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Editorial

Perspectives and Advancements on "Land Use and Land Cover Mapping in a Changing World"

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1. Introduction

It is increasingly recognized that land use and land cover changes driven by anthropogenic pressures are increasingly impacting terrestrial and aquatic ecosystems and their services, human society, and human livelihoods and well-being. Mapping and monitoring land use and land cover change dynamics are essential for preserving the environment and natural capital and ensuring the sustainability of ecosystem services.

In recent years, the rise of new geospatial technologies around computational techniques and the Internet brought forth a revolution in mapping creation, visualization, and dissemination, bringing new prospects for land mapping and monitoring and enabling near-real-time and cost-effective analysis at multiple scales.

Among others, salient mapping approaches at multiple scales were applied to investigate land use and land cover changes seeking to provide answers in the spheres of human-dominated landscapes and land-related issues (i.e., to explore, manage, organize, or predict land changes). Examples include automated cropland mapping [1], glacier inventory [2], flood inundation [3], mapping forest harvesting [4], and mapping urban agriculture at high-resolution [5].

This Special Issue contains 12 original papers covering various issues related to land use and land use change in several parts of the world (see references), with the purpose to provide a forum to exchange ideas and progress in related areas. Research topics include land use targets, dynamic modelling and mapping using satellite images, pressures from energy production, deforestation, impacts on ecosystem services, aboveground biomass evaluation, as well as investigations on libraries of legends and classification systems.

2. Key Findings and Insights

Measuring and mapping aboveground biomass is a critical component for carbon stock inventories and quantification (Appendix A). In the first paper of this Special Issue, Amara et al., assessed aboveground biomass distribution in a multi-use savannah landscape in southeastern Kenya using airborne laser scanning data, field surveys, and Sentinel-2 satellite images in the Google Earth Engine. Their study evidenced that fences and conservation areas can lead to reduced biomass stocks, which is a vital role of savannahs. The paper by Žoncová et al. used CORINE land cover data for mapping extent and character of land cover changes in the Low Tatras National Park in Slovakia over the last 30 years (1990–2018). This approach allowed them to exploit the potentials of CORINE data to evaluate the long-term landscape changes in protected areas.

Similarly, the study by Gu et al., analyzed land use and land cover dynamics and their impacts on ecosystem services in central Himalaya using the Google Earth Engine between 2000 and 2005. This study highlighted that the Google Earth Engine is a valuable source of data to evaluate the effects of land use and land cover changes on ecosystem service values.

Monitoring the intensity of land use and urban expansion is of great importance for environmental policies. Kim et al. determined changes in land coverage for 31 satellite cities surrounding Seoul using land cover maps from 1988 and 2018 and employing morphological spatial pattern analysis and cluster analysis. The authors suggested that their results can serve for establishing differentiated environmental policies at the local level. The paper by Nedd et al., performed a literature review to scrutinize and evaluate land and land cover definitions and classification systems at the national, regional, and global scales, highlighting the most important challenges, discrepancies, and knowledge gaps. The methodology proposed by the authors will aid the researcher in analyzing the information required in land us and land cover studies.

Deforestation and forest degradation is one of the main environmental problems in Africa. The paper by Kabuanga et al. evaluated deforestation in the Ituri-Epulu-Aru Landscape (Democratic Republic of the Congo) analyzing historical changes and future trajectories through the diachronic analysis of satellite images (2003–2010–2014–2016) and using the DINAMICA EGO platform. The study shows that observed deforestation rates remain relatively low compared to other regions, but forests are shrinking as a result of the unsustainable land use pattern. In their Perspective article, Jand and Woo reaffirm the importance of native trees and their potential for carbon sequestration and mitigation of greenhouse gas emissions. The study highlighted the importance of native trees for providing vital ecosystem services.

Renewable energies can play an important rule toward carbon neutrality. Nevertheless, they can also impact on landscape integrity. Cole et al. assessed landscape dynamics in the United Kingdom driven by pressures from energy production and forests, analyzing change patterns and land cover transitions using CORINE data (years 2006–2018). The authors reported that there has been an increase in the rate of change attributed to renewable energy infrastructure.

Remote sensing images can be efficiently used for multitemporal analysis of changes in forest ecosystems. De Oliveira et al., used high-resolution Landsat images to carry out a multitemporal analysis of changes in land use and land cover in the municipality of Floresta in Pernambuco State in Brazil. The authors analyzed impact of changes in the study area, showing a reduction in the forest and agricultural classes and an increase for exposed-soil class. In another study, Nicolau and Condessa assessed net land take in Portugal between 2007 and 201 by using the Land and Ecosystem Accounting (LEAC) system developed by the European Environment Agency. The study shows that the land use rate amounted to 7.2 ha/day.

The paper by Mushtaq et al., developed an International online catalogue for land cover legend, named Land Cover Legend Registry. This is an international platform that can contribute to development of harmonized land cover legends and datasets at various levels globally. In the final paper, Allan et al. performed a review on the drivers of land use and land cover change in urban areas (2012 to 2022). The study shows that transportation availability was the most frequent factor impacting land use and land cover change processes.

3. Conclusions

A growing body of literature has shown that land use and land cover change can impact the global ecosystem, shaping the future sustainability of natural resources. Research findings, challenges, and key insights that emerged in the cutting-edge studies in this Special Issue contribute to the literature by exploiting the full potential of land mapping in understanding the complex nexus of dynamics among land ecosystems, use of resources, and anthropogenic interaction with the land. We hope that the readers of the *Land* journal find these articles of interest and that they may help in the development of further applications of land use and land cover mapping.

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Appendix A

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