

ARCHITECTURE



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Dick Riniker of the Tribune staff

Building their GREEN home

La Crosse couple apply environmentally sound principles to dwelling

By **TERRY RINDFLEISCH**
Of the Tribune staff

Roald Gundersen and Kitty Patch are building more than a dream home in North Chipmunk Coulee south of La Crosse.

Their A-frame home in the middle of the woods is their biosphere — the model of an energy-efficient, clear-air home that reuses energy.

Gundersen, a La Crosse native, is taking principles that he learned and used as an architect for Biosphere 2, the largest self-sustaining ecosystem ever built, and is creating a biosphere-like home.

"I guess you could call it Biosphere 3, but really it's more of a prototype of a small family farm," Gundersen said.

The 1978 La Crosse Central High School graduate was one of two architects who designed living quarters for Biosphere 2, the glass-domed complex where eight people lived among 3,800 species of plants and animals for two years.

For his house, Gundersen has developed a low-cost greenhouse and a total solar heating and cooling system that will be attached to his house when it is finished in September.

Waste from the house, such as water from the washer, will flow to the greenhouse to fertilize plants and flowers. Food and oxygen producing plants, which also use carbon dioxide, will add more humidity and provide clean air to the house.

Solar panels and shutters will provide electricity and excess heat from the solar greenhouse will heat the house.

"Pipes will force the air into the ground, storing heat," Gundersen said. "The snow will help reflect more light inside and help produce more heat, and when the snow melts, the reflection is down and it cools down."

Gundersen said he also cleans up the air inside by using fewer fossil fuels, and his solar system replaces a furnace. He said he will use his house as a model to demonstrate the technology.

People spend 90 percent of their lives or about 65 years in a

building, Gundersen said, and the Environmental Protection Agency says that in some cases there is 100 times more pollution inside a building than outside.

"We can't have energy-efficient buildings unless we clean the air inside," he said. "That's what I want to develop."

He said he will have clean air and a desired humidity, which will make his house healthier for his family.

Gundersen is building the dwelling on land owned by his grandmother and has used trees, sand and rock from the site. He used straw bales for insulation.

"It sounds primitive, but it's a high-tech house," he said.

Gundersen and his fiancée are expecting a child this summer and hope to have a wedding and a house-warming party when the house is finished in the fall.

He and Kitty are building the house themselves. They started last August.

"I really have not built anything before," Gundersen said.

The house will cost between \$15,000 and \$20,000 before it is finished, he said.

Gundersen also designed a solar greenhouse for Badgersett Research Farms in southeast Minnesota in Amhearst, which raises hybrid hazelnuts and chestnut seedlings.

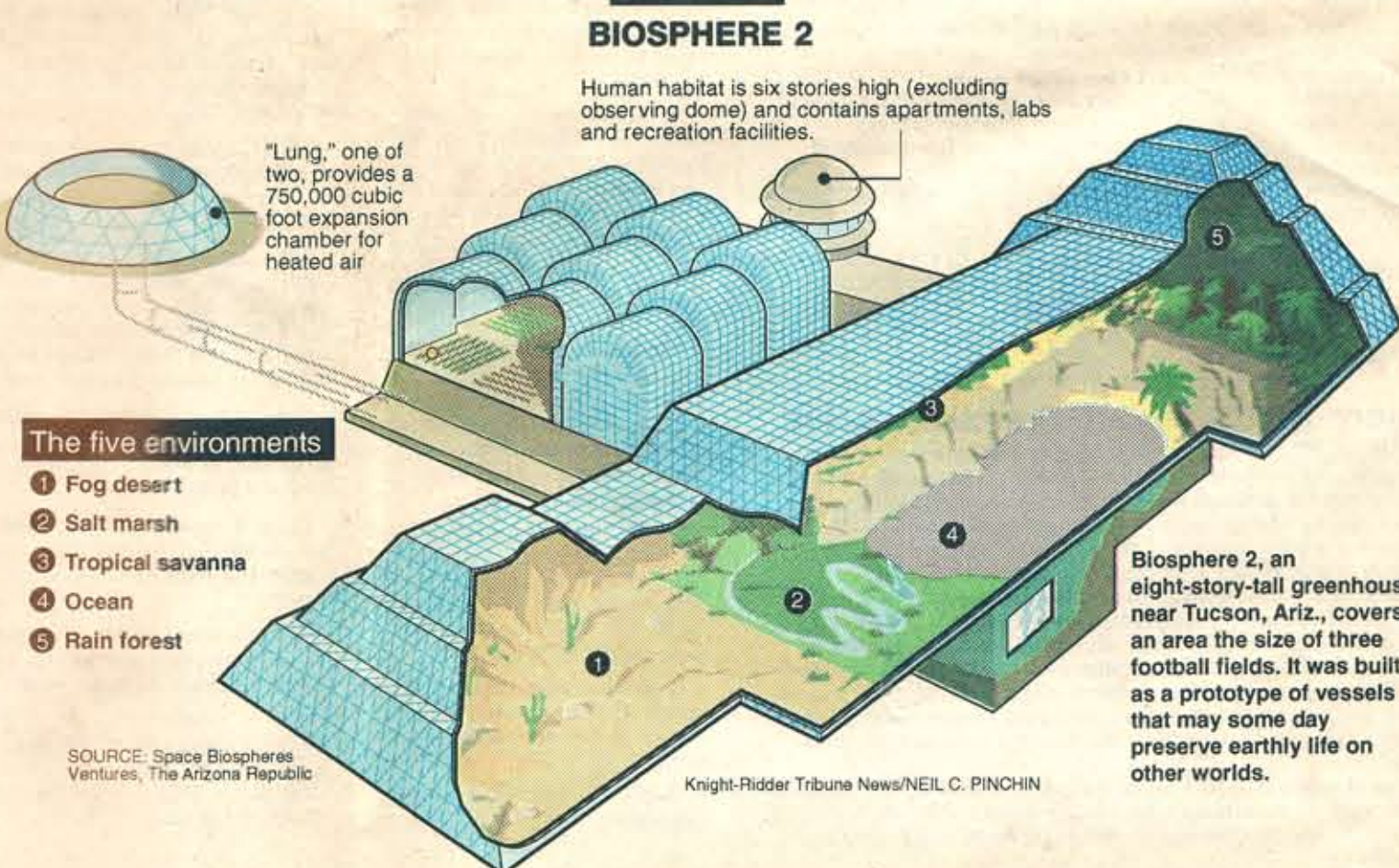
The greenhouse is semi-earth sheltered, with the front four feet in the ground, and the back six to seven feet in the ground. The roof is super insulated, with glass facing only south.

