

ReSurveyEurope

Project Metadata Form

When contributing data to ReSurveyEurope, please fill in this form for each resurvey project and send it to Ilona Knollová (ikuzel@sci.muni.cz) together with the database. A resurvey project is understood as repeated sampling of a certain type of vegetation in a certain study area using specific methods.

- PROJECT NAME (identical with the Resurvey Project name given in the database):

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- FULL PROJECT NAME (use if the full project name is longer than used in the database):

Intensive Monitoring of Forest Ecosystems (ICP-Forests Level II) in Slovenia

- REFERENCE (publication or URL or DOI of the dataset if published online):

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- DATA OWNER: person(s), institution(s):

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- METHODS (description of sampling design and methods):

- Both datasets contain forest vegetation surveys in different forest vegetation types across Slovenia, spanning from lowland oak forests, through mesic beech forests to mountainous spruce forests. These are representative forest types for Slovenia and also beyond as they cover the main forest vegetation communities found in temperate zone.
- Eleven forested areas (sites) were selected, covering countrywide geographical range and representing a broad spectrum of ecological conditions. They are included in the ICP-Forests EU network with standardized and harmonized measurements.
- At each site, vegetation was first sampled in 2004 and then every five years, yielding a total of 4 resurveys, except for 2 sites which were sampled 3 times during the period 2004-2020. Two different plots sizes were used at each site.
- Dataset 1:** Four or eight 10 x 10 m vegetation plots (100 m²) were established at each site, yielding a total of 64 sampling plots. The number of plots depended on whether the site was fenced or not. Spatial distribution of plots was random and

optimized in order to describe the variability of local site and vegetation conditions. Each plot was sampled 4 (3) times: in years 2004, 2009/2010, 2014/2015 and 2019/2020. Thus, dataset 1 contains a total of 248 relevés. In each vegetation plot, cover estimation of different vertical vegetation layers (tree, shrub, herb layer) and vascular plant species were assessed according to the modified ICP-Forests protocols (Canullo et al. 2011). The visual estimation of plant species cover was conducted using a modified Barkman's method (Barkman et al. 1964). Nomenclature of species names followed national flora - Mala Flora Slovenije (Martinčič et al. 2007) and Flora Europaea (Tutin et al. 1980, 1993).

- **Dataset 2:** At each forest site, we sampled forest vegetation in 10 plots with a size of 2 x 2 m (4 m²), resulting in 110 sampling plots in total. Spatial distribution of plots was random and optimized in order to describe the variability of local site and vegetation conditions. Each plot was sampled 4 (3) times: in years 2004, 2009/2010, 2014/2015 and 2019/2020. Thus, dataset 2 contains a total of 420 relevés. At each plot, we recorded all vascular plant species (woody and herbaceous species), and visually estimated their cover percentage according to the modified method of Londo (1976) in different vertical vegetation layers: tree (upper and lower), shrub and herb layer. Nomenclature of species names followed national flora - Mala Flora Slovenije (Martinčič et al. 2007) and Flora Europaea (Tutin et al. 1980, 1993).

- Detailed information regarding our sampling design and methods can be found in published papers:

Kutnar L., Nagel T.A., Kermavnar J. 2019. Effects of disturbance on understory vegetation across Slovenian forest ecosystems. *Forests*, 10: 1048. <https://doi.org/10.3390/f10111048>

Kermavnar J., Kutnar L. 2020. Patterns of understory community assembly and plant trait-environment relationships in temperate SE European forests. *Diversity*, 12: 91. <https://doi.org/10.3390/d12030091>

Kermavnar J., Kutnar L., Marinšek A. 2021. Disentangling the ecological determinants of species and functional trait diversity in herb-layer plant communities in European temperate forests. *Forests*, 12: 552. <https://doi.org/10.3390/f12050552>

Kermavnar J., Kutnar L., Marinšek A. 2021. Variation in floristic and trait composition along environmental gradients in the herb layer of temperate forests in the transition zone between Central and SE Europe. *Plant Ecology*, <https://doi.org/10.1007/s11258-021-01203-8>

- ENVIRONMENTAL DATA (list of environmental data measured):

- During the vegetation surveys, we assessed environmental variables related to forest structure, local topography, bedrock type and soil conditions. The following factors were assessed:
 - slope aspect,
 - slope inclination,
 - cover of stones and rocks on the surface,
 - cover of deadwood,

- cover and height of different vertical layers (tree layer, shrub layer, herb layer, moss layer),
 - cover of bare soil.
 - Detailed soil sampling was conducted during the first sampling period (2004/2005) with many data related to physical (e.g., soil texture) and chemical soil properties (e.g., pH, C and N content, cation exchange capacity, etc.). Measurements of site-level meteorological variables (e.g., air and soil temperature, air humidity, irradiance) were also employed.
 - We additionally evaluated the impact of various natural and anthropogenic disturbances on vegetation development.
 - Environmental conditions in all plots were further indirectly evaluated by using phytoindication methods, i.e., calculation of community-weighted means of Ellenberg indicator values.
- MANIPULATED PLOTS (description of the treatment if the plots were manipulated, e.g. mowing twice a year, fertilizing by NPK once a year, post-fire succession)
 - Five forest sites were fenced to prevent ungulate browsing. At these sites, 4 vegetation plots of 10 x 10 m were inside the fence and another 4 plots outside the fence. Also, 5 vegetation plots of 2 x 2 m were inside the fence while 5 plots were positioned outside the fence.

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