Urban Forests of Riga, Latvia – Pressures, Naturalness, Attitudes and Management

ILZE JANKOVSKA1, INGA STRAUPE2, GUNTIS BRUMELIS3, JANIS DONIS3 AND LIGA KUPFERE1
1 Forest Faculty, Latvia University of Agriculture, Akademijas iela 11, Jelgava, LV-3001, Latvia; inga.straupe@llu.lv; +37129442520
2 Faculty of Biology, University of Latvia, Kronvalda bulvāris 4, Riga, LV-1010, Latvia
3 Latvian State Forest Research institute „Silava“, Rīgas iela 111, Salaspils, LV-2169, Latvia


Abstract

The urban forest landscape in Europe differs depending on the past history of sociopolitical cultures. Latvia presents a special case, as perceptions of urban green spaces changed from a period of Germanic dominance, to a developed European Republic, later subdued in the Soviet era, and now to a European country in transition. The human footprint has been relatively moderate, and there is little alienation between people and natural values. In Riga there are 15 forest tracts, some connected with rural forests and others are isolated remnants of ancient or planted forests. These forest stands are mostly dominated by Scots pine Pinus sylvestris L. on poor dry soils, with a characteristic feather-moss layer. While recognition of the importance of urban forest ecosystems in resilience of the city is growing, recreational pressure and demands for aesthetic, novel, man-made landscapes are significant. Governance in Latvia almost completely overlooks the complexity of urban forest management and there have been no attempts at integration of ecological, social, aesthetic and recreational functions in all-encompassing landscape planning of Riga forests with all relevant stakeholders participating. As a result, the ‘naturalness’ of the forests has been largely shaped by recreation loads. Knowledge is needed on the ecological and recreational functions of these forests, in order to develop specific management plans. We firstly used species and plant functional groups to derive indicators to determine extent of ecological degradation of the forests. Secondly, we applied the psychophysical method to determine public preferences for forest landscape models on images that were created with the aim to portray different management practices (e.g. retention of deadwood, cutting of understorey, and recreational infrastructure). We examined four types of forest landscapes and found a significant difference both in public preferences between them and in choices of respondent groups for the most preferable landscape for recreation.

Key words: recreation, forest management, landscape preference

Introduction

Urban forests are part of a complex environment that contains complicated diverse and interconnected ecosystems. The wooded area is an indicator of sustainability in the city; forest provides natural areas to inhabitants, which needs to be considered in city development and policy (Weng 2007, Cekule 2010). While recognition of the importance of urban forest ecosystems in resilience of cities is growing, recreational pressure and demands for aesthetic, novel and man-made landscapes are high. Spatially non-planned recreation and excessive recreation loads have impact on forest ecological functions and create a mosaic of disturbed and undisturbed forest compartments (Bell 2008, Kuzmina and Treshkin 2010). Planning of the urban environment needs to combine landscape design with ecological management to develop stand stability, ensure that recreation does not cause degradation of forest ecological functioning, and to develop the respective infrastructure to increase forest accessibility while conserving its biological value (Emsis 1980, Heyman et al. 2011).

In Europe, the inclusion and maintenance of natural areas in cities has long traditions from the start of development of civilization (Cekule 2010). The roles of urban green spaces differ widely between European cities and towns due their different environmental and socio-cultural background. The forest culture of the northern Europe in the eastern Baltic countries and Fennoscandia is rather similar, in those forest is a significant element of everyday lives, it is important in national economies, and is a major element of the landscape (Tyrväinen et al. 2006, Bell 2008). In this respect, the recreational and aesthetic benefits of urban forest are traditionally important (Gunnarsson and Øhrstroom 2007, Chen and Jim 2008), which differ from the central Europe, where land conversion processes
have been profound. In Latvia, as in other countries of the Northern Europe, the human footprint on nature throughout the twentieth century and the alienation between people and nature had less impact.

