

FEATURES OF LANDSCAPES GEOJEKOSISTEMA KLINSKO-DMITROVSKAYA RIDGE WITHIN MOSCOW REGION



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T.S. Lukianova,
V.A. Shirokova,
A.O. Khutorova,
V.V. Vershinin

The article is devoted to the history of landscapes Klinsko-Dmitrovskaya Ridge and transform it into the present. Considered a brief change of topography and the transformation of natural vegetation on it. Provides an overall picture of the landscape changes under the influence of human.

Keywords: *history of landscapes, Klinsko-Dmitrovskaya Ridge, transformation of natural vegetation, the influence of human.*

Explored in this article is geojekosistema Klinso-Dmitrovskaya ridge as one of the most important objects from the perspective of nature under the influence of human activity. However, in order to introduce the changes that have taken place over several decades, it is important to understand the history of its formation to try to analyze the current status and its future possibilities [18].

As stated in "The rules for the care of forests" to obtain information about the object to measure its dimensions in time in comparison with other similar objects [15]. It is important to understand an evaluation of modern landscape of geojekosistema ridge and its history.

Klinsko-Dmitrovskaya ridge is a part of Moscow hills, located in the North side of Moscow and South of Yaroslavl region. In the North it is bordered by Verkhnevolzhsk lowlands (H =120-150 m), and on the East side by side with Vladimir opolje (An elevated, treeless, well-drained rolling plain in the middle belt of East European Plain). Its western border is the origins of the river Istra. Ridge length 225 km, width-40 km, the greatest height-285 m (village Remmash, Sergiyevo-Posadsky district). Dominates the hilly-morainic topography, between the hills are hollow, which swamped. Part of the hollows is occupied by lakes and artificial reservoirs. At the foot of the Ridge can be found the ancient valley of the river flow. Numerous lakes are traced, gradually, small water-logging rivulets, and streams of ox-bow [1,3,4,5]. One of the most important forms of Klinsko-Dmitrovskaya ridge is the Smolensk-Moscow upland.

The Smolensk-Moscow upland lies on the South-West border of the Moscow region to the North-East and occupies a large area ridge. Asymmetric ridge to the South it enters the convex-concave Moskvoretsko-Oka groups plain. Overall, ridge has a variety of landforms [1].

The terrain Klinsko-Dmitroovskoj ridge is a sustained stretch of Earth's crust, formed one and a half billion years. Klinsko-Dmitrovskaya ridge is located on the East European platform within the Moscow basin.

Earth's crust has been subjected to slow, raising and lowering, during that era succeeded each other, resulting in a huge column formed sedimentation breeds, primarily of limestone, which is currently used for different structures.

The territory has been subjected to at least three times the formation. The most recent ended 10-12 thousands of years ago. Glacial material has been delayed in the column in the form of moraine sediments, thus formed moraine hills and ridge. When melting glaciers occurring water streams sought to take a downgrade, where sand deposits were formed and numerous lakes and rivers network [17].

In the following era happened water logging, formed outwash plain relief, sediment accumulation went parallel to the material in the form of the moraine hills. To the South with her neighbors the Devon axis, which goes north to Elecko-Tula elevation, in the North-East is Kljazmo-Cninskij shaft to which West joins Vladimir-Shilovo-Shatsky deflection. To the North-East through Klin the axis of the Moscow Upper Palaeozoic Wedge hollow is going on. Leaving

the main directions of incidence in the territory take place near North-Eastern azimuth. Slopes mostly small seams up to 2 m/km. Sometimes due to secondary depressions, the slope increases to 5-6 m [19].

Complicated structure of availability in the West Vladimir-Shilovo-Shatsk deflection and Kljazmo- Cninskogo shaft in North-East are that in the band trough formed a second almost Meridian axis almost branching from the main axis of the Moscow basin to the South. There were a number of shallow bends North-West or the latitudinal stretch. The average drop of carbon layers up to 2 m/km. The overall fall in a North-Easterly direction violated local five reverse excesses. Ancient terrain is coal bed suites.

