrain analysis. The proposed work will: Highlight major technological breakthrough in 3D data collection. Feature examples of application across a wide range of environmental areas. Critically evaluate the role of laser based techniques in the environment. Detail theory and application of laser techniques in the natural environment.

This volume concisely and systematically presents our current knowledge of the terrestrial environment and inland water resources in the Kaliningrad Region. The 22 chapters, including an introduction and a conclusion, are based on observational data; scientific literature, mainly published in Russian; and the authors' long-standing experience in this area of research. The book is intended for specialists working in various fields of environmental sciences and ecology; water resources and management; land reclamation and agriculture; and international cooperation in the Baltic Sea Region. This is the first of four volumes on Environmental Studies in the Kaliningrad Region. The other three volumes, to be published in the coming years, will be devoted to the physical oceanography, geoecology and bioecology of the Southeastern Baltic Sea.

This book aims to promote the core understanding of a proper modelling of road traffic accidents by deep learning methods using

traffic information and road geometry delineated from laser scanning data. The first two chapters of the book introduce the reader to laser scanning technology with creative explanation and graphical illustrations, review and recent methods of extracting geometric road parameters. The next three chapters present different machine learning and statistical techniques applied to extract road geometry information from laser scanning data. Chapters 6 and 7 present methods for modelling roadside features and automatic road geometry identification in vector data. After that, this book goes on reviewing methods used for road traffic accident modelling including accident frequency and injury severity of the traffic accident (Chapter 8). Then, the next chapter explores the details of neural networks and their performance in predicting the traffic accidents along with a comparison with common data mining models. Chapter 10 presents a novel hybrid model combining extreme gradient boosting and deep neural networks for predicting injury severity of road traffic accidents. This chapter is followed by deep learning applications in modelling accident data using feed-forward, convolutional, recurrent neural network models (Chapter 11). The final chapter (Chapter 12) presents a procedure for modelling traffic accident with little data based on the concept of transfer learning. This book aims to help graduate students, professionals, decision makers, and road planners in developing better traffic accident prediction models using advanced neural networks.

This book offers a comprehensive overview of progress in the general area of fluvial remote sensing with a specific focus on its potential contribution to river management. The book highlights a range of challenging issues by considering a range of spatial and temporal scales with perspectives from a variety of disciplines. The book starts with an overview of the technical progress leading to new management applications for a range of field contexts and spatial scales. Topics include colour imagery, multi-spectral and hyper-spectral imagery, video, photogrammetry and LiDAR. The book then discusses management applications such as targeted, network scale, planning, land-use change modelling at catchment scales, characterisation of channel reaches (riparian vegetation, geomorphic features) in both spatial and temporal dimensions, fish habitat assessment, flow measurement, monitoring river restoration and maintenance and, the appraisal of human perceptions of riverscapes. Key Features:

- A specific focus on management applications in a period of increasing demands on managers to characterize river features and their evolution at different spatial scales
- An integration across all scales of imagery with a clear discussion of both ground based and airborne images
- Includes a wide-range of environmental problems
- Coverage of cutting-edge technology
- Contributions from leading researchers in the field

Environmental information and systems play a major role in environmental decision making. As such, it is vital to understand the impact that they have on different aspects of sustainable environmental management, as well as to understand the opportunities they might present for further improvement. *Environmental Information Systems: Concepts, Methodologies, Tools, and Applications* is an innovative reference source containing the latest research on the use of information systems to track and organize environmental data for use in an overall environmental management system. Highlighting a range of topics such as environmental analysis, remote sensing, and geographic information science, this multi-volume book is designed for engineers,

data scientists, practitioners, academicians, and researchers interested in all aspects of environmental information systems. Environmental Information Systems in Industry and Public Administration provides an overview of worldwide research and development of environmental information systems (ENVIS). This book is the only topical documentation of the highly innovative approach of information systems for environmental protection. Issues are covered from the global and multinational level to industrial solutions for enterprises. In particular, the book deals with protection of air, water and soil, urban and landscape developments, prevention of environmental hazards and waste management.

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