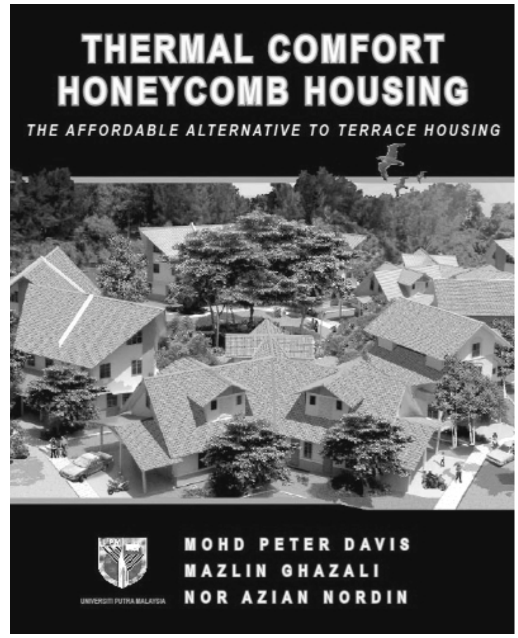
How to Build Comfortable, Cool, and Attractive Housing

by Marjorie Mazel Hecht



Thermal Comfort Honeycomb Housing: The Affordable Alternative to Terrace Housing
by Mohd Peter Davis, Mazlin Ghazali, Nor Azian Nordin
Kuala Lumpur, Malaysia: Universiti Putra Malaysia, 2006
Hardcover, 187 pp., $50.00 (postpaid from Malaysia)*

This book is an inspiring example of how human creativity and determination can solve a problem that will change the lives of many people for the better. As the authors' "honeycomb housing" becomes a reality in Malaysia (where the government and housing developers are awarding honeycomb projects), the idea should catch on, to build comfortable housing around the world—and to tackle other very solvable development challenges.

In the first chapter, author Mohd Peter Davis explains how when he moved to Malaysia from Australia, he found his wife's house in Kuala Lumpur lovely, but too hot. It was a typical terraced row-house, but so hot during the day that he couldn't think and so hot at night that he couldn't sleep. Malaysia has 2 million of these grossly overheated houses, both low cost and luxury versions, he says, and the capital, Kuala Lumpur, is now a serious "urban heat island."

The older, traditional wooden kampong houses in the rural areas were cool at night, but unbearably hot "torture chambers" during the day. So, highly motivated by heat stress, Peter Davis decided to design and build a new kind of house that would be comfortably cool without air conditioning. He succeeded, and has been living with his family in their dream house for 14 years.

As he writes, "Our dream bungalow, designed to suit our family needs, has served a wider purpose; it is the first scientific demonstration that energy efficient thermally comfortable houses can be built in Malaysia without using air-conditioning." Davis calculated that his decision not to use air-conditioning will save him the entire cost of building the house in another 9 years. (Note that he is not against air-conditioning, however, and recommends that for bad heat waves or large gatherings, people could have one unit for their living area.)

Thermal Comfort

Davis then took on the project of improving Malaysia's existing urban housing and developing an attractive, comfortable, cool design for new housing that could be easily and inexpensively mass-produced. He and his colleagues scientifically studied, first of all, individual thermal comfort—what a tolerable temperature was for most people in Malaysia's hot, humid, climate—and then measured the temperatures night and day of various kinds of existing housing. For most people, the thermal comfort zone is between 24° and 28°C (75.2°-82.4°F).

They charted the Malaysian climate for every day in a year, and studied how houses heat up, and cool down. Although Kuala Lumpur's humid outdoor temperature didn't get above 35°C (95°F), the indoor temperature reached 49°C under the roof.

Then Davis and co-authors worked on the science of the architecture and the building materials. First, they developed a "cool roof," which reduced indoor temperature by 3.5°C (6.6°F). They found that the common Malaysian practice of using natural ventilation—doors and windows open—during the day made the house hotter, because it brought in the hottest air of the day from outside.

