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CONSERVATION MEASURES OF TUGAI FORESTS IN THE ILE RIVER BASIN

Abstract

In the article, based on the results of the forest pathological survey, conservation measures for the tugai forests of the Ile river basin were proposed. We consider preventive measures and organize forest pathological monitoring are appropriate for the tugais.

Key words: tugai forests, forest pathological state, conservation measures.

Introduction

As known the tugai forests in Kazakhstan are tree, shrub and herb communities in flood plains of the Syr Darya, Chu, Ile, Karatal, Lepsy, Aksu and Charyn rivers with total area of about 400 thousand ha of which is covered by forest no more than 150 thousand ha [1]. The tugai forests are destroyed by cuttings in a non-systematic manner until there is complete extermination in some areas. These forests are damaged by frequent fires, which in most cases take place when people burn the bulrush for agricultural needs [2]. In addition to frequent fires and illegal cuttings of the unique tugai forests, they constantly decrease because of the growth of pests and diseases loci and an unregulated year-round pasturage of livestock. All these reasons mentioned above essentially influence reproduction, growth and development of the tugai vegetation [3]. The tugai forests have great meaning that is why it is very important to preserve these forests. According to the results of the conducted forest pathological survey [4, 5] we suggested conservation measures for the tugai forests.

Materials and methods

We used the data of the forest pathological survey conducted in the tugai forests of the Ile River basin [4, 5]. According to the results, we suggest the conservation measures for these forests including Forest Pathology Monitoring (hereinafter FPM). During the period of the research, the FMP was organized in the tugai forests territory of the Kurty, Bakanas, Shelek State Enterprises for Forest and Wildlife Protection as well as in the Charyn State National Nature Park on the territory of the Charyn Ash Forest. For the FPM organization, we used the Recommendations [6].

Results and Discussion

According to the results of the detailed forest pathological survey, it is established that the trees of almost all the species studied in the territory of tugai forests are weakened. The middle age class of the trees is five, six classes. Stands are a mature, but there are also overmature stands. Therefore, we recommended to conduct preventive forestry measures including selective sanitary felling and cleaning from clutter.

In accordance with the Felling Rules in the Kazakhstan forests [7, p. 7], selective sanitary felling refer to forest protection measures and is aimed to the improvement of forest stands by taking defective and infected with pests and diseases trees. Such felling are appointed when the sanitary state of the forests requires operative intervention and cleaning cuttings are not planned.

Selective sanitary felling are carried out in forests with disturbed sustainability. There are increased formation and accumulation of trees populated by pests, as well as drying, dead standing, windfall trees, snags, snowfall trees, infected by diseases, populated with stem pests and other damages, which lead to the cessation of tree growth. Such trees have an average score from 1.6 to 3.5, determined by the sanitary status of trees [7, p.18].

In accordance with the Felling Rules in the Kazakhstan forests the selective sanitary felling in the tugai forests of the desert zone are conducted in the presence of drying up to 30 percent from all trees and the stand density of 0.6-0.9. During carrying out these cuttings, the stand density should not be reduced below 0.5, and along the riverbanks in the forbidden bands - 0.7. The most effective measure aimed at improving of tugai forests, combining prevention with direct destruction of pests, is taking of just populated trees [7, p.14].

In the tugai forests of the Ile River basin, we do not recommend conducting pest control measures using pesticides, because their quantity is not high, and pests do not exceed the economic threshold of damage. We recommend using biological methods of the tugai forests protection, because it is optimal way to protect and prevent forests from pests and diseases. These methods include useful animals and insects (attraction of insectivorous birds, protection and dispersal of useful ant species), living organisms (entomophagous insects, parasites, predators) and entomopathogenic organisms (viruses, bacteria, fungi) for the destruction of harmful organisms [8].

Entomophagous (parasitizing insects) of forest pests widely distributed in the tugai forests. There are the following basic methods of using entomophages in forest biological protection: introductions and acclimatization of entomophages, seasonal colonization of entomophages, intra-areal migration of entomophages, attraction, conservation, accumulation of entomophages and their protection [9].

The biological method of control has several advantages. There is no pollution of the environment with pesticides. Biological forest protection does not have a negative impact on humans, plants and forest biogeocenosis. This protection act slowly, but then for a long time restrain the growth of the number of harmful insects in the forests [10].