Positive Foundation structure is in the Eastern part of the Volga-Ural antecline, South-Voronezh antecline, in Western- Belarus, in the Northern-Baltic shield. The Foundation of the platform is divided into blocks tectonic faults, lowered or raised concerning the foundation of the Russian platform. In the western part of the Ridge lies the extensive Gzhatskaja depression. South-East and East pass narrow hollows: Podmoskovnaya and Pachemskaja. Breed rain cover located on the Precambrian basement surface in four floors, in between the layers pass corresponding era of continental regime in Moscow sineklize, and layers-this era marine transgressions: Devon, to the Ordovician, to Jurassic and Cretaceous system after [1].

Such a structure is expressed in gidro-network and relief. Accumulated in the situation of marine transgressions thick sediments, which neutralized the surface roughness. In General, the territory from the late Proterozoic tectonic shifts are not experienced significant tectonic movement occurred epeirogenetic fluctuations that are not considered to be significant variations in amplitude [1].

Landscapes are characterized by steep ridges of the Northern slopes (80 m) dismembered river valleys. Here the relief is weakly wavy with gentle elevations. Developed estimation-rail network. Interfluvial height are equal from 200 to 270 m. There are two horizon moraine loams that are separated by glaciofluvial sands. Blanket loam covering developed Jurassic clay. In the North-East stand out sandy and sandy-argillaceous rocks of Cretaceous age. Apparent landslide and karst processes. The Ridge includes bedrock with sandy-clayey sediments of the Jurassic and Cretaceous periods on the West of the town of Klin, deposits are covered with glacial sediment thickness, as shown on the hilly-ridge relief of moraine and Southern slopes are much more gentle on the compared with the North. The least explored the glacial deposits of the lower

Quaternary, the complexity of their study was to build diversity lower Quaternary sediments and their power [1].

On materials of complex lithologic-paleo-geographical zoning the Moscow region geojekosistema ridge is divided into 4 regions: central part of the glacial hills, North slope the bottom of the glacial Ridge, North Slope the bottom of the glacial ridge, the Western part of glacial-accumulative upland, South-Eastern slope of glacial-erosion ridges. It must be borne in mind that the specificity and power of occurrences of deposits depend on pre-glacial underlying morphological structures [19].

The radial structure of middle-Pleistocene glacial layers predetermines the peculiarities of modern relief, as well as its material composition and structure of deposits. However, prejudging is the demolition of the glaciers from Fennoscandia in a South-Easterly direction. The central part of the ridge belongs to the highest parts of more than 250 m, to this territory are erosive outliers to Quaternary surface with absolute marks over 200 m.

In the North its honor and developed pronounced terminal moraine, hill-moraine relief. The surface moraine-erozion in the West below, the highest marks are confined to the watershed of the rivers Sister, Lutosni and Klyazma. There is conformity to the Quaternary and modern relief. Sediments are presented in the form of moraines, arbitrarily split on uneven ground [1,3,6,19]. Slope to the South-East upland differs the most simple structure of moraine deposits. Power its deposits of moraine is several meters [19].

To the North-East from the town of Sergiev-Posad (20 km), there are significant Pleistocene deposits of the area (up to 70m). Three moraine aquifers are laminating with sandy-clayey interglacial sediments. (During Lihvinskaya interglacial happened spread broadleaf forests, with the participation of the deciduous forests in species composition with the presence of relict elements). Average moraine refers to the formation of the Dneprovsky glacier. It contains fragments of varying size and composition. Among the pebbles is dominated by magmatic rocks from stavrolitom, distenom, sulfides. In the sand moraine is dominated by minerals, transit and remote provinces, such as hornblende, which is a mineral of Fennoscandia (25-30%). In contrast to the medial moraine complex clay minerals the upper moraine contains gidromica (60%), montmorilonit, mixed-layer formation: kaolinite with impurities. That is, the upper of moraine which upper and local components is similar to Muscovite (lower is similar to Dnieper) [2,7,8,9,10,11,13,14,15].

Climatically, due to its location, the territory obtains total radiation of the order of 90 kkal/cm^2 . Of these, 40% of the scattered radiation. At the Earth's surface flux of solar radiation is 87 kkal/cm^2 per year. Within a year the sun shines 1568 hours. The length of daylight hours in summer equals 15-17 hours. The total value of temperatures for the vegetative period (more than 10°) is 2050°C .

