

5 Monitoring approaches in Switzerland that integrate both physical/spatial and preference/recreation data

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In Switzerland there are two major monitoring programs that include outdoor recreation and try to integrate physical/spatial data from area statistics and remote sensing as well as social data from surveys. The first one is forest monitoring consisting of the National Forest Inventory (NFI) as well as the socio-cultural forest monitoring WaMos. The second one is the landscape monitoring program LABES which includes various physical/spatial indicators as well as preference data from surveys.

Forest monitoring normally either focuses on physical aspects such as tree species, stand structure, etc. or on social aspects such as forest recreation and preferences. However, in forest recreation, both the physical characteristics of the forest as well as the social aspects play an important role. The question aroused whether NFIs and socio-cultural forest-monitoring surveys could be combined to explain and possibly even predict forest recreation patterns from forest-related and visitor-related data.

In order to achieve this, we tested two approaches. In the first one we took the most relevant parts of the questionnaire from the Swiss socio-cultural forest-monitoring survey and used them in a forest visitor survey at NFI sample plots. In addition, visitors were asked to rate the visual attractiveness of the NFI-plot and the surrounding forest. NFI-data were collected from 4 systematically arranged 50x50 m plots, covering the forest area visible to visitors from the footpath. Multi-level modelling combining both plot-related inventory data and visitor-related questionnaire data showed that forest attractiveness is determined by both social and physical factors (Hegetschweiler et al. 2018).

In the second approach we used photographs of NFI sample plots with known forest data in an online survey in the whole of Switzerland. Again, the respondents were asked to rate the visual attractiveness of the forest depicted. Regression models and multi-level modelling were again used to

combine physical forest data and questionnaire data to predict visual attractiveness and recreational usage of forest (Hegetschweiler et al. 2020).

Results show that visual attractiveness could be explained by a combination of several NFI-parameters, such as stand structure, and social factors, such as contemplative visitation motives.

Most of the landscape monitoring programs in Europe and worldwide are limited to the physical and biological space (Kienast et al. 2019) despite the fact that land-use is strongly linked to the socio-cultural realm via people's perception, as it is stated by the definition of landscape of the European Landscape Convention. The Swiss Landscape Monitoring Program LABES is one of the first large-scale landscape observatories where not only physical/spatial data are included but landscape perception has been systematically monitored with representative surveys from the beginning of the monitoring program. The entire monitoring consisted of roughly 30 indicators. Approximately 25% of the indicators measured perception properties: Respondents were instructed to base their statements on the landscape and places of their current home municipality rather than on pictures of specific landscapes.

In the first run of LABES 2010 the physical/spatial and the social preference data were gathered and analysed more or less independently resulting in separate clusters of indicators. However, first attempts to correlate physical/spatial indicators with social/preferential ones turned out to be highly promising (Kienast et al 2015). There was, e.g., a clear interdependence of high urban-sprawl values and low preference values. Nevertheless, the findings remained statistical correlations, and it lacked a theory-driven empirically supported explanation of this interdependences.

A method re-development project was, thus, conducted to close the gap between physical/spatial indicators and the social ones. We included indicators focusing specifically on the contents of

what is measured by the physical/spatial indicators. In addition, the latter were extended by recreation suitability and use indicators to allow going beyond only landscape preferences. Multi-level and structural equation modelling then was applied to analyse the complex data in an adequate way (Wartmann et al. 2021a, 2021b, [re-subm.](#))

Our results on the individual level show that how long residents have lived in a region and how well they can see the landscape in an unobstructed way are significant predictors of perceived landscape quality. At the municipality level, the type of municipality and the biogeographic region are significant predictors to explain variance between municipalities.

Finally, the question arises which of the mentioned approaches, and others, are most suitable for which task. On-site surveys of course are most adequate for regional studies and for exploring the mechanisms, photo-based online surveys help to include a large population but still stick to particular situations represented on the photographs. And finally, the general municipality evaluation regarding landscape and recreation quality is best to gather information about the public perception of large areas as countries or beyond (suitable to compare the situation in, e.g. the whole of Europe).

References

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