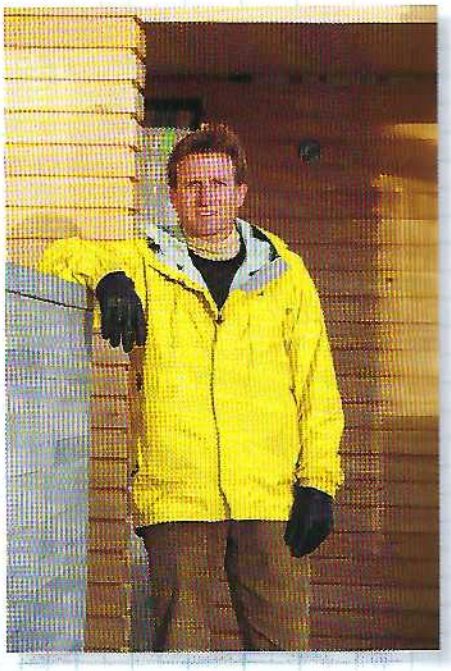
a dream, green Ski Hut

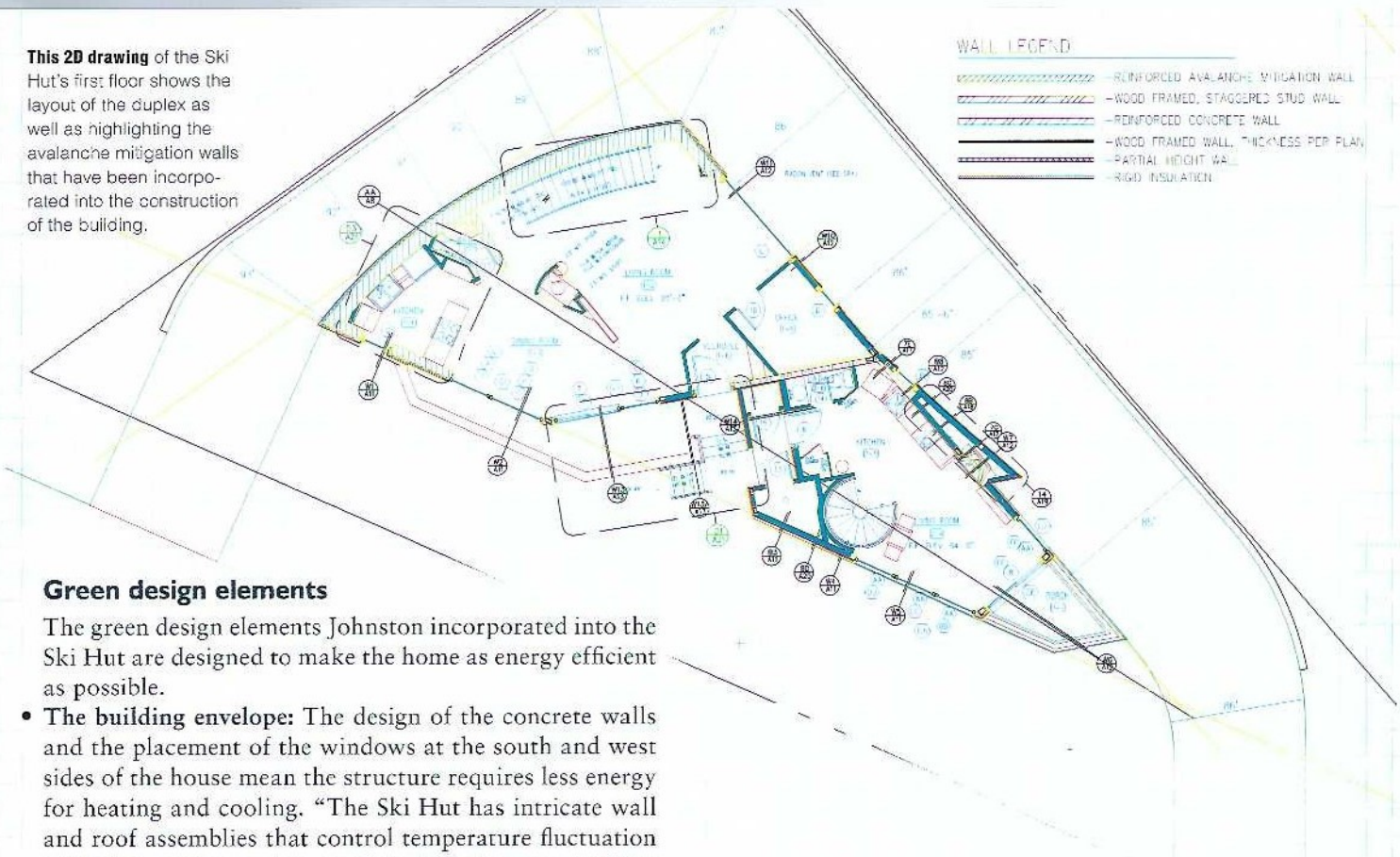
The challenge of building a sustainable duplex in an avalanche-prone area of Warm Springs brought out the best in problem solving for architect Daniel Johnston.

When the opportunity arose for San Diego-based architect Daniel Johnston to build his mountain dream house in Ketchum, he decided to build a sustainable, green structure. In addition, Johnston needed a home that could withstand the powerful force of an avalanche. "Once I decided to build, I wanted to know the best way to build," Johnston said. "I ended up with a duplex in an avalanche-prone area, but it was near the lifts and suited me."

