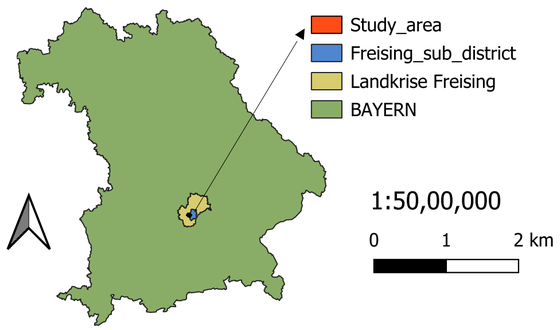
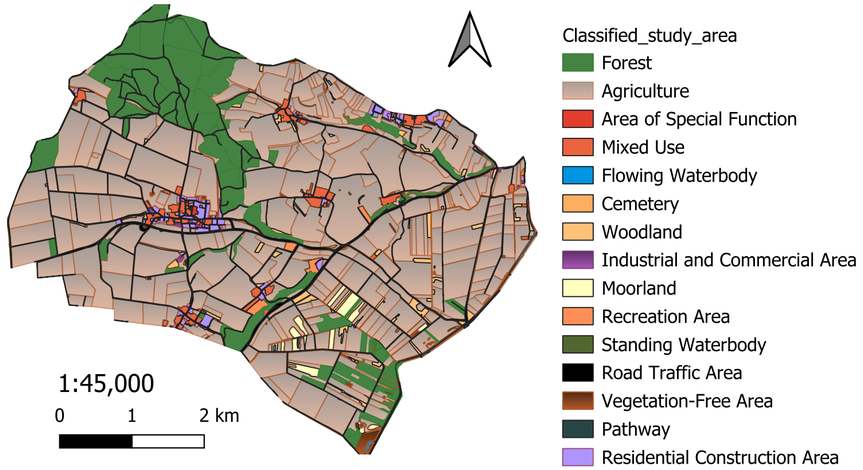
Land use and Land Cover

Overview map: Location of the study area



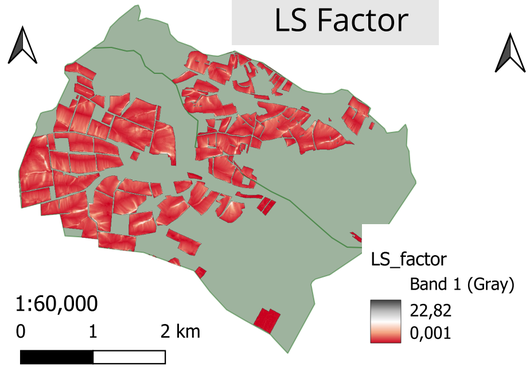
The study area (48° 24' 12" N, 11° 44' 55" E), located southwest of Freising in Bavaria, is characterized by its predominant agricultural and forested landscapes. Agriculture forms the backbone of the region's land use, while forests contribute significantly to its ecological balance and biodiversity.

Land use and Land Cover in Study Area

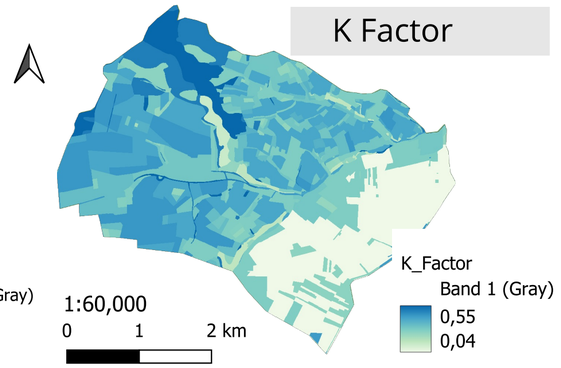


Study area exhibits diverse land use practices, with 15 major and minor land use classes identified in 2021. Agricultural land was the most dominant, covering around 70%, followed by vegetation at 20%. Barren land had the smallest share, accounting for just 1%. This highlights the region's reliance on agriculture and its ecological significance

