THE ROLE AND POSSIBILITIES OF USING ARTIFICIAL LIGHTING IN LANDSCAPING

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Abstract. *This paper presents the benefits of artificial illuminating in landscaping designs, from a practical point of view, as a matter of safety, but especially as a decoration enhancement element. Artificial light in gardens doesn't only extend the decoration period to 24 hours per day, but it can even give completely different connotations to the garden, from theatrical, dramatic effects, to playful and colourful beams of light. There are many ways that light can accent the shape, silhouette or colours of decorative plants, or emphasize the materials and textures used in landscape, which will be detailed and illustrated in the following material.*

Keywords: lighting, green spaces, ornamental plants, night decoration.

INTRODUCTION

Landscaping has become more important in our everyday life, as it makes our homes a green oasis of plants, colours, perfume and shapes. Living a stressful urban life, with many working hours or in traffic, the presence of decorative plants revives the human mental state, making it a real pleasure to come back home. In most cases, we can enjoy the benefits of our beautiful gardens during daylight. But with the help of the outdoor garden lighting, we can extend, or even improve the plant decoration.

Artificial lighting, besides its practical role, the one allowing night visits in green spaces, can emphasize the decorative characteristics of the plants, furniture or accessories used in the project.

The basic function of lighting is to extend the decoration hours. Recent developments in lighting technology have encouraged us to look at how light sources are used as an integral part of the overall design, first in our homes and now in our gardens. Increasingly, we see the garden as an extension of our outdoor living space, and introducing lighting there will not only extend the time you can spend outdoors but will also give it a different appearance (Raine, 2005).

In landscaping, but not only, light is a defining element, for its sanitary and decorative role, but the actual aesthetic effect becomes complete when the light comes into contrast with the shadow. In compositions where the light is used as an expression tool, there are two specific strategies: the key point of the composition goes in a shadow spot, meanwhile its surroundings are lit (for example a group of trees placed on a lawn, or on the contrary, the centre of the composition can be enlightened, while the other elements are placed in shadow (Negrutiu, 1980).

The lighting fixtures themselves can be decorative, through their shape, height, texture, material. Not to mention that their emplacement can create very attractive night views such as lamp alignments placed at the same level, which can

create beautiful perspectives, or even light circles, multiple layers lamps or just light dispersion effects (Iliescu, 2006).

MATERIAL AND METHOD

When designing a lighting system for a garden it is important to understand the roles light will play in the use and enjoyment of each part of the exterior place. The purpose of the garden and the chosen lighting strategy will have fundamental implications for the planning of the system, including the sources of power, the number of circuits and the position and type of controls.

Artificial lighting in landscaping can be done from the ground, with the lighting spot coming from water or ground level they even have nice, decorative shapes, such as mushrooms, and could be placed among flowers, or shrubs. Sometimes the illuminating system could be attached to the tree crowns, creating nice, playful effects with the light-shadow alternation, giving depth to the crowns.

Ornamental lighting is used when the garden decorative elements are lit only for visual appeal. Amenity lighting is introduced for safety and practical purposes, for example on a patio, to light a dining area. Task lighting makes it possible to carry out specific jobs, such as cooking on a barbeque, or enables different outdoor leisure activities. Access lighting permits safe movement around the garden by lighting paths, steps, doors and water. Security lighting discourages intruders, creates an illusion of occupation and reassures home-owners (Raine, 2005).

Artificial lighting has the advantage of offering a great variety of colour shades, warm or cold, clear light or diffused light, intermittent or continuous distribution. It also gives the possibility of directing the light spectrum towards certain points or even adjusting the intensity. Another significant attribute of artificial landscaping is that with the use of light and the scenario that can be created, the garden, at night, can receive completely different connotations from the daytime landscaping (Mitrea, 2008).

Usually, along alleys and in squares, the limits are marked by high lighting objects, which enable a diffuse light. The short lamps, in order not to discomfort the human eye, are oriented towards ground, or they can simply be provided with translucent globes or low voltage lighting bulbs.

When projecting the lighting in a landscape design, it is recommended to elaborate an organized and rational lit. Therefore, there should be some sectors projected with a more intense light (buildings, terraces), meanwhile other elements (statues, trees) could be kept in a less intense lit. In other words, there should always be a clear hierarchy between the lit elements of the garden.

For a clear image of the benefits of light in landscaping, this paper presents an example of a garden concept and the multiple ways that light can be used.

