



## Scientific and Educational Potential of The Educational Base "Gornoye" of The State University of Land Use Planning as a System of Monitoring Indicators for The Environmentally Sustainable Development of The Region

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**Abstract** The use of green campus practices by the State University of land use planning promotes a culture of sustainable development for all stakeholders. One of the forms of interaction was the scientific and educational base (SEB) Gornoye. The territory of the SEB "Gornoye" combines unique physical, geographical and agricultural features necessary for performing the educational, scientific, applied, research and production functions of the Department and is designed to ensure the sustainable development of natural territories.

### Keyword:

SULUP, environmental monitoring, green campus, SEB "Gornoye", field practices, environmental education.

## 1. Introduction

Responding to global challenges, the State University of land use planning is trying to modernize its scientific, educational and economic activities and introduce the best available technologies in the field of environmental management. The University pursues an environmental policy that should guarantee its sustainable, environmentally-oriented development [1].



Figure 1. Results of participation in the Green Metric World University Rankings Network. (2019)

In 2018, the State University of land use planning (SULUP) signed a Declaration on joining and further participating in the Green Metric World University Rankings Network (Fig. 1). UI GreenMetric measures the commitment of universities to sustainable development and the creation of "green" infrastructure. The rating evaluates universities in 6 parameters: infrastructure convenience, transport policy, waste management programs, use of energy-efficient technologies, water resources protection and education in the field of sustainable development [2].

The list of the greenest higher education institutions has been published for the ninth time, including representatives of 780 universities from 83 countries, including 46 Russian universities. In October 2019, the Department of soil science, ecology and nature management of the State University of land use planning on behalf of SULUP presented materials for participation in the rating of "green" universities to the organizers of the competition.

In 2019, the University was included in the rating and took 455th place out of 780 universities representing 85 world countries (46 Russian universities took part in the rating from Russia). The use of green campus practices by an educational organization contributes to the dissemination of a culture of sustainable development to all stakeholders [3].

## 2. Scientific and educational base as an element of environmental education system

The importance of the project is the need to strengthen the practical elements of training of specialists-ecologists; assessment of anthropogenic load on unique campus under the influence of intensive development of district's infrastructure; the need to improve the overall environmental culture of the population, and ensure the competitiveness of Russian universities [4].

From the point of view of modern geocology, the regularity of interaction between society and the natural environment has territorial relations and is taken into account in the space-time context. All human habitats - natural, technological, economic and cultural - are interconnected, mutually conditioned, differentiated and integrated into various subjects, that is, in the field of research and application of geo-ecological approaches. Therefore,

from the point of view of Geoecology, the study of geographically differentiated forms of human interaction is the most important [4,5].

According to the Russian economic geographer E. B. Alaev, one of the forms of such interaction is the "scientific and educational base". The scientific and educational base is understood as a network of geo-ecological zones and trails. In this case, the scientific and educational base is a "research territory", which means the presence of structural cells (as a component of the polygon) or elements (as a component of the system). In this case, linear elements are represented as geo-ecological trails, area elements are represented by geo-ecological stations, and point elements are represented by natural monuments and landmarks [5].

### 2.1. The feasibility of field practices for sustainable development of the regions

*Scientific and educational base (SEB) "Gornoye"* was founded in 1963. The territory of SEB "Gornoye" of the State University of land use planning is located on the North-Eastern slope of the Central Russian upland, in the basin of the Osetr river – the right tributary of the Oka river. Administratively, the territory belongs to the Zaraysky district of the Moscow region. The main campus of the base is located in the village of Spas-Doshchaty on the right bank of the Osetr river (Fig. 2).

The territory of the SEB "Gornoye" combines unique physical, geographical and agricultural features necessary for conducting educational and industrial practices; scientific work for employees and students of the Department of soil science, ecology and nature management of the State University of land use planning.

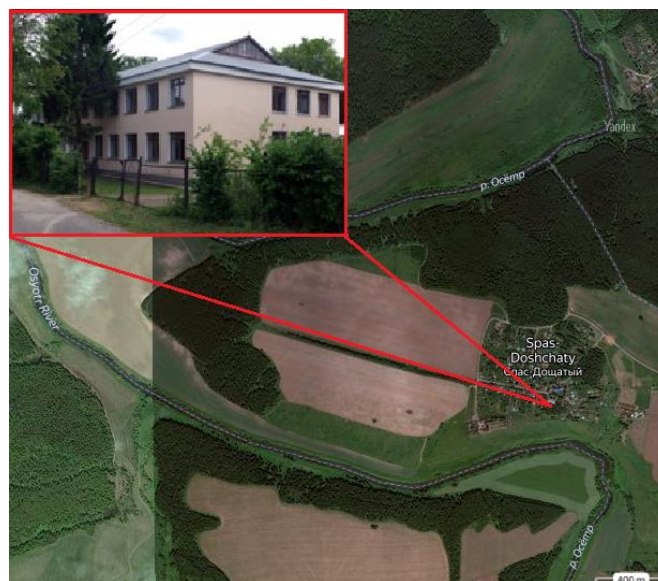


Figure 2. The location of the scientific and educational base (SEB) "Gornoye"

