

СЕКЦІЯ I

ЛІСОВЕ ТА САДОВО-ПАРКОВЕ ГОСПОДАРСТВО, ЕКОЛОГІЯ

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THE CONTRIBUTION OF LITHUANIAN FORESTS FOR STABILIZING THE CLIMATE CHANGE

Describes the role of forests in absorbing CO₂ from the atmosphere and reveals their role in the climate change. Low-value wood resources in Lithuanian forests are analyzed and the opportunities to increase the volume of forest fuel harvesting are identified.

Key words: *climate change, low-value forest resources, forest fuel*

Over the past 200 years, the amount of carbon dioxide in the atmosphere has increased more than 50%. CO₂ and other greenhouse gases (methane (CH₄), nitrous oxide (N₂O), fluorinated gases) transmit the sunlight to the Earth, but delay the heat from the Earth's surface, and thus creates a greenhouse effect. Stopping the climate change within +2°C would allow adaptation to the consequences of climate change. To stabilize the processes of the global warming, it is necessary not only to reduce CO₂ emissions, but also to find the ways of its "capture" and "storage". It is known that green plants "take" CO₂ from the atmosphere in the process of photosynthesis and "lock" it in the resulting phytomass. For the cultivation of 1 ton of forest phytomass 1,47 tons of CO₂ is consumed, 1,1 tons of O₂ is formed and 800 tons of water evaporate. Unfortunately, the world's CO₂ emissions currently far exceed the capacity of forests and other green plantations to absorb them.

The role of Lithuanian forests in the absorption of carbon dioxide. In 1990- 1991 about 45-50 million tons of CO₂ were "thrown" into the atmosphere annually in Lithuania. From 1992 this indicator decreased to 20-25 million tons per year. Reduction of CO₂ emissions is mainly connected with the shutdown of Soviet industrial enterprises. At present, most of the greenhouse gases in Lithuania are emitted by transport, energy enterprises and agriculture. Only woody plants of Lithuanian forests consume about 23 million tons of CO₂ annually. They also evaporate about 10 billion tons of water and produce about 8 million tons of oxygen. From 23 million tons of carbon dioxide gas consumed by woody plants, about 6 million tons of CO₂ "returns" back to the atmosphere from rotting wood in the same year and another 4,5 million tons - from the burned forest fuel. 12,5 million tons of CO₂ are "locked" for a long time (5 million

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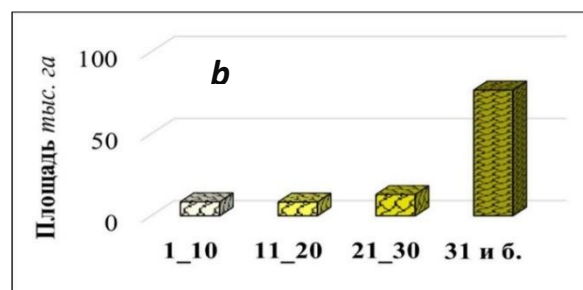
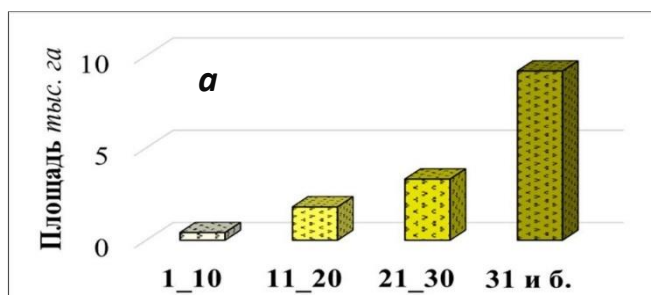
tons of which is in growing trees (as a stock change) and 7,5 million tons - in the products developed from wood pulp

Opportunities to increase the use of forest fuels. Lithuanian forests are among the most productive in Europe and even in the whole world. However, they also contain a significant proportion of low-value plantations (gray alders, aspens, etc.). Most of gray alder wood is suitable only for firewood or chopped forest fuel. Gray alders occupy more than 120 thousand hectares of Lithuania (table 1). In the state forests, they occupy only 15 thousand hectares, and more than 105 thousand hectares in private ones. 62% of gray alders in the state forests and 72% of them in the private forests are already ripe or overripe (picture 1). Aspen stands of Lithuania occupy nearly 100 thousand hectares (table 1). A part of aspen stem wood can be used to make some assortments suitable for the woodworking industry, but most of the aspen can be used only as fuel. Half of these plantations are already ripe or overripe.