About 0.8% of all Latvian forests are considered urban forests and 20% of urban areas are covered by forests (Donis 2001). Presently, natural areas contribute 54.2% of the total area of Riga (Cekule 2010), of which the inner city wooded area is 4244 ha. According to Latvia legislation the urban forests cannot be exploited for timber production as the main management goal and clear-cutting is not allowed. Thus, the main management activities are focused on forest structure and health. Governance in Latvia largely ignores the complexity of urban forest management and there have been no attempts at integration of ecological, social, aesthetic and recreational functions in all-encompassing landscape planning of Riga forests with all relevant stakeholders participating. Thus, while knowledge of the multiple functions and significance of urban green areas in Riga does exist (Jankovska et al. 2010), it is not integrated in planning documents. In Riga there is no unified forest or green area management model or plan, and information exchange with state institutions, NGO’s and other organizations is poor (Gaiss 2009). Tyrväinen et al. (2008) considered that problems in regard to urban forest infrastructure exist in all of the new European Union countries. Generally, the intensity and ways of forest management are determined by forest policy and ownership but the financial resources allotted for management of European city forests is often insufficient, leading to degradation of functions and decrease of use (Gundersen et al. 2006).

In Riga, there is a need to determine recreational loads to forests and their impact on vegetation. Previous research showed that the recreational target of going for a walk in a forest was chosen by 60% of Riga city inhabitants and 34% of respondents travelled to the forest afoot. The mean distance for this recreational target in Riga city was 1.5 km on working days. This information was used to create a GIS model that predicted average distribution of visits/year to forest areas afoot for walking (Jankovska et al. 2013). The predicted highest recreational pressure occurred in isolated forests located in proximity to the city centre and in places with greater population density. Traditional phytosociological study showed insignificant changes of the forest environment and typical boreal forest vegetation. Significant proportion of boreal vascular plant and moss species was observed in one group of communities, which were called unimpacted forest (Straupe et al. 2012). In another group (impacted forest), the proportion of boreal species was low (mainly in the tree and shrub layers), nemoral tree species were more common, ground vegetation was trampled, and there was a larger proportion of adventive and introduced species. However, the processes governing vegetation composition in relation to recreational load might best be studied using plant attributes (Ikauniece et al. 2013) rather than by the taxonomic units of species. Clearly this needs to be better understood, to enable choosing the correct management methods.

Natural character of the forest and the landscape are the main factors determining its perceived value and suitability for recreation. Each person’s individual value of a forest for recreation is based on their conception of a landscape beauty and personal emotional longings (Gobster 1996, Jestaedt 2008). These different individual needs and perceptions differ, creating conflicts in the choice of a forest landscape created by forest management (Tyrväinen et al. 2003). Therefore, there is a need to determine the perceptions and values of the human community regarding its recreation in forest, which would allow to choose management methods that retain or create these qualities. However, ecological functioning of a forest is just as important as are needs for recreation, and both need to be integrated in planning. The chosen management methods should promote natural succession, be economically efficient, and promote use of forests for recreation (Jankovska 2013).

Assessment of visual quality and suitability for recreation, depending on forest management intensity, was carried out in Latvia in 2008 (Donis 2011). The preferred choice for recreation was a forest landscape formed by sparse stands, or a forest composed of a mixture of sparse to dense stands. The least preferred was landscape with clearcuts. Most respondents preferred some facilities (for example, paths) but while conserving naturalness. The least preferred were forest stands affected by cutting and those transformed into wooded parks.

This paper presents an empirical application of the psychophysical methods to study the landscape experience and perception. These methods employ techniques that allow to examine the relationships between experiential qualities of landscapes and their physical characteristics. Photographs of landscapes are generally used, whereby the effect of specific physical characteristics of landscape on perceived experiential qualities (safety, preference, scenic quality) can be investigated by manipulating the physical characteristics of landscape (e.g. by adding or taking away different attributes) (Karmanov 2008). This approach allows high accuracy in assessment, as it involves humans as observers of landscape quality and estimates the
role of biophysical characters of the landscape. The psychophysical methods has been widely used in Fennoscandia in the past 30 years in assessment of landscape quality (Gundersen and Frivold 2008) and the most important recreation and landscape value parameters have been utilized in forest policy, planning and management in several European countries (Kohsaak and Dembczynski 2004).

