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Analysis of Land Use Change at Wind Turbine Sites

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A wind power plant's development causes a range of disturbances, both short-term and long-term. Wind turbine pads, access roads, substations, service buildings, and other equipment that physically occupy land or produce impermeable surfaces are examples of these disruptions. Development in forested areas, where more land must be removed around each turbine, is linked to extra direct impacts. Although the land cleared around a turbine pad does not produce impermeable surfaces, the quality of the ecosystem may be significantly degraded as a result of this alteration.

This work includes the outcomes derived from a sequence of data analytics. The analyses entail aggregating unprocessed data obtained from Copernicus Sentinel-2 satellite images covering the timeframe from 2015 to 2023. The development of algorithms tailored to distinct regions (such as EU countries and sub-regions) to identify alterations, together with the subsequent statistical examination of the alteration data, are essential elements of this procedure. The change dataset has a spatial resolution of 10m x 10m, which is the same as the input data from Sentinel-2. It is a binary raster dataset that visually shows the changes happening below and near the wind turbine sites that were built between 2015 and 2023. The statistical analysis includes the evaluation of this data and the examination of the changing raster, land-cover data, the biogeographical area, and terrain data. The statistical calculations are conducted for both individual wind turbines and wind parks comprising many wind turbines.