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**ДЕГРАДАЦИЯ НАПОЧВЕННОГО ПОКРОВА ПОД ВЛИЯНИЕМ
РЕКРЕАЦИИ НА ТЕРРИТОРИЯХ ПРИРОДООХРАННЫХ ЗОН****Малыш Надежда Александровна**

Магистрант кафедры «Почвоведения и экологии почв»

г. Санкт-Петербург, Санкт-Петербургский государственный университет

malysh.n.a@mail.ru

Трунова Елена Олеговна

Эксперт-товаровед

г. Санкт-Петербург, Schmidt & Olofson, Marine

Simonilus@yandex.ru

Аннотация

Данная статья повествует о проблемах деградации напочвенного покрова прибрежных природоохранных зон. Рассмотрены возникшие проблемы и предложены пути их решения с опорой на знания о специфике мест.

Ключевые слова: рекреация, природоохранная зона, почва, органические вещества, водный баланс, лесные пожары.

**DEGRADATION OF THE GROUND COVER UNDER THE INFLUENCE OF
RECREATION IN THE TERRITORIES OF CONSERVATION AREAS****Nadezhda A. Malysh**

Master's student of the Department of Soil Science & Soil Ecology Saint Petersburg, St. Petersburg State University

malysh.n.a@mail.ru

Elena O. Trunova

Commodities expert Saint Petersburg, Schmidt & Olofson, Marine Simonilus@yandex.ru

ABSTRACT

This article tells about the problems of degradation of the ground cover of coastal conservation areas. The problems that have arisen are considered and ways to solve them are proposed based on knowledge about the specifics of places.

Keywords: recreation, conservation area, soil, organic matter, water balance, forest fires.

The issues of soil degradation under the influence of active recreation have become relevant recently. The living ground cover is important for the life of the forest community, in particular for the phytocenoses of the boreal zone in the European part of Russia (Akatusheva, 2013). It is in the ground cover and the upper soil horizon that all active biological processes occur. Forest cenoses formed with coniferous plants confined to dry quartz sands have a rather vulnerable position and can be degraded quite strongly under the influence of recreation. This is due to the fact that the accumulation of organic matter in pine forests and spruce forests in a temperate climate will not be as fast as in the zones of the middle and southern taiga. This is primarily due to the fact that coniferous litter has resins, tannins and lignin in its composition (Beznosikov, 2017). Such compounds are capable of decomposing the fungal community. Consequently, the soil acquires a fulvic acid character. So we can conclude: quartz-depleted soil-forming rocks with fulvic acid character are not suitable for bacteria (Fedorchuk et al., 2005). Such a combination of soil-forming factors as the predominance of the fungal community, coniferous litter, loessage in rocks of light granulometric composition, acidic environment, washing water regime and the predominance in the chemical composition of hard-to-decompose quartz, as well as iron and aluminum does not contribute to the rapid accumulation of soil organic matter. In the works of O. G. Chertov (1981), using the example of Karelian soils, it was noted that the smaller the accumulation of soil organic matter, the less stable the ecological community turns out. Emphasis was placed on the problem of recreation, since trampling and compaction of the ground cover can cause irreversible consequences. In addition, the abnormal heat in the Leningrad region in 2021-2022 only contributes to the fact that people from nearby settlements tend to relax on the territory of lakes in dry pine forests under the shade of trees and the coolness of key waters (Chomaeva, 2020). Therefore, research in the field of the influence of uncontrolled recreational load can have great importance for the development of such a direction as the stability of the environment in natural landscapes, taking into account the effects of recreation (Dobrovolskij, 1990).

Object of research: communities of dry pine forests on the territory of "Druzhinny" Lake in the reserve "Lake Shchuchye" (Zelenogorsk, "Kurortny" district of Saint-Petersburg, Russia).

Research objectives:

1. Geobotanical description of the mesorelief of the studied territory;
2. Visual analysis of the assessment of recreational regression of ground cover and vegetation;
3. Based on the data obtained, a proposal for a solution to the problem will be given.

Research methods:

1. Review of the literature used;
2. Visual analysis of the study area.

The territory of the "Druzhinny" Lake is located within the city forest of the protected area "Lake Shchuchye" (60.228956, 29.758670), 80 meters from the stop "763 km". The attractiveness of this place is based on the proximity of urban settlements (by bus about 7 minutes from railway station of Zelenogorsk) and of the highway. On the other hand, the very steep slope of the inter-chamber basin (depth up to 11 m) in which the lake is located reduces the attractiveness for some categories of the population (disabled people, children, seniors).

The landscape originates from the Holocene epoch (about 10 thousand years ago), forming sandy kams after the melting of the glacier, forming hollows ("Shchuchye" and "Druzhinnoye" lakes are the deepest). After the melting of the glacier, significant territories of sand, moraine ridges, gravel, clay and earth were opened. Pioneer species such as pines and birches began to

settle on poor quartz sands, thereby forming a forest community. About 5 thousand years ago, spruce trees began to appear (Saksa, 2010).

However, it is worth noting that at present there are pronounced signs of succession in the pine forest: the appearance of a spruce forest in a pine forest suggests that the soil was able to accumulate enough organic matter for the vital activity of a more demanding species (Komarova, 2011).

