

Geospatial Analysis of Hydrological Response to Forest Fires in Small Mediterranean Catchments

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Abstract : Forest fire is a major threat in many regions in Croatia, especially in coastal areas. Although they are often caused by natural processes, the most common cause is the human factor, intentional or unintentional. Forest fires drastically transform landscapes and influence natural processes. The main goal of the presented research is to analyse and quantify the impact of the forest fire on hydrological processes and propose the model that best describes changes in hydrological patterns in the analysed catchments. Keeping in mind the spatial component of the processes, geospatial analysis is performed to gain better insight into the spatial variability of the hydrological response to disastrous events. In that respect, two catchments that experienced severe forest fire were delineated, and various hydrological and meteorological data were collected both attribute and spatial. The major drawback is certainly the lack of hydrological data, common in small torrential karstic streams; hence modelling results should be validated with the data collected in the catchment that has similar characteristics and established hydrological monitoring. The event chosen for the modelling is the forest fire that occurred in July 2019 and burned nearly 10% of the analysed area. Surface (land use/land cover) conditions before and after the event were derived from the two Sentinel-2 images. The mapping of the burnt area is based on a comparison of the Normalized Burn Index (NBR) computed from both images. To estimate and compare hydrological behaviour before and after the event, curve number (CN) values are assigned to the land use/land cover classes derived from the satellite images. Hydrological modelling resulted in surface runoff generation and hence prediction of hydrological responses in the catchments to a forest fire event. The research was supported by the Croatian Science Foundation through the project 'Influence of Open Fires on Water and Soil Quality' (IP-2018-01-1645).

Keywords : Croatia, forest fire, geospatial analysis, hydrological response

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