The first goal of our study was to determine effect of recreational pressure and forest tract size on composition of vegetation in terms of plant attributes. The second goal was to evaluate the impact of different management activities to landscape attributes to identify the most preferred landscape models for recreational use by groups of local residents. Thirdly, the above goals were integrated to provide suggestions for optimal management directions for forests of Riga.

**Materials and Methods**

**Site description**

Riga city forests consist of 15 forest tracts, some of which are connected with rural forests outside the city and others are small isolated forests (Figure 1). The dominant tree species is Scots pine *Pinus sylvestris L.* (88% of total forest area). As most of the pine forests (80% of the area) occur on poor sandy soils, they have high landscape appeal due to openness but are highly susceptible to recreational pressure (Emsis 1980, Straupe and Kreile 2010). The city forests have been planted or are fragments of older forest. Stand age is mostly 80-100 years. The vegetation of Riga urban forests has diverse structure, from typical open dry pine forest to patches overgrown with shrubs or a grass-dominated cover. The management of green areas in Riga is regulated by the Riga Dome regulations No. 34 on use and building in the Riga territory. All green areas are defined as nature areas. They are not classified by functional, landscape and natural elements, and include recreation areas, forest parks, agricultural land and forest (Jankovska 2013). Most of the wooded area of Riga is classified as forest park with primary use by recreation, sports and tourism, however the accessibility and recreation infrastructure are not developed properly. Another category is forests, which are considered as areas with primary forest ecosystem function. Spatially, the inner city wooded areas are forest parks and those on the outskirts are forests. In this paper, we consider the forest category.

**Vegetation analysis**

Three plots (20×20 m) were placed in each of the fifteen forest tracts in dry *Myrtillus* pine forests. Vegetation was described by layers using standard field methods (Straupe et al. 2012). To understand the main processes governing plant community formation rather than analyze vegetation by taxonomic species composition, the plots were described by plant attributes. A matrix was derived with total cover in plots of species by plant structure (tree, tall shrub, low shrub, forb, graminoid, fern and moss), common habitat (boreal forest, temperate forest, grassland), introduced plus adventive species, nitrophilous species, and plant strategies (stress tolerant, competitor and ruderal) sensu Grime (2002). Information on plant attributes was taken from the Biolflor database (Kuhn et al. 2004). A species was considered nitrophilous if it had a rank of at least 7 on the N according to the Ellenberg scale. Then, redundancy analysis (RDA) was conducted to identify gradients in vegetation composition based on these attributes, constrained on a matrix of environmental factors (recreation load and forest tract size). Recreational load was estimated as potential number of visits per year (Jankovska et al. 2013). Based on the estimated loads, the forest tracts were classified into 9 recreational load classes. Forest tract size was estimated in ha.

**Landscape quality**

We used the psychophysical method for evaluation of forest landscapes to determine forest management activities that affect the visual appeal of a landscape and willingness to use it for recreation. The psychophysical paradigm provides a way to predict which landscape factors are associated with public perception of scenic beauty, in a framework of landscape management application (Zube et al. 1982). We chose four typical landscapes of Riga city forests, which differed in vegetation, structure and landscape attributes (open-
ness, diversity, coherence, visual accessibility, etc.): two rather unimpacted forest tracts (Buļļi and Mangalsaļa) and two impacted forest tracts (Annīņmuiža and Mežaparks). On these images, which we defined as the status quo state, we modified seven more images using Photoshop 7.0, to portray changes in landscape (vegetation structure) and accessibility (amenities) that would result from various types of management. Thus, four choice sets were created (‘Annīņmuiža’; ‘Mežaparks’; ‘Buļļi’; ‘Mangalsaļa’), each with eight images: status quo state and seven different hypothetical landscape models. On each image was also given the estimated cost of the management (per hectare) and defined changeable landscape attributes created by management (branches, understorey, logs and recreational facilities). A survey of residents was conducted in Riga city forests and neighbourhoods in 2011 to determine community preference. A total of 506 respondents were involved. Each respondent was provided with 4 sheets or choice sets corresponding to the four status quo situations and were asked to choose only the most preferred landscape model in each choice set for recreational activities.

