The condition of landscape felling and its perspectives in protective forests

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Abstract. Conducted variations of landscape felling in conditions of increased recreational load are new and optimal. They bring more improved concepts to the theory and practices of landscape felling. The developed variations of landscape felling in protective forests are suitable in stands of natural and woodland parks.

1. Introduction
Landscape felling is a relatively new institutional category. It became a part of forestry practices in recreational areas, national, natural and woodland parks in the 90s of the 20th century. An incentive to its development was population’s unmet demands for high-quality recreational services, on the one hand, and unpreparedness of forest plantations, on the other hand. However, every human being, respecting forests and thinking of improving forest landscapes, raises questions of where and how to plant, or how to increase the decorative effect and aesthetic value of plantations. Moreover, every piece of a forest is unique; therefore, it cannot be valued and considered equally. Formed landscape is a unique piece of art and requires its own method of cutting based on set goals. That is not even enough, as it is essential to know how visitors will react. All the mentioned makes both the methods of stand improvement prevailing in forestry (low thinning, crown thinning, combined thinning, special-purpose thinning, moderate thinning, gradual and row thinning, Tula thinning method, increment thinning, Kravchinskiy’s thinning method and heavy thinning) and timber harvesting methods unsuitable. Therefore, landscape transformation and establishing necessary structural coefficients of stands were accompanied by clean cutting, by the elements and modifications of selection cutting, shelter wood felling and tending of individual trees. No wonder, the attempt to adopt the canons of classical forestry without significant modifications has led to some one-sidedness of research results. The entire system of landscape architecture regulations has not been taken into consideration; nothing more than contrast and balance laws apart from consideration of tourist psychology has been discussed. The expressiveness of a single architectural fragment has been hardly emphasized.
Nevertheless, the desire to unite knowledge and creativity, closeness of science and art has led to establishing a new informational environment. A combination of knowledge in forestry management, psychology and landscape design would bring in the greater profit.

2. Methods and Materials
Common forestry and taxation methods, observational methods and a trial area method have served as the basis for the research methodology. Green zones and forests of nature parks in the city of Kazan have become the objects for this research.

3. Results and Discussion
Landscape felling aims to change existing landscapes to reinforce their recreational features. Territory sanitation, aesthetic improvements of landscapes, an increase of recreational value and volume capacity of forest stands, reinforcement of landscape resistance permeate through plantations, ranging from single trees, bushes, some functional areas in recreational forests and entire stands [1-3]. According to N V Tyulpanov [4], S V Zalesov and A F Khayretdinov [1], N A Luganskiy et al. [2], landscape-shaping felling is a reinforcement of landscape resistance to adverse environmental conditions, especially to increasing recreational impact.

That is a current state of landscape felling in present-day conditions. As we can see, a specific objective of a forming stand is not viewed.

In the long view, the following main groups can be represented as the variations of landscape felling: planting all-aged multilayer stands to create edge effect, architectural and planning arrangement of pine stands felling after the first stroke of selection cutting, landscape felling in young dense softwood stands to improve passability and view depths, landscape felling in artificial stands and designing viewpoints. We suggest viewing some of them that have given convincing results.

It is necessary to mention that majority of researches has a general lack, some one –sidedness. That is an attempt to adopt the canons of classical forestry without any significant modification and associating with laws of landscape architecture. The entire system of landscape architecture regulations has not been taken into consideration; only single features of landscape tending, contrast laws [5] and balance laws [6] have been discussed. Moreover, the tourist himself for whom the efforts were intended has been left behind. Nevertheless, science and art go hand – in – hand. Despite the fact that science and art differ in their drive for knowledge and creativity, we still can note their closeness in ideological content and style features in every stage of forestry development. The noted authors’ desire to unite knowledge and creativity has led to establishing a new informational environment often realized intuitively but not by logical reasoning [7, 8]. However, they all offer prospects of social, silvicultural and economic effects.

Foresight and forecasting are particularly important features. While empirism provides theory with practical construction material, theory pursues three aims. The first aim regarding the past is to explain and summarize, the second aim regarding the present is to help investigate and familiarize with the current research, and the third aim regarding the future is to predict the unknown.

In terms of landscape felling it is necessary to note that there is a need, firstly, to arrange landscape felling terminology, secondly, to specify the components of ‘improvised, landscape’ and other types of felling.

