

## Abstract template for the conference “A century of national forest inventories – informing past, present and future decisions”

Dear author. This is a two-page template that in the first page will ask for information on presenter name, topic, and preferred presentation form.

On page two, you are asked to fill in your abstract in the format and font size indicated. Please remember to include authors affiliation information in the footer section of page two. The length of the abstract may not be more than one page including references.

<b>Abstract title:</b>		Comparison of various approaches of forest carbon estimation using National Forest Inventory data from Poland
<b>Take-home message:</b>		<i>Carbon estimates are a crucial element in various activities related to climate mitigation, however, as the estimation method has a strong effect on the results, it is necessary to assess the range of the results obtained with different methods and uncertainty related to them.</i>
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<b>General topic, see website:</b> <small>(please double click on the check box and activate the relevant one)</small>	<input type="checkbox"/>	Improving future NFIs by learning from the past
	<input checked="" type="checkbox"/>	NFIs today and in the future
	<input type="checkbox"/>	Cutting edge and futuristic inventory techniques and technologies
<b>Preferred presentation form:</b>	<input checked="" type="checkbox"/>	Oral presentation
	<input type="checkbox"/>	Poster
<i>Abstracts will be reviewed by members of our scientific committee and you will be given information on decisions in due time after the submission deadline has passed.</i>		

# Comparison of various approaches of forest carbon estimation using National Forest Inventory data from Poland

*Karol Bronisz*

## Introduction

Environmental protection, particularly issues related to the climate change, has become recently more and more frequently the theme of both policy makers discussion and scientific research activities around the world. Forest ecosystems are an important source of biomass and make significant contribution to the global carbon budget and the mitigation of climate changes. In this context inventory of the forest biomass can be used as a tool (intermediate step) to assess carbon storage. A commonly used method to determine tree biomass applies empirical allometric biomass equations. An alternative solution includes biomass expansion/conversion factors. Because the estimation of carbon stock can be done with different methods, which has a strong impact on the results (Neumann et al., 2016). The aim of this study was to compare the forest carbon results using two different approaches: empirical allometric biomass equations and general methodology proposed by international guidelines for the FAO and the UNHCCC carbon reporting (IPCC).

## Materials and methods

All measurements within Polish NFI are taken during a 5-year cycle (20% of sample plots are measured annually). The first cycle of the inventory started in 2005. Polish NFI sample plots are arranged into clusters and grouped into blocks of five (Tomppo et al., 2010). The research material was collected during the second cycle of NFI. Analyses were carried out according to relatively homogenous tree species groups (TSG). Comparison was done for the total carbon content both on the sample plot level and for all Polish forests based on the mean carbon stock and area occupied by each TSG.

## Results

The summary for total carbon storage shows that the difference in the results depending on the method can be as high as 100.1 million Mg, which corresponds to 11% of the total carbon storage assessed based on empirical allometric biomass equations. Indicated differences between analysed methods depend on the tree species groups age structure.

## Conclusion

The analysed methods differed in terms of tree species groups and the stand age structure. The use of local solutions taking into account parameters such as stand age or local formulas especially on a large scale is worth consideration. Among compared methods, only empirical allometric biomass equations allow to determine biomass/carbon storage directly at a single tree level. In addition, these calculations are obtained based on the measurement data or simple conversions, which minimize the errors of the results.

## References

- Neumann, M., Moreno, A., Mues, V., Härkönen, S., Mura, M., Bouriaud, O., Lang, M., Achten, W.M.J., Thivolle-Cazat, A., Bronisz, K., Merganič, J., Decuyper, M., Alberdi, I., Astrup, R., Mohren, F., Hasenauer, H., 2016. Comparison of carbon estimation methods for European forests. *For. Ecol. Manag.* 361, 397–420. <https://doi.org/10.1016/j.foreco.2015.11.016>
- Tomppo, E., Gschwantner, T., Lawrence, M., McRoberts, R.E., 2010. *National Forest Inventories Pathways for Common Reporting*. Springer Heidelberg Dordrecht London New York.