GENERAL INFORMATION

author(s)	Vande Walle I
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project	PhD_VandeWalle
supervisor	Lemeur R
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data	C7: data from Janssens_etal_1998

MATERIALS & METHODS

study area	5n (scientific zone)
time period	January 1996 – August 1997
goal	Investigate how much short-rotation forestry and Belgian forests can help reach the Kyoto Protocol target for Flanders and Belgium. - study the establishment and biomass production of SRF plantations in Flanders - determine biomass carbon stocks in different (Belgian) forest ecosystems - investigate methodologies to assess the carbon balance of a forest ecosystem - examine the carbon balance of different forest ecosystems
set-up	study of C sequestration in a short rotation forestry plantation (Zwijnaarde) C stocks and C sequestration in mature forests (Aelmoeseneie forest) upscaling to Flanders & Belgium (forest inventory) for the chapters 7 & 9 on the Aelmoeseneie forest: see the papers below chapter 8: oak-beech and ash stand, mass-balance approach to determine net ecosystem productivity
data collection	for the chapters 7 & 9 on the Aelmoeseneie forest: see the papers below chapter 8: full inventory of the scientific zone in Dec 1990, Dec 1997, Jan 2006 - cbh for trees with cbh > 22 cm - species - x,y coordinates
remarks	C7: Above- and belowground C stocks (VandeWalle_etal_2001_AFS) C8: C sequestration between 1991-2005 C9: C stock in Belgian forests (VandeWalle_etal_2005_AFS)

RESULTS

Total carbon stocks, including the vegetation, litter and soil compartment, amounted to 324.8 t C ha^{-1} in the oak-beech (OB) stand, and 321.4 t C ha^{-1} in the ash stand (AS). Approximately half of this carbon stock was found in the vegetation of the two stands. Based on data from three full inventories of the two stands, NEP (net ecosystem productivity) was assessed at 3.3 ± 2.3 and 2.3 ± 1.8 t C ha^{-1} $year^{-1}$ in the period 1991-1997 for OB and AS, respectively. The carbon balance was slightly higher in the period 1998-2005, and amounted

to 3.6 ± 2.3 and 3.0 ± 1.8 t C ha^{-1} $year^{-1}$ for OB and AS, respectively. The increase in NEP appeared to depend on higher air temperatures and increased precipitation in the period 1998-2005 compared to 1991-1997, while differences in elemental deposition between these two periods were not significant.

Belgian regional forest inventories contain no data on carbon stocks, as is the case in many countries. An extensive literature study was performed to select wood density, biomass expansion factors s.s. and carbon content values applicable for Belgian forests. These values were then used to convert total solid wood volume data from the forest inventories to total biomass carbon stocks. As such, the total carbon stock in Belgian forest biomass in the year 2000 was assessed at 60.9 Mt C, with a mean of 101.1 t C ha^{-1}. The choice of the wood density value had the highest impact on the calculated total C stock. Starting from the year 2000, a back-calculation was performed to assess the carbon sequestration by Belgian forests in the period 1990 to 2000. Mean carbon uptake by Belgian forests amounted to 2.1 t C ha-1 $year^{-1}$ in this period, including changes in biomass and soil carbon stocks. For this calculation, it was assumed that litter and dead wood carbon stocks did not change during the considered time period. The calculation of the carbon sink strength in Flemish forests will be improved when region-specific increment data will become available.