Unfortunately, besides the mentioned works, the data on complex research work regarding recreational value of landscape felling and recommendations on landscape felling in conditions of increased recreational load have not been sufficient. Rules of forest tending with some of their unclear recommendations have not added anything substantially new to the theory and practices of landscape felling.

Edge effect is a tendency to increase species diversity and density at the boundaries of two neighboring biogeocoenosis and at the transition area between them. In psychology, border effect is known as ‘a law of primacy’ saying that the items at the beginning and the items at the end of an information string are mostly recalled. The first teacher, the first love, the first read or published book...
are mostly retained in our memories. Regarding forest edges, primacy effect is connected with a communication process, which means that the information communicated primarily has a greater effect on impression formation.

The perception of forest edges is a psychological process of a sensory reflection on forest properties. A simple irritability caused by forest closeness does not have direct ecological value. However, it reflects the relation between biotic and abiotic environmental factors. Visitors’ response, their feelings, emotional experience and behavior act, arose in reply to certain structure of stands boundaries, are characterized by a rate, intensity and a flow pattern, as the forest affects sight, hearing, sense of touch and etc. Aesthetic and visual perception of forest borders lasts in a long run.

From a scientific perspective, edge effect is being discussed exclusively in terms of growing (harvesting maximum timber at the forefront) and does not affect the interests of people, visitors particularly. At the same time, the first impression of forests forms and depends on the degree of edge effect manifestation. Foresters have realized it late, and the forests used in recreational purposes happened to be completely unprepared. Hence, forest borders look dull and unvarying.

Why does the image of forest and field borders, meadow and forest borders, or forest edges appeal so much? Probably this ‘life instinct’ is subconsciously tied to favorable living environment providing safety (open space), plentiful food supply and visual appeal (the abundance of light, light and shadow play). Due to gradual colorful forest edges in early spring and wilting periods, the perception of scarlet and golden forests intensifies because of spectral composition, emission intensity and the complex of physical characteristics related to configuration, form, spatial orientation, movement and other perceptual quantities. This perception also depends on realization that the forest is a real, however fragile world.

Creating edge effect by using combined felling in forest stands that neighbor fields has allowed both to arrange trunks based on their diameter and improve the site class of plantations.

Landscape felling in very dense spruce stands is driven by the need of improving the view depth and passability. Moreover, the forest plantations in public places have become comfortless corners where grounds maintenance is hindered, visitors provoke unlawful acts and crime situations are established. The advisability of such maintenance is driven by involving those types of stands in recreational felling process.

Horizontal type of a spruce landscape is at Myeshebashevskiy forest district. Here are its features: thirty-five years old, at medium height of 14 m, diameter is 14 cm, bonitet 1st forest class, forest density is 1.0, forest type is a lime wood spruce wood, habitat area is suramen. Poor aesthetic qualities, low passability in combination with poor viewability do not allow spruce forests to take their rightful place in recreational assessment hierarchy.

In that forest plantation the desired limit of viewability and passability is reached by row cutting (intensity of 17.5%) or snedding the trees that are at the height up to 1.3 m. Those are optimal indices of felling dense spruce stands that will increase passability and view depths.

Landscape felling and architectural planning arrangement conducted in 1991-1992 in a vigorous and perfect in terms of quantity pine undergrowth located in Matuyshinskiy coniferous forest also have given gratifying results. As space plays the leading role in the landscape and is a main window to the world, road network layout has required taking undergrowth espacement and its structural coefficients into account. It will define the final architectural and planning arrangement of a territory in the future. Therefore, while forming stand - alone and evenly spaced undergrowth groups, the emphasis has been made in their conservation.

2. Conclusion

Creating edge effect in all-aged broadleaved stands is possible due to combined method at intensity of up to 19 %. Low thinning method with a simultaneous rise of crown layer up to 1.3 m (17.5% intensity) is effective in dense spruce stands. In terms of architectural and planning arrangement of old- aged pine forests felling, diverse undergrowth espacement has to be taken into account while designing road networks.
Those conducted goal–oriented landscape felling convinces that the range of its use can be a lot broader. Landscape felling of a target objective is a non-traditional type of cutting. Research results might be used while conducting landscape felling. They will serve to preserve forests’ recreational potential and to fully satisfy population demands for favorable living environment.

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