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Analysis of Legal and Theoretical Framework Creating the Methodology of Visual Pollution Assessment for Natural Landscapes

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Fulfilling the requirements of European Landscape Convention (2002) and following the statements of the National Landscape Policy of the Republic of Lithuania (2004) in 2014 the Ministry of Environment of the Republic of Lithuania initiated creation of Methodology of the Assessment of Visual Pollution to Natural Landscape Complexes and Objects. In order to prepare the Methodology legal and theoretical framework of visual impact assessment (VIA) was analysed and evaluated. The analysis showed that international legal documents create all preconditions for the VIA at the national level. The national legislation requires the avoidance of visual pollution (in the state parks regulations), but there are no recommendations how to evaluate visual impact. Foreign countries in the field of VIA, unlike Lithuania, have validated concepts of landscape visual quality and planned activity or object visual impact assessment; systemic and objective methodological recommendations of visual impact assessment, which are used in practical activities of planning and design. Methodologies used by Lithuanian authors are well developed theoretically and intended for the overall evaluation of landscape visual quality or VIA, designation of landscape visual quality classes, evaluation of visual spaces (VS) indicators, establishment of VS visual resistance and sensitivity. Parts of some works can be used for the creation of methodology of visual pollution (negative visual impact) assessment.

KEYWORDS: natural landscape, visual impact assessment, visual pollution.

Introduction

By ratifying the European Landscape Convention (ELC) (2002), Lithuania, together with other countries, acknowledged that the landscape contributes to the formation of local cultures and that it is a basic component of the European natural and cultural heritage, contributing to human well-being and consolidation of the European identity. However, in recent times due to the socio-economic, technological development, globalization, and other factors landscape is changing rapidly, and its quality support actions become increasingly important for the sustaining main qualitative (ecologic, aesthetic, social, cultural, economic, etc.) features of it. Landscape visual quality is important to society from aesthetic, ecologic, historic and economic points of view. It is a public resource and environmental asset, which is a valuable part of landscape as a geo-cultural system.

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Human activities (construction, agriculture, mineral extraction, deforestation, outdoor advertising, etc.) cause landscape anthropogenisation. They can result in the creation of cultural landscapes with positive qualitative indicators or low quality degraded landscapes. Various ecological impacts on the natural structure of landscape are assessed in order to avoid the decrease of landscape quality and formation of degraded landscape. Visual quality of landscape as one of the qualitative aspects of it decreases too and assessment of visual impact helps to prevent the loss of landscape visual-aesthetic potential.

Negative visual impact could be defined as visual pollution. This phenomenon must be identified, assessed and regulated. Especially in the case of natural, protected areas, because they are more sensitive and their visual capacity is quite low comparing with man-made landscapes (townscapes).

Regard to this situation and fulfilling the requirements of ELC (2002) and following the statements of the National Landscape Policy of the Republic of Lithuania (2004) in 2014 the Ministry of Environment of the Republic of Lithuania initiated creation of *Methodology of the Assessment of Visual Pollution to Natural Landscape Complexes and Objects*.

Developing the Methodology the legal framework (international and national legislation) of the assessment of visual pollution (negative visual impact) on landscape was analysed. Lithuanian (scientific works of M. Purvinas (1975, 1983a, 1983b, 1990), P. Kavaliauskas (2011), J. Abromas (2014), etc.) and world-wide experience (United States (Environmental impact..., 2008; Turner, 2003; Visual Resource... 2001; Manual 8431..., 2012), United Kingdom (Morris and Therivel, 2001; Guidelines for Landscape..., 2002) Germany, Spain, New Zealand, South African Republic, Australia (Evaluation of Methodologies..., 2012; Böhm, 1996; Turner, 2003; Guidelines for..., 2005)) in the fields of the assessment of landscape visual-aesthetic potential and visual impact assessment as the theoretical framework was analysed too.

The aim of the paper is to review legal and theoretical framework of visual impact assessment (VIA) and to present the main legal and theoretical premises of visual pollution assessment (VPA) for natural landscapes.