Conversly, opening the doors and windows at night—the opposite of usual Malaysian practice—cooled down the house and stored the coolness, keeping the house cooler the next day. A mechanical ventilation system at night (such as an exhaust fan) helped this process. They found that between 14 to 28 air changes per hour were most effective. Roof wind turbines, they discovered, had no cooling effect.

By combining the cooling features, the improved house was 5.6°C (10°F) cooler than conventional houses. The key was keeping the roof from heat gain from the Sun. They accomplished this, working with industry, by finding a white metal that would stay clean, not leak, and not store as much heat as the usual red concrete tile Malaysian roof. They tested both glass wool and rock wool insulation, which both worked, all in all reducing thermal discomfort in a two-story house by 80 percent and in a one-story house by 70 percent.

To keep the walls from heat gain, they designed wrap-around verandas. This enabled the concrete building materials to store the coolness from night ventilation, instead of the heat from the Sun.

The authors proposed that the government replace the current urban roofs with the new "cool roof," which would cut the thermal discomfort factor by 80 percent. But no one wanted to pay for the renovation. And so, they decided to concentrate on building new housing that was thermally comfortable—at no additional cost to the builder or buyer.

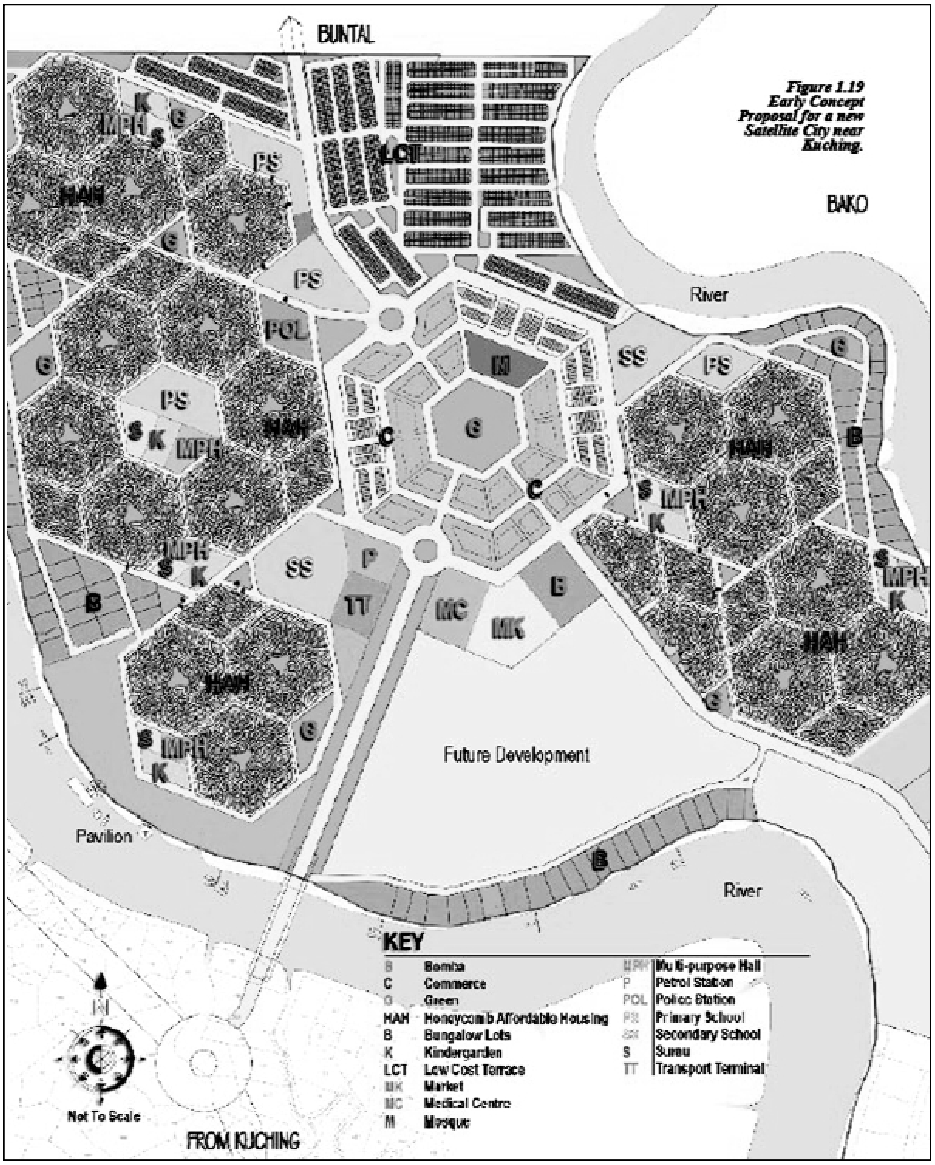
It should be noted that in the past, Malaysia has been a housing success story, constructing "reasonable quality urban housing," Davis says, to keep pace with the population increase and the migration from the rural areas. The problem is today that the price of buying a row house is too high for most working families, who live instead in high-rise "pigeon-hole" apartment buildings.