RESULTS AND DISCUSSION

The plan from the project bellow (Fig. 1) belongs to a garden of a family house, the terrain measures round 1670 square meters. While the construction

occupies about 200 square meters, the actual green space measures round 1470 square meters. The garden concept consists of a paved surface, with pool, Jacuzzi, a wooden gazebo and all the specific accessories. This area, according to the plan is also lit, since lights in (or next to) water are very expressive and aesthetic, meanwhile the textures of the pavement and other materials can absorb or reflect light in interesting manners.

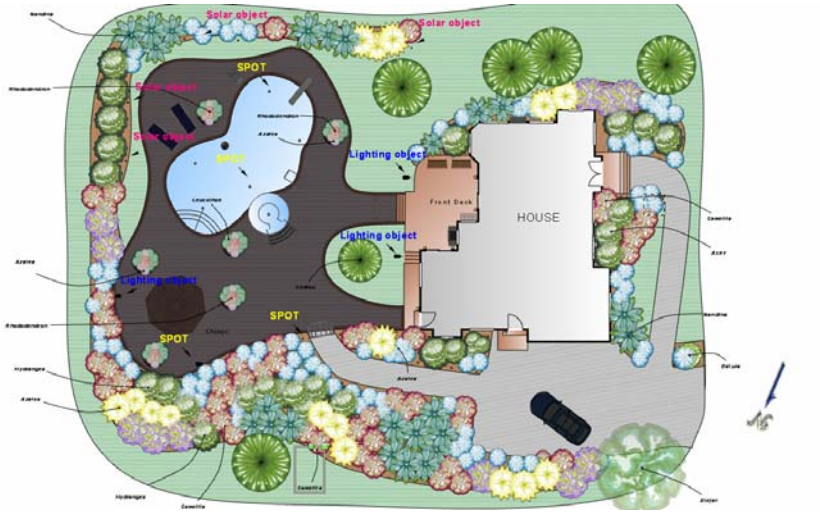

Fig. 1. The garden 2D plan, with the lighting objects and plants

The vegetation consists of flower shrub species, mainly: *Camellia japonica* (needs protection during winter), *Rhododendron*, *Azalea* (needs protection during winter), *Hydrangea*, tree species like *Cedrus*, *Acer* or *Quercus*, or other flower species combinations in concrete containers. All of these beautiful, various, decorative plants will be emphasized with the help of artificial light.

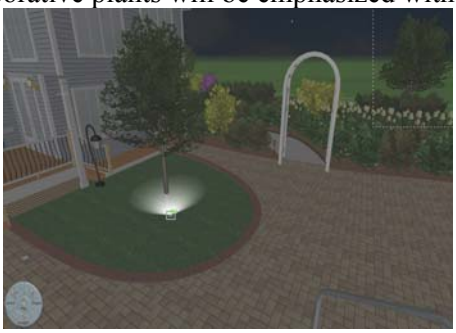

Fig. 2. Uplighting *Cedrus*

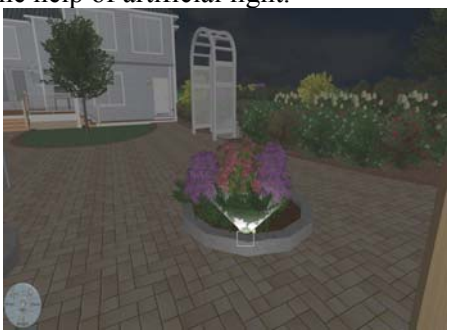

Fig. 3. Uplighting a plant container

The tree or shrub species are lit from the ground: *uplighting* (Fig. 2) or they can be used as the light source, when you want to lighten flowers or other elements nearby, by placing the lit in the tree crown, and creating a *downlighting* or *moonlight*

effect. The sun demanding plants can also benefit from the artificial light. An extension of light can be assured at night with a 50-100 Lux lamp, strategically placed at the plant level. In this manner, the stronger the light source is, the more intensity decreases (Cantor, 2009).

The second image (Fig. 3) presents a way of lighting a pot, with spots from the ground. This method emphasizes the plant shape, not necessary the colours. It also doesn't bother the visitor's eye, by diffusing the light beam.

