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Editorial

Remote Sensing and Geospatial Approaches for Studying the Environment Affected by Human Activities

Chengye Zhang [1,2], Jun Li [1,2,*], Xinyi Shen [3] and Qiusheng Wu [4]

[1] College of Geoscience and Surveying Engineering, China University of Mining & Technology–Beijing, Beijing 100083, China; czhang@cumtb.edu.cn
[2] State Key Laboratory of Fine Exploration and Intelligent Development of Coal Resources, China University of Mining & Technology–Beijing, Beijing 100083, China
[3] Civil and Environmental Engineering, University of Connecticut, 159 Discovery Dr., Storrs, CT 06269, USA; xinyi.shen@uconn.edu
[4] Department of Geography, University of Tennessee, Knoxville, TN 37996, USA; qwu18@utk.edu
* Correspondence: junli@cumtb.edu.cn

1. Introduction

In the past few decades, drastic human activities such as urban expansion, agricultural and pastoral activities, water conservancy construction, deforestation, mining, and tourism have significantly altered regional ecological environments. In other words, the deep coupling of environmental changes with various human activities has led to various environmental problems, such as land degradation, reduced ecological functions, geologic hazards, and declining water quality. Therefore, in areas with intense human activities, especially environmentally fragile ones such as agricultural and pastoral transition zones and arid, semi-arid, coastal, and alpine areas, it is crucial to carry out effective environmental monitoring to immediately ascertain the current state of the environment under the influence of human activities.

In this context, there are several key points for scholars to focus on (1) how to monitor environmental alterations via human activities at different spatiotemporal scales; (2) how to quantify, evaluate, and predict the impact of human activities on the environment; (3) how to analyze or evaluate the coupled influence of various natural disturbances (e.g., changes in temperature and precipitation) and human alterations (e.g., water conservancy construction, mining, deforestation) on the environment; and (4) what the corresponding patterns or mechanisms of the environmental evolution to different human activities may be.

Satellite and airborne remote sensing have proven to be valuable tools for retrieving environmental parameters, and have been widely used for monitoring environmental changes at regional or global scales, with the advantage of being able to look back at historical changes and the spatiotemporal continuum. Geospatial approaches have been prevalently used in analyzing the coupled effects from multiple factors based on remotely sensed images and other geospatial datasets. Both remote sensing and geospatial approaches are thus critical for investigating the impact of human activities on the environment.

This Special Issue, entitled "Remote Sensing and Geospatial Approaches for Studying the Environment Affected by Human Activities", presents a collection of new theories, datasets, methods, findings, and applications in relevant fields. Among the 43 submitted manuscripts, 12 met the academic requirements and have been accepted for publication. These publications cover various ecological environment scenarios, remotely sensed data, human activities, and geospatial approaches, including not only theoretical framework research but also work detailing various related methods and applications. This Editorial provides an overview of the academic contributions from the 12 published manuscripts.

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2. Overview of the Published Contributions

The studies included in this Special Issue contributed to the academic community from different aspects. Yue et al. [1] proposed a framework for the construction of a heritage corridor system in the Shu Road in China, a famous example of cultural heritage. Wang et al. [2] investigated the spatiotemporal pattern of invasive *Pedicularis* in the Bayinbuluke Land, China, during the period of 2019–2021. Ref. [3] investigated the impacts of reservoirs on the regional air temperature changes before and after two large dam constructions in the lower Jinsha River, located in southwest China. Jiang et al. [4] investigated the response mechanism of landslide deformation under reservoir water and rainfall variations through long-time on-site observations. Ref. [5] accessed the time-series two-dimensional displacements around the Xiluodu reservoir using multi-orbit space-borne Synthetic Aperture Radar (SAR) datasets from Sentinel-1 (launched by the European Space Agency) and ALOS2 (launched by the Japan Aerospace Exploration Agency). Ref. [6] proposed a long-time series evolution and scenario simulation method for land use function and realized the simulation of land use functions and structures in ecologically fragile areas. Yang et al. [7] developed an integrated decomposition–reclassification–prediction method for water quality affected by urban activities. Li et al. [8] proposed a new method for the quantitative analysis of driving factors for vegetation coverage changes in surface coal mines. Fu et al. [9] improved the benefit transfer method to evaluate the ecosystem service value (ESV) in Hainan Province and proposed the coupling analysis method of economic and environmental coordination. Zhao et al. [10] proposed a new multitemporal convolutional network framework (MT-CNN) for mapping large-scale forest disturbance types (forest fire and harvest/deforestation) without human intervention. Ref. [11] investigated the characteristics of ecological cumulative effects due to underground mining disturbances. Chen et al. [12] constructed a model to extract water body information by weakening the influence of shadows and dense vegetation in Yangtze River, China.

These publications cover various types of ecological environment scenarios, including subtropical mountains [1,3–5], cold temperate meadow grasslands [2], alpine rivers [6], urban water bodies [7,12], arid and semi-arid grasslands [8], tropical coastal zones and islands [9], mediterranean climatic forests [10], and loess sandy plateaus [11]. The study locations in most of these publications are typical ecologically fragile areas or those projected to exhibit fragility, which is of significant importance for performing a thorough investigation.

The ecological environment scenarios in these studies are affected by a variety of human activities, such as tourism [1], invasive alien species and their artificial management [2], reservoir construction [3–5], urban expansion and economic activities [6,7,9,12], mining activities [8,11], and harvest/deforestation [10], which are representative of those currently affecting the ecological environment.

In terms of academic contributions, the framework proposed by Ref. [1] for constructing a heritage corridor system has made theoretical contributions. Furthermore, some new and improved methods have been developed to extract and analyze environmental information, including a long-time series evolution and scenario simulation method [6], an integrated decomposition–reclassification–prediction method [7], the geographically weighted differential factor artificial neural network (GWDF-ANN) [8], the improved benefit transfer method [9], the multitemporal convolutional network framework (MT-CNN) [10], and a model to extract water body information [12]. In addition, other studies applied existing methods and focused on revealing the pattern of ecological environment changes in corresponding study areas [2–5,11].

3. Conclusions

This Editorial reviews the 12 publications in the Special Issue "Remote Sensing and Geospatial Approaches for Studying the Environment Affected by Human Activities", and the following conclusions can be drawn.

This Special Issue features publications that have enriched the knowledge in the field of ecological environment changes caused by human activities, highlighting the new

achievements realized by those research works in their respective research directions. These new findings have provided important scientific information for local ecological environment protection, and the proposed theories and methods are worth popularizing and applying in similar ecological environment scenarios.

However, the types of ecological environment scenarios and human activities in focus still need to be expanded, e.g., the impact of industrial emissions on the atmosphere and the impact of human activities on the polar environment. In addition, the accuracy of analyzing the coupled influence of various natural disturbances and human alterations on the environment still needs to be improved. In the future, it is expected that better solutions to these problems will be realized.

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