



on the Earth's resources, leading to significant changes in its land cover (e.g., deforestation), diminishing biodiversity and natural habitats, dwindling fresh water supplies, and changing weather and climatic patterns (e.g., global warming, changing sea level). Environmental monitoring techniques that provide information on these are under scrutiny from an increasingly environmentally conscious society that demands the efficient delivery of such information at a minimal cost. Environmental changes vary both spatially and temporally, thereby putting pressure on traditional methods of data acquisition, some of which are highly labour intensive, such as animal tracking for conservation purposes. With these challenges, conventional monitoring techniques, particularly those that record spatial changes call for more sophisticated approaches that deliver the necessary information at an affordable cost. One direction being pursued in the development of such techniques involves environmental geoinformatics, which can act as a stand-alone method or complement traditional methods.

There is no doubt that today, perhaps more than ever before, humanity faces a myriad of complex and demanding challenges. These include natural resource depletion and environmental degradation, food and water insecurity, energy shortages, diminishing biodiversity, increasing losses from natural disasters, and climate change with its associated potentially devastating consequences, such as rising sea levels. These human-induced and natural impacts on the environment need to be well understood in order to develop informed policies, decisions, and remedial measures to mitigate current and future negative impacts. To achieve this, continuous monitoring and management of the environment to acquire data that can be soundly and rigorously analyzed to provide information about its current state and changing patterns, and thereby allow predictions of possible future impacts, are essential. Developing pragmatic and sustainable solutions to address these and many other similar challenges requires the use of geodata and the application of geoinformatics. This book presents the concepts and applications of geoinformatics, a multidisciplinary field that has at its core different technologies that support the acquisition, analysis and visualization of geodata for environmental monitoring and management. We depart from the 4D to the 5D data paradigm, which defines geodata accurately, consistently, rapidly and completely, in order to be useful without any restrictions in space, time or scale to represent a truly global dimension of the digital Earth. The book also features the state-of-the-art discussion of Web-GIS. The concepts and applications of geoinformatics presented in this book will be of benefit to decision-makers across a wide range of fields, including those at environmental agencies, in the emergency services, public health and epidemiology, crime mapping, environmental management agencies, tourist industry, market analysis and e-commerce, or mineral exploration, among many others. The title and subtitle of this textbook convey a distinct message. Monitoring -the passive part in the subtitle - refers to observation and data acquisition, whereas management - the active component - stands for operation and performance. The topic is our environment, which is intimately related to geoinformatics. The overall message is: all the mentioned elements do interact and must not be separated. Hans-Peter Bahr, Prof. Dr.-Ing. Dr.h.c., Karlsruhe Institute of Technology (KIT), Germany. ?????:Industrial water pollution control

The Author, Through The Valuable Data, Information And Analysis In This Book, Provides The Reader Not Only With A Vivid Panorama Of Railways` Performance Over