Percentage of clear days amounts to 17%, while completely cloudy - 32%. Most often, clear days stand in April, and overcast in November. The climate of the ridge is formed under the influence of long-range air masses South-Western and Western cyclone, due to the stem of Arctic air, free of penetrating from the North to the East-European plain.

Ridge area refers to the zone is temperate-continental, different warm summers and relatively cold winters. And continental is enhanced with the West on the East ridge. Climate causes the arrival of frosty and snowy winters, humid and relatively warm summers with well-marked seasons. In winter, the biggest sustainability is observed due to cyclones North-Westerly direction. The coldest month is January. The average monthly temperature ranges from -10° to -11° [12].

Anticyclone weather conditions affect the temperature. Due to frequent cold anticyclones of the Arctic, which sometimes lead to cooling to -35° . Sets the frosty, windless and sunny weather. If anticyclone occupies the entire territory of the East European plain, frost may persist long enough. But more often, especially in the last decade, over a ridge dominated the Western and South-Western cyclones which bring a thaw and snowfalls. During the spring season, the weather becomes extremely unstable. The winds change direction, however the Northern winds can bring a sharp cooling in the North.

During the summer season, from mid-June to mid-August (60-70 days) the average temperature does not fall below $+15^\circ$. The frequency of occurrence of cyclones at this time of the southern (16-25%) and Western areas (approximately 15%). Repeatability of cyclones from the West and South - West, formed under the influence of the Azores maximum is 22%. In the summertime on the territory sometimes anticyclone, coming from the North, and almost no winds Eastern and North-Eastern areas [12].

The warmest month, July, has an average temperature of $+18^\circ$, and the highest temperature can reach up to $+30^\circ$. and above. Long-term observations on temperature observed at ridge was equal to $+36^\circ$. Winds predominantly Western, the air comes from the Atlantic, quickly heated, saturated with additional moisture by evaporation from the ground and at the expense of the

plants. Ridge refers to the area of sufficient moistening. Rainfall is associated mainly with the cyclones. Precipitation in the summer-autumn period falls more than in other seasons of the year and accounted for the month 80-90 mm [12].

Frequent phenomenon of the showers and thunderstorms that occur due to warming up the Earth's surface and rapid recovery of air masses (convection air) [12]. For the year, but not enough rain falls to approximately 550-650 mm per year, sometimes rates vary from 270 to 900 mm per year. These kinds of oscillations depend on the effect of different air masses, which penetrate into the territory of the ridge. Exceptions include dry years or when on the contrary more than evaporates.

It is noted that the distribution of rainfall is directly connected with a relief, because at higher elevations usually rain falls more on the Northern slopes of the ridges more than Southern. Maximum of them in July, at least in February-April. Most moistened the Western and Northern slopes, minimum South and East. The year is observed in approximately 171 day with precipitation, of which 1/3 falls as snow, and 2/3-in the form of rain. Snow cover appear in November, sometimes at the end of September, and sometimes in December. Permanent snow cover is installed at the end of November, its height is between 25 to 50 cm. Overall height of snow cover is formed on the East ridge, the lowest in the West. Frozen soil to a depth of 65 cm in the West and up to 75 cm in the East. During periods of drier winters freezing were observed to frosty 150 cm. Snow disappears in the middle of April (sometimes at the end of March), and the soil thaws completely only in late April [12].

The ridge is the watershed of the rivers Oka and the top of the Volga River. River valleys are clearly expressed. The upland rivers Klyazma, Dubna, Volgusha, Yakhroma and others. There are lakes of glacial-moraine origin (Trostenskoe, Senezh and others).

In the water against widespread perched water and located at different depths of the origin of Morin and sand lenses [4]. Through the study region channel of Moscow passes there. On the southern slope of the ridge are Moscow, Ucha, Pestovskoe, Pjalovskoe, Ikshinskoe and Himkinskoe reservoirs. In the West the Ridge formed by the Istrinskoe reservoir, and on the East-Zagorsky reservoir [4].