"With this concept, farmers in Minnesota and Wisconsin can grow produce year-round and without using petroleum products to heat the building," Gundersen said.

Gundersen said people need to look at how buildings and cities are designed in the future.

"We are using a tremendous amount of energy to process these building materials," he said. "We waste a lot of energy and materials and we don't need to do that."

In 10 to 20 years, he said, people will want a more sustainable way of living.



It's the healthiest building on earth

By **TERRY RINDFLEISCH**
Of the Tribune staff

Architect Roald Gundersen did not want to end up in some office drawing up plans for skyscrapers and energy-inefficient buildings.

Gundersen, 33, son of Cameron and Rachael Gundersen of La Crosse, wanted to specialize in environmental design and create buildings and living systems that were healthy for people and the environment.

He attended the University of Minnesota School of Architecture for 4½ years and graduated with a major in environmental design and architecture in 1984. He even helped create a couple courses at the University of Minnesota that he thought he needed.

"I wanted something beyond architecture," Gundersen said. "I was interested in the environment because father is a naturalist, and I grew up in the Coulee Region which is a wonderful treasure of biology."

Gundersen said he was fortunate to land his first job with K and CZL Architects and Planners, San Jose, Calif., where his first project was to help restore St. Joseph's Cathedral.

"The project encompassed a cross-disciplinary approach," he said. "It had the arts and choreography of space for funerals and Mass, sculpture and painting, architecture and music."

He planned other church restorations and several housing developments and helped develop a plan to move the pope through San Francisco during his visit in 1987.

But after three years as an architect, Gundersen wanted to work with living and biological systems. He thought about space stations, other planets and Biosphere 2 in Arizona.

"I was keeping tabs on Biosphere 2, but I thought it had been designed," he said.

Gundersen found what he wanted in a job with Environmental Research Labs in Phoenix, a designer of Biosphere 2. In 1988 he became one of two architects to design the living quarters for Biosphere 2.

He spent three years designing the living quarters.

"Biosphere 2 was getting press from around the world, and I was getting incredible experience," Gundersen said.

Gundersen said Biosphere 2 is the

healthiest building on earth. Life-support systems and waste-treatment systems were intricately coordinated for humans and animals, he said.

"It was also the most complicated building on earth," he said. "It was air tight. It has one air exchange in 20 years and most buildings have an air exchange every other hour."

Gundersen said he designed high ceilings and interesting variety of heights and spaces so people could look out of their apartments.

"It was not boxy and not a lot of right angles," Gundersen said. "We had curves, high ceilings — 78 feet high — big windows, a library tower and a glass floor."

"People living in Biosphere 2 really enjoyed the habitat," he said.

Most of world's attention was focused on the basic science of Biosphere 2, but Gundersen said he felt the greatest accomplishment was applied science — how to apply the biosphere to everyday life and buildings.

That's exactly what Gundersen is trying to do with his own business, REA Farm (Research in Environment Architecture) on the site where he is building a biosphere-like home in North Chipmunk Coulee south of La Crosse.