Methods

In order to get the research results we performed literature analysis. We analysed theoretical issues of visual impact assessment (VIA) in United Kingdom, United States, Germany, Spain, New Zealand, South African Republic, and Australia (Environmental impact..., 2008; Turner, 2003; Visual Resource... 2001; Manual 8431..., 2012; Morris and Therivel, 2001; Guidelines for Landscape..., 2002; Evaluation of Methodologies..., 2012; Böhm, 1996; Guidelines for..., 2005); reviewed Lithuanian experience in the fields of the assessment of landscape visual-aesthetic potential and visual impact assessment (scientific works of M. Purvinas (1975, 1983a, 1983b, 1990), P. Kavaliauskas (2011), R. Skorupskas and V. Vasilevskaja (2014), J. Abromas (2014), etc.). Lithuanian and world-wide experience was compared and evaluated considering the concept of visual pollution (negative visual impact) and the necessity of its assessment for natural landscapes. The main criteria of material selection and analysis were the following: formulation of scientifically valid notion of visual pollution (negative visual impact), identification and description of comparative indicators (physical and visual characteristics) of landscape and the object of visual pollution, clarification of the main stages of VPA, and determination of the content of each stage of VPA.

The legal framework (international and national legislation) of the assessment of visual pollution (negative visual impact) to landscape was analysed too. The statements of EU Directive on Environmental Impact Assessment (85/337/EEC) (amendment 2014/52/EU), EU Directive on Strategic Environmental Assessment of plans and programs (2001/42/EC), European Landscape Convention (2002), the Recommendation CM/Rec(2008)3 of the Committee of Ministers to member states on the guidelines for the implementation of the European Landscape Convention, national political documents (National Landscape policy (2004)), studies (National Landscape Study (2013)), laws (Law on Environment Protection (1996), Law on Protected Areas (2001), Law on Im-

movable Cultural Heritage Protection (2004), etc.) plans (National Landscape Management Plan (2015)), and other documents were reviewed. Afterwards concluding statements about common legal preconditions for the assessment of visual pollution were made.

Results

Legal framework

Internatio-al level

The Legal preconditions for the Assessment of the impact on landscape relay on the requirements of the EU Directive on Environmental Impact Assessment (EIA) (85/337/EEC) (amendment 2014/52/EU) and EU Directive on Strategic Environmental Assessment (SEA) of plans and programs (2001/42/EC), which applies to a wide range of public and private projects. EIA and SEA requires assessing the impact on landscape, and particularly, to indicate significant effects on the all protected areas (Council Directive..., 1985; Directive 2001/42/EC..., 2001).

European Landscape Convention (2002) promotes the protection, management and planning of European landscapes. This treaty focuses attention on both the character of the area and the human perspective, perception of this area. It defines "landscape" as an area, perceived by people, whose character is the result of the action and interaction of natural and/or human factors.

ELC Implementation Guidelines (Recommendation CM/Rec(2008)3..., 2008) indicate the need to integrate landscape issues (analyses, studies, plans, etc.) into all sectorial policies and EIA system, even more – recommend to establish specific procedure for landscape evaluation of projects for which official permission is required, but which are not yet a subject of the EIA or SEA. The documentation should: show how the project fits into the different contexts (the "immediate" context of a development proposal, and its "halfway" and "distant" contexts), which present problems of visibility and intervisibility of sites in the largest areas; show the link with materials, colours and building techniques; describe the impact on biotic and abiotic aspects; reveal the conditions of the sites and contexts before work is carried out; demonstrate the consistency of the project characteristics with the contexts; simulate how the site will look afterwards; demonstrate that the project conforms with its landscape planning and development instruments (plans, charters, etc.) and landscape quality objectives, where they exist; assess the effects of the proposed development on the places concerned and introduce, where necessary, mitigation measures which will ensure the maintenance of good landscape quality in those sites and compensation measures contributing to environmental quality.

National level

Implementing ELC, strategic National Landscape policy (NLP) (2004) document was approved by the Government of the Republic of Lithuania in 2004. This Strategy provides main objectives and general guidelines for the future actions. Among the main tasks related to the strengthening of aesthetical values protection there are the following tasks: ensuring appropriate management, use, planning and sustainable development of landscape safeguarding the main features and identity of the country; maintaining and enhancing existing biological and landscape diversity, the spatial structure and the ecological potential of the landscape; optimizing trends of the development of cultural landscape; harmonizing its architectural-spatial composition. While maintaining and strengthening aesthetical functions of landscape, it is foreseen to: sustain and enlarge the spatial expression of landscape; sustain and regulate informative diversity of landscape; enhance the individuality of landscape structures; seek for consistency between natural and artificial features.

