Open Access Library Journal
2018, Volume 5, e4399
ISSN Online: 2333-9721
ISSN Print: 2333-9705

Forests Organization on the Base of Ecological-Dynamic Characteristics of Vegetation (Some Methodological Aspects)

Alexander P. Sizykh[1], Alexey I. Schekhovtsov[2]

[1]Siberian Institute of Plant Physiology and Biochemistry of RAS SB, Irkutsk, Russia
[2]A.B. Sochava Institute of Geography of RAS SB, Irkutsk, Russia
Email: alexander.sizykh@gmail.com

How to cite this paper: Sizykh, A.P. and Schekhovtsov, A.I. (2018) Forests Organization on the Base of Ecological-Dynamic Characteristics of Vegetation (Some Methodological Aspects). *Open Access Library Journal*, **5**: e4399.
https://doi.org/10.4236/oalib.1104399

Received: February 2, 2018
Accepted: February 23, 2018
Published: February 26, 2018

Abstract

Mapping of forest vegetation is considered as an efficient method for obtaining of statistic information, which serves as a base for determination of the character of coenisis use in concrete regions. Different scales and periodicity of vegetation mapping allow to establish the peculiarities of coenisis structure, dynamics and functioning. Physical-geographic conditions pre-determine time intervals of forests taxation. Mapping taking into account the synchronicity and syntopic aspects helps to reveal the ecological potential both of forests and of the whole landscapes.

Subject Areas

Forestry

Keywords

Vegetation, Forests, Mapping, Ecological-Dynamic Characteristics, Forests Organization, Forests Use

1. Introduction

Organization of forests use nowadays is performed on the base of forests taxation investigations for many years from 1950 to 2000ies, where such timber stand characteristics as species composition, yield class and age are taken into account first of all. On this base, wood stock and a definite lumbering scale are calculated. Basic information for such calculations is provided by forests taxation schematic maps of different scale, as well as by years of forests taxation, which are essential source of information on wood stocks in cubic meters per

taxation territory or section. All other parameters are very conventional from the viewpoint of cenotic structure and of ecological-topological conditions for forests and the whole biota formation.

2. Methods

We considered the available information base on taxation data and schematic maps of territories of forests management assessment during different years for the period of 55 years using Olhon forestry enterprise in central part of Lake Baikal western shore (Irkutsk Region) as major part its forests was intensively exploited up to middle 1990ies. We used data of geobotanical survey of different years and vegetation periods together with use of aerial and space photographs of different years.

3. Results

The schematic map of the forestry enterprise made in 1950ies presents general spatial characteristics of timber stand structure for a wide territory with different conditions of forest growth. The schematic map made in 1970 presents some spatial-structural timber stand peculiarities with elements of forest communities typology. The schematic map made in 1985 reflects some structural-typological peculiarities of forests taking into account undergrowth and soil cover species composition. Anyway, all characteristics are aimed to calculate wood stock and lumbering. The analysis of schematic maps of different years of taxation reveals extreme difference of the boundaries of established taxation territories for a perennial accounting period. Consequently, the characteristics of forests structural-cenotic parameters in the assessment of wood stocks was performed from the viewpoint of availability of timber stand convenient for cutting using the information obtained during the accounting time. Each accounting period was a rationale to determining cutting volumes, and the start point in taxation assessment was based on the data of earlier taxation years. Timber stand pattern for a definite time interval was taken into account, and it was quite not obligatory to have any information on processes occurring during communities development and reconstitution between accounting periods and on dynamics of formation of a concrete forest type. With such material it is doubtful that it is possible to determine exactly real forests state and to determine how much wood, where and how can be taken without violation the natural basis for the formation of potentially productive timber stand.

Forests taxation mapping without information on temporal forests dynamics, on the peculiarities of forests growing conditions on a concrete territory, on detailed spatial and vertical communities characteristics, on trends of forests reconstitution for such a long period results in problems in the assessment of strategy of forests formation for concrete physical-geographic conditions. This results, in turn, in degradation and depletion of forest resources.

