Sunshade Practice in New Zealand Primary Schools

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Abstract. In recent years many primary schools throughout New Zealand have introduced management practices, built shade structures and planted trees in order to reduce the UVR exposure of students. Although the Cancer Society of New Zealand Inc. has provided guidance for management practices, no comprehensive guidelines for designing built shade in schools has been available. New environmental shade has been designed independently by local builders, architects, landscape architects and shade manufacturers. This paper outlines a current research project, which is studying ten school sites in order to identify features of best practice in providing shading from UVR in New Zealand primary schools.

Introduction

In 2001, a baseline study of the provision of sun-shading in New Zealand was carried out (Joubert, Mackay, 2001) in consultation with the Cancer Society of New Zealand Inc (CSNZ). The study revealed a lack of understanding of best sunshade practice for protection from damaging ultra-violet light for New Zealand conditions. New Zealand's temperate, seasonal, changeable and very windy climate creates unique challenges in the design of shade. As part of the critical period for sustaining damaging levels of solar UVR exposure occurs during the school years, CSNZ initiatives have focused on developing shade awareness in Primary schools with the Sunsmart school scheme. As a result many schools throughout the country have recently added both built and natural shade to their environment. The success of these installations has not been evaluated.

This current research project sets out to investigate and analyse the effectiveness and efficiency of various sun-shading practices in NZ primary schools.

It is anticipated that results from this study will contribute to guidelines for providing sun-shading in primary schools. The guidelines would be made available to schools and designers to encourage better cost effective design in the future.

Project structure

A project advisory group was set up to advise, review and critique the research content and process. It is anticipated that the group will also be involved in formulating the most appropriate method of disseminating the findings. The advisory group includes members from CSNZ, Building Research Association of New Zealand (BRANZ), Ministry of Education, Wellington School of Medicine and Industrial Research Limited (IRL).

The research project commenced November 2001. Following pilot studies, site surveys were undertaken in February 2002. The project is scheduled for completion in September 2002.

Best shade practice

Reducing student exposure to UVR can be achieved by management practices and environmental shade.

Timetables can be adjusted to shorten time spent in full sun during and middle of the day in Semesters 1 and 4. Possible strategies include shortening the lunch break and the timetabling of outdoor activities outside of times of high risk. Encouraging or enforcing student use of personal protection (hats, clothing and sunscreen) is another important strategy.

Ideally, environmental shade is both effective and efficient. For the purposes of this project, shade is defined as effective if it provides at least 94% protection from direct UVR as well as controlling indirect UVR. The shade should also be of sufficient size, in an appropriate location, and create a comfortable environment in both summer and winter. Efficient shade is defined as being good value for investment (measured by cost per square metre per year). A further measure of efficiency is that the shade serves more than one function such as. providing protection from wind and/or rain as well as from UVR.

Research methods

The research is based on case studies of ten schools located in Dunedin, Christchurch, Marlborough, Wellington, Napier and Auckland. Schools with significant built shade were recommended by Ministry of Education property officers in each region.

Management practices were surveyed firstly by interviewing school principals to ascertain policy and practices, and secondly by observation of student behaviour at lunchtime.

Environmental shade was surveyed in relation to site planning and use. The location and type of natural shade was recorded. At each school, three different built shade structures were selected for further investigation. Each structure was surveyed with respect to orientation, dimensions, materials and construction. Ground materials and surrounding surfaces were noted. Details of adjustments to allow for seasonal variations were recorded along with other relevant features (eg seating).

Environmental measurements were taken in a control location open to the sky as well as under each of the selected shade structures. Surveys were carried out during the lunch break, 12.30 – 1.30pm in all cases. Dry Bulb, wet bulb and globe temperatures plus the wind-speed were taken to allow calculation of comfort conditions. The temperatures of ground surfaces were also recorded as well

as light levels. Polysulphone patches were used to measure the UVR exposure over the one-hour period. A control patch was positioned horizontally in open sunlight. In the center of each shade structure, two patches were positioned at 1m above the ground; the first horizontally and the second vertically facing the most open side of the structure (in order to gauge the contribution of the scattered UVR).

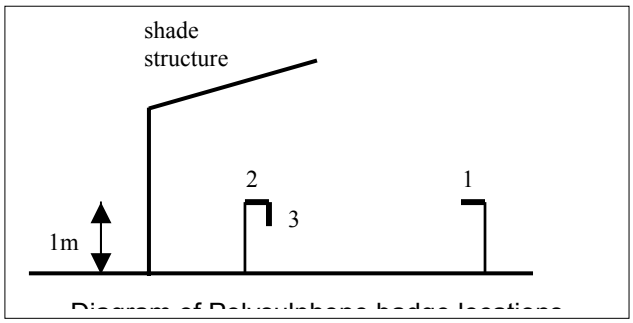

Figure 1. Diagram showing the placement of the three polysulphone badges under typical shade structure.

Along with environment measurements, observations of use by students and staff of the shade structures were recorded using digital photographs.

Information was also gathered to assess the efficiency of built shade. Structures were photographed, measured and materials and construction recorded. The condition of each structure was examined for signs of wear and tear or vandalism. Where information was available, details on the time and cost of construction were gathered. Estimations will be made of the capital cost and annual maintenance expenses for each structure. The multifunctional use of each shade form was also noted.

Initial findings

Presently, case studies of each school are being compiled and the polysulphone patches are forwarded to ARPANSA in Melbourne for calibration. Although detailed analysis has just commenced, the following observations suggest features of effective sun-shade design:

- The design and use of sunshade appears to be a complex issue. Many existing shade sources (eg building shadow, porches and covered ways) are not preferred places for students to play.

- Designers from a wide range of backgrounds and working independently have produced a great variety of shade solutions.

- The best are visually appealing as well as providing effective shade.

- Some shades successfully performed multiple functions. This north-facing shade structure prevents class-room overheating, provides classroom extension space, shaded group play area as well as dry play space for rainy days.

- Many schools provide a shaded area for the supervised eating of lunch outdoors. These structures can become the 'heart of the school' providing space for group gatherings eg assembly.

- In some cases sun-shades were constructed to be removed for Semesters 2 & 3. This practice is also likely to prolong the life of the shade fabric and therefore be cost effective.

- Although many verandahs functioned well in sheltering circulation routes and classroom entrances from wet weather, they did not work effectively as shade structures. Often the space was too narrow to accommodate group activities and group play. The steps at the edge of the verandah (which form natural seating 'possy') were often in full sun over the lunch break.

- Given choice, students appeared to prefer light and/or warm shade that was large enough to group around within.

- Established natural shade was successful on many counts. Trees were used as play equipment and the space underneath used as 'rooms'.

- At several schools with well established landscape deciduous trees worked well in providing spectator shade to sports fields. These examples support the role of a comprehensive long term landscape plan in achieving a well-shaded school environment.

Conclusions

Initial findings suggest that in recent years many New Zealand schools have developed a variety of successful initiatives to reduce students exposure to UVR. The full analysis of the ten case studies should provide a series of the strategies and features of best practice.

The further, detailed analysis of 29 built shade structures will provide further understanding of the ways in which siting, design, materials and construction contribute to the effectiveness and efficiency of the sun-shading for UVR.

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