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Abstract

Carbon stocks and fluxes in Dutch forest ecosystems
G. J. Nabuurs & G. M. J. Mohren
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Wageningen, The Netherlands
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Summary
The biospehere plays an important role in the regulation of the global carbon cycle. Especially forests are important as a storage pool of atmospheric carbon and as regulator of the carbon cycle. In the framework of the Dutch National Research Programme on Global Air Pollution and Climate Change, research on stocks and fluxes of carbon is carried out as part of Theme B: Causes. Within this framework, this desk-study attempts to quantify the stocks and fluxes of carbon in the present-day Dutch forests (330000 ha) and in forest soil, on the basis of existing yield tables, biomass measurements and soil profile description. Following the 4th National Forest Inventory, the forest terrain types standing forest (twelve tree species), spontaneous forest, coppice and natural regeneration forest are distinguished. For each forest type the next parameters are quantified: carbon stock in the living biomass, current annual accumulation of carbon through stem volume increment per site class, carbon stock in soil stable humus and in the forest floor. Harvesting and decomposition of wood procucts is only

superficially accounted for.
The present stock of carbon in the living biomass, soil stable humus and forest floor of the Dutch forest amounts to 63.7 Mt C. 58% of the carbon is stored in the soil stable humus, which makes this stock rather important as an absolute amount and as a pool that is secured for a long time by the forest. At this moment the standing forest of beech has the highest stock of carbon per ha in the living biomass (125 Mg C/ha). The average carbon stock in the living biomass amounts to 59 Mg C/ha. 40% of the standing forest consists of Scots pine. The carbon stock in the area of this species amounts to 5.4 Mt C and is 33% of the carbon stock in the living biomass.
The present gross annual carbon accumulation through current stem volume increment on the total afforested area amounts to 0.66 Mt C/yr, equivalent to about 1% of the total Dutch carbon emission. This however is a gross sink because harvesting and product decomposition are not taken into account. The net annual carbon sink is roughly estimated at 0.33 Mt C/yr. At present attainable the gross annual carbon sink through stem volume increment is with 4.6 Mg C/ha/yr the largest in beech stands on good sites. For the total area of beech, the average net annual carbon sink is only 1.8 Mg C/ha/yr. The current average net annual carbon sink for the total Dutch forest amounts to 0.97 Mg C/ha/yr.
The importance of forests in reducing the concentration of atmospheric carbondioxide lies in their stock of carbon in the living biomass and in the soil organic matter that build up during long-term forest development rather than in the annual increment. The Dutch forests contain a small stock of carbon because of the small area and the relatively young age. As a consequence of a current annual increment that exceeds the annual cut, the Dutch forests act as a carbon sink, equivalent to 0.5% of the total carbon emitted through burning of fossil fuels in the Netherlands.

ecosystem: mass, water and energy cycling
Notes

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Tartalom

Appendix 3: Organic matter content in soil profiles
Appendix 4: Relevant biomass data
Appendix 5: Growth data from IBN permanent sample plots

Címszavazva - VA

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