The example of mentioned above Olhon (**Figure 1**) forestry enterprise

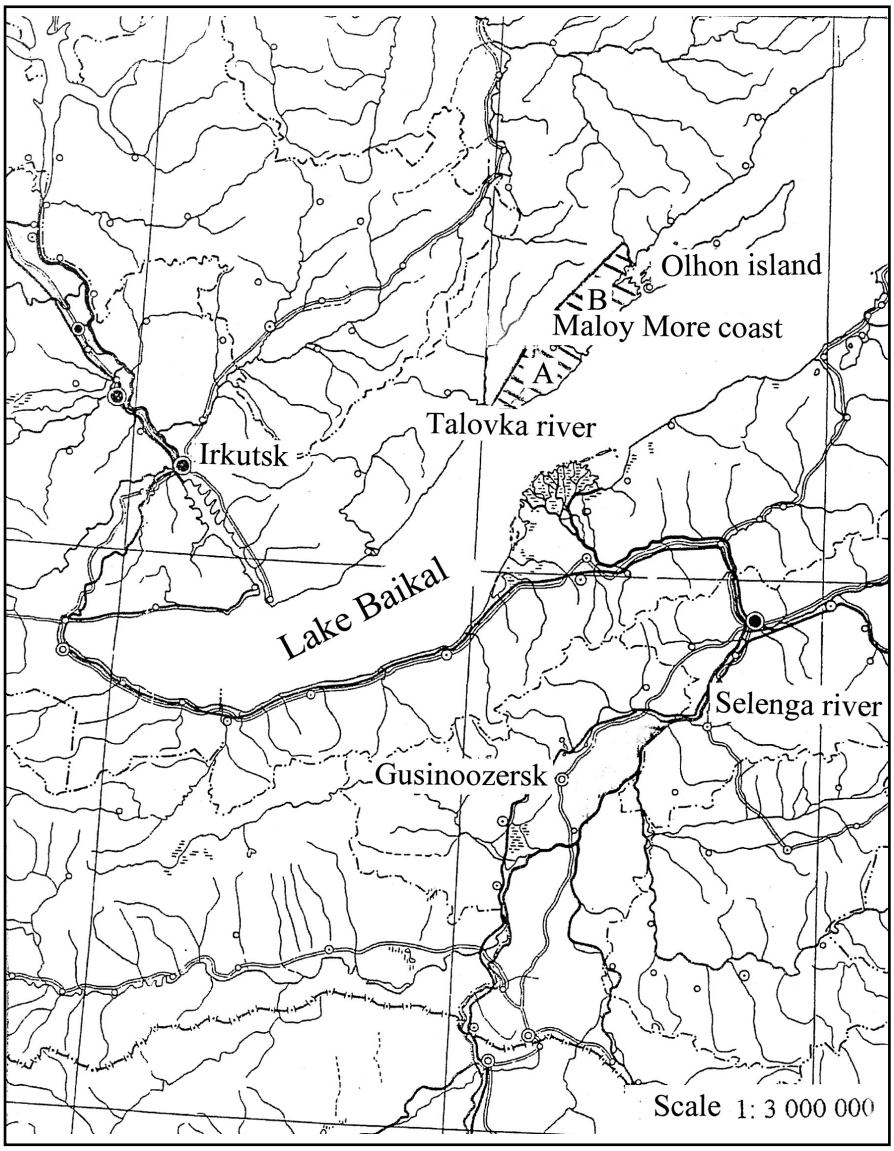

Figure 1. Areas of Study—Olhon forestry enterprise (Irkutsk Region): A—central part of western coast of Lake Baikal; B—coast of Maloe More Gulf.

(Irkutsk Region) allows to follow the decrease of forest cover with domination of small-leaf species in timber stand on wide territories, where before coniferous trees dominated. But the most important matter is the trend of deterioration of forest conditions (mainly edaphic ones) resulting in the decrease of the potential of natural forests reconstitution and in ineffectiveness of artificial one. This occurs in some studied areas, where industrial lumbering was performed up to recent period.

Nowadays, forests organization requires new qualitative approaches to forests taxation, which must be based on periodic characteristics of vertical and horizontal structure of the communities, on taking into account of the peculiarities of forests growing conditions, on cenotic links of biomorphs composing a community. It is necessary as well to take into account complete formation and

reconstitution dynamics and development trends on any concrete forest area. This will allow to provide stable functioning and save potential of forests natural sustainable formation [1]. This is particularly important for the regions with high contrasts of forests growing conditions—for transitional environmental zones, for intrazonal environmental heterogeneity, for zones of plants types contact.

