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Sulkava M. et al.: Quality of monitoring programmes is determined by the quality of the collected data

Detecting spatial and temporal changes in ecosystem characteristics is a principal tool for identifying and understanding the effects of anthropogenic activities on the condition and functioning of ecosystems. Ability to detect these trends can, however, be blurred by the imprecision of the data. Managers of research and monitoring programmes are aware of the difficulties surrounding representative sampling and therefore enforce strict sampling protocols. Standardized and harmonised sampling can be so effective that the initially much smaller uncertainty in the instrumental analysis can become substantial. To quantify the effects of laboratory quality on trend detection we made both theoretical computations and computations using results of "Needle/Leaf Interlaboratory Comparisons Tests" conducted by Forest Foliar Coordinating Centre of ICP Forests (in co-operation with European Commission). The results showed that, when sampling protocols largely reduce the variability of representative sampling, poor quality of the instrumental analysis blurs the data to the extent that environmental monitoring or long-term ecological research programs can lose the ability to detect trends. As an example, in our case study where actual trends in foliar data were combined with the results of Interlaboratory Comparison Test we observed up to three decades-long delay in detecting changes, while the actual change in the data took place within 15 years. We can thus conclude that high quality of the instrumental analysis is a prerequisite for a reliable monitoring program.

Original study:
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