

Experience Areas Landscape Design Features: Visualization Possibilities

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We understand 80 percent of the surrounding environment by sight, and 70 percent of experience landscape areas consist of plants. When planning experiences landscape area we use number of trees and shrubs shoots, stems, bark, leaves, flowers, fruits ornamental characteristics: colour, texture, shape or size. These measures through visual sense in the experience landscape areas can provide a unique look and mood. The aim of this article — review of the use of visualization's possibilities in the landscape design of the experience areas. This study is done in systematic and comparative analysis methods.

Visual sense in environment without some work of art is also expressed through some trees and bushes characteristics, features (colour, texture, shape and size) in the planning of experience landscape areas. These measures may take very specific purpose to identify the desired image and mood in the environment experience areas landscape design. Moreover, in the planning process we not only work with the drawings, but also provide visualizations to help realize our proposed ideas, to feel those experiences from the planning process, which helps to convince the customer. The common understanding of the green areas landscape design projects depends on how designer and customer can work on their different experiences/views to achieve the desirable result. Visualization projects of experience landscape areas we can divide into several possible categories depending on the tools and desired results. Visualization usually is created as an additional tool during the project or as an additional part of the project, which would increase the attractiveness. Results depend on selected different tools and quality of the visualization.

The most common problems occurred during the work with visualizations - *tool selection, project complexity mismatch with a computer programs and tools used to create forms; or content restriction.*

KEYWORDS: Experiences Areas, Visualization, 3D modelling, Rendering, Landscape Design.

A man learns about environment through the senses: sight, hearing, smell, taste, and touch. When you cannot see well, you prefer using other senses. Generally speaking about the experiences we usually think about entertainment experience, but the fact is that such areas may be very different (Tuch et al., 2008; Kučinskienė, Baravykaitė, 2012): public space (*recreation centres, shopping centres, restaurants, hotels, etc.*), education space (*museums, heritage sites, research centres, etc.*), the other space (*libraries, hospitals child units in residential areas, etc.*). It may also be relatively natural (*which consists primarily of natural elements of the natural environment*) or have urban landscape components. The planning of experience area starts with designing process. Without some means of artistic expression (*the proportions, zoom, accents, contrast, and other common composite measures*) environment visual sense can be created using some trees and bushes charac-

Introduction



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teristics, features - colour (*leaves, needles, stem, branches, shoots, flowers, fruit*), texture (*crown, trunk, branches, stems*), shape (*crown, leaves, flowers, fruits*), size (*plant and its branches, leaves, flowers, berries, fruits*). These measures affect experience areas of landscape design in different ways. Therefore it may be used for a specific purpose in the environment to identify the desired image and mood. Moreover, in the planning process we not only work with the drawings, but also provide visualizations to help customer realize our proposed ideas, to feel those experiences from the beginning of the planning process, which also seeks to convince the customer. The common understanding of the green areas landscape design project depends on how designer and customer can work on their different views to achieve the desirable result. *The aim of the article* — review of the use of visualization possibilities in the landscape design of the experience areas.

Methods

The experience areas landscape design visualizations were analysed and categorized in Lithuanian and foreign literature. Analysis of the landscape design visualization possibilities, comparison of 3D modelling software. This study is carried out in systematic and comparative analysis methods, using 10 years of personal experience.

Results

Depending on the tools and desired result of experience areas landscape visualization projects we can divide into several categories. Visualization usually is created as an additional tool during the project, or as an additional part of the project, which would increase the attractiveness of the project and visualization. What tools to choose depends on the purpose and visualization performance quality (e.g. Fig. 1).

