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Editorial: Advanced numerical and spatial analysis of forest and environmental management

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Editorial on the Research Topic
Advanced numerical and spatial analysis of forest and environmental management

Forests serve as a balance in the preservation of ecosystems on the planet. Tropical forests, which represent the lungs of the planet, must be investigated through time. Spatial analysis is of great significance, since it can recognize all the changes related to tropical forests and all other types of forest biomes (Rudel, 2005). *Numerical analyses supported by advanced GIS m*ethods and remote sensing techniques provide better analysis of the real state of the forests and the areas they occupy (Pourghasemi, 2016; Valjarević et al., 2018; Abedi et al., 2020; Razavi-Termeh et al., 2020). The advanced methods of spatial analysis, when used together, give fast and efficient management of the environment and forest communities. The best results have lately been achieved by means of mixed methodologies of *GIS*, namely, *buffer*, *kernel*, *Kriging*, *zonal statistics* and the method of elimination, digital elevation model, analysis of a slope, and vector statistics, as well as the method of pixel, or grid analysis. Other combined methods, which could be upgraded by means of satellite detection, are *advanced raster analysis*, *multi-criteria overlay analysis*, and *automated map creation with a print-layout atlas*.

When continuous supervised and unsupervised pixel classification is combined with advanced GIS methods, it is possible to obtain even better results (Lee et al., 1999; Duda, and Canty, 2002; Valjarevic et al., 2014; Milanović et al., 2017). The data on forests are being used mostly from the CORINE database, while satellite data may successfully be downloaded from the satellite missions such as *Landsat* and *Copernicus*, which vary in resolutions from 10 m to 100 m. Environmental management consists of the following phases: forest stage, forest protection, forest management, and environmental management. The analysis of the state of forests may be conducted at local, regional, and global levels. The areas under forests may be at slight, mid, and large slopes. Advanced numerical methods may successfully be applied to all the regions. In this way, a geospatial database is created, which is later being updated by fresh data from the field (Svob et al., 2014; Sabatini et al., 2020). Standard remote sensing software applications, such as QGIS, IDRISI, and R-Mapper, are today complementary with the *Google Earth Engine (GEE) tool platform*.

The Google Earth Engine algorithms showed good potential in the speed of analyzing the data from larger forest areas. This platform has an excellent base of spatial data, obtained by means of visible and infrared recordings. It is possible to analyze the forests for the period before 10 years, thus conducting the analysis of the past and forecasting the future. This Research Topic has shown the increasing need for advanced methods and techniques, for the purpose of accelerating the data processing. Inaccessible areas, those degraded ones, are also suitable for the

analyses of *satellite data*. *Numerical and statistical analyses* provide accuracy of the processed data, being thus necessary for getting the real insight into the state of forests. Although this Research Topic only contains a small number of forest areas, it reflects the current status of the forest in these areas supported and classified by advanced numerical and spatial methods. The findings of this research can be extended in the future to the new study on the forest across the world. A new study with similar Research Topic is highly recommended.

Author contributions

The author confirms being the sole contributor of this work and has approved it for publication.

Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

References

Abedi, H., Feizizadeh, G., and Blaschke, T. (2020). GIS-based forest fire risk mapping using the analytical network process and fuzzy logic. *J. Environ. Plan. Manag.* 63 (3), 481–499. doi:10.1080/09640568.2019.1594726

Duda, T., and Canty, M. (2002). Unsupervised classification of satellite imagery: Choosing a good algorithm. *Int. J. Remote Sens.* 23 (11), 2193–2212. doi:10.1080/01431160110078467

Lee, J-S., Grunes, M. R., Ainsworth, T. L., Du, Li-Jen, Schuler, D. L., and Cloude, S. R. (1999). Unsupervised classification using polarimetric decomposition and the complex Wishart classifier. *IEEE Trans. Geoscience Remote Sens.* 37 (5), 2249–2258. doi:10.1109/36.789621

Milanović, M., Tomić, M., Perović, V., Radovanović, M., Saumitra, M., Jakšić, D., et al. (2017). Land degradation analysis of mine-impacted zone of Kolubara in Serbia. *Environ. Earth Scieneces* 76, 580. doi:10.1007/s12665-017-6896-y

Pourghasemi, H. R. (2016). GIS-Based forest fire susceptibility mapping in Iran: A comparison between evidential belief function and binary logistic regression models. *Scand. J. For. Res.* 31 (1), 80–98. doi:10.1080/02827581.2015.1052750

Razavi-Termeh, S. V., Sadeghi-Niaraki, A., and Choi, S. M. (2020). Ubiquitous GIS-based forest fire susceptibility mapping using artificial intelligence methods. *Remote Sens.* 12 (10), 1689. doi:10.3390/rs12101689

Rudel, T. (2005). *Tropical forests: Regional paths of destruction and regeneration in the late twentieth century*. New York Chichester, West Sussex: Columbia University Press. doi:10.7312/rude13194

Sabatini, F. M., Keeton, W. S., Lindner, M., Svoboda, M., Verkerk, P. J., Bauhus, J., et al. (2020). Protection gaps and restoration opportunities for primary forests in Europe. *Divers Distrib.* 26, 1646–1662. doi:10.1111/ddi.13158

Svob, S., Arroyo-Mora, J., and Kalacska, M. (2014). The development of a forestry geodatabase for natural forest management plans in Costa Rica. *For. Ecol. Manag.* 327, 240–250. doi:10.1016/j.foreco.2014.05.024

Valjarević, A., Djekić, T., Stevanović, V., Ivanović, R., and Jandziković, B. (2018). GIS numerical and remote sensing analyses of forest changes in the Toplica region for the period of 1953–2013. *Appl. Geogr.* 92, 131–139. doi:10.1016/j.apgeog.2018.01.016

Valjarevic, A., Zivkovic, D., Valjarevic, D., Stevanovic, V., and Golijanin, J. (2014). GIS analysis of land cover changes on the territory of the Prokuplje Municipality. *Sci. World J.* 14, 1–8. doi:10.1155/2014/805072