LS Factor

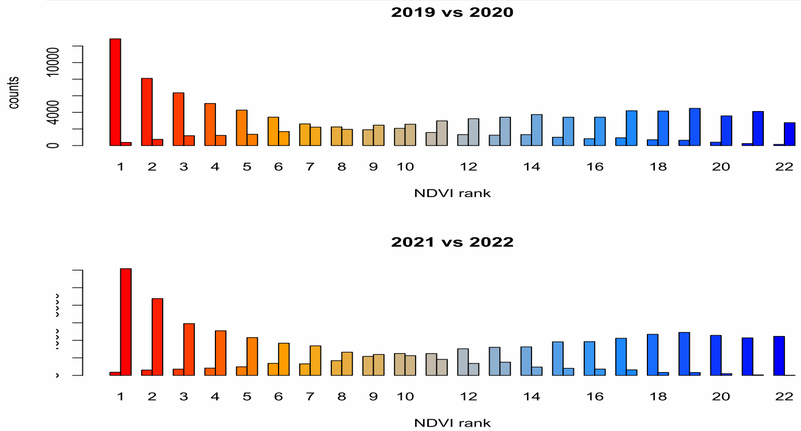


K Factor



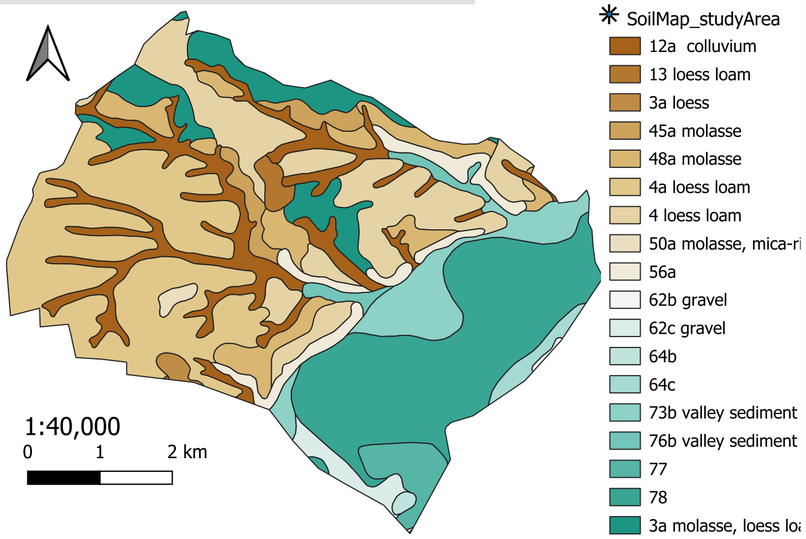
The maps highlight erosion-prone zones where sustainable land management is crucial. High LS and K factor areas are better suited for conservation practices or reforestation rather than intensive agriculture.

NDVI (Normalized Difference Vegetation Index) ranks across the years 2019, 2020, 2021, and 2022



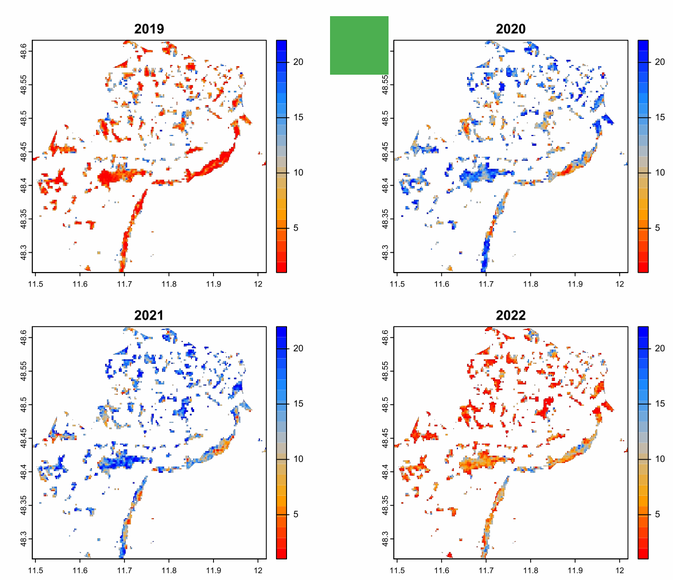
The histograms show poor forest health in 2019 and 2022, with NDVI skewed toward lower ranks (1–6), likely due to droughts and stress. In contrast, 2020 and 2021 display higher NDVI ranks (12–22), indicating recovery and healthier vegetation. These trends highlight the impact of climate and stressors on forest health, emphasizing the need for adaptive management.

