

Siberian researchers contribute to global monitoring of the Earth's Green Lungs

Researchers of Siberian Federal University took part in a global [project](#) to collect, systematize and universalize data on the composition of forests in all climatic zones and on all continents of the planet.



Researchers from more than 80 scientific institutions provided detailed insights on the quantitative and species composition of world forests, distribution and correlation of its' various components — trees, shrubs, and ground cover — using a unified methodological system and data collection protocol. „Bringing to a common denominator“ is expected to greatly facilitate the further study of changes in forests due to global warming.



„Great work has been done. One hundred forty-three authors from leading scientific schools studying forest as the most important biological and ecological system, which life on Earth depends on, armed themselves with a unified methodology and general principles of data collection to compile a map of the distribution of phytomass over all continents where forests grow. Phytomass is everything that can be classified as plants, and even leaf and branch shedding. Knowing the volumes and approximate composition of the world phytomass, we can draw fairly accurate conclusions about carbon stocks, as well as a level of fire-hazard of any particular part of the forest, whether it is prone to certain diseases, or what natural and anthropogenic factors may threaten its well-being in the future,“ — said Dr **Sergey Verkhovets**, one of the co-authors and leading research fellow of the laboratory of biogeochemistry of ecosystems, Siberian Federal University.

The researcher pointed out that the first data on the Siberian taiga included in this global study had been obtained more than ten years ago within project „Assessment of Ecosystems of Central Siberia“, which involved work of SibFU students and scientists. The information is planned to be updated (and the entire developed system) no less than once every five to ten years. Thus, the researchers will be able to understand whether their predictions have been correct, or whether forest development follows a different scenario that has not been predicted by experts.

„We can already indicate some changes that Siberian forests will go through, according to the data of our system. Judging mainly by the recorded climatic changes, we can already observe moist warming (that does not mean that droughts will end, though), lengthening of the vegetation season of trees, and an increase in carbon absorption of forests. To put it simpler, trees are getting taller and thicker, and the forest is thickening too. Some types of woody plants do not like such climate changes, i.e. larch forests spread in the northern taiga zone are gradually replaced by pine-spruce forests, and so dark coniferous Scandinavian-type forests are appearing in our country. Shortly, for example, linden may return to Siberia - it used to grow here until the last mass glaciations which reduced them to insignificant relic groves in Novosibirsk and Kemerovo regions,“ — continued **Dr Verkhovets**.

There are less pleasant consequences of climate change, and increased air dryness in the mountain forests of the Western Sayan is among them. Scientists complain about the direct consequences of lack of moisture — the forest is weakening, and most importantly, it becomes an easy prey for all kinds of pests from phytopathogenic fungi to insects, i. e. Ussuri polygraph and Siberian lasiocampid that destroyed hectares of taiga in the area of the village of Nazimovo in Yenisei district.

„As for Ussuri polygraph, these insects used to be in our taiga en route but considered it as a cold and uncomfortable area. And now, when favourable conditions have formed, we see an outbreak of mass reproduction of polygraph in Siberia marked by rusty dead trees along the roads. There is another abiotic factor that bothers scientists — soil erosion. Permafrost thawing is dangerous, as it causes unpredictable flooding and stagnation of moisture, and some trees (for example, larch and pine) may not survive overmoistening of the soil,“ — the expert specified.

To the research team, fire forecasting was another significant reason to develop the system. It is no secret that in recent years this disaster has been particularly troubling the northern and central regions of Krasnoyarsk Territory. According to the authors of the article, Siberia already experienced terrible fires dozens of thousand years ago, when those linden forests burnt, the very ones that may eventually return to the once-abandoned regions.

*„That is not to say that the fires of 2019 are unique in the scale of the affected territories, but they are alarming indeed. The anticyclone which comes here annually from the territory of Yakutia, this time, provoked the strongest smoke that reached Omsk, Krasnoyarsk, Novosibirsk, and even the capital region. It spread a little wider and lasted a little longer than usual — and cool moist air from the Atlantic could not turn the tide and cool the burning Siberia. The most unpleasant thing is that such fires will happen again and again. Global warming, as it has been already mentioned, brings droughts to some areas, and the drying out forest burns up like a match both from natural factors and from a human careless hand. A forest that lacks moisture resembles a person weakened by a chronic disease — it is more difficult to repel an attack of parasitic species, and it recovers much more slowly after fires,“ — **Dr Verkhovets** concluded.*

The project was guided by Professor Dmitry Schepaschenko (Mytishchi branch of N. E. Bauman Moscow State Technical University). In addition to SibFU researchers, scientific fellows from V. N. Sukachev Institute of Forest, SB RAS, and M.F. Reshetnev Siberian State University of Science and Technology have been involved in the global research.

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