A major watercourse runs from the South-East to the North-West River Yakhroma. River falls-a right tributary of the Moscow river. The main tributaries to the river-left Yachroma (Volgusha, Djatlinka and Kamariha). Rivers have low gradients channels (a few centimeters per

kilometer of length). The Valley of them have broad, asymmetrical shores, usually the right bank is steep, and the left-flat [4,5,17].

Feeding the rivers mainly snow, the largest stock in the spring. In summer and winter mean such rivers are powered almost entirely underground. The Northern part of the region is irrigated by the tributaries of the river Volga (Shosha, Lama, Dubna, sister, Yakhroma river), and the southern part-tributaries of the Oka (Loposnja, and Nara). The Oka river basin include tributaries of the Moscow river that flows within the Moscow region [4,5]. Eastern and North-Eastern parts of the irrigated tributaries Kljazmy, which is one of the main tributaries of the Oka river.

The river floods over the calm, different accounts for April-May. In autumn-winter and spring river covered with ice since the end of November and ending in mid-April. To navigable rivers include the Volga, Oka and Moscow. Lakes throughout the shallow. Here there is hilly-morainic topography, all lakes are of glacial origin [4,5,17].

Soil ridge are related generally to the sod-podzol loamy with varying degrees of erosion. Among the different degrees of podsolization soil, more prevalent medium podzol soils soil, which is usually located on the upper slopes and watersheds, as well as strongly ashed, which are located in the lower parts of the slopes and microscopic downgrade. Characteristic of the Earth with high rates of humidity and swampy (25-50% of the area under consideration). High susceptibility to soil erosion (10-25%). Podzol soils are dominated by Taiga forests, under whitish upper layers on agronomic characteristics-poor, acidic, low in nutrients. Such soil are on the North ridge [2].

Sod-podzol soils are found in the zone of mixed forests. Fertile little soils require fertilizers. In comparison with podzol soils they are less acidic and contain more humus. At higher elevations distributed loamy and clayey soils with high degree of podzolization and within lowlands distributed sod-podzol loamy, and rare marsh [7].

In the valleys of large rivers, such as the Oka River and Klyazma, note strips of alluvial soils. On the northern slopes of the Ridge soils are usually plowed. Because they exceed the medium annual precipitation over evaporation, annually from arable soils, rainfall and melt water washed out micronutrients and nutrient salts (approximately 6 kg with 0.1 hectares). Soils have a deficiency of zinc, cobalt, molybdenum, sulfur, copper, manganese, boron. The deficit increases with decrease of the amount of clay in the soil. Poorer sandy and loamy soils in total, as well as easy to medium loamy [9].

Authors identified the following development phases of vegetation: the transitional phase-transition from glacier to Moscow Mikulinskya interglacial - spruce and sparse birch forests with preserved steppe and tundra species; phase beginning interglacial mikulinskya - birch and pine forests; phase beginning of mixed forests of broad-leaved species of elm and oak; phase of the climatic optimum of an interglacial with broadleaf forests with hazel in the undergrowth. The last phase is divided into subphase: elm and oak forest oligodominance:-polidominance forests with a predominance of hornbeam Linden; subphase end of the interglacial-spruce and pine-birch forests with deciduous rare breeds. The characteristic features of the Mikulinskaya fossil flora include the preponderance of elements of the European, Euro-Asian Holarktic geographic groups. East Asia group is one kind - *Osmunda cinnamomea* [9].

To the North and partly to the West Ridge is dominated by coniferous and Broadleaf transition. South-Taiga has coniferous forests, mainly of spruce. Amongst indigenous South-Taiga forests meet clean spruce and pine forests. Among them Woody substratum only one rare, undergrowth rare. Ground tier is dominated by herbaceous plants and little undershrub.

The central part is characterized by the proliferation of coniferous-deciduous forests. Forests have a more complex multi-tier structure, in comparison with the South-Taiga forests. The basic rocks form the pine ordinary, common spruce, common oak, Norway Maple (*Acer Platanoides*), lime-tree small-leaved, *Ulmus Laevis*, *Ulmus Glabra*. In indigenous forests are present Birch warty, Birch Fluffy, Grey Alder (*Alnus Incana*), Aspen, more raw ground- Bird Cherry, Black Alder, *Salix Caprea* [10].

