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Land use change in the last century in the Veneto floodplain: effects on network drainage density, water storage, and related consequences on flood risk

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In a high-density populated country such as Italy, the anthropic pressure plays a fundamental role in the alteration and the modification of the landscape. Among the most evident anthropic alterations, the most important are the urbanization processes that have been occurring since the end of the second world war. Agricultural activities, housing and other land uses have shifted due to the progressive spreading of urban areas. These modifications affect the hydrologic regimes, but municipalities often are not aware of the real impact of land cover changes on such processes and, consequently, an increase of the elements at risk of flooding is generally registered. The main objective of this work is to evaluate the impact of land cover changes in the Veneto region (north-east Italy), from 1954 to 2006, on the minor drainage network system and on its capacity to attenuate the direct runoff. The major flood event occurred between October and November 2010. The study is a typical agrarian landscape and it has been chosen considering its involvement inthe major flood of 2010 and considering also the availability of high-resolution topographic data (LiDAR-derived DTMs) and historical aerial photographs. Aerial photographs dated back to 1954 and 1981, in particular, have been used either to classify the land cover in five categories according to the first level of the CORINE land cover classification and to identify the minor drainage network. A semi-automatic approach based on the high-resolution DTM (Cazorzi et al., 2012), was also considered to identify the minor drainage network and estimate its water storage capacity. The results underline how land cover variation over the last 50 years has strongly increased the propension of the soil to produce direct runoff (increase of the Curve Number value) and it has also reduced the extent of the minor network system. As a consequence, the capacity of the agrarian minor network to attenuate and laminate a flood event is decreased as well. These analysis can be considered useful tools for a suitable land use planning in flood prone areas.

References

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