
Cambisols Classification in „Central Balkan” National Park

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Abstract

Analysis of the Cambisols classification on the territory of the Central Balkan National Park has been carried out. The assessment of the available information has revealed the insufficient level of knowledge and use of outdated criteria for soil definition. The presence of *Dystric Cambisols*, *Eutric* and *Dystric Regosols*, *Haplic Umbrisols*, *Rendzic Leptosols*, *Haplic Fluvisols* has been determined in separate studies. A detailed study is required in order to define the soils and update their classification. This will contribute to the proper planning of the necessary measures for soil protection for the different types of land use.

Keywords: *Umbrisols*, *Cambisols*, *Regosols*, base saturatuion, national park

State-of-the-art

The Central Balkan National Park is one of the most valuable and the largest protected areas in Europe – second category according to International Union for Conservation of Nature. It has an area of 72021.07 ha and it is the second largest national park in Bulgaria. The Park contains rare and endangered wildlife species and communities, self-regulating ecosystems of biological diversity, as well as historical sites of global cultural and scientific significance.

The soils on the territory of the Central Balkan National Park are insufficiently studied. The analysis of the soil map (fig. 1) of the park Management plan (MP, 2014 – 2023 project, pp. 48; pp.199) shows that *Cambisols* are present in the forest areas (96.9% of the forest territories), while *Umbrisols* are distributed almost entirely in the areas of grasslands and meadows (about 55% of the park area). The *Luvisols* are present on 2.1% of the park territory, the *Cambic Umbrisols* – on 1% of the territory. The portion of *Rendzic Lepthosols* is insignificant (MP, 2001-2010 pp. 21-24; MP, 2014-2023 project, pp. 29-30).

The analysis of the soil subtypes shows that 32.1% of the *Cambisols* are “dark”, 56.6% - “transitional”, and 11.3% are “light” (MP, 2001-2010). The maps, necessary to determine their area and distribution, can be found neither in the park management plans (MP, 2001-2010; MP, 2014-2023), nor in the scientific literature.

An attempt for correlation between the national soil classification of 1980 and the basic classification of 1992 has been made in the project for updated management plan (MP, 2014-2023). It is stated that the *Eutric Cambisols* occupy 32.1% of the total *Cambisols* area, which is practically equal to the area, occupied by the subtype “dark” *Cambisols* of the MP (2001-2010). Since it is not clearly specified, the conclusion that the remaining area, occupied by *Cambisols*, refers to the *Dystric* can be made by default. In practice, the areas

