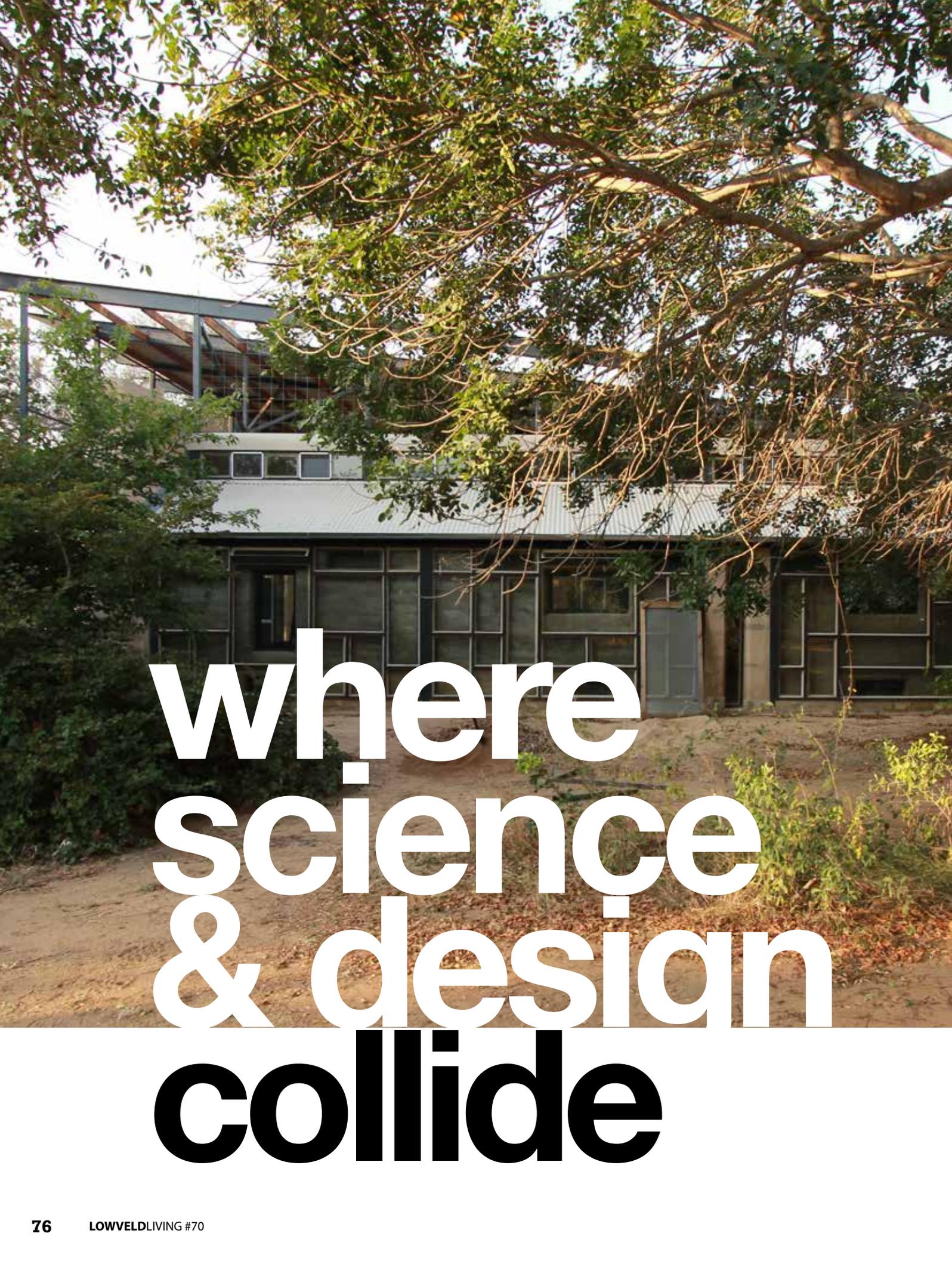




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“WHAT IF THE BUILDING DESIGN EMBODIES THE PRINCIPLES WE ARE TRYING TO TEACH YOUNG SCIENTISTS?”

Skukuza Institute for Science Leadership:
a lesson in sustainable building

Words Dianne Tipping Woods **Photos** Simon Bird and Karen Vickers

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a new building in Kruger National Park's Skukuza staff village is demonstrating how design draws on life's principles to create a sustainable – and beautiful – space for science students.