In relation with these NLP tasks, the Ministry of Environment initiated development of the National Landscape Study in 2013. The Study (2013) systematizes general concepts, basic determinants and pressures on the landscape, ascertaining its types and morphology based on natural character, technogenic structure, spatial geochemical processes, aesthetical features, potential and spatial differentiation in the territory of Lithuania. The Study serves as the main scientific basis, the general

professional landscape information for the State and Local authorities, planners, etc. There are distinguished areas of particular character, rarity, specific environmental sensitivity or aesthetic peculiarity.

Implementing the NLP, National Landscape Management Plan is prepared on the basis of National Landscape Study and it is foreseen to be adopted in 2015. The main goals of this document (Nacionalinis kraštovaizdžio..., 2015) are: to distinguish main functional structures of landscape and formulate quality objectives for them. The Plan provides territorial differentiation of aesthetical potential of Lithuania and enables to embed legally and spatially protection measures of aesthetical resources.

The legal preconditions for Visual impact assessment on landscape are laid out in legal acts, legitimizing landscape structure, character, features and functions as values of international, national, regional or local importance. The hierarchical system consists of Laws on Environment Protection, Protected Areas (PA), Immovable Cultural Heritage Protection (ICHP), Coastal Strip, Land, Forests, Territorial Planning, and others, Governmental Decision on Special Conditions of Land and Forests Use, special planning documents (Borders and zoning plans, Management plans) and different regulations of particular protected areas, individual and typical regulations of cultural heritage objects protection, regional architectural regulations of protected areas, etc.

The Law on Environment Protection (1996) regulates social relations in the environment protection. It states the main components and characteristics of environment and defines concept of potential harm on environment. The potential harm to landscape is indicated as made by direct or indirect impact on protected landscapes and their character, the change and impairment of their functions, features, which are important to environment and society, the worsening of the state of protected areas when there is a fact of controversies with requirements of environment protection.

The protection of visual attributes and aesthetical potential of landscape is a subject of the Law on Protected Areas (PA) (2001) and the Law on Immovable Cultural Heritage Protection (ICHP) (2004). Natural and particularly cultural values, the aesthetical value of territories and objects are recognized as an important part of general value. According to the PA and ICHP Laws, in all protected areas, territories and objects of immovable cultural and natural heritage all activities, which could harm their valuable features, ability to percept them, change the landscape character in their territories or surroundings are prohibited. The same regulation is applied for the recreational areas in State parks. The Articles 9 and 13 of the Law on PA prohibit to plant trees, which can diminish ability to observe panoramas of historical, cultural and aesthetical value, place commercial advertising boards, perform any activity, which can harm protected characteristics and objects, not related to the protected features in all State parks, natural and complex reserves. Design, reconstruction and construction of buildings in State parks are allowed only according to the requirements of legal acts, taking into account regional character of traditional architecture and landscape.

For the protection of natural and cultural values, specific visual preservation zones are established covering the areas from which values could be observed. According the Laws of PA (Article 18), and ICHP (article 11) activities, that could harm surroundings of valuable territory, object; could diminish optimal perception of values or the landscape in these visual preservation zones are prohibited. Such zones surround State parks, recreational areas, nature and cultural heritage monuments. The activities in these zones and general provisions on the use of protected areas are specifically regulated by the Governmental Decision on Special Conditions of Land and Forests Use (1992). Among the restrictions are prohibitions to construct buildings which can diminish aesthetical value of the landscape and plant trees, blocking up the historically, culturally and aesthetically valuable panoramas. In the State parks preservation zones there is prohibited to construct buildings, if this can reduce distinctness of natural relief and *increase visual pollution of the park area*. Among other requirements, in the preservation zones of nature monuments it is prohibited to harm, change the main features of the relief which forms character of the area, construct buildings and constructions, not related to the protected values exposition or management. Mostly

relying on the visual motives (visual disturbance), in almost all reserves it is prohibited to place container houses and other not used transport vehicles, garages. In landscape of geomorphologic reserves it is prohibited to lay down air electric or communication lines and place wind power plants, plant forest and trees groups which can unify, even relief.

