

Colour in Landscape Lighting

What is natural as far as lighting is concerned?

Critical evaluation of landscape lighting is frequently done on the basis of what is natural and what is unnatural. There appears to be a general belief in the industry that the use of coloured filters results in unnatural effects, which is not considered desirable. "Coloured filters should not be used. They make plants and trees look unreal." (Whitehead, p. 169, 1999) In this context, unreal is presumably intended to mean unnatural. If judgements like this are to be made on the basis of what is natural, then a clear understanding of natural light and the colours of daylight is required. Past experience as a theatre lighting designer, specialising in modern dance, has given Jenny Pullar the perfect opportunity to experiment with colour and light in a medium not bound by any concept of what is natural. Pullar has learnt that it is easily possible, purely through the use of colour, to influence the meaning of a work and the emotional response of an audience.

Moving into the field of landscape lighting design, Pullar wishes to exercise the same control over the mood and atmosphere created in an environment. To determine only the angle and intensity of light, but not the colour, seems extremely limiting and unexciting. As a designer, it is necessary to take control of all aspects of the light that scenes are painted with.

To justify the belief that the use of colour filters is an essential tool of landscape lighting design, Pullar undertook a research project 'Colour in landscape lighting' (while studying at UNITEC). This demonstrated that in order to create natural 'effects' it is necessary to use a variety in the colours of light sources. Obviously,

if you don't feel bound by any concept of what is natural the only limitations on colours selected from are aesthetic judgement and availability.

SURFACE COLOUR

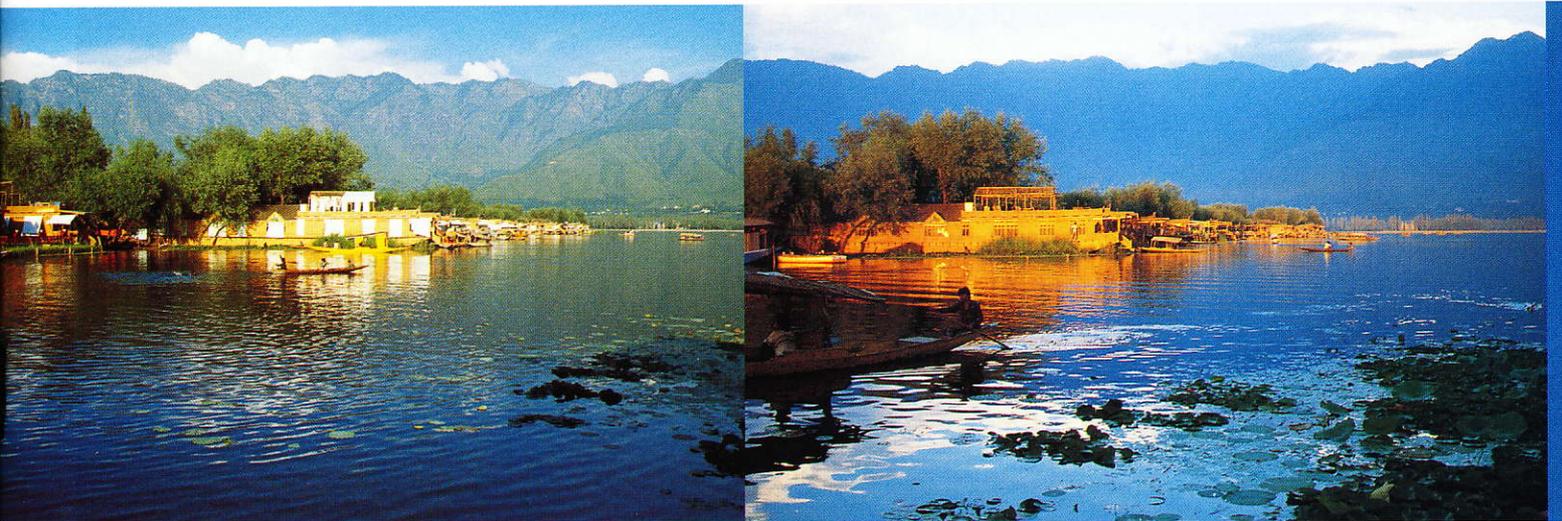
We commonly talk about objects and surfaces as being a particular colour, but this is not the correct technical use of the term. Surfaces have chemical and physical properties which determine how they will respond to varying light conditions. Some portions of the spectrum will be absorbed and some reflected, depending on pigmentation and texture. The apparent colour, as we perceive it, will always change when the spectral composition of the light shining on a surface changes. This can be readily seen in nature by observing the same scene at different times of the day.