Fig. 1

Example of project rendered with commercial landscape design software
(Rendered with Chaos Group V-Ray)



The aims of creation of landscape design visualizations

Landscape design visualization projects are designed to meet a number of objectives. The most common objectives are space allocation, project vision in the perspective representing plants' and objects' heights rating or shading zones. For this purpose it is enough to use basic, free tools, such as a free software Trimble Sketchup (Sketchup, 2015), where you have to face lack of speed and concerns about data well-being. When visualization is created to achieve this goal, it becomes another designing tool. Often the customer does not even see visualization – it is used only at designing time. In this case the desired result is to create visualization project for the presentation or explanation, it facilitates the design (makes it three-dimensional), but increases time costs significantly. Also visualization can be used for project lighting system control. In this case basic tools are not enough, therefore you have to use specialized rendering solutions that simulate light sources too (such as the Chaos Group V-Ray, POV-Ray, Kerkythea or other (Kerkythea, 2015; POV-Ray, 2015, V-Ray, 2015).

Usually this type of visualization is extremely realistic. It is often used to introduce the project, to attract customers and represent the author of the project (e.g. Fig.2, Fig.3, Fig.4).

This type of visualization gives an advantage to the project, making the project more attractive to the customer. On the other hand this type of visualization requires additional software (sometimes

full 3D drafting in a separate program - such as Autodesk 3ds Max (Autodesk 3ds Max, 2015) or similar) and additional computing resources. Generating one video can take from several minutes to several hours or days - depending on the complexity of objects and materials. Therefore, it can be said that higher quality visualizations make project more expensive (Gill, 2013).



Fig. 2

Example of project rendered with commercial landscape design software (Rendered with *Realtime Landscaping Architect*)



Fig. 3

Example of project made and rendered with free 3D modelling and rendering software (Rendered with *Kerkythea*)



Fig. 4

Example of project rendered with commercial rendering software (Rendered with *Chaos Group V-Ray*)

The methods of the creation of visualization

Usually landscape designers are working with “normal” tools – the most commonly used are Autodesk AutoCAD or similar software packages. These software tools are very versatile, allowing the users to realize various different ideas. The negative side to most drawing and design programs are that it is more convenient to use flat (2D) mode. Creating experience areas of landscape design project in “traditional” way, you have to perform several steps – 2D design environment; project transfer to 3D environment; work on surfaces, environment and animation; rendering. Often greenery designers considering time costs and resources required for the expected result of the project, decide against using visualization (Al-Kodmany, 2002).

Depending on the tools and goals, landscape design projects’ visualizations can be classified into several possible methods:

- Visualization created as an additional tool for raising awareness of the project. It is based on the use of Trimble Sketchup or similar program (e.g. Fig.5). It is very easy to use, it is fast, have the possibilities to work with the online libraries of objects, and have ability to check the lighting project at different times of day and year. This and similar programs can generate images looking more like drawings rather than high quality environment rendering, but the program works quickly, the results are visible straight away.
- Visualization of the project designed to increase the attractiveness. In this case there are several possible development paths. Available immediately to design in a 3D environment (using both: conventional design programs e.g. Autodesk AutoCAD and ending in any

three-dimensional design program). The project is transferred to the rendering program (sometimes in the rendering plug-ins inside the design program), where users set up the textures and lighting. Also the animation options are available. This stage is completed by generating the video or animation (series of images). This way rendering is similar to reality images (with regard to the reflections, transparency, light fractures, surface roughness, etc). But this method of rendering requires a lot of computer resources and is time consuming.

Other way – design created in traditional 2D way and then transferred to the three-dimensional program. In this case the transfer might reduce the details of the project, leaving only those objects that will be visible in visualization. On the other hand this way needs more time and basically once again replicates the project in three-dimensional space. It depends on the designer's skills and taste which method to chose. Nonetheless, it is advisable to evaluate rendering time and resources and decide whether it is worth to load the project into a three-dimensional design.

The other similar way is possible, when visualization is used as an additional and optional part of the project. In this case, the visualization is generated only when required by customer.

- There is another way – to outsource project to outside companies which provide rendering services. In this case the designer saves time, but purchasing rendering services significantly increases the total cost of the project.

Fig. 5

Different imaging techniques with Trimble Sketchup and Kerkythea: Trimble Sketchup without and with colours, and Kerkythea at night and at day



Visualization creation tools

Visualization development tools according to the nature of the project development are divided into several groups:

- 3D modelling tools (e.g. Table 1, Table 2).