Further, we tested significant differences in the preferences for all respondent groups among each hypothetical landscape model but in this paper we present only the differences between the status quo state and models. The respondents were divided in the following groups: women (A); men (B); visit on weekdays/weekends (C); visit on weekends (D); respondents with higher and secondary education, who visit a forest on weekdays/weekends (E); and respondents with higher and secondary education, who visit a forest on weekends (F). The level of significance between landscape models features was determined by calculation of confidence intervals. Assuming that in large sample groups the theoretical value of Student’s criterion is \( t_{0.05} = 1.96 \), then if \( t_{0.01} < 1.96 \), the relationship is not significant, and if \( t_{0.05} > 1.96 \), the relationship is significant (Liepa 1974).

Results

Vegetation analysis

RDA was used to determine effect of recreational pressure and forest tract size on composition of vegetation in terms of plant attributes (e.g. life form, strategies). A Monte Carlo test showed that the first RDA axis and the ordination of both axis were significant and could not be explained by chance (accordingly, \( p = 0.0080 \) and \( p = 0.0020 \)) (Figure 2). Although the coefficient of determination \( R^2 \) was rather low (trace = 0.199), forest tract area was significantly related (GLM, \( p < 0.05 \)) to RDA axis 1 and recreation load to RDA axis 2. More boreal and moss species were found in large forests. Greater recreational pressure was associated with more grassland, nitrophilous, tall-shrub, and temperate zone species.

Landscape quality

Of the landscape models that were significantly more often chosen than the status quo state, the models with the most significant differences in choice are presented in Table 1.

The status quo state of the choice set ‘Buļļi’ represents an open forest with uniform tree age structure but its location on dune topography and the presence of understorey saplings and shrubs make the landscape to be complex, attractive and diverse (Figure 3a). The most frequently chosen landscape models were VI and VII (Figure 3b-c), respectfully, confirmed by 31% and 16% respondents. In comparison, the status quo state was chosen only by 6% respondents. The most chosen landscape model was VI (5.11dS0.05dS9.26) confirmed by all respondent groups (defined management activities: understorey removed; facilities implemented – path and bench; Figure 4b). The second most chosen landscape model (3.72dSt0.05dS6.06) for all the respondent groups was model VII (defined management activities: shrubs not cut, logs and dead branches present, and facilities implemented; Figure 3c). For A, B, D, E and F respondent groups, the third most chosen was model V (3.00dSt0.05dS5.03) (samplings and shrubs cut, logs removed, dead branches removed, facilities implemented; Figure 3d), but for respondent group C (\( t_{0.05}=2.19 \)) – the third choice was model IV (understorey, dead branches and logs present, without facilities; Figure 3e).
The *status quo* state in the choice set ‘Mangalsala’ depicted an open accessible pine stand with homogeneous tree structure (Figure 4a). The most chosen alternatives models, which significantly differed from the *status quo* state, were III and VII, respectively, by 29% and 21% respondents. The *status quo* state was chosen only by 11.4% respondents. Landscape model III was most often chosen (2.81*dst = 4.45) by all respondents except group E (defined management activities: understorey and dead branches present, logs removed and facilities not implemented; Figure 4b). Landscape model VII (understorey present, dead branches and logs removed, facilities implemented) was the second choice (*t obs = 2.23*) after model III for respondents from group F (Figure 4c). For respondent group E, the landscape models did not differ in choice.

The *status quo* state of the choice set ‘Anninmuiza’ was a forest stand with dense sapling and shrub understorey, which made the landscape to be closed, unable to see through and uniform (Figure 6a). The most often preferred landscape alternatives were VI, V and VII, selected by 27%, 21%, and 14% respondents, respectively. In comparison, the *status quo* state...
was chosen only by 5.3% respondents. Alternative VI was most often chosen by A, B, C, D, and E respondent groups (4.81$ds_{1.06}, ds=7.52$), while this was the second choice for respondent group F ($t_{0.05}=5.74$). In this model, the defined management activities were: understorey, dead branches and deadwood removed, and facilities implemented (Figure 5b). Landscape model V (understorey and dead branches present, dead wood removed and facilities implemented) was the second choice for A, B, C, D, and E respondent groups (4.36$ds_{1.06}, ds=5.77$), while this was the first choice for respondent group F ($t_{0.05}=5.25$) (Figure 5c). Landscape model VII was the third choice (2.09$ds_{1.06}, ds=4.05$) for A, C, D, and E and F respondent groups (understorey removed, deadwood present, dead branches removed, facilities implemented; Figure 5d), while model VIII was the third choice ($t_{0.05}=3.59$) for B respondent group (understorey, dead branches and deadwood present, and facilities implemented; Figure 5e).