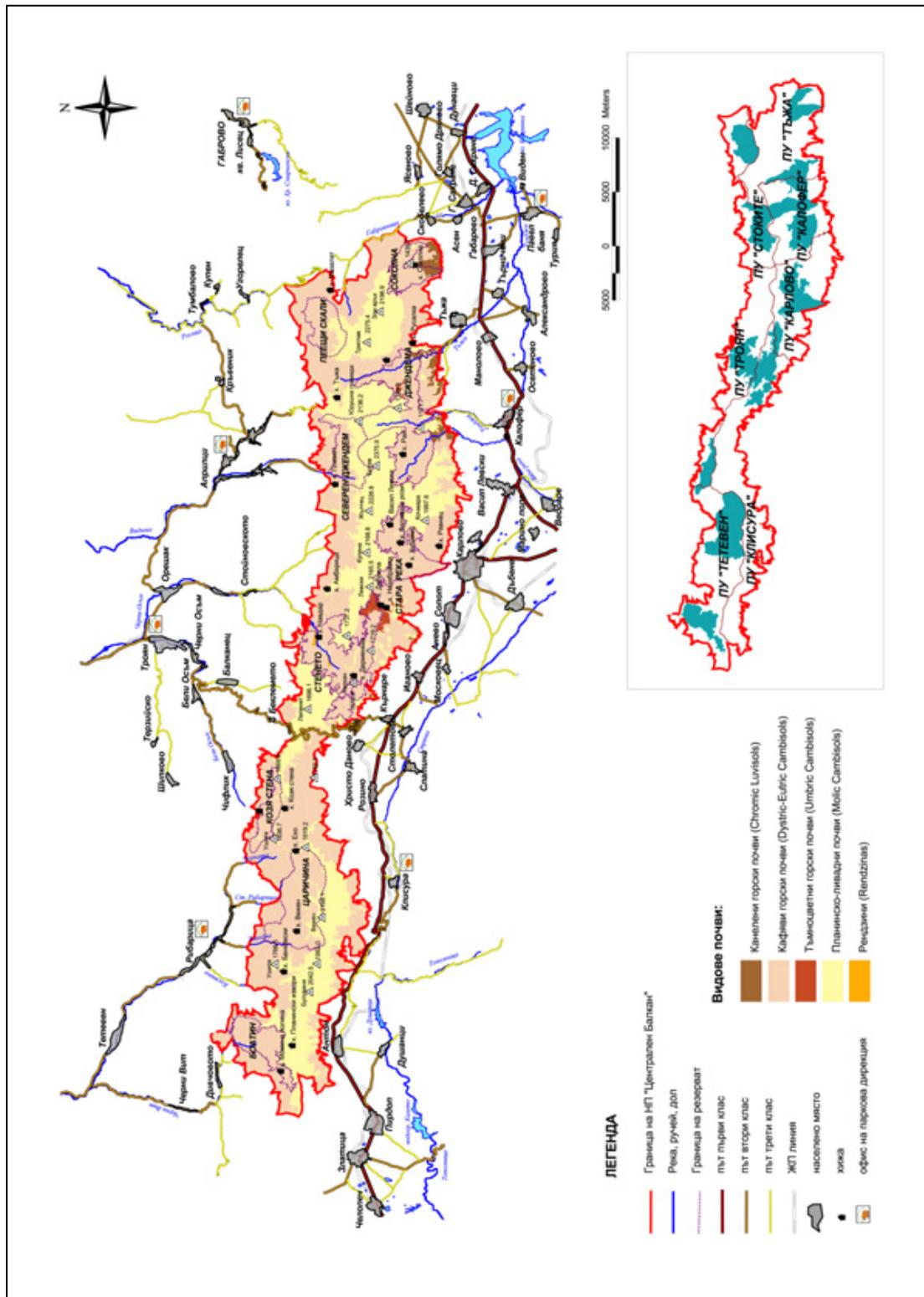


Figure 1. Soil map of „Central Balkan” National park (MP, 2014 – 2023 project)

Table 1. Investigated soil - location, land use, altitude, parent materials, soil group and qualifier

Site №	Latitude and Longitude	Land use	Altitude (m)	Parent materials	Soil group (WRBSR, 2006)	Qualifier (WRBSR, 2006)
1	42°46' 34.9" N 24°21' 42.4" E	forest	1503	gneiss	Cambisols	Dystric
2	42°46' 26.8" N 24°39' 07.3" E	grassland	1445	schist and sandstone	Cambisols	Dystric
3	42°46' 44.9" N 24°37' 50.3" E	forest	1440	schist and sandstone	Cambisols	Dystric
4	42°41' 44.0" N 24°59' 42.0" E	forest	1539	granite	Cambisols	Dystric
5	42°41' 02.4" N 25°06' 57.3" E	forest	1247	schist	Cambisols	Dystric
6	42°46' 52.2" N 24°20' 01.3" E	grassland	1536	granodiorite	Umbrisols	Haplic
7	42°46' 53.3" N 24°36' 14.6" E	grassland	1529	schist	Umbrisols	Haplic
8	42°46' 04.0" N 24°39' 51.0" E	grassland	1635	schist	Umbrisols	Haplic
9	42°42' 36.6" N 24°58' 52.9" E	grassland	1877	weathering materials from granite	Umbrisols	Haplic
10	42°41' 20.0" N 25°06' 50.0" E	grassland	1384	weathering materials from schist	Regosols	Dystric
11	42°44' 04.7" N 24°29' 10.9" E	grassland	1165	weathering materials from granite	Regosols	Eutric
12	42°44' 42.0" N 24°36' 46.0" E	grassland	1270	weathering materials from gneiss	Regosols	Eutric
13	42°44' 46.0" N 24°36' 54.0" E	forest	1272	weathering materials from gneiss	Regosols	Eutric
14	42°40' 51.0" N 24°57' 35.0" E	grassland	1100	limestone	Leptosols	Rendzic

