

Publication

Assessment of the cover changes and the soil loss potential in European forestland: First approach to derive indicators to capture the ecological impacts on soil-related forest ecosystems

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The Member States of the European Union have committed to the maintenance and protection of forest lands. More precisely, the Member States aim to ensure the sustainable development and management of the EU's forests. For 2013, Eurostat's statistics about primary and secondary wood products in the European forest land (65% thereof privately owned) estimate a roundwood production of 435 million m³ in total. Harmonised information, i.e., spatially and temporarily differentiated, on forestry and wood harvesting activities in the European forests are missing however. This lack of information impedes the scientific assessment of the impacts that forest management practices have on the soil-related forest ecosystems (e.g., accelerated water soil erosion, delivery of inert sediments and pollutants within the drainage network, pauperization of aquatic ecosystems). It also prevents national and European institutions from taking measures aimed at an effective mitigation of the rapidly advancing land degradation. This study provides a first pan-European analysis that delineates the spatial patterns of forest cover changes in 36 countries. The first dynamic assessment of the soil loss potential in the EU-28 forests is reported. The recently published High-resolution Global Forest Cover Loss map (2000–2012) was reprocessed and validated. Results show that the map is a powerful tool to spatiotemporally indicate the forest sectors that are exposed to cover change risks. The accuracy assessment performed by using a confusion matrix based on 2300 reference forest disturbances distributed across Europe shows values of 55.1% (producer accuracy) for the algorithm-derived forest cover change areas with a Kappa Index of Agreement (KIA) of 0.672. New insights into the distribution of the forest disturbance in Europe and the resulting soil loss potential were obtained. The presented maps provide spatially explicit indicators to assess the human-induced impacts of land cover changes and soil losses on the European soil-related forest ecosystems. These insights are relevant (i) to support policy making and land management decisions to ensure a sustainable forest management strategy and (ii) to provide a solid basis for further spatiotemporal investigations of the forestry practices' impacts on the European forest ecosystems.

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