These tools allow you to create three-dimensional scenes. Most programs can import / export models or scenes into many popular 3D and 2D formats. Some programs can prepare simple

visualizations or use sophisticated rendering plug-ins. Software's advantages– free, easily absorbed, have a huge online library of objects and an online library of plug-ins. For better quality visualization you can use plug-ins (such as the Chaos Group V-Ray (e.g. Table 4.)) or external applications (such as Kerkythea (e.g. Table 3.)) aid. Simple projects visualization tool kit "Trimble Sketchup + Kerkythea" is completely sufficient. Disadvantages are: applications defects are very awkward;

Table 1

Free 3D modelling software

Program name	License	Visualization generating opportunities
3D Slash	Freemium	Yes
Anim8or	Freeware	Yes
Autodesk 123D	Freeware	No
Blender	GNU GPLv2+	Yes
Caligari TrueSpace	Freeware	Yes
DAZ 3D Studio	Freemium	Yes
FreeCAD	GNU LGPL	Yes
NewTek LightWave 3D	Trialware	Yes
OpenSCAD	GNU GPL	Yes
Pixologic Sculptiris	Freeware	No
Trimble Sketchup	Freemium	Yes
Wings 3D	BSD	Yes
Zanoza Zmodeler	Freeware	Yes

Program name	Visualization generating opportunities	Program name	Visualization generating opportunities
Animation: Master	Yes	ESRI City Engine	No
Autodesk 3ds Max	Yes	Inivis AC3D	No
Autodesk AutoCAD	Yes	MAXON Cinema 4D	Yes
Autodesk Inventor	Yes	Nevercenter Silo	No
Autodesk Maya	Yes	Pilgway 3D-Coat	Yes
Autodesk Revit	Yes	Pixologic ZBrush	Yes
Autodesk Soft image	Yes	Realsoft 3D	Yes
AutoDesSys Form-Z	Yes	Rhineceros 3D	Yes
Cheetah3D	Yes	Remograph Remo 3D	Yes
DAZ 3D Bryce	Yes	Side Effects Software Houdini	Yes
DAZ 3D Carrara	Yes	SolidWorks	Yes
DAZ 3D Hexagon	No	Strata 3D	Yes
Electric Image Animation System	Yes	The Foundry Visionmongers Modo	Yes
Electric Rain Swift 3D	No	View Point 3D	Yes

Table 2

Commercial 3D modelling software

limited opportunities to work with complex and irregular graphics. It is also problematic without the use of add-ons to cover the complex surface textures.

– Generation of visualization (*Rendering*) tools (e.g. Table 3, Table 4).

These tools work as plug-ins or as separate programs with imported three-dimensional models. Most programs allow you to import the majority of the most popular models in 3D formats. All programs have the ability to save the generated visualization as a picture or series of pictures, some even allows at once transform sequence of pictures into a video format.

If you chose another tool for the visualization job, here the best programs for this purpose are Autodesk 3D Studio Max products using Chaos Group V-Ray, or POV-Ray generation visualization plugins. These programs are professional three-dimensional modelling tools and that gives an advantage. Disadvantages – a complex program management, time consuming, program costs.

– Specialized landscape design programs. It can be used on its own (such as Realtime Landscaping Architect) or as a plugin (like Plantare – Autodesk AutoCAD plug-in). Almost all of these programs have 3D visualization possibilities. Some of them can create videos. Most of these programs are used for creating visualizations. These programs have exclusive feature – the ability to add new plants to existing database.

From specialized applications the most suitable for green design is Realtime Landscaping Architect (Realtime..., 2015).