A series of images taken on Dal Lake in Kashmir in late summer of more or less the same view, show the daily colour changes. It is essentially the same water, the same hills, the same trees and the same houseboat opposite. The colours of daylight are constantly changing so the colours of the environment are also constantly changing. No one has been out and painted the houseboat a different colour. As the light changes the colours change, and the mood or atmosphere evoked also changes. Its like magic the things you can do with light.

THE COLOURS OF DAYLIGHT

Nature can actually display some pretty "wild" (but entirely natural) colours of light. When she turns on a spectacular sunset we notice, but we are not so good at observing more subtle variations of colour, all of which change the mood and atmosphere of a scene. Even the most simple, minimalist landscape design will be constantly changing in colour due to changing natural light. It is only artificial light that is static in colour and intensity.

Graph 1 has been normalised so absolute levels of light are no longer indicated. Approximate interpretation of wavelength in



terms of colour gives the following:

- 380 - 490 = blues
- 490 - 566 = greens
- 566 - 590 = yellow
- 590 - 700 = reds

In curve A significant amounts of green and blue light have been removed or scattered so that the resulting daylight is considerably warmer, or has a lower colour temperature. This light is also likely to be of lower intensity. C type curves will be typical on a sunny summers day in New Zealand, while A type curves will be typical in a place like Los Angeles.

SUNLIGHT AND SHADOWS

Landscape lighting is commonly directional light, rather than ambient light which fills in a form from all directions. The natural equivalent of directional light is sunlight, but the shadows will always be filled in by ambient or skylight. Therefore a careful examination of the colours of sunlight and shadows is required to make judgements on what is 'natural'.

When light from the sun meets the earth's atmosphere, some of it is scattered by the particles in the air, some is absorbed, and some arrives directly as sunlight. The shorter wavelength blue light has a greater chance of being scattered and colouring the sky. The darker the blue of the sky, the less light has been scattered and the more that arrives directly as sunlight. Skylight is the ambient light which colours the shadows. If there was no ambient light the shadows would be completely dark.

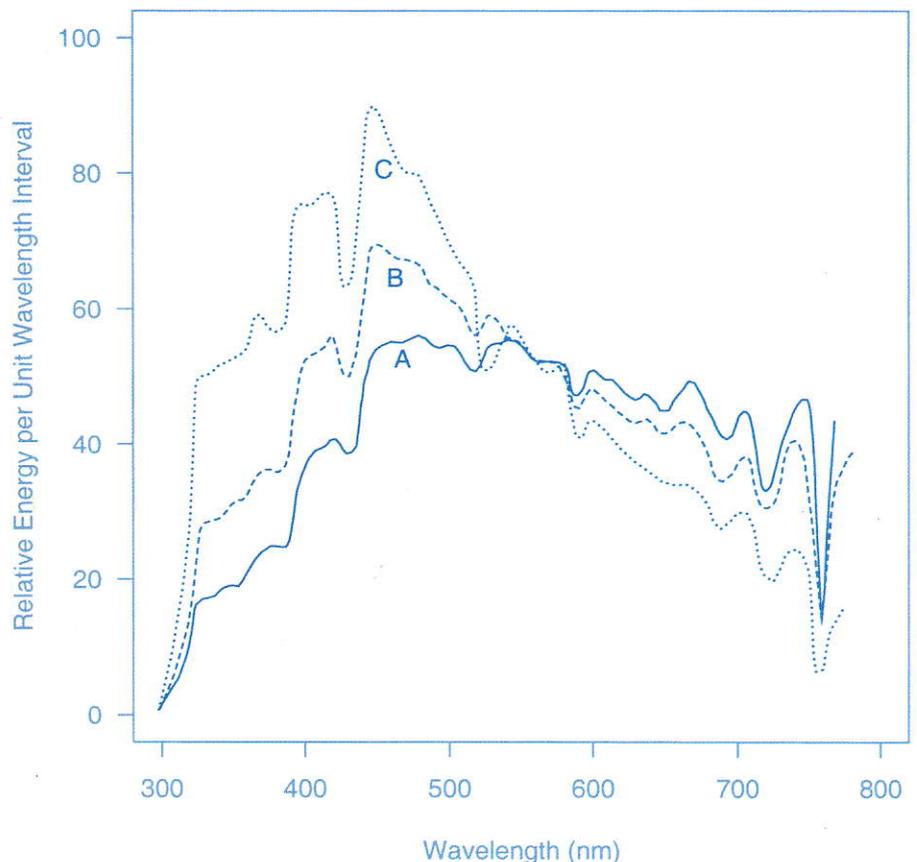
The ambient light will not be the same colour as sunlight as it is composed of the portions of the spectrum which have been scattered or removed from direct sunlight. In a typical bright sunshine situation it is common to think of sunlight as being yellow and the sky as blue. Direct sunlight provides bright 'key' lighting and skylight or ambient light fills in the shadows. This gives a common combination of yellow