The status quo state of the choice set ‘Mežaparks’ was a wooded meadow setting in an intensively managed even-aged stand. There was a path in the foreground, and the landscape was open, accessible and homogenous but the understorey made the landscape to be complex and attractive (Figure 6a). The most preferred alternative models were VI, V and VII, chosen by 27%, 21%, and 14% respondents, respectively. In comparison, the status quo state was chosen only by 5.3% respondents. This choice set had the most variability in respondent preferences, as also indicated by the lower values of significance. A and C respondent groups most preferred (3.71$ds_{1.06}, ds=4.55$), and F group second-most preferred ($t_{0.05}=2.84$) landscape model VII (defined management activities: understorey and dead branches removed, deadwood present, and facilities implemented; Figure 6b). Landscape model VI (understorey removed, dead branches

**Figure 5.** The most chosen landscape models in the choice set ‘Anniņmuiza’ (author: I. Bojare)

**Figure 6.** The most preferred landscape models in the choice set ‘Mežaparks’ (author: I. Bojare)
present, deadwood removed, and facilities implemented) was the second preferred choice for A, B, D, and E respondent groups (2.03 M = 2.63 s = 2.69) and for E and F respondent groups – the third choice (2.24 M = 2.80 s = 2.84) (Figure 6c). Landscape model V (understorey present, deadwood removed, dead branches present, and facilities implemented) was the most chosen (3.17 M = 2.66 s = 2.10) for B, D, E, and F respondent groups and third in preference for A respondent group (t = 2.66) (Figure 6d). For C respondent group, the second most chosen (t = 2.66) alternative was model III (understorey removed, dead branches and deadwood present, no facilities implemented; Figure 6e), and the third most chosen (t = 2.33) was model II (understorey removed, dead branches and deadwood removed, and no facilities implemented; Figure 6f). For D respondent group the third most preferred (significance t = 2.84) was model VII (understorey, dead branches and deadwood present, and facilities implemented; Figure 6g). For B respondent group only two landscape models were significantly preferred (V and VI), in comparison with the status quo model.

Discussion and conclusions

In urban forests recreational load can cause changes in the landscape (Goris et al. 2007, Hamberg et al. 2008). The intensity of recreation is dependent on the number of inhabitants in neighbourhoods, the intensity and period of effect, and forest tract size (Emsis 1980, Malmivaara et al. 2002, Florgård and Forsberg 2006). The stress tolerant plant strategy, as defined by Grime (2002), is adaptation to growth in habitats, where resources are in low supply and the level of disturbance is low. Previous studies confirmed that recreation and trampling have the most significant impact on projective cover and number of boreal species in the herb (ferns, Ericaceae species) and moss layers (Malmivaara et al. 2002, Malmivaara-Lämsä et al. 2008, Hamberg et al. 2008). Thus, vegetation with stress tolerant species with low productivity on sandy soils is sensitive to man-made disturbances and regenerates very slowly (Malmivaara-Lämsä et al. 2008). The RDA analysis in the present study indicated that the plant communities in forests with high recreational loads are not necessarily predictable by species composition. The species composition can differ in stands but the cover of grassland, nitrophilous, tall-shrub, and temperate zone species is higher. Thus, analysis using plant attributes showed a more clear relationship between recreational load and forest tract size. We found that typical unaltered boreal forest vegetation with high cover of moss and stress tolerant species occurred in stands with low recreational load, when forest tract area was large (Mangalsala, Buļļi and Jaunčiems), or in less sensitive forest tracts (Bikernieki, Jugla and Šmerlis). In contrast, in smaller forest tracts located close to the city centre (Annipmuiza, Mežaparks, Bābelite, Ulboka, Šāmpeteris, Kleisti, Vecdaugava, Lāčupe and Katlakalns), which are fragmented by city infrastructure and are under constant recreational load, there typically occurred a mixture of light-requiring grassland, tall shrub, nitrogen-requiring, ruderal and invasive species, independent of the effect of forest tract size.