The geobotanical description shows that the nature of vegetation will differ depending on the element of relief and proximity to the reservoir. Right on the shore of the lake and around it, such species as birch, black alder and rowan are observed. A few meters from the shore, there is a sharp change of woody vegetation - pine and growing spruce. This is due to the fact that broad-leaved species are more demanding of water access than pine and spruce. Lingonberry by its nature is not a deciduous species and overwinters with leaves, while blueberry bushes shed their leaves every autumn and gives an increase of new twigs in spring. The relief in this case affects the distribution of nutrients, namely, that there is a drain from the top at a fairly strong angle of more than 30°, therefore, blueberries receive more nutrients than cranberries. (Nadporozhskaya et al., 2018). There are also typical forest vegetation: lilies of the valley, ferns, in open areas forest bluegrass and endangered species - lake hemisphere (indicator of the purity of the reservoir) (Netrusov, 2009). Heather - indicators of grass-roots fires are found throughout the territory.

Visual analysis of the recreational area showed that some areas are in the last stages of recreational digression (stage 4 and 5), where there is no ground cover, tree roots and general destruction of the ground cover are visible. The control area shows an abundance of blueberry bushes, forest cereals and lilies of the valley. The absence of ground cover and the exposure of the mineral horizon suggests that the biological activity of these sites is minimized (Gerasimova et al., 2019). The roots of trees experience a tremendous load: trampling has a physical damage to the root system (Zakamsky, Musin, 2013). Since all biological activity not only of the microbiota, but also of the root system takes place in the organic horizon, its destruction will have a detrimental effect on the forest in the future (Gendler, 2015). Thin root hairs in such conditions cannot perform their natural functions, moreover, the entire suction zone of the tree root is on the surface, since the underlying soil horizons are too poor in nutrients and there is a fairly powerful elluvial horizon (Chertov, 1981; Rozanov, 2004; Mirchink, Stepanova, 1982).

In addition, there is a re-compaction of the forest floor. Due to the compaction, violations of the water-air regime occur, which adversely affects the transformation of the soil organic matter. As it was mentioned earlier, the transformation of coniferous litter occurs by basidiomycetes in aerobic conditions (Gabov, 2010). Due to the appearance of the soil crust and trampling of the forest floor, natural processes in the organic horizon do not take place, as a result of which the death of the ground cover is noticeable. The change in the water regime is that the disturbed porosity of the soil prevents the water exchange of moisture from the atmospheric air. The absence of an organic horizon prevents the preservation of moisture and it evaporates from the surface of the mineral horizon. Thus, trampling causes physical damage to plant organs and contributes to the disruption of the water-air balance of the organic soil horizon (Fedorchuk, 2005). The heather that appears on all elements of the relief suggests that about 15-20 years ago (it persists up to 25-30 years due to the presence of coal in the soil profile) there was a grass-roots fire. This is also due to the fact that people during outdoor recreation in a dry pine community make bonfires for cooking barbecue (Golovanov, 2005). Equipped places for a barbecue on the territory of the "Druzhinny" Lake were not found.

The impact of intensive and uncontrolled recreation on forest phytocenosis and ground cover has a detrimental effect on forest litter and ground cover, thereby disrupting biological soil processes, causing the extinction of cenoses (Kochurov, 2018). Separately we would like to note that the appearance of people leads to more frequent forest fires and unscrupulous behavior

(throwing garbage, breaking a branch, tying a bungee to a tree, wash something with aggressive detergents) (Vahnina, 2008). Thus, it turns out that the nature protection zone is protected at the legislative level from the construction of harmful industries and buildings, but it is completely defenseless from recreational activities (Kollin Jellard, 2015). Such endangered species as the lake hemisphere will be under threat of extinction, since the zone of the most active recreation is located directly near the shore of the lake (Federal Law "About the protection of environment", 2002). The ways of solution of this situation can be proposed: the regulation of recreational activities of nature protection zones must be provided at the legislative level. It is possible that in order to proper monitoring of the state of the landscape, it will be necessary to invite ecologists, soil scientists and landscape architects who will be able, taking into account the recreational load and landscape features, to make a competent organization of people's recreation places without disturbing the phytocenosis, to organize places using biologically safe materials. Equipment of a place for bungee jumping or their complete ban is strongly recommended. On forest trails it is necessary to make special decking, as it was made in the protected area "Komarovskiy Coast" in order to avoid trampling of the ground cover and forest litter (Vedmanova, 2020). The introduction of a system of fines for dumping garbage in the wrong place will make people to treat the nature protection zone more sensibly. The arrangement of barbecue areas will allow people to build bonfires safely without risks of forest fires (Nefedov, 2002).

Therefore, more attention should be paid to these territories in order to protect against the death of phytocenosis and forest litter. Inviting specialists not only from the fields of ecology and soil science, but also from the field of landscape design will help to equip places for recreation competently while preserving not only the soil and vegetation, but also the spirit of the place, which should always be taken into account when planning the landscape (Vershinin, 2014). Updating and clarifying the legislative framework will help resolve a number of issues regarding recreation and introduce more competently structured environmental activities in the executive system.

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