Soil Map ; Study Area

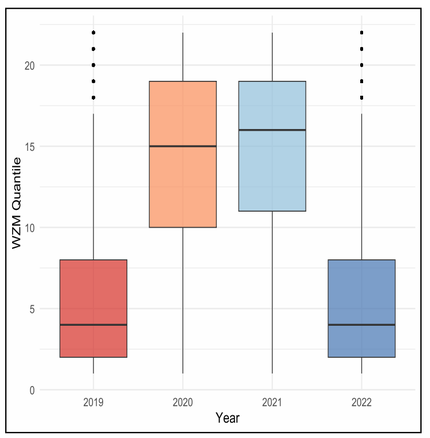


The study area is dominated by brown earth (4a) at 21%, fen soils (78) at 18.7%, and brown earth from loess (5) at 15.9%, emphasizing their agricultural and ecological importance. Calcareous gley (64c) and alluvial marl (62c) account for 13.4% and 7.7%, reflecting poor drainage and river sediment influence. Fertile loess soils support agriculture, while waterlogged soils like gley and fen align with wetlands and grasslands. Steeper slopes with less stable soils are forested or conserved to prevent erosion, highlighting the strong connection between soil types, land use, and sustainable management.

Forest condition Monitoring for 2019, 2020, 2021, and 2022 for Freising KRS



The maps showcasing the forest condition quantilesand significant temporal variations in canopy health. Poorer forest conditions are evident in 2019 and 2022, marked by widespread red areas, likely reflecting the impact of environmental stressors such as droughts. In contrast, 2020 and 2021 exhibit healthier canopy conditions, with more blue areas indicating recovery or stability during these years. The Wilcoxon test (p-value < 2.2e-16) confirms significantly lower forest conditions in 2019 and 2022 compared to 2020 and 2021.



The boxplot illustrates the WZM quantile distribution for forest conditions from 2019 to 2022, showing distinct trends across the years. The median values for 2019 and 2022 are significantly lower than those for 2020 and 2021, indicating poorer forest conditions during those years, likely due to environmental stressors like droughts or the drought in 2018 might have influence in 2019. Additionally, 2019 and 2022 exhibit smaller interquartile ranges (IQR), suggesting less variability in forest conditions, with a few high-value outliers. In contrast, 2020 and 2021 show higher medians and broader IQRs, reflecting improved forest conditions and greater variability.

✳ 12a Colluviosol from silt to loam (colluvium).
13 Pseudogley and pseudogleyed brown earth from silt to silty clay (loess loam).
3a Pararendzina from carbonate silt (loess).
45a Brown earth (podsolized under forest) from gravel sand to sandy gravel (molasse
48a Brown earth from loamy sand to sandy loam (molasse), sometimes with cryosol.
4a Parabraunerde and brown earth from silt to silty clay (loess loam
Brown earth from silt to silty clay (loess loam).
50a Brown earth from clay to clay silt (molasse, mica-rich).
56a Pseudoschwarz and brown earth on steep valley slopes.
62b Calcareous gley from silt to loam over carbonate silt (gravel).
62c Calcareous alluvial marl from silt to loam over deep carbonate silt (gravel).
64b Calcareous gley or humic gley from silt to loam over carbonate silt.
64c Calcareous alluvial marl from silt to loam over carbonate silt.
73b Gley and brown-earth gley from silt to loam, rarely clay (valley sediment).
76b Gley and groundwater-influenced soils from silt to loam, rarely clay (valley
77 Calcareous fen from peat over diverse substrates, with meadow marl.
78 Fen and transitional mire from peat over diverse substrates.
3a Brown earth from sandy loam to silty clay (molasse, loess loam).

Sources :
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