In natural woodland the landscape is usually structurally and compositionally diverse at multiple scales due to disturbances and subsequent successions (Brunelis et al. 2011). However, in urban environments, natural processes are usually replaced by human-caused disturbances and simplified forest structure with even-aged stands has dominated (Nabuurs et al. 2001, Gundersen and Frivold 2008). Such management practice emphasizes a visual, stylized design of ideal nature that creates an illusion that a natural forest is in the mature stage and will always remain in this state (Gobster 1996). In the period since the 1960s, studies of landscape perception have shown that forest stands with multiple layers, which have arisen due to natural succession and are characteristic of old, overmature forests and edges, receive a low value in respondent preferences. Landscapes with an open view, accessibility, coherence, and homogeneity in tree age and vertical structure, or, so called, savanna-type tree stands, are preferred (Jestaedt 2008). Deadwood and wood debris left after management lower the perceived landscape value (Tyrväinen et al. 2003, Ode et al. 2009). In present study we found that the most preferred landscape models for all of the choice sets (except ‘Mangalsala’) was when the understorey, dead branches, and deadwood were removed and facilities (paths, benches, information boards) were implemented (for 27-31% of respondents). Although the landscape models with deadwood and understorey showing multiple successional stages were preferred by significant proportions of the respondent groups (men) (B), ‘visits forest on working days and weekends (C) and ‘visits on weekends (D), the presence of recreational facilities was significant. The recreational facilities provide assurance of the presence of humans and give direction of travel, improving feeling of security even if the understorey or dead wood in general are not preferred attributes. We observed that a significant proportion of respondent group ‘visits forest on working days and weekends’ (C) preferred landscape models without facilities (choice set ‘Buļļi’, ‘Mangalsala’, ‘Mežaparks’). Tyrväinen et al. (2003) observed that women usually prefer an open landscape
without dense understorey. It was also confirmed in the present study that the respondents group ‘women’ (A) mostly preferred park-forest landscape models.

An important issue of forest management analysis is related with the current state of management (status quo). Some studies have shown (Hanley et al. 1998, Horne et al. 2005) respondents prefer to retain the status quo alternative (when other facilities are identical). Surprisingly, in our datasets the proportion of status quo preferences varied from 5.3% to 11.4%, which was less those for other alternatives. This indicates that most would prefer a change in management (Pavllyuk and Jankovska 2012). For example, the Annīņmuiža forest tract is located within the Imanta residential area where the resident density is 5539 persons/km² (Jankovska 2013), and the visual attractiveness of it is relatively low (Emsis 1980). The high resident density creates a high social use and importance of the forest, which continuously increases degradation of the ecosystem. Thus, the residents use the area for recreation, but the high loads and insufficient management has led to low landscape quality. In contrast, the impacted Mežaparks forest tract with size 500 ha, which has implemented facilities and low resident density – 373 persons/km² (Jankovska 2013) has maintained relatively more typical vegetation of pine forests. In the less impacted forests in the city periphery (‘Buļļi’ and ‘Mangalsala’ sets) the ecological role of the forest is more important than the social role, and the typical vegetation and landscape has survived the low recreational loads. However, the residents also in those choice sets would prefer management, such as implementation of facilities.

The choice set ‘Mangalsala’ differed from the others by having an open, easily accessible status quo landscape. In this case, all respondent groups preferred a model with understorey over the status quo state, and the presence of facilities was insignificant. Simonič (2003) found that the landscape of choice usually contains specific spatial information, has distinct structure and is complex, and less frequently, a simple or abstract landscape. Thus, a simple, homogenous open landscape with even-aged tree structure of ‘Mangalsala’ choice set was not preferred, and management should therefore create a mosaic type uneven-aged stand structure with both open and closed spaces, increasing the landscapes complexity and mysteriousness.

We found that the landscape model choice was dependent on the status quo state. Management was preferred, if understorey was present in the status quo state (‘Buļļi’ and ‘Mežaparks’), or the landscape was closed and uniform (‘Annīņmuiža’). However, when the status quo state was an open-type pine forest (‘Mangalsala’), the public showed alternative preference for a diverse, complex and mysterious landscape.