Legislation requirements are much more generalized safeguarding the aesthetical values developing the landscape. The Law on Construction (2001) Article 5 states that the architecture of structure has to fit in landscape. The protection of landscape visual character is encrypted in the Law on Advertising (2013). According this law, it is prohibited to place free standing billboards in and above the roads, roads lanes and their protection zones, in the streets, if it could diminish visibility, threaten traffic safety; place outdoor advertisement in the areas of natural and complex reserves, state parks, if they are not related to the protected subjects (except city areas). Installation of advertising billboards in the areas of cultural heritage objects, territories and their preservation zones, other protected areas is allowed only with special permission of the responsible authority. The necessity to prepare special territorial planning document of local or regional level, i.e. Plan on regulation of outdoor advertising or relevant part in complex master plan, which must ensure that the advertising billboards will meet requirements of legislation on construction, planning, landscape and cultural heritage protection, and assess the potential visual impact on landscape is specified.

Implementing EU Directives of EIA and SEA the procedure of environmental impact assessment (including landscape) is organized by the Law on the Assessment of Environmental Impact of the Planned Economic Activity (2005) and partly by the Law on Territorial Planning (2013). National law on EIA describes the landscape as an object of EIA, states necessity to indicate the impact on landscape, and set mitigation measures. It focuses on analysis of such characteristics of landscape as: *regionality, structure, diversity, geomorphology, hydrographical network, afforestation.* The need for *visual assessment of the planned activity* is foreseen. Subordinating legislation stresses need to indicate cases when planned activity can cause short or long term *negative visual impact on the valuable landscape*, cultural heritage objects and territories and other important areas. Regulation on EIA Program and Report Preparation (2005) states the need to perform *visibility analysis* of the planned object/activity from the various points; to present information about the viewing points, level of their equipment and evaluate the impact on possible visitors' number changes. The *increase of the general ecological and aesthetical potential of the territory* is listed among the possible mitigation measures. The requirement to develop Scheme of the planned activity impact assessment on aesthetical, recreational resources is specified.

The Manual of SEA sets requirement to assess impact of the plans and programs on landscape, and to analyze what it is estimated impact of planned alternatives on the both protected and not protected valuable landscape and its *eco-recreational* and *visual recourses* (2006).

There are not many activities, which have specific Methodological recommendations of EIA: landfills (2002); hydroelectric power plants (2003), wind power plants (2003), lake cleaning (2004). All mentioned documents point out the need for visual assessment of these activities at the same time and implicate possibility that these constructions or actions can cause visual impact and can be visually harmful.

The Methodological recommendations of EIA of landfills (2002) require to provide information on landscape type, character, land use, recreational areas, to assess the impact on natural and urban landscapes, their *aesthetical potential*, nature frame and protected areas, *visibility* from different observation points, to analyze if the planned activity will fit into the landscape, to specify the necessary visual impact mitigation measures.

It is recommended, that the Report of wind power plants EIA should contain landscape character analysis of the affected area (type, structure, diversity, cultural values, traditionality, regional importance, *aesthetic features*, main observation points, panoramas, touristic and recreational

objects and territories), evaluation of the distance to protected areas, urban zones, roads, touristic routes, recreational areas and objects (2003). The scope of the recommended visual assessment is the following: possible changes of the visual features of landscape in the site and surroundings, the visual importance of wind power plant for the general visual character of the area. It is recommended to assess the direct and indirect visual impact form the all the significant view points and touristic and main auto-routes, residential areas, impact on important panoramas. The document denotes possibility of large impact of wind power plant constructions on the traditional, protected landscape, all the areas of natural, cultural, scientific and aesthetical significance, the ability to reach and observe protected values and recreational areas of the affected territories, diminishing of the recreational resources and the changes of the recreational conditions.