In the underbrush grows *Rhamnus*, Hazel, *Euonymus Verrucosus* and European, *Viburnum*, Honeysuckle, Rowan, *Mezereum*, Black currant. The following grow herbaceous plants: grow in coniferous woods-*Maianthemum*, *Oxalis*, *Pyrola*. In deciduous forests grow *Aegopodium*, *Zelenchuk*, *asarum*, *Carex pilosa*, Crow Eye [2,8,9,10].

Within the ridge lies the forest fund Sergievo-Posad and Dmitrievsky. This area is allocated to the area of spruce and deciduous forests. The main breed is basically spruce. Forest ridge area occupies 46% of the forest covered the territory of Moscow region [11,13,14].

Wood stands dominated by distribution complex, largely green mossy swamp forest types. The dominant indigenous spruce types: wood sorrel spruce forest (*Oxalis*) spruce forest with *Hylocamium Dicranum*, *Rhytidiadelphus*). They offer a rich understory, living ground cover. Often there are oak, spruce, spruce cabins, with a very developed understory Hazel, *Euonymus Verrucosus*. They are among the most productive types of forests with the potential of use of

forest resources. Their characteristics include what after clear felling dynamic processes forming types of cuttings and the initial stages of forest types occur with vigorous obliteration herbaceous vegetation and secondary deciduous species (Aspen Birch, Alder) of vegetative origin. In such types of forest natural regeneration is complicated and is deficient in quality and quantity (usually 0.5-1.0 thousand pieces per hectare).

The most widespread coniferous-deciduous forests are preserved on the slopes of the ridge. The number of indigenous species is declining, widespread acquire another flora, for example, American Maple, Heracleum Sosnowskyi, Giant Goldenrod, Impatiens Glandulifera. Are listed in the Red Book of some types of primary plants (like a Lady's Slipper, Water Chestnut and other [13].

A tentative resumption ate under the canopy of mature and overmature is available in sufficient quantities for natural renewal only on 10% of the territories. Currently, forest fond ridge is represented mainly man-made forests. Almost no preserved natural landscapes, with the exception of difficult accessible and awkward areas with steep slopes and boggy [7]. Referring to the history of the 19th century in the Moscow region total intensively had been destroyed the forests for firewood and lignine. Even then there was a change of hardwood and the fine-leaved softwood (Aspen and Birch). Relative surface area decreased from 48% (17century) of up to 26% in the 20 century. In forested areas were carried out clear cuts.

Only from 1936 year onwards after the establishment of the Glavlesohrany, as well as the allocation of water protection zones of decreased clear cutting, then happened some improvement in forest management. In 1968 year by order of the Council of Ministers of the USSR, forests were transferred to the one group that has the main environmental value. Of the total amount of the territory, about 50% of forests were assigned to different categories of protection, where it is prohibited to use forests. However, currently the forests are dominated by a ridge rocks (fine-leaved to 50%) and coniferous (48%), 50% of the forests around classified in different categories of protection, where it is prohibited to use forests [11,16].

Prevail were mature and over mature (45%) plantings make up about 27%, young growth stands make -13% [12]. As pointed out by several authors [7] there are ageing of forests. Furthermore, over the past decade, the forest covered territory ridge at four Times Square increased over aged and mature forests. Negative situation develops in Aspen stands, where over aged and ripe forests around 82%. Aging forests associated with low intensity managed forests. Wood gains low about 2.7 m³/ha per year, the intensity of use of less than 0.8 m³/ha per year

annually to cut 30% of the total provided for management, actually mildly-hardwood -15% [14,16].

Actively runs extensive activity management. Aging protective forests is a negative development because over mature and ripe plantings do not fulfill its target value, they formed a fungal disease, they get plagued with. Since 1994 the forests allowed logging updated OIA and rearrangement. Since the year 2000, according to the Rosgiproles, forest management has determined the amount of thinning of about 216.3 thousand m³ of liquid pulp per year.