Prevention of the fungi epiphytoty, which are wood destroyers, is implemented by the “Sanitary rules in the forests of the Republic of Kazakhstan”. For these purposes selective sanitary felling are conducted to remove rotten trees from stands, or by clear cutting of fungi foci trees.

Monitoring is the tracking of forest pests and diseases for action. For organizing forest protection measures, it is necessary to take into account that the tugai forests grow in the riverine zone. Treatment with chemical insecticides in this area is prohibited. Therefore, in this region it is recommended to use biological preparations, and apply biological methods of forest protection.

Regulation of the forest pest numbers can be carried out with Forest Pathological Monitoring (FPM), because the costs of processing pest outbreaks were higher than the cost for the FPM (Table 1).

Table 1 –Calculation of the standard costs for FPM conducting and pest control in the tugai forests, in terms of 1 hectare

Indicators	Costs for FPM, thousand tenge	Costs for pest control, thousand tenge
Payment for labour	120	120
Materials	965	1740
Other direct costs	-	377
Transportation costs	181	9335
Other costs	40	527
Total:	1306	12099

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FPM is the constant and rapid tracking of the state and health of forests, the violation of their stability, damage by harmful organisms, other pathogenic and anthropogenic factors as well

as the dynamics of these processes. FPM ensures timely identification of the unfavorable condition of forest stands, assessment and forecast development of forest pathological situation for timely decision-making on the planning and implementation of necessary forest protection measures, or other forestry measures. One of the main objectives of forest monitoring is to assess the state of forests. The state of the forest stand is estimated by the quantitative ratio of tree different categories and their damage by pests, diseases, pollutants, fire and other factors.

The tasks of FPM are the following:

- timely detection of forest areas weakened by the impact of phytophagous insects, diseases, unfavorable natural and anthropogenic factors;
- revealing the role of natural factors in regulating the dynamics of forest phytophages and pathogens numbering;
- forecasting changes in the forest state, the dynamics of forest phytophages and pathogens numbering;
- prediction of possible damage to forests by phytophages, diseases, natural and anthropogenic unfavorable effects;
- forecasting of possible measures to limit adverse impacts on forests and the success of protective measures;
- monitoring of forest biological diversity and forecasting possible negative consequences for their biodiversity by the influence of various adverse impacts.

FPM, based on the laying of permanent sites for monitoring pest numbers, is the basis for all forest protection measures. For the organization of these activities, it is necessary to draw up a Project (Scheme), which includes:

- characteristics of monitoring objects;
- forest protection zoning;
- planning of forest pathological monitoring;
- calculation of labor costs for FPM conducting.

Taking into account the difference in the ecological and economic significance of individual pathological factors for specific subjects (SPNA, forestry enterprises, forest parks, green areas, etc.), the program of the Forest Pathological Monitoring Project may be different.

Development and implementation of Forest monitoring projects will make more extensive using of integrated systems for forest protection and improve the sanitary state of forests [11-12].

Conclusion

Because of the costs of carrying out the FPM is 9 times more profitable than the cost of pest control. Therefore, we recommend conducting FPM on the territory of the tugai forests. The development and implementation of Forest Pathology Monitoring projects allow for greater use of integrated protective systems and significantly improve the sanitary condition of forests.

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ІЛЕ ӨЗЕНІ БАССЕЙНІНДЕГІ ТОҒАЙ ОРМАНДАРЫН САҚТАУ ШАРАЛАРЫ

Аңдатпа

Мақалада Іле өзені бассейнінің тоғай ормандарында патологиялық тексерудің нәтижелері бойынша осы ормандарды сақтау шаралары ұсынылады. Біз тоғай ормандары аумағында алдын алу шараларын жүргізуді және орманды бақылауды ұйымдастыруды орынды деп есептейміз.

Кілт сөздер: тоғай ормандары, орман патологиялық жағдайы, сақтау шаралары.

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МЕРЫ ПО СОХРАНЕНИЮ ТУГАЙНЫХ ЛЕСОВ БАССЕЙНА РЕКИ ИЛЕ

Аннотация

В статье по результатам лесопатологического обследования предложены меры по сохранению тугайных лесов бассейна реки Иле. Мы считаем целесообразным проводить профилактические мероприятия и организацию лесопатологического мониторинга на территории тугайных лесов.

Ключевые слова: тугайные леса, лесопатологическое состояние, меры по сохранению.