When researchers and educators Karen Vickers and Laurence Kruger were dreaming about creating a space to develop science skills in the Kruger National Park, they dared to ask “what if the building design embodies the principles we are trying to teach young scientists?”

What would such a building look like? What would it be made of? Who would design it? And how much would it cost?

The answer to the first question is self evident, because the Skukuza Institute for Science Leadership opened in 2017. It's a beautifully proportioned building that's deceptively unassuming from the outside, but has an expansive, welcoming layout that centres around a courtyard. The rammed earth walls and water feature create interesting functional spaces, while the steel structures that support the living roof (trays of plants) create a sense of height and perspective in an otherwise grounded environment.

The design ethos is about more than just aesthetics though. “Our goal is to bring students here in a way that shapes them but also shakes them up,” says Karen. “We knew the centre had to demonstrate to managers, tourists and students alike the feasibility of low impact living by showcasing the ways in which design can reduce our environmental footprint in all aspects of daily living.”

Working with architects Nicholas Whitcutt and Kevin Mitchell, Karen and Laurence conceptualised the centre. Phase one, which includes a lecture theatre, library and lab space, with catering facilities for up to 40 students, is complete. Funding for the building came from The National Science Foundation in the USA through the Organization for Tropical Studies and from SANParks, which allocated the two hectare site on the road leading to the Skukuza staff village. Already serviced with water and electricity, the site contained several existing buildings and structures, including two four-bedroomed houses – currently used for student accommodation.

Rubble, rammed earth and mud bricks cooked by the sun mean that the bulk of the building materials for the centre were locally sourced and made with simple, life friendly chemistry. “In the lecture theatre, the drivers were acoustics and sightlines, natural ventilation, light levels and the mitigation of glare, while there are various spaces in the library for different types of working and studying, with areas that are quieter and more introspective, and spaces that allow for discussion and interaction,” says Karen. In the laboratory, ventilation was important, together with a system of specially designed work tables and racks of trays.

As much passive cooling and heating as possible was included in the design, broadly mimicking the thermal principles





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of a termite mound and drawing on the natural properties of the building materials. Rammed earth in particular has amazing thermal capabilities and the shape of the library was also designed to help the thermal aspects of rising hot air. The north wall is a Trombe wall, which is manually operated to adjust airflow and temperature depending on the time of day and year through a simple system of vents to control heating and cooling.

The lecture theatre is built into the earth so its back wall is soil and all the rainwater from the roof gets captured in storage tanks with seating around their bases, while trees and planted screens provide shade. The gorgeous, multi-functional pond in the courtyard has to work too, providing evaporation and cooling. "The roof is the least green aspect of the building due to the high levels of embodied energy in the steel," says Karen, but it was a calculated trade off as the planted tray system will help with the thermal effect.

"We want to enhance science education and experiential learning opportunities, but we also want to change how people think, feel and act, so they have the skills we feel scientists need for the 21st century. It's about more than just biodiversity skills," says Karen.

"Everything was treated as a learning exercise, in a highly participatory process. The building tells the story of the organic construction process and the work that will be conducted in these spaces – and the finished product is breathtaking," says Laurence.

Having used life friendly chemistry where possible, available material, passive heating and cooling systems that rely on cyclic processes, and multifunctional design, with a diversity of building materials and techniques, it's not surprising that the centre recently hosted a workshop by Biomimicry South Africa's Claire Janisch, which used the building as a case study for sustainable design.

Other sustainability features include:

A multi-hybrid solar photovoltaic (PV) system to ensure uninterrupted power supply to essential equipment in the event of an outage. This works as a combined island and grid-tied system, and consists of 24 PV panels and 24 batteries.

A cold room off the laboratory that is a plant-operated humidity-controlled space for lab storage, with the plant powered by the solar PV system. LED lighting is used wherever possible.

The site is serviced for water-borne sewage, which is treated in Skukuza via oxidation tanks and a reed bed system. Additionally, Enviro Loo waterless composting toilets were installed in the Science Centre, and all wastewater from basins drains to a soak-away system or to existing plants.

Funding is still required for the phases (2, 3, 4 and 5) of the project. If you would like to make a contribution to the green facility or science outreach programs please visit: www.nsasani.co.za



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