Table 1

Distribution of Lithuanian forest areas by predominant tree species and forms of property (thousand hectares)

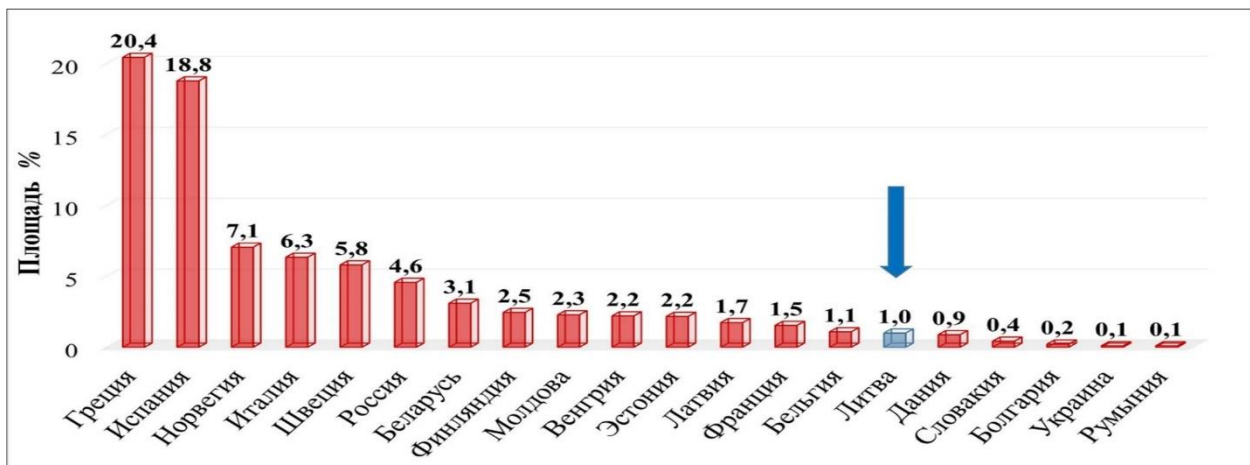
Stands	State woods	Private and privatized woods	All the woods
Pine	388,6	321,7	710,3
Spruce	285,4	149,4	434,8
Birch	190,4	262,0	452,4
Oak	24,8	23,3	48,1
Ash	3,2	9,4	12,6
Black alder	88,1	74,6	162,7
Aspen	31,9	63,6	95,5
Gray alder	14,9	106,6	121,5
Others	8,4	13,3	21,7



Picture 1. The structure of gray alder areas in the state (a) and in the private (b) forests of Lithuania by age classes

In addition, near two million cubic meters of low-value timber produce tree and shrub plantations growing on the abandoned fields, which occupy 1% of the

country's area (picture 2). All this low-value phytomass (gray alders, aspens, tree and shrub plantations, etc.) is still used not so much because of the relatively high costs for harvesting raw wood. Now, when Lithuania and many other countries of the world suffer from the energy crisis (rising prices for energy resources, heat and electricity) it is necessary to look for more rational ways to get energy. One of the opportunities is to use more forestfuel for the production of thermal energy. Thermal energy received from forest fuel is almost twice cheaper, than from fossil fuel. On the other hand, burning more forest fuel allows to reduce the use of natural gas, oil products, coal, and this creates the background for stabilizing the climate changes by expanding the usage of "green" energy.



Picture 2. The area of tree and shrub plantations, growing on non-forest lands in some European countries (FAO FRA 2020)

Considering opportunities to increase the forest fuel harvesting it is necessary to assess whether the forests' condition will worsen? Will rotting wood resources be affected? After all, rotting wood is needed to increase biodiversity of the forest, as it is the "home" for some species of forest mushrooms, lichens, mosses, insects and birds.

In recent years, the volume of natural waste stem wood has been annually 2,65 million m³, and other phytomass components of rotting wood (branches of fallen trees, stumps, low-value undergrowth and shrubs) - another 4,8 million m³. All this mass does not disappear in one year. The decay process of woody phytomass takes from 5 to 15 years, so currently there are near 66 million m³ of rotting phytomass in the forests of Lithuania. As a result, the volume of forest fuel harvesting can be increased by 1-1,5 million m³/year. In this case, the forests will not suffer: timber resources will continue to increase rapidly (by 5,5-6 million m³/year), and the amount of decaying phytomass will decrease by about 12-13%. After cutting down the low-value plantations, it is possible to grow a higher quality forest on their place - plantations that would be better not only economically, but also ecologically.