The *SEB "Gornoye"* as a unique natural object performs educational, scientific and applied, research and production functions and is designed to ensure the sustainable development of natural territories.

Uniqueness is determined by the following facts:

- unique combination of landscapes of the Sturgeon river valley complex and watershed spaces;
- location on a semi-mountainous wooded area;

- diverse soil cover;
- unique combination of different types of plant communities;
- rich flora and fauna;
- picturesque sections of the semi-mountainous and flat stream of the meandering Osetr river;
- the presence of various and diverse natural complexes and their elements (soil, terrain, rocks, fauna and flora, etc.) with a small anthropogenic impact, a unique catchment area of the Osetr river.

For students, there are several specialized practices in: hydrology, hydrochemistry, ecology, landscape studies, meteorology and climatology, geoecology. Field practice is a mandatory part of the educational process in the higher education system of natural science, aimed at expanding and deepening the knowledge of students obtained in the course of theoretical study of the material.

Practices contribute to the formation of ecological worldview and aesthetic education of students, give a visual representation of natural phenomena and their relationship, teach them to register facts and analyze them, generalize what they see and draw conclusions.

In order to assess the current ecological state of individual components of the natural environment in the surveyed territory, geo-ecological monitoring activities have been carried out in the period from 2015 to the present, which include the following set of studies:

- air condition assessment;
- radiation inspection of the site;
- measurement of noise and electromagnetic radiation;
- ecochemical and microbiological testing of soil from surface horizons and soils from geological wells for the presence of heavy metals and organic pollutants;
- study of surface and ground water quality.

Every year, together with the Department of Geodesy and Cartography of the State University of Land Use Planning, on the territory of the *SEB "Gornoye"*, work is carried out on:

- equipping a hydrological post on the Osetr River;
- practical development of the procedure and methods for performing work on water bodies;
- conducting systematic observations of the water regime and meteorological phenomena.

### **3. Summary/ Concluding Remarks**

According to the Green Metric World University Rankings, "green campus" is a modern "automated" building equipped with a security system with a number of functions for monitoring the state of the campus and territory, namely: thermal comfort, water and air quality, lighting, etc. [2].

Field		Requirement		Description
B	Automation	B1	BMS	+
		B2	APP	-
S	Safety	S1	Intruder Alarm System	+
		S2	Fire-fighting	+
		S3	Video surveillance	+
		S4	Anti-flooding	-
E	Energy	E1	Monitoring	+
		E2	Management	+
A	Water	A1	Monitoring	+
		A2	Recovery	+
I	Indoore environment	I1	Thermal comfor	+
		I2	Air quality	+
		I3	Real-time	-
		I4	Passive system	-
L	Lighting	L1	LEDs	+
		L2	Sensors	-
		L3	Shielding	-
		L4	Natural light	+

Figure 3. Compliance of the territory of nub "Gornoye" with the General requirements for "smart" buildings according to the List and Description of Smart Building Requirements

Thus, the territory of the SEB "Gornoye" is considered a "green campus", because it meets the General requirements for "smart" buildings for 5 construction functions: automation, security (physical security, presence sensors, video surveillance / CCTV), energy, water (sanitation), internal environment (thermal comfort and air quality) and lighting (lighting, low-power lighting) (Fig. 3).

The results of research on the SEB "Gornoye" are the basis of scientific reports, articles, final qualifying works, dissertations, etc.

Prospects of research in the "green campus" include:

- the establishment of a number field of integrated geoenvironmental laboratories (hydrochemical, soil, geo-ecological);
- organization and development of ecological trails and water routes for the study of problems of geocology and nature management;
- geo-environmental monitoring of the basin of small rivers; the development of proposals for the improvement of water quality of the Osetr river and the state of the field of recreation;
- as well as training students (collection and processing) to participate not only in the preparation of RFBR (Russian Foundation For Basic Research) and RSF(Russian Science Foundation) bids, but also in contractual work on environmental monitoring.

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