

Building with straw bales

Bungalows

FOR RIVER RAFTERS

interview by Carol Knoll

Patrick Herbert

"What we call the 'housing crisis' is in fact a crisis of disingenuity and diseconomy. For example, a relevant statistical fact would be that in California alone, the 'waste product' called straw that gets burnt, clogging up the west coast skyline and causing a great fire risk, could be the source of sufficient building material to construct four million 150 m² dwellings, annually. The straw walls for each house take three to four days to bale, while the process of building itself is a magnet for community and invariably cultivates goodwill and exchange between people who learn from one another and empower each other in so doing - usually spontaneously."

Etienne Bruwer - Introduction to Green Issues and Building Materials - talk given at Sustainability in the Built Environment Conference, August, 1998.

Architect Etienne Bruwer of Greenhaus Architects in Cape Town was approached by Paddy Herbert and Bill Mitchell, owners of the guest farm, Oudrif, on the Doring River in the Clanwilliam District near Klaver, after they had read several articles on his work with clay/straw building methods. Klaver is a wheat farming area and Herbert and Mitchell had already drawn on information about straw bale building from a handbook on the subject and research on the internet. Their idea was to build a number of straw bungalows and an open lapa for river rafters alongside the river, at the point where the white water rafters disembarked.

Bruwer said that the aesthetic was generated out of the idea of a meeting place in distinctive rural surrounds. He described the site as a rocky ledge facing a cliff and rocky sub-valley where there are numerous well-preserved bushmen paintings. The natural vegetation of the area is low-growing fynbos. The rocky river bed is the result of a flash flood which took out 8 ha of alluvial land originally planned for crops of watermelon and paprika.

Bruwer explained the building methods used by Mitchell and his team at Oudrif and mentioned other techniques used in straw bale construction.

The foundations for the bungalows comprise shutters made of two timber planks placed vertically on top of the ground. Riverstone is packed into these shutters with an infill of a concrete and lime mix. Bars of reinforced steel, half a meter in length, are concreted into the shutters at intervals, with 10 cm of the bar exposed to secure the initial row of straw bales.

The basic structure of the walls is a wooden framework and the wheat straw bales are used as infill. The wood is treated with one of the new borax based products which is anti-fungal, distasteful to insects and mammal friendly. Where the roof structure rests directly on the bales, the top part of the wall is horizontally reinforced or tied together, either by means of a wire link or a wooden ladder lintel which is put on top of the bales so that the roof can be attached to it. This reinforcement serves to prevent the roof from pushing the walls outwards.

"The original American method of attaching the roof to the walls, known as the impaling method, involves steel or bamboo rods which are pushed down through the bales from the top and these rods are tied to the ladder lintel which is tied to the roof beam above. Strong wire - 2 mm diameter 'bloudraad' - can also be used and has been dubbed the 'sosatie' method. The wire is threaded through all the bales right down to the foundation and strapped to the roof beam, so that the roof can't be lifted off by wind," said Bruwer.



Patrick Herbert

The window sills of the building are wide (35 cm) because of the thick walls and they make comfortable window seats. The unfinished wood can be varnished with prickly pear juice or plastered with clay to prevent splintering. The door and window lintels are three times the width of the respective openings so that the weight load is spread.

Plastering can be done in the conventional way, with the straw bales being wrapped in wire mesh so that the layer of cement plaster will adhere to the walls. The preferred method is, however, the use of a clay slurry or a so called 'cob' mix which is a mixture of straw and clay. This will fill up all the crevices in the walls before the final coat of plaster is applied - and this plaster coat can be reinforced with a small amount of straw which will give a good bond. This is a 'greener' method and costs half as much as the wire mesh technique.

"Currently, a square meter of external, plastered, burnt-brick wall will set you back R 231, 00, while the equivalent in clay plastered, straw bale costs R 45, 00 - a six-fold difference," commented Bruwer. "The clay/straw product radically reduces noise pollution; provides a consistently healthy, dry and toxin absorbent atmosphere; will insulate for all seasons - so that minimal heating is necessary in winter and there is maximum protection against heat in summer; and will require a fraction of the water that conventional methods use for construction. Straw bales have a much better fire rating than wood. The clay/straw building will be totally renewable and easy to renovate. Most importantly, it will feel like you've come home!" ■



ABOVE & LEFT: A completed house (bungalow) with its plastered straw bale roof and walls.



Etienne Bruwer

RIGHT: The foundations of the bungalows comprise riverstone packed into timber shutters with a final infill of a concrete and lime mix. The Doring River is in the background.

BELOW: The bales immediately above the shuttered foundations are covered in damp-proof wrapping. The deep window box frames are in evidence.



Etienne Bruwer