



# Landscape-botanical Method for Russian Vegetation Zoning

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## Abstract

*Geobotanical zoning is a recognized method for displaying regional features of vegetation cover. It is based on the properties of the vegetation itself. The purpose of the article is to substantiate the expediency of the landscape approach, which is implemented in the landscape-botanical method of zoning. The latter is based on the close connection of regional features of vegetation with landscapes. This method allows us to most fully consider the problem of studying the vegetation cover, both from a geographical and botanical point of view.*

*Keywords: geobotanical zoning, vegetation cover, phytosphere, landscape*

## Introduction

Vegetation cover (phytosphere) is part of the geographic envelope. The variety of physical and geographical conditions determines the heterogeneity of the vegetation cover, which necessitates its zoning.

Landscape and botanical zoning aims to reflect the uniqueness of the vegetation of natural-territorial units of different ranks. This was pointed out by A. A. Korchagin, in his definition of "Botanical Geography" he wrote that this is a science that studies the vegetation cover as one of the components of modern landscapes and landscapes of past geological epochs [1]. Unfortunately, in subsequent years, the concept of "landscape-botanical zoning" began to be used as a synonym for geobotanical. We emphasize that landscape-botanical zoning is a special type of zoning, where physical-geographical units are filled with botanical content. A similar approach was used by Chinese scientists [2, 3].

The landscape-botanical method has a wide applied value, for example, the landscape basis is used for zoning forests [4], swamps [5], pastures [6] and deserts [7]. A. A. Tishkov used it when discussing the theoretical issues of modern biogeography [8, 9].

## The Use of Landscape and Botanical Zoning of Russia for Educational Purposes

The method of landscape-botanical zoning was implemented when writing the textbook "Vegetation cover of Russia" [10]. The higher taxa of landscape-ecological zoning developed by A.G. Isachenko [11, 12] were used as a framework. Such signs as climatic, geomorphological, originality of cover deposits are decisive in the formation of phytocenotic and floristic features of the regions.

Let us present, based on the sections of the landscape-ecological map, the system of units of landscape-botanical zoning of Russia, used in the textbook when describing the vegetation cover of Russia [10].

Latitudinal zonation results from northwards/southwards changes in geothermal conditions. Russia's territory incorporates four belts/sectors and five zones. The Arctic belt encompasses the zone of High Arctic tundra (polar deserts). The Subarctic belt includes the zone of tundra with the following subzones: Arctic tundra (moss and lichen), typical tundra (shrubs, moss and lichen), southern tundra (shrubs) and forest tundra. The Middle belt comprises the following zones: boreal (taiga) forests, nemoral broad-leaved forests and steppe. The zone of boreal (taiga) forests breaks down into the four subzones: northern, middle, and southern taiga as well as sub-boreal forests (coniferous and broad-leaved forests). The zone of nemoral broad-leaved forests includes the subzones of broad-leaved forests and forest steppe. The zone of steppe has the following subzones: northern steppe (forb and cereal communities), middle steppe (caespitose and cereal community), and southern desert steppe (subshrubs plus forb and cereal communities). Russia' subtropical zone comprises two subzones: Mediterranean subtropics and humid subtropics.

Natural zones whose boundaries coincide with physiographic areas result from the oceanward/continental changes in hydrometric conditions (the westerlies, areas of high atmospheric pressure in Middle Siberia and monsoon circulation in the Far East). Among them are such sectors as Coastal Atlantic (the Baltic Shield), East European (the East European Plain), West Siberian (the West Siberian Plain), Mid Siberian (the Central Siberian Plateau) and Coastal Pacific (the Far East).

The relief and vegetation patterns of the Eurasian plain provide evidence for the need to identify botanical and geographical areas within the sectoral boundaries. Every such area is a section within a sectoral zone. The map has no special indication of sections to avoid cluttering.

The Coastal Atlantic sector comprises the section of Karelian boreal taiga.

The tundra zone of the East European sector has the following sections: the Barents Sea section in the High Arctic tundra; the Kola and the East European sections in arctic, typical, southern, and forest tundra; the East European section in the boreal taiga zone and its related subzones (northern, middle, and southern taiga as well as sub-boreal forests); the East European section in the zone of nemoral broad-leaved forests; the East European (Don and Volga areas) and the Trans-Volga and Ural sections in the

steppe zone with the related subzones of northern and middle steppe; the Caspian section in the subzone of southern desert steppe; Southern Coast of Crimea and the Black Sea Coast of the Caucasus in the subtropical zone.

The West Siberian sector incorporates the following sections: the Siberian section in the subzone of High Arctic tundra; the Yamal-Gydan section in the subzones of arctic, typical, southern and forest tundra; the West Siberian subsection within the northern, middle and southern taiga subzones of the boreal taiga zone; the West Siberian small-leaved section in the nemoral forests zone; the West Siberian section in the northern and middle steppe subsection as part of the steppe zone.

Let us focus on the sections comprising the Middle Siberian sector. Among them are Taimyr and Lena-Kolyma section in the arctic, typical, southern and forest tundra subzones within the tundra zone; the Middle Siberia section in the northern, middle and southern light coniferous taiga subzones within the boreal taiga zone; the Dauria-Mongol section in the northern and middle steppe subzone of the steppe zone.

The Coastal Pacific (Far Eastern) sector comprises the Chukotka and the North Pacific coastal sections in the arctic, typical, southern and forest tundra subzones of the tundra zone. It also includes the Sakhalin section in the northern, middle, southern taiga and subtaiga subzones within the boundaries of the boreal taiga zone and the Primorsky section in the subzone of coniferous and broad-leaved forests.

Vegetation patterns in mountain ranges are governed by the combination of latitudinal and altitudinal conditions. Here, botanical and geographical sections coincide with the boundaries of ranges. Major mountain ranges are the Urals, the Caucasus Mountains, the Altai and the Sayan Mountains, the East Transbaikal, the Northeast Siberian, and the Kamchatka ranges.

### **Results and Discussions**

The textbook *Vegetation Cover of Russia* provides a detailed description of vegetation patterns typical for landscape and botanical areas discussed above [10].

### **Conclusion**

1. Geobotanical/landscape and botanical zoning are different from other approaches to zoning. Geobotanical zoning focuses on vegetation properties per se, while botanical and geographical zoning is based on the correlation between regional vegetation patterns and local landscapes.
2. Geobotanical as well as landscape and botanical approaches to zoning are useful for educational purposes. The former may be taught at university departments related to biology, the latter at the departments of geography.
3. The textbook *Vegetation Cover of Russia* incorporates the landscape and botanical zoning approach discussed in the present paper. The framework of botanical and geographical zoning is based on the highest taxonomic ranks identified by A. G. Isachenko as an outcome of landscape and ecological zoning.

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