Software	License	Platform		
		Windows	OS X	Linux
Art of Illusion	GPL	Yes	Yes	Yes
Blender	GPL	Yes	Yes	Yes
Kerkythea	Freeware	Yes	Yes	Yes
Lux Render	GPLv3	Yes	Yes	Yes
Picogen	GPLv3	Yes	No	Yes
Pixie	GPL	Yes	Yes	Yes
POV-Ray	AGPLv3	Yes	Yes	Yes
Radiance	BSD	Yes	Yes	Yes

Table 3

Free rendering software

Table 4

Commercial rendering software

Software	Platform		
	Windows	OS X	Linux
Autodesk 3ds Max	Yes	No	No
Autodesk Maya	Yes	Yes	Yes
Autodesk Softimage	Yes	No	Yes
Chaos Group V-Ray	Yes	Yes	Yes
DAZ 3D Bryce	Yes	Yes	No
DAZ 3D Carrara	Yes	Yes	No
E-on Vue	Yes	Yes	No
Glare Technologies Indigo Renderer	Yes	Yes	Yes
MAXON Cinema 4D	Yes	Yes	No
NA Research 3Delight	Yes	Yes	Yes
NewTek Light Wave 3D	Yes	Yes	No
Next Limit Maxwell Render	Yes	Yes	Yes
Nvidia Mental ray	Yes	Yes	Yes
Pixar Photorealistic Renderman	Yes	Yes	Yes
Realsoft 3D	Yes	Yes	Yes

This program allows you to work with both: flat plans and with the three-dimensional models, allows making corrections simply in 3D view window. There are broad plants, objects, and textures libraries, buildings, swimming pools, fences flowerbeds development assistants (wizards), you can import and export flat and three-dimensional objects and many other useful features. The program also allows you to move camera around inside the project and enables you to create and export videos from 'inside'.

Table 5

Commercial 3D modelling software for landscape design

	Topo	Fence	Peak list	Outcomes	Plant encyclopedia	3D plants	2D planning	3D planning
Realtime Landscaping Architect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Home & Landscape Design	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Home Designer Suite	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Landscape Deck & Patio	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
HGTV Ultimate Home Design	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Turbo Floor Plan 3D Home & Landscape	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Total 3D Home, Landscape & Deck	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
Home & Landscape Design	Yes	Yes	Yes	Yes	No	No	Yes	No
HGTV Home & Landscape Platinum	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
Landscape Vision	No	No	No	No	Yes	No	Yes	No

Typical problems of the creation of visualizations

The development of projects visualizations of landscape design experience areas faced with a number of problems. In most cases at beginning there is a question: "Which software tool to choose?" It depends on few criterias: first of all designer's financial position. Then we also need to take into account such factors as the capacity of the existing computer equipment, rendering time and designer's skills.

The best way is to use specialized tools (such as Realtime Landscaping). These tools allow two-dimensional design and three-dimensional images. Besides, as a rule, this type of application has its own plant libraries. Designer choosing this type of programs in order to avoid problems in the future, should pay attention to the following points:

- *Program interface.* Is there a native language support? Is it possible to generate drawings and reports in native language?

- _ *Plant library.* How much and what kind of plants there are? Is there a description of the plant? Does the library have plants which are growing in the planning region? Is it possible to supplement the library (the same or purchase additional packages)? Is it possible to rename or add plant names? Is it possible to import / export plant library?
- _ Are there images of three-dimensional objects and ability of import? Is it possible to upload a background image?
- _ Is it possible to generate lists automatically (price, quantities of work anticipated and so on)? Can they be generated in native language?
- _ What kind of license the program has (or additional cost Software updates and additions to the library)? Do you have to pay extra if you change the operating system (or example - upgrading)?
- _ Price for the software and upgrades.

If you choose not to use specialized tools, the main criteria when choosing a tool should be considering how easy to use it and availability of skills. Most of the three-dimensional modelling programs have plug-ins that allows generating plants, but when you need to create a specific known plant, these plug-ins work in very poor quality. Therefore when choosing 3D modelling tool you should consider its simplicity (example – Trimble Sketchup) and versatility - popularity (such as Blender). Nevertheless it should emphasize simplicity and efficiency rather than modelling capabilities.

The same applies to the rendering applications. There are a few evaluation criteria:

- _ *Material Library.* Usually, rendering program already has small library of the materials, but hardly enough to create even the simplest visualization. Therefore it should be noted that you might find materials for the selected program libraries.
- _ *Additional program options* (environmental generation, import of 3D and flat objects, etc.).
- _ *Rendering speed.* It is not an objective measure, it depends on many settings of the 3D scene and computer resources, but subjectively it can be said which programmes are working slowly, which - faster. Speed is affected by different rendering algorithms.

