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CARBON POOLS IN TWO DIFFERENT MOUNTAIN ECOSYSTEMS

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The carbon pools were assessed in two ecosystems: mixed forest and grassland (meadow). The methods of sampling measurement and calculation were comparable though some specific procedures for forest and for grassland were used.

Characteristics of Experimental Study Sites

The experimental study sites were located in the central part of the Slovak Republic (N 48°38'34", E 19°32'22") in protected landscape area (PLA) Polana. About 90% of the area is covered by forests, mostly by beech, fir-beech and spruce forests. Localities with the experimental sites are according to the Slovak climate classification within the moderately warm zone. The mean annual air temperature is 5,8 °C; the mean annual precipitation is 853 mm in total.

The forest experimental site is situated on the NE slowly exposed slope (5–15°) with the elevation of 850 m a.s.l. Soil type according to FAO classification is (Ando)–Eutric Cambisol. Parent material is sediments of tertiary volcanic rocks (andesite and andesitic pyroclastic materials) and granodiorites. Soil texture is loamy sand with 30 to 40% coarse fragments and the soil depth is from 60 to 90 cm. The vegetation of forest stand has been classified as Abieto – fagetum. Tree species composition: *Fagus sylvatica* (Europen beech): 70%, *Picea abies* (Norway spruce): 20%, *Acer pseudoplatanus* (Sycamore maple): 4%, *Abies alba* (Silver fir): 4%, *Fraxines excelsior* (European ash): 2%.

The grassland experimental site is situated on the SW slowly exposed slope (5°) with the elevation of 820 m a.s.l. Soil type according to FAO classification is Eutric Cambisol. Parent material is granodiorites and admixture of pyroclastic materials. Soil texture is sandy loam with coarse fragment less than 10% and the soil depth is from 80 to 100 cm. The vegetation of meadow has been classified as Festuco – Cynosuretum with these dominant plant species: *Agrostis capillaris* L., *Festuca rubra* L., *Leontodon hispidus* subsp. danubialis, *Luzula campestris* [L.], *Nardus stricta* L., *Trifolium pratense* L., *Trifolium repens* [L.].

Results

Forest ecosystem

Above-ground carbon stocks fixed in biomass were estimated separately for selected groups of forest ecosystem. The biggest carbon stocks were determined in living trees

(267 222 kg ha-^{1}), which presented 95% from the total above ground biomass in mountain forest ecosystem. Carbon pools in the dead trees represented about 2% and in dead wood about 3%. The smallest carbon pools were registered in ground vegetation (herbs and seedlings). Carbon stocks in below-ground biomass (roots) were estimated on the base of ratio to above-ground stocks (16%). Carbon pools in soil represented 291 000 kg ha^{-1}. The highest mineral soil carbon pools were found in topsoil: in the layer of 0–20 cm (113 000 kg ha^{-1}). The carbon pools decreased within the soil depth. However, due to high organic carbon concentrations were found high carbon pools also in deeper soil layers.

Grassland ecosystem

Above-ground carbon stocks fixed in biomass were estimated separately for selected function groups of plants (herbs, grasses, mosses). The total carbon stocks in the living above ground biomass represented 12 610 kg ha^{-1}, from which 6 326 kg C ha^{-1} were fixed in the grasses. Carbon pools in the dead phytomass (litter) were estimated on 1 906 kg ha^{-1}. Carbon stocks in below-ground biomass featured 21 136 kg ha^{-1}. The highest carbon pools sequestrated in roots were assessed in the upper soil layer (89% in the 0–8 cm layer) and strongly decreased within the soil depth. Carbon pools in soil were in total 125 527 kg ha^{-1}. The highest mineral soil carbon pools were found in topsoil: in the layer of 0–20 cm (58 890 kg ha^{-1}). The carbon pools also decreased within the soil depth.

Conclusions

The results of carbon stocks assessment in two different ecosystems showed that there were ascertained considerable differences in the total carbon stocks and in the distribution of carbon stocks too. The biggest carbon stock represented soil (soil organic mater), for both forest and grassland ecosystems. The distinctions of carbon stocks between the two model ecosystems can be partial explained by differences in land use. Methods used in the assessment of carbon stocks showed that detailed investigation of all components and factors deserves further attention, especially for the purpose of carbon inventories.

Key words: *carbon stocks, biommas, grassland, forest*

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