of the “transitional” *Cambisols* (56.6% of the total area) are not included in this description. It should be noted that the correlation with the classification of 1980, as well as with other similar classifications, is specified in the basic soil classification (Penkov et al., 1992), but the term “transitional” is not mentioned for the *Cambisols*, i.e. there is no option for a correlation with other classifications. This classification defines “common” *Cambisols*. The term “transitional” *Cambisols* is absent from the Soil Forest Science textbooks by Georgiev (1959) and Donovan (1979; 1993), as well as from the Soil Science textbooks by Gyurov et al. (1969), Koynov (1980) and Penkov (1996). In “Forest Soil Science” Donovan (1979) made an overview of the *Cambisols* classification, returning back to 1948, when the Russian-Bulgarian expedition was carried out under the leadership of Gerasimov and Antipov-Karataev, but he did not mention the presence of the transitional *Cambisols* subtype. The term “transitional” is used in the Forest management plans, developed for the entire forest area of the country. The determination of the subtypes is carried out by the depth of the surface horizon as follows: “dark” - 25-40 cm, “transitional” - 10-20 (25) cm and “light” – less than 10 cm. This longstanding practice separated the *Cambisols* from the basic soil classification (Penkov et al., 1992) and from the global classifications.

In 2011 (Raikov, et al.) an update of the Instruction for identification and mapping of the forest habitat types, applied in the Forest management plans, was made. The correlation between the national soil classification of 1980 and the basic classification of 1992 was adopted. In this classification the “common” *Cambisols* are defined as *Eutric* and the “light” ones as *Dystric*. No equivalents were determined for the “dark” subtypes. Although this actualisation was a step forward, the thus obtained correlation was too inaccurate. For example, the subtype “light” *Cambisols* are low in humus, eroded and in such cases the influence of the soil-forming materials, which are actually the source of the soil base richness, is enhanced on the surface. The probability that such soils are *Dystric* is small, even for those, developed on granite. Actually, defining a soil qualifier level can be made only on the basis of the information for their base saturation, obtained from laboratory analyses. The compliance between “dark”, “light”, *Eutric* and *Dystric Cambisols* is not possible due to the fact that colour can be used as a diagnostic feature only for humus content but not for base saturation.

The pilot studies carried out in 2015 on the territory of the park and supported also by the data of laboratory analyses show the presence of other soil units (Malinova, 2015, Malinova, 2016) except those, specified in the Management plans. The summarized information of their analysis is given in Table 1. The basic principles of WRBSR (2006) have been applied (“The classification of soils is based on soil properties defined in terms of diagnostic horizons, properties and materials. The selection of diagnostic characteristics takes into account their relationship with soil forming processes”). The classification of WRBSR (2006) has been applied and the qualifiers have been determined, which allow to define two tiers of categorical detail. In forest areas, as well as in the pasture and meadow, regardless of the color of the surface horizon, the presence of *Dystric Cambisols*, *Eutric* and *Dystric Regosols*, *Haplic Umbrisols*, *Rendzic Leptosols*, *Haplic Fluvisols* has been determined. The results show that a detailed study in park territory is required in order to define the soils and update their classification.

The analysis of the available information about the soils on the territory of the Central Balkan National Park has shown the insufficient level of knowledge and use of outdated criteria for soil diagnostics. A detailed study is required in order to define the soils and update their classification. The proper soil definition will contribute to the better planning of the necessary measures and procedures for soil protection for the different types of land use.

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