Summarizing the analysis of the legal framework it can be said that national legislation:

- declares aesthetical character, aesthetical features or elements (aesthetically valuable panoramas, silhouettes, dominants, traditional architecture style, etc.) of the particular areas and whole landscape as national values;
- defends ability to admire valuable territories and objects – it is prohibited to obstruct protected areas and objects, recreational areas, panoramas of significant value;
- partly interferes the development of the landscape informational field, architectural form;
- indicating the cases in which EIA process has to be applied and specifying the critically harmful impact on landscape (prohibited activities) indirectly notes these activities and their material shape as visual pollution;
- formulates the need for visual evaluation, assessment; preparation of aesthetical and recreational resources assessment schemes, but does not regulate the methods, means, information resources, does not specify content of visual studies and classification of possible impact significance;
- requires the avoidance of visual pollution (in the state parks regulations), but there are no recommendations how to evaluate visual impact.

Theoretical framework

International experience

The concept of environmental impact assessment (EIA) originated in United States, partly because of its extra-rigid system of zoning. Planning control in some American states was much less comprehensive than in Europe and there was great public concern about the harmful affect which individual development projects were having on the environment. The National Environmental Policy Act (NEPA) of 1969 became a model for similar legislation throughout the world (Environmental impact..., 2008). This act also states that all Americans have the right to aesthetically attractive environment. EIA is understood as evaluation of impact of every aspect of the planned object or activity on every aspect of environment. The matrix of evaluation of aspects interaction is used for this purpose. There is evaluated impact of project earthworks, waterworks, vegetation, paving, walling and building on natural environment (physical and biological), social environment (circulation and recreation), and spatial environment (views, spaces, skylines) (Turner, 2003; Visual Resource..., 2001). Project correspondence with visual resources management objectives is evaluated and possible negative impact is mitigated according contrast rating method developed by Bureau of Land Management. A visual contrast rating process involves comparing the project features with the major features in the existing landscape using the basic design elements of form, line, colour, and texture. The degree to which a management activity affects the visual quality of landscape depends on the visual contrast created between a project and the existing landscape. This assessment process provides the means for determining visual impacts and for

identifying measures to mitigate these impacts. Project features which repeat the basic design elements found in landscape are visually compatible with the contextual environment. Project features which make contrast with the contextual environment according the basic design elements are assessed as positively or negatively influencing landscape visual quality taking into account visual environment management objectives. The basic design elements are the main measures to achieve harmony of the project and environment reducing the negative visual impact. The main steps in the contrast rating process (Manual 8431..., 2012) are the following: project description, identification of visual resources management objectives, selection of key observation points, preparation of visual simulations and completion of the contrast rating.

In 1995 Landscape Institute (United Kingdom) published Guidelines for landscape and visual impact assessment (VIA) for the first time. Visual impact is defined as a change in the appearance of the landscape as a result of development which can be positive (improvement) or negative (detraction) (Morris and Therivel, 2001; Guidelines for Landscape..., 2002).

The main stages of visual impact assessment are: screening (determines the need of EIA) and scoping (identifies the scope and content of EIA); project description and description, classification and evaluation of visual resources of surrounding landscape; the systematic identification of potential impacts, prediction of their magnitude, and assessment of their significance; establishment of measures to avoid, reduce or offset negative effects of the development proposals.

During the process of VIA the type and magnitude of visual impact of the proposed development is determined according its visual compatibility with the surroundings (for ex., massing, height, shape, proportion and rhythms of building elements, colours and materials used) and the role of it in the visual environment: formation of visual obstruction (for ex., blocking of views towards existing landscape features; or existing/planned view corridors towards landmarks and notable features) or improvement of visual quality (for ex., clearance of visual obstruction and blight, appealing design features that enhance attractiveness of the landscape).

A very important stage of VIA is evaluation of visual impact significance. Impact significance is a combination of impact magnitude and the sensitivity of the receiving landscape and viewers. The sensitivity of the landscape potentially affected by the proposed development is based on the degree to which the landscape is able to accommodate change without unacceptable effects on its character. The most sensitive is protected landscape. The criteria of landscape sensitivity to the proposed development are the following: rarity and representativity, social significance, visual quality, localization of visual pollution, distinctiveness and identity, conservation interests, professional and public opinion. For ex.: sensitive landscape and large change results in a high significance of impact, landscape of law sensitivity and large change results in a moderate significance of impact.