The use of the psychophysical method and assessment of hypothetical forest landscapes in the present study confirmed that visual perception dominates over cognitive perception, as shown previously (Gobster 1999, Parsons and Daniel 2002). Persons firstly assess the landscape by psycho-emotional and biophysical parameters, while assessment of landscape elements that requires a cognitive approach and ecological knowledge has secondary importance. The respondent groups ‘with higher and intermediate education, who visit forests on weekdays and weekends’ (E) and ‘with higher and intermediate education, who visit forests on weekends (F), who might be expected to landscapes with greater ecological and aesthetical values and higher biological diversity, did not however, differ from the other groups in preferred choice.

The present study allowed to determine the role of recreation load and forest size in determining impact on vegetation in the forest tracts of Riga. The views and social needs of the community were also identified, which can allow to identify the required management methods. Knowing the importance of both ecological factors and social preferences of landscape, both of these factors can be integrated in management, which should promote natural succession processes, be economically effective, and promote forest use by residents (Jankovska 2013). We consider that carefully organised surveys, such as those presented here, can help forest managers identify management alternatives preferred by the public and utilise this information for policy making. The most important management option that should be considered in the Riga forest tracts is to increase public awareness of natural structures, such as deadwood and understorey. Management activities should differ depending on the main function of the specific forest tract. In forests located in suburbs with undeveloped accessibility, ecological functions should be maintained by supporting the natural character of existing habitats and protection of biological diversity by provision of paths in the most accessible areas. In forests located close to residential areas and which have high recreational loads and social importance, the implementation of recreation facilities should be increased (i.e., paths, benches, picknickering areas), and openness of forest stands along paths to improve the landscape aesthetic value.

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ГОРОДСКИЕ ЛЕСА РИГИ, ЛАТВИЯ – АНТРОПОГЕННЫЙ ПРЕСС, ЕСТЕСТВЕННОСТЬ, ОТНОШЕНИЕ К НИМ И УПРАВЛЕНИЕ

И. Янковскя, И. Страупе, Г. Брумелис, Я. Донис и Л. Купфер

Резюме

Ландшафт городских лесов в Европе различается в зависимости от истории политической и социальной культуры. Латвия представляет собой особый случай, так как восприятие городских зеленых насаждений изменилось с периодом германского господства в развитую европеюскую республику, покорённую в советские времена и теперь, ставшую снова европейской страной. Антропогенное воздействие здесь было относительно умеренным, а связь между людьми и природными ценностами довольно тесной. В Риге имеется 15 крупных лесных массивов, некоторые из которых связаны с сельскими лесами, а некоторые представляют собой изолированные остатки древних лесов или лесосаждений. В этих лесах в основном преобладает сосна обыкновенная Pinus sylvestris L. на бедных сухих почвах, с характерным слоем мхов. В то же самое время понимание важности городских лесных экосистем в устойчивости города растёт, поэтому рекреационные нагрузки и требования к экстетическому, необычному и искусственному ландшафту являются значительными. Руководство Латвии не полностью контролирует сложность управления городскими лесами и было предприятило мало попыток интеграции экологических, социальных, экстетических и рекреационных функций во всеохватывающее ландшафтное планирование лесов Риги со всеми заинтересованными сторонами. В результате „естественность” лесов в значительной степени определяется рекреационными нагрузками. Необходимы знания касательно экологических и рекреационных функций этих лесов для разработки конкретных планов управления. Во-первых, нами использованы виды растений и функциональных групп для получения показателей, позволяющих определить степень экологической деградации лесов. Во-вторых, нами применялся психофизический метод для определения общественных предпочтений для моделей лесного ландшафта по фотографиям, сделанным с целью изображения различных методов управления (например, сохранение сухостоя, вырубка подлеска, рекреационная инфраструктура). Нами рассмотрены четыре типа лесных ландшафтов и обнаружены значительные различия в общественных предпочтениях между ними, а также в выборе групп респондентов для наиболее предпочитительных рекреационных ландшафтов.

Ключевые слова: рекреация, управление лесами, предпочтение ландшафта