It is to notice due to this fact that there are recent proposals of forests taxation approaches on natural basis with maximally probable for concrete conditions revealing of the specifics of territories environmental conditions [2] [3]. There are different opinions on this matter [4]-[10]. Anyway, there are trends towards taking into account of the peculiarities of environmental conditions during forests organization at concrete territories.

In our opinion, forests taxation mapping with ecological and dynamic characteristics of timber stands and habitats types will serve as a base for organization of sustainable forests use including natural and effective artificial reconstitution of forests without great expenses.

This paper about some methodological aspects for using for characteristics of dynamic and development trends of forests concrete sites. It is possible to use this approach for getting dates about forest formation of another territory as well.

4. Conclusions

Formation of basic maps for obtaining of map series for accounting vertical and spatial variations in the forests can be a way of obtaining information on forests states for any concrete time interval. They will be a base for keeping of links between and inside the ecosystems providing sustainable functioning of whole ecosystems. This is especially important under highly contrast environmental conditions where forests development trends are quite ambiguous, often manifesting paragenese [11] in vegetation formation.

Express information from such maps will allow to assess more impartially the possibility of ways of forests use type and wood amount, which could be taken to keep its reconstitution potential. Any changes in forests state can be rapidly added to basic taxation schematic maps. The amount of lumbering will be based on assessment and forecast of forests formation. Situation taxation mapping series will be an effective tool for keeping a sustainable forests use on the background of climate dynamics and recent environmental changes on concrete territories. Ecological-dynamic characteristics of forest formation by obtaining of the map series of the forests stands allowing to get more natural dates for formation and genesis the forest of different physical-geographic and ecological-topological conditions concrete territories.

References

[1] Hummel, R. and Sizykh, A. (1997) Sustainable Development of Forest as a Way to

Preserve the Natural Basis of Forestry. In: *Global Challenges and Local Solutions*, The Harword Press, Inc., New York, London, 53-60.

[2] Ziganshin, R.A. (1997) Taxation of Mountain Forests of Natural Base. V.N. Sukachev Institute of Forest of RAS SB Publishing House, Krasnoyarsk, 203 p.

[3] Sukhikh, V.I. (2006) On Upgrading of Methods for Finding out the Scale of Main Forests Use. *Lesnoe Khozyaystvo*, Iss. 6, 30-35.

[4] (2003) Dendrochronology: Achievements and Perspectives (Co-Authors). Proceedings of All-Russian Workshop. V.N. Sukachev Institute of Forest of RAS SB Publishing House, Krasnoyarsk, 72 p.

[5] Isaev, A.S. (Ed.) (2005) Forests Organization in Natural Reserves—Principles and Methods. Approaches to the Experienc Summarizing. V.N. Sukachev Institute of Forest of RAS SB Publishing House, Krasnoyarsk, 118 p.

[6] Vaganov, Ye.A. (Ed.) (2004) Structural-Functional Organization and Dynamics of Forests. *Proceedings of All-Russian Conference*, V.N. Sukachev Institute of Forest of RAS SB Publishing House, Krasnoyarsk, 491 p.

[7] Voronin, V.I. and Oskolkov, V.A. (Eds.) (2007) New Methods in Dendroecology. Proceedings of All-Russian Conference. Institute of Geography of RAS SB Publishing House, Irkutsk, 200 p.

[8] Vaganov, Ye.A. (Ed.) (2009) Ecological-Geographic Aspects of Forests Formation Process. *Proceedings of All-Russian Conference*, V.N. Sukachev Institute of Forest of RAS SB Publishing House, Krasnoyarsk, 417 p.

[9] Kovalev, A.P. (Ed.) (2014) Problems of Sustainable Management of Forests in Siberia and Far East. Proceedings of All-Russian Conference. Federal Budgetary Institution "Far East Research Institute of Forestry" Publishing House, Khabarovsk, 505 p.

[10] (2009) Forests of Russia in XXIst Century. *Proceedings of All-Russian Conference*, Saint-Petersburg State Forest Technical Academy Publishing House, Saint-Petersburg, 264 p.

[11] Sizykh, P. (2017) Ecotones and Paragenese (Object) as Indicators of Structure – Dynamical Organization of Vegetation on the Background of Climate Dynamics (The Lake Baikal as an Example). *Open Access Library Journal*, **4**: e3310. https://doi.org/10.4236/oalib.1103310