The other countries have prepared methodologies of VIA considering their landscape peculiarities and experience of United States and United Kingdom (Evaluation of Methodologies..., 2012; Böhm, 1996; Turner, 2003):

- In Spain there is used VIA methodology structure and content of which is based on the VIA methodological principles of the United States (Böhm, 1996).
- In Germany (Evaluation of Methodologies..., 2012) landscape (visual) plans are prepared, which ensure protection of landscape identity, diversity and beauty; visual impact is assessed by specifying quantitative and qualitative indicators of it (colours, textures, visual relations, diversity, uniqueness, scale, proportions, openness of spaces, types, domination of components, etc.).
- In New Zealand (Evaluation of Methodologies..., 2012) the assessment has common ground with the United Kingdom method in its emphasis on landscape character. The physical, environmental, and visual attributes of the landscape, such as landform and land cover, combine with aesthetic elements to create the character or sense of place of an area or location. Physical, ecological and aesthetic landscape features (terrain, vegetation, buildings, imag-

ery, etc.) determine the protected character of landscape. The main VIA phases are: establishment of visual character and protected attributes of landscape; evaluation of landscape sensitivity; designation of observation points and observers, photo-fixations; assessment of impact of planned activities on landscape character; designation of areas that require mitigation measures and selection of them.

- In Australia methodology of VIA is also based on United Kingdom experience (Evaluation of Methodologies..., 2012). The guidelines describe eight steps required in carrying VIA: landscape character analysis based on desk and field study and incorporating the main physical, natural, and built components of the landscape; identification of landscape character zones if the size or complexity of the project suggests that this is helpful; assessment of landscape character impacts based on the sensitivity of the landscape character zone and the magnitude of the proposal in that zone (sensitivity means how sensitive the character of the zone is to the proposed change, while magnitude refers to the nature of the project and the size of the change); assessment of the visibility of the proposal by producing a visual envelope map, primarily related to land form but noting the obscuring effects of vegetation and buildings where possible; identification of key viewpoints within reasonable distance (unspecified) of the project, and within the visual envelope; assessment of visual impacts by combining judgments about the sensitivity of the view with the magnitude of the proposed project in that view; refinement of the concept design to avoid and minimize impacts at an early stage of selecting options and exploring concepts design; development of a mitigation strategy to minimize landscape character and visual impacts with mitigation measures that are integrated with the overall design of the project.
- Typical components of VIA in South African Republic are (Guidelines for..., 2005): identification of issues and values relating to visual, aesthetic and scenic resources through involvement of specialists and the public; identification of landscape types, landscape character and sense of place, generally based on geology, landforms, vegetation cover and land use patterns; identification of viewsheds, view catchment area and the zone of visual influence, generally based on topography; identification of important view points and view corridors within the affected environment, including sensitive receptors; indication of distance radii from the proposed project to the various view points and receptors; determination of the visual absorption capacity (VAC) of the landscape, usually based on topography, vegetation cover or urban fabric in the area; determination of the relative visibility, or visual intrusion, of the proposed project; determination of the relative compatibility or conflict of the project with the surroundings; a comparison of the existing situation with the probable effect of the proposed project, through visual simulation, generally using photo-montages. Visual sensitivity of the area is understood as the inherent visibility of the landscape, usually determined by a combination of topography, landform, vegetation cover and settlement pattern. Visual absorption capacity (VAC) is determined as the potential of the landscape to conceal the proposed project.

In other sources of information visual pollution is determined as the phenomenon that causes damage in the sense of beauty and the breakdown of aesthetic considerations and satisfaction and acceptance of the image of the ugly (Mohamed et al, 2011); that makes some negative changes in the natural environment and, in this way, turns the visual areas into something that disturbs people (Yilmaz et al, 2011; Nagle, 2009). Magnitude of visual pollution depends on the number of affected persons, on the distance between them and the observed object, and also depends on the orography of the terrain between the observation point and the observed object (Garcia-Garrido et al). The objects of visual pollution can be: structures, objects of transport infrastructure, garbage containers, electrical infrastructure, the area damaged by mineral extraction, cell phone towers, lighting, outdoor advertisement, neglected greenery, etc. (Visual Pollution..., 2007; Molnár...; Mohamed et al, 2011; Atta, 2013; Yilmaz et al, 2011; Nagle, 2009).

To sum up the experience of foreign countries in the field of VIA, it can be said that these countries, unlike Lithuania, have validated concepts of landscape visual quality and planned activity or object visual impact assessment; systemic and objective methodological recommendations of visual impact assessment, which are used in practical activities of planning and design (Table 1).