Another common problem is PC's inability to cope with huge amounts of data. If you create a complex project, it is likely that the computer will not manage, video start jerking, and slows down. To avoid this issue, we should avoid complex plant models consisting of loads of polygons. Another way is to hide all unnecessary information (if the modelling or rendering program supports layers feature).

Another common problem faced by designers when preparing visualizations - a long time of image or video rendering. This can take anywhere from a few minutes to several hours or even days.

When preparing the visualization designer should pay attention to several things:

- _ If it is possible we have to avoid many small parts of objects (for example, if the plant is not very close to the camera use sheet with a transparent texture of leaves). More clear details – more time to create the image.
- _ Using only the necessary light sources. More light sources - the longer it takes to create the image.
- _ Deciding on the reflecting and refracting objects. More of these objects leads to slow image generation.
- _ Availability of online rendering services. It allows computer resources only to be used in designing, but on the other hand, these services are rather expensive and that raises the total cost of the project.

Visualisation tools can not realize all designing ideas. Sometimes the tool itself sets draft form and content restrictions. For example if it was decided to use landscape design program Trimble Sketchup, user should avoid irregular shapes and curved surfaces. This problem can be solved by using specific tool functions or another simple way - make a few sketches by hand.

Conclusions

- 1 Visualization is usually created as an additional tool during the experience areas landscape design project, or as an additional part of this project, which would increase the attractiveness of the project and visualization. Results depend on selected different tools and quality of visualization.
- 2 The visualizations can be created in several ways. Using specialized programs for their creation process is automated. In the case of universal design tools separately generate 3D model and transfer it into the program, which is used to generate visualizations image.
- 3 From the list of software tools, according to one of the objectives described above, it is possible to select the most appropriate programs: for the creation of the operational visualization, the shadow zones or determination of the fast visualization, the best product at this moment is program Trimble Sketchup. For green design the most suitable from specialized applications is program called Realtime Landscaping Architect. This program allows you to work both with flat plans and the three-dimensional (3D) models, allows making corrections simply in the 3D view. The designer should not do high-quality visualization, there are specialized companies offering rendering services. If for whatever reason, you have decided to choose a tool for visualization, so the programs for this purpose would be Autodesk 3D Studio Max products, with Chaos Group V-Ray, or POV-Ray rendering plug-ins.
- 4 The most common problems in the creating visualizations – tool selection, project mismatch with a computer programs and/or the tool used to create forms, content restriction.

References

- Al-Kodmany, K. Visualization Tools and Methods in Community Planning: From Freehand Sketches to Virtual Reality. *Journal of Planning Literature*, 2002; 17(2): 189–211. <http://dx.doi.org/10.1177/088541202762475946>
- Autodesk 3ds Max. 2015 [interactive]. Internet link: <http://www.autodesk.com/products/3ds-max/overview>.
- Gill, L. An analysis of usage of different types of visualisation media within a collaborative planning workshop environment. *Environment and Planning B: Planning and Design*, 2013; (40): 742–754.
- Kerkythea. 2015 [interactive]. Internet link: <http://www.kerkythea.net/cms/>.
- Kučinskienė, J., Baravykaitė, D. Potyrių vietovės – šių dienų planavimo iššūkis [Experience Areas – Today's Planning Challenge]. *Miestų želdynų formavimas*. Mokslo darbai, 2012; 1(9): 95–101.
- POV-Ray. 2015 [interactive]. Internet link: <http://www.povray.org/>.
- Realtime Landscaping Architect. 2015 [interactive]. Internet link: https://secure.ideaspectrum.com/arch_overview.php.
- Sketchup. 2015 [interactive]. Internet link: <http://www.sketchup.com/>.
- Tuch, L., Mayer J. (editors). *Architecture and place making*. 2008; June: 1–11.
- V-Ray. 2015 [interactive]. Internet link: <https://www.vray.com/>.

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