Designing Sun Safe Environments

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Abstract. This paper discusses how the use of the Shade Audit, by those responsible for the design and regulation of outdoor spaces, can ensure that such spaces provide appropriate levels of protection against solar UVR.

The Issue of UVR Protection

Skin cancer is a major health problem in Australia and New Zealand, which share the highest rate of skin cancer in the world. As many as two out of three people who live in Australia all their lives will get skin cancer at some time. The factors contributing to high rates of skin cancer include high levels of UVR, a predominantly fair-skinned population and our outdoor lifestyle.

Over-exposure to solar ultraviolet radiation (UVR) causes skin cancer as well as sunburn (erythema) and skin ageing (solar elastosis). In addition to the effects on skin, UVR can damage eyes causing growth over the cornea (pterygium), cloudiness of the lens (cataract) and eye cancer. These negative health effects can be significantly reduced by minimising exposure to UVR.

Public education campaigns over the last twenty years have achieved significantly increased awareness of the dangers of over-exposure to the sun. Communities are increasingly expecting that shade should be provided in outdoor spaces and legislation in both countries has confirmed the legal requirement for employers to provide solar protection for outdoor workers.

Notwithstanding the importance of individuals to take responsibility for their own health, a clear challenge exists for owners, managers and designers of outdoor space to design them to be as 'sun safe' as possible. There is also an obligation on the governmental authorities that regulate how we use, manage and develop the land to ensure that this is done as safely as possible.

As a result of increasing public awareness of the dangers of UVR exposure, there has recently been a proliferation of 'shade projects' with a diverse range of solar protection and aesthetic outcomes. Ironically, poorly designed shade structures can exacerbate the problem by creating the impression of protective shade while actually providing low levels of protection from solar UVR.

If solar protection is to be effective and enhance the urban fabric, two key issues need to be addressed -

- there needs to be a process for determining the solar risk of individual sites, and for designing solar protection that will deliver known and appropriate outcomes:

- there must be active and considered participation from both local government and the design profession.

Protecting Against UVR

Maximum protection from solar UVR can best be achieved through a combination of personal and environmental strategies, primarily shade. The use of protective clothing, hats and sunscreens can provide high levels of protection and are particularly useful in situations where shade is not practical (eg some workplaces, when sailing or undertaking similar active sports etc). However, shade can provide very high levels of 'whole body' solar protection and has been shown to be the most effective single form of protection.

If environmental solar protection is to be effective, it must provide:

- **Shade in the right place, at the right time** -understand the usage pattern of a site and use sun angles to ensure that shadow lands where protection is required.

- **At least 94% protection from direct UVR** shade with lower protection levels can create a false sense of safety.

- **Protection against indirect UVR** -minimise indirect UVR by increasing shaded area, providing side-screening and reducing reflectivity of surrounding surfaces.

- **Summer and winter comfort** - if a shaded space is not comfortable it will not be used; conversely, comfortable shaded spaces will be used by people seeking relief from heat, not UVR.

Because of the need to ensure these four aspects of protection, it is rarely the case that a single element will provide the optimum solution – more often, it is necessary to combine a number of different elements in order to achieve effective solar protection.

For example, a roof over an outdoor café might be sheeted with poly-carbonate, providing excellent direct UVR protection throughout the year but no cooling in summer. By adding deciduous trees on the northern side, replacing smooth concrete paths with coarse brick paving and side screening on the western side, the space would be cool in summer, warm in winter and experience lower indirect UVR levels.

Providing Shade

Solar protective shade can be created using natural or built shade solutions or a combination of both.

Natural shade can provide highly effective and aesthetically appealing shade with significant environmental benefits. Natural shade is generally cooler than built shade as vegetation does not store heat and the evaporation of water through the leaves creates cooling. Vegetation provides colour, form, texture and scent as well as food and shelter for wildlife.

Natural shade can have disadvantages that need to be allowed for at design stage, including:
- long lead times due to the slow growing nature of vegetation
- some unpredictability of shade outcomes due to natural or seasonal variations
- potential detrimental affects to paths and services (above and below ground)
- the need for relatively high levels of care and maintenance.

Built shade can take many forms and utilise a wide range of materials. Structures can be permanent, demountable or adjustable depending on the shade needs of the particular location. The range of materials available enables significant shelter benefits to be achieved, including:
- shade outcomes that are predictable in both quality and location
- shade that can be quickly created
- spectrally-specific design, allowing transmission of heat or light whilst excluding UVR
- rain and wind protection.

In many situations, the advantages of built and natural shade can be optimised, and their disadvantages minimised, by combining both forms in a single solar protection solution.

The Shade-Planning Tool

Designers can ensure that they create safer outdoor spaces and consent authorities be confident that proper consideration has been given to solar protection by utilising a process of site analysis known as the **Shade Audit**.

The Shade Audit is a process for developing a strategic plan for shade provision at a particular site. This is achieved by
- establishing the usage patterns at the site,
- assessing the quantity, quality and usability of existing shade,
- determining the need for additional shade and protection against indirect UVR

- identifying the preferred location and type of new shade
- setting site-specific solar protection goals and strategies to achieve those goals

By assessing both summer and winter shade conditions, the Shade Audit ensures that effective solar protection is achieved whilst comfort levels at the site are enhanced.

It is said that design is more a process of logic than intuition, and that good designers are intuitively logical. By leading the user through a logical process of site assessment and consideration, the Shade Audit provides a framework within which persons with only basic knowledge of UVR can successfully undertake planning of solar protection at an outdoor site.

The Key Role of Local Government Authorities

Local government authorities are uniquely placed with regard to the issue of solar protection, as they have four distinct roles:

MANAGERS. Councils are directly responsible for the management of considerable areas of public open space, generally of a recreational nature, many of which are used by young children who are at high risk of skin damage due to UVR exposure. Councils have an obligation to assist and enable the public to safely use and enjoy their areas of open space.

CONSENT AUTHORITIES. Councils are obliged to assess development applications with regard to design, amenity, safety and environmental impact. In this role they should require applicants to address the issue of solar protection at the design stage, and submit a Shade Audit with their application, thereby significantly influencing the extent and quality of shade provision.

EMPLOYERS. Councils are employers with a relatively high number of outdoor workers. Occupational health and safety legislation obliges employers to protect the health and safety of their employees. In the case of outdoor workers, this clearly involves providing protection against excessive solar UVR exposure.

EDUCATORS. Councils inform the community on a range of health matters and are active in programs aimed at increasing public awareness of important social issues. Given that skin cancer is preventable and that changing community behaviour is a key issue, councils could form powerful partnerships with public health authorities to bring about significant change.

Reasons for local government to act in the area of solar protection are two-fold:

Social obligation to the community is a powerful motivator of most local government authorities at both the political and bureaucratic levels. Most would correctly

perceive that the potential to 'do good' should be acted upon rather than ignored.

Risk management practices require councils to consider existing liability issues relating to the workplace and issues that may arise with regard to the general duty-of-care that local authorities have to users of their facilities. The functions of local authorities are prescribed in NZ by the Resource Management Act, which requires that issues of health and safety, including mitigation of natural hazards, are considered when regulating development.

The initial task that local authorities must undertake is the preparation of a comprehensive shade/solar protection policy. Whilst some councils may have already initiated such policies, few consider issues other than those associated with protecting their employees. As outlined above, this represents only one portion of the scope of responsibilities that local authorities need to consider.

Local authorities that are reluctant to act need to weigh the actual cost of implementation of comprehensive solar protection policies against the potential cost of litigation for failing to do so.

References

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