sunlight and blue shadows.

Sunlight and shadow colours will vary considerably, but in any given situation they will always be different from each other. Additional lighting effects will also be present due to reflected light, depending on the pigmentation of surfaces. Therefore, if natural effects are to be created with direct landscape lighting then a variety in the colours of light used is required. Key light will be in one colour, and fill light in a different colour. This is not a currently accepted practice in landscape lighting. Shadows often in

Above: Images taken at Dal Lake, Kashmir at different times during the day

Below: (Graph 1) Typical variations in spectral data or the colours of daylight with measurements taken in the middle portion of the day. (Wright, p 8, 1969)





fact show quite startling colours once you start to observe them. The Impressionists were considered mad when they started to use this fact in their paintings. Because of this ability to observe the colours of light and shadow, the Impressionists are an excellent source of ideas for the lighting designer.

GREEN LIGHT

Green light is considerably more common in nature than is generally noticed. In any situation with plants and trees, such as a landscape or garden, most of the reflected light will be green. Red and blue light is absorbed by a leaf during chlorophyll production while the green light is reflected giving the leaf its pigmentation. When walking under trees, particularly deciduous trees, the leaves will act as filters allowing the green light to colour the shadows below.

Ozone absorbs heavily in the ultra violet and blue green portions of the spectrum. (Lynch & Livingston, 1995) With the hole in the ozone above New Zealand, not only do we get more ultraviolet light, we also get more green light. (We are not so sensitive to the blue light.) On a lovely clear, bright sunny day, once you start observing carefully, there is a distinct green tinge to the colour of our sunlight. When we talk about "clean green New Zealand" perhaps it is a judgement on our visual perception of our environment rather than any comment on our ecological practices. The grass really is often greener here.

A broad range of green tints would be of particular use in landscape lighting. For practical reasons, uplighting of trees is likely to remain a commonly used but unnatural angle of lighting. (The sun does not shine out of the ground) The undersides of many leaves are light or even "white" and this broadly reflecting surface will colour as you light it. Green light may fulfil your clients expectations of what is natural, for some trees.

COLOUR BY DESIGN

In considering colour in the landscape a designer needs to be aware that:

To work with light is to work with colour.

To design with light is to determine the colour appearance of surfaces.

To choose a lamp source is to make choices about the colour composition.

The colours of light determine the way people respond to and interpret their environments, and as a lighting designer this is what you control.

The human visual system is primarily adapted to viewing natural scenes. Natural light comes in an infinite variety of different tints and tones so we are accustomed to the constantly changing colours of the natural environment. Clearly, it is unnatural to restrict the pallet of light colours selected from, to only the few standard lamp sources available. In order to create natural lighting effects with directional sources it is necessary to use variety in the colours of light. Colour filters are the means by which this can be achieved.

If the aim of a lighting design is to create magic or atmosphere then the only limitations on the colours used should be those imposed by the design concept, and aesthetic judgement. It is possible for landscape lighting to become an environmental art form and move beyond the technicalities of angle, glare, spill, intensity and composition.

If the profession of landscape lighting design is to move forward, it must learn to make design statements using more than one colour of light. ■

REFERENCES:

- Lynch, D. K. & Livingston, W. (1995) *Color & light in nature*. Cambridge University.
 Whitehead, R. (1999) *The art of outdoor lighting*. Rockport Publishers, Gloucester, Massachusetts.
 Wright, W. D. (1969) *The measurement of colour*. 4th ed. Adam Hilger, London. The graph is based on measurements taken by Henderson & Hodgkiss, 1963.

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Above left: Roman ruins. 'Yellow' sunlight and blue ambient light reflecting off the same 'white' marble.

Above right: Shalamar Bagh in Kashmir. Filtered green light is clearly distinguishable on the path. (and yes, it was definitely a romantic light!)