The resulting Ski Hut at 100 Sage Road in Warm Springs is a two-unit residence—one for Johnston and one to sell—situated on an environmentally friendly 5,676-square-foot lot. He broke ground on the project in September 2005. "Sustainability was the focus of the design," Johnston said. "And the most fundamental effort in designing a sustainable building is creating an efficient building envelope, where the transfer of air and moisture between the inside and outside is planned and controlled."



Daniel Johnston (right) stands outside his avalanche resistant environmentally friendly duplex in Warm Springs (above) which consists of an 850-square-foot unit for himself and a 1,850-square-foot unit to sell.



This 2D drawing of the Ski Hut's first floor shows the layout of the duplex as well as highlighting the avalanche mitigation walls that have been incorporated into the construction of the building.

Green design elements

The green design elements Johnston incorporated into the Ski Hut are designed to make the home as energy efficient as possible.

- **The building envelope:** The design of the concrete walls and the placement of the windows at the south and west sides of the house mean the structure requires less energy for heating and cooling. "The Ski Hut has intricate wall and roof assemblies that control temperature fluctuation and allow a passive space conditioning system to perform very effectively," said Johnston.
- **A zinc roof:** Zinc is a durable material, similar to copper. It is a soft metal easily molded into shingles.
- **Photovoltaic solar panels:** These were integrated into the zinc roof structure at the home's southern exposures. The panels have net metering, and are tied to the electric utility. Excess power generated by the panels will be sold back to Idaho Power. The panels, like many elements of the home, are integrated to follow the shape of the roof and appear as a continuation of the roof's surface.

- **Lighting efficiency:** The home uses a mix of energy efficient lighting elements and fixtures including fluorescent, compact fluorescent, low voltage, incandescent and LED bulbs. Planned placement allows for more efficient lighting of spaces and fewer fixtures.
- **Stairway:** A glass stairway connecting the three floors and garage is designed to bring daylight into the house, and features a frit or non-skid material, with an enameled pattern and dots.
- **Sealed building envelope:** All chimneys, vents, ducts, electrical outlets, plumbing, doors and windows are sealed to prevent air leakage. Sealing improves thermal efficiency and minimizes condensation, which can cause mold and rot.
- **Hydronic heating:** The interior space is heated with hydronics, a system that circulates warm water through pipes beneath the floors, including those of showers, closets and garages. The heat radiates upward from the flooring into the room. Exterior patios, walks, steps and driveway use hot water snow melting systems. The hydronic system is heated by a separate set of solar panels.

Green building materials

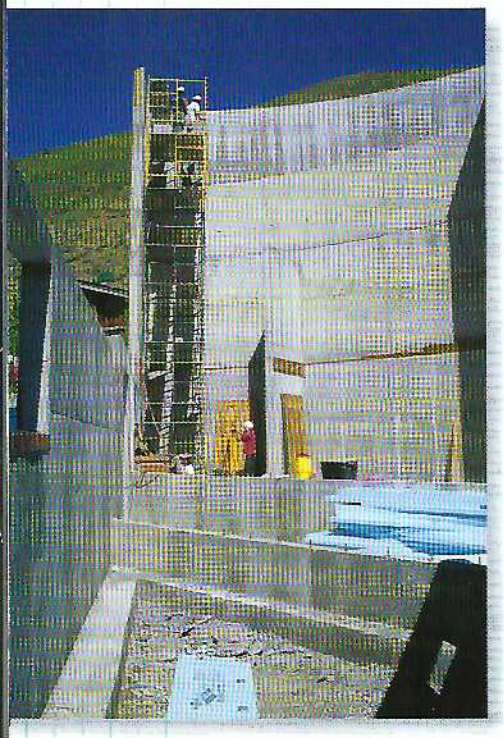
Ideally, when building a sustainable structure, all materials should come from within a 500-mile radius, to reduce the carbon footprint of the building process. Although Johnston was well aware of this principle, it is a difficult goal to achieve in rural Idaho. Instead, he strove to work with sustainable materials such as recycled products, natural materials, products manufactured with minimal environmental impact and materials that require minimal ongoing maintenance.

Some of the sustainable materials Johnston used included Alaskan yellow cedar from Washington State for the exterior. The wood is naturally resistant to decay and does not require a finish. The soapstone Johnston used for the base of the building, patios and landscape walls is from a quarry in Brazil, distributed through Denver. Since it is an organic substance, it too requires very little maintenance and wears naturally. "What is interesting about the green movement is that the ideas are out there, but whole materials and construction are not up to speed yet," Johnston said. "There is a learning curve, but I don't think it will be many more years before everyone will be involved."

Avalanche resistance

Alongside learning how to build an environmentally friendly structure, Johnston also became versed in the ins and outs of avalanche-resistant construction, which is the primary purpose for the shape and structure of the house. The mitigation of an avalanche involves several processes that enable the structure to withstand the impact and prevent it from sliding off its foundation. Such buildings are not uncommon in Ketchum, but most have been excavated into hillsides so avalanches flow over the top. This wasn't possible for the Ski Hut.

Using European design as inspiration and conferring with Bruce Smith, a regional avalanche consultant, Johnston incorporated more than 300 cubic yards of reinforced concrete into the house. The avalanche impact wall is curved and the structure is