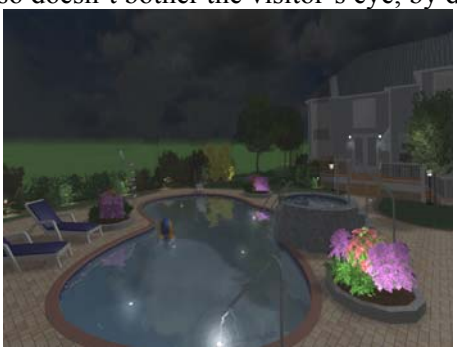

Fig. 4. Mirroring effect

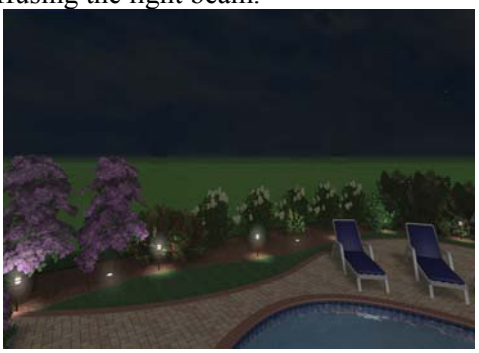

Fig. 5 Lighting vegetation

The picture above, (Fig. 4) illustrates a water lighting possibility: *mirroring*, by accent lighting aside objects from the water and placing just few, or no, lighting objects in the pool. For flower illuminating the recommended lit is the one placed 30-40 cm above the plants, with a thin stem and low intensity, so that the flower colours wouldn't be denatured. Nevertheless, a flower area can also be lit from the ground, with the use of spots. So can be the pavement or grass areas (Fig. 5).

In the lighting project there were used multiple forms of lighting sources such as: spots, lamps, solar lights with various beams and colours (Table 1).

Table 1

Types of illuminating objects used in the garden design and their characteristics

Illuminating object	Number	Position	Beam angle	Light colour
SPOTS	25	On the ground	90 degrees	Yellow/warm, White
SPOTS	8	On the ground	90 degrees	White/cool
LAMPS	6	180 cm from the ground	70 degrees	Orange/warm
SOLAR LIGHTS	22	40 cm from the ground	90 degrees	Yellow/warm

There are multiple types of lamps with several light colours and temperature which can create various tones and effects, from warm yellow and orange tones, to cold white or blue. These lamps are adapted to the characteristics of the materials used in the concept, or to the desired effects. Table 2 illustrates the types of lamp and color tones available for garden use.

Table 2

Types of illuminating objects with various colours and light temperatures

Lamp	Colour temperature (K)	Colour/tone
Sodium street lighting	1800-2000	Orange/warm
Tungsten	2700	Yellow/warm
Tungsten halogen	2900-3000	White
Metal halide	3000-6000	White or blue/cool
Mercury vapor	3500-4000	Blue/cool

Source: Raine, 2005.

The lighting objects were chosen according to the reflectance of the surfaces from the materials and vegetation used in the landscape concept (Table 3).

Table 3

Reflectance on landscape surfaces

Material	Reflectance %	Lighting level for equal brightness (Lux)
White paint	75	133
Light stone or brick	50	200
Concrete	40	250
Red brick	30	350
Vegetation	25	400
White marble	45	225
Asphalt	7	1400
Grass	6	1666
Dark stone	18	550

Source: Raine, 2005.

CONCLUSIONS

Decorative lighting in landscaping is a key element, both for the owner's safety, but also for the beautiful effects light creates. There are many aspects to consider before designing the garden and the lighting system, most of them were illustrated in the present paper, such as lighting different types of decorative plants, lighting the textures and the materials of the accessories and most importantly creating the desired effect that the owner wants to achieve from the installations.

All in all, this paper presents a real example of lighting a landscape, with various sources, beam angles, light color and strategies. This covers just a small piece of the importance of artificial light in gardens, and the variety of benefits and means to enhance the beauty of decorative plants at night time.

REFERENCES

1. Cantor, M. (2009). Floricultură generală. Ed. Todesco, Cluj-Napoca.
2. Iliescu, A. F. (2006). Arhitectură peisageră. Ed. Ceres, Bucureşti.
3. Mitrea, V. (2008). Note Curs Peisagistică.
4. Negruţiu, F. (1980). Spaţii verzi. Ed. Didactică şi Pedagogică, Bucureşti.
5. Raine, J. (2005). Garden Lighting Design Inspiration Techniques. Octopus Publishing Group Limited, London.