The Honeycomb Design

Architect Mazlin Ghazali's honeycomb design addresses the cost question, and also two other complaints by residents of current low-cost housing: thermal discomfort and too-small kitchens. He also considered the lack of community spaces and the unfriendliness of conventional urban designs.

The Ghazali design revamps the traditional urban row house design by placing housing units around a central space in hexagonal formations. This gives the group of houses an inner courtyard. Instead of "monotonous terrace houses with small front yards," Ghazali says, there are "semi-detached houses with generous gardens . . . at no extra cost to the buyers."

The Ghazali tessellating design is not only attractive, but is more efficient than the usual row house design, accommodating more housing units per acre, using duplexes, triplexes, and quadruplexes. He has designed whole neighborhoods in a hexagonal grid, and all types of housing, including honeycomb four- and five-story apartment buildings. The design allows for mature trees to have the room to grow in the inner courtyards, unimpeded by sewer and utility lines.



An early concept proposal for a satellite city envisioned to house 100,000 residents in 2,000 acres.

A basic consideration was how to provide safe play areas for children, and community recreational spaces in an urban setting, and how to make quality homes available for every Malaysian family. Toward this end, for the last four years, the authors have been talking about thermal honeycomb housing with consumers, developers, and the government. In one market survey, their scale model of "My First Home" had 80 percent approval among respondents. When you look at the housing layouts, and the sketches of the honeycomb community, it is easy to see why they would be preferred to the usual row house.

The authors note that the world needs "about 500 million new houses, mainly in developing countries." They see their design as a counterpole to the greens who advocate going back to nature and the Stone Age. Instead, they write, we have to go "back to the optimism of the great Biosphere scientist Vladimir Vernardsky and his concept of the Noösphere. . . ."

We need 1,000 new cities in the developing world, the authors state, and Malaysia is positioned to play a leading role as a city builder. Where will these cities be located? The authors cite the Eurasian Land-Bridge, as pioneered by Lyndon and Helga LaRouche, as the location for these new cities.

The book concludes: "We can only agree with Vernadsky: 'The future is in our hands. We will not let it go.' "

The first honeycomb cities, to be funded by the Malaysian government, are on the drawing board (see figure).

If Malaysia can do it, why not New Orleans?

Notes

* The book can be obtained directly from the authors in Malaysia. Send a bank draft for U.S.$50.00 (which includes postage), payable to Peter Davis, and mail to him at Institute of Advanced Technology, Universiti Putra Malaysia, UPM 43400 Serdang, Selangor, MALAYSIA. For more information, contact Peter Davis at e-mail: mohd_peter@hotmail.com.