Logging technology of felling are allowed with a uniform, politician, group cutting down stand [7]. This is done in order to create favorable conditions for the development of a new generation of highly productive forests. But in modern conditions such cuttings are hardly justify them self, so as not to apply because there is no demand for low-quality low-grade wood (9). The negative impact of forests ridge caused the cottage construction and unprofitable leads land for the same purpose [18].

Going negative anthropogenic impact on the forests due to illegal felling, because of cluttering up the forest waste, landfills, destruction of rare representatives of the animal world, the depletion of species diversity of plants communities, pollution of nearby rivers, reservoirs, lowering of groundwater levels. Significant harm caused unreasonable drainage territories ridge. Agricultural drainage used before 1917 year. However, it was in Soviet times land reclamation has acquired enormous scale. Next the researchers determined that, after several years of use of such lands, filtration ability increases several times. It leads to increased runoff and groundwater level. In addition, the draining of peat lands affects the surrounding territory.

Over the past two decades, droughts have caused desiccation stands from the bark beetle. Relatively warm when winter and allow most beetles overwinter successfully in spring they come and start looking for new locations for breeding. Bark beetle inhabits extremely weakened spruce forests. Often introduced and propagated in a fresh, therefore, fallen tree ground dump.

Real disaster was the invasion of bark beetles. The bark beetle or spruce bark beetle belongs to the particularly dangerous pests in the forest. Spring gathering of beetles in Midland begins at the end of the April bark beetles prefers ate medium-and large-diameter trunk, inhabits the area of colon and economies in the crust, sometimes comes on a thin crust Effective methods of the struggle with bark beetle does not exist.

Selective or clear sanitary cuttings in forests, populated by bark beetles, it should be borne in mind that left free-standing trees spruce will inevitably struck by bark beetle after felling,

exactly the same as the old one and spruce forests, adjacent to breeding for domesticity. If the number of bark beetle outbreak is in development, sanitary cuttings in the places of mass reproduction of bark beetle must be continuous and seize adjacent to homes drying strips of old spruce forest width of up to several tens of meters [16].

World of animals preserved only in some areas. You can meet a Hare, Wolf, Fox, deer, noble common elk, chamois, wild boar Europe. The forests still living deer, borsuk, beaver. Ornithofauna now has 170 species. From them there are woodpeckers, Ruffed grouse, bullfinch, thrush, nightingales, crak, grey herons, white Storks, ducks (Mallard), gulls, and inhabited ogari. Many can be attributed to crows, sparrows, Magpies, pigeons. There are fish in water: Ruff, carp, bream, Roach, Chinese sleeper, perch, burbot, perch, pike. Inhabits 6 reptile species, 11 amphibian species, numerous species of insects.

To preserve the diversity of flora and fauna formed PA system "Zavidovo State complex" with the status of a National Park, monument of Federal significance "Lake of Kyiv", regional nature reserves and nature monuments. Such plots, which have the status of protection, must be combined with natural territories, with fields, meadows with restrictions on economic activity [16].

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About the authors:

Lukianova Tatyana S. doctor of geographical sciences, professor, professor at the department of soil science, ecology and natural resources, State University of Land Use Planning, Moscow, torf_2011@mail.ru

Shirokova Vera A. doctor of geographical sciences, professor, head of the department of the history of Earth sciences of the S.I. Vavilov institute for the history of science and technology of the Russian academy of sciences, professor at the department of soil science, ecology and natural resources, State University of Land Use Planning, Moscow, ORCID: <http://orcid.org/0000-0003-0839-1416>, shirokova@gmail.com

Khutorova Alla O. candidate of geographical sciences, associate professor, deputy head of at the department of soil science, ecology and natural resources, scientific secretary of the dissertation council D 220.025.03 “Earth sciences”, State University of Land Use Planning, Moscow, Moscow, ORCID: <http://orcid.org/0000-0002-9389-2444>, hutorova_alla@mail.ru

Vershinin Valentin V., doctor of Economics, professor, head of the department of soil science, ecology and nature management, State University of Land Use Planning, Moscow, v.vershinin.v@mail.ru

¹ State University of Land Use Planning, Moscow, Russia

² S.I. Vavilov institute for the history of science and technology of the Russian academy of sciences, Moscow, Russia