Works of Lithuanian scientists

In Lithuania theoretical field of landscape visual quality analysis and evaluation is quite broad and developed. Many scientists worked creating methodology of landscape visual quality analysis and evaluating it: K. Ėringis ir A. R. Budriūnas (1975, 2000), M. Purvinas (1975, 1983a, 1983b, 1990), V. Stauskas (1966, 2001), P. Kavaliauskas (1970, 1992, 2006, 2011, 2015), G. J. Daniulaitis (1970), J. Bučas (2001), J. Kamičaitytė-Virbašienė (2003), J. Abromas (2014), etc. The most objective and holistic conception of visual pollution is proposed by P. Kavaliauskas (2011), R. Pakalnis and Z. Venckus (2012). They state that visual pollution is the loss of aesthetic quality of landscape visual structure caused by irrational human activity. P. Kavaliauskas (2011) also defines the notion of landscape visual resistance. It is the ability of landscape structure to absorb new anthropogenic objects in its visual structure without changing the existing invariant type. This concept is synonymous to the notion of landscape visual absorption capacity – a term used in foreign countries VIA methodologies (Guidelines..., 2005; Kamičaitytė – Virbašienė, 2003; Evaluation of Methodologies..., 2012).

The most important methodical works from the point of view of assessment of visual pollution are methods of quantitative and comparative structural analysis developed by M. Purvinas (1975, 1983a, 1990), J. Kamičaitytė-Virbašienė (2003), P. Kavaliauskas (2011), R. Skorupskas and V. Vasilevskaja (2014) and J. Abromas (2014).

Method of landscape psychological-aesthetic potential analysis (structural analysis) developed by Martynas Purvinas is the most suitable for territory plans the scale of which is 1:500 - 1: 10 000. Landscape is described by model which consists of visual spaces of various sizes and visual importance marked on topographic plan (Purvinas, 1983a). Procedural steps of landscape visual analysis (Purvinas, 1975) are: designation of landscape visual spaces (VS) as landscape primary structural elements; establishment of VS characteristics (size, configuration, vertical and horizontal closure, visual relations, integrity); establishment of VS naturalness and variety; evaluation of psychological-aesthetical potential of the analysed area (attractive and unlikely objects aesthetically, dominant and background objects are marked); establishment of VS individual characteristics and expert evaluation (by method of overall impression). Methodical principles of psychological-aesthetical potential evaluation are applicable to analysis of visual contrast in terms of the planned activity or object visual impact assessment on the environment. After visibility analysis of the object, it is proposed to assess the visual impact (positive or negative contrast of the planned object with the environment, contrast level) according the ratio of object and environmental visual characteristics: size, form, color, tone, facture, and texture (Purvinas, 1990).

Paulius Kavaliauskas (2011) also states that the analysis of landscape visual quality should start from the designation of video-tops as visual spaces perceived as integral units from any point inside of them. The criteria of evaluation of landscape aesthetic potential are vitality (indicators are naturalness and wholesomeness), expressivity of landscape structure (indicator is the number of video-tops ranks), individuality (indicators are representativity and originality), and compositional harmony (indicators are formal compositional factors). Visual resistance of VS is analysed according the following indicators of VS: plan configuration, size and visibility.

Ričardas Skorupskas and Violeta Vasilevskaja (2014) developing structural comparative trend of landscape visual research performed analysis of natural landscape colors and forms perception. This work revealed the main factors, which are influencing the perception of the landscape. It is evident that the subject of the appraisal is extremely complicated because it embraces subjective judgement and objective indicators of landscape.

Jūratė Kamičaitytė-Virbašienė (2003) proposed the main theoretical methodological steps of VIA. The whole process of visual impact assessment of planned activity (development) has to be performed as follows: *establishment of the quality indicators of the standard (protective) visual type of landscape* (determining characteristics of visual spaces, proportions of opened and developed areas, principles of the layout of buildings and greenery, possible visual contextuality of buildings); *establishment of the present visual character of landscape* and comparison with the standard indicators of landscape visual quality; formation of *the target spatial model of landscape* (preparation of the *conception of landscape formation*) the visual indicators of which have to meet the criterions of vitality, complexity, harmony, expressivity, uniqueness, functionality and meaningfulness; after characterizing physical and visual features of the designed structure the *possible changes of landscape visual character* have to be established and evaluated from the *spatial* (typical viewing places and visual spaces, zones of visual influence), *quantitative* (levels of identity indexes of physical and visual characteristics of the structure) and *qualitative* (character of contextuality of the structure) point of view; in the stage of elaboration the *proposals of improvement of visual relation between the designed structure and the contextual landscape* have to be prepared according the visual influence of the structure on the main landscape components and overall scenery.

Jonas Abromas (2014) conducted feasibility study of wind turbines visual impact assessment on landscape. His proposed methodology of visual impact assessment consists of: cameral research (project descriptions, establishment of wind turbines visual impact zones, landscape character and visual sensitivity analysis, etc.); research in situ (description of observation points, photo-montages, photo-fixation, assessment of nature, significance and degree of visual impact, etc.); cameral research (public integration, selection of measures of impact mitigation, etc.).

Summarizing it can be said that methodologies used by Lithuanian authors are well developed theoretically and intended for the overall evaluation of landscape visual quality or VIA, designation of landscape visual quality classes, evaluation of VS indicators, establishment of VS visual resistance and sensitivity. Parts of some works can be used for the creation of methodology of visual pollution (negative visual impact) assessment (Table 1).

Table 1

Evaluation of theoretical-methodological framework relevance for visual pollution assessment

Country/Author	Methodological aspects applicable for the creation of methodology of visual pollution assessment to natural landscape complexes and objects
United States	The main steps in the contrast rating process; description of the basic design elements; levels of visual contrast
United Kingdom	The main stages of visual impact assessment; notions of visual impact and its significance
Spain	Notions of landscape visual sensitivity and capacity; the main steps of VIA
Germany	Quantitative and qualitative indicators of visual impact
New Zealand	Notions of landscape character and visual capacity; the main VIA phases
Australia	Steps required in carrying VIA
South African Republic	Typical components of VIA and notion of VAC and visual sensitivity of the area
Martynas Purvinas	Methodical principles of psychological-aesthetical potential evaluation
Paulius Kavaliauskas	Criteria and indicators of landscape aesthetic potential and visual resistance of VS
Jūratė Kamičaitytė-Virbašienė	Theoretical methodological steps of VIA
Ričardas Skorupskas and Violeta Vasilevskaja	Methodological issues of visual attributes (colours and forms) perception analysis
Jonas Abromas	Proposed VIA stages and their content

Conclusions

In order to prepare Methodology of the Assessment of Visual Pollution to Natural Landscape Complexes and Objects legal framework (international and national level) and theoretical framework (world-wide and Lithuanian experience in the field of VIA and assessment of landscape visual-aesthetic potential) was analysed and evaluated.

The analysis results of legal framework show that national legislation declares landscape visual-aesthetic potential as national asset and defends ability to admire visually valuable areas and objects; partly regulates the development of the landscape informational field, architectural compositional form; indicates the cases in which EIA process has to be applied and specifies harmful impact on landscape (prohibited activities) indirectly noting these activities and their material shape as visual pollution; formulates the need for visual impact assessment, preparation of aesthetical and recreational resources assessment schemes, requires the avoidance of visual pollution, but there are no recommendations how to assess visual impact.

The analysis of experience of foreign countries in the field of VIA, shows that these countries have validated concepts of landscape visual quality and planned activity or object visual impact assessment; systemic and objective methodological recommendations of visual impact assessment, which are used in practical activities of planning and design. Methodologies used by Lithuanian authors are well developed theoretically and intended for the overall evaluation of landscape visual quality or VIA, designation of landscape visual quality classes, evaluation of visual spaces indicators, establishment of visual spaces visual resistance and sensitivity.

Considering the analysis results it is possible to state that the assessment of visual pollution should be based on: the evaluation of visual resources and landscape character, landscape visual capacity (or sensitivity), and other aspects as the starting point for the evaluation of visual pollution; designation of observation points, photo-fixations and assessment of visibility of visual pollution object; description of characteristics of visual pollution object with the help of visual simulations (if necessary); and evaluation of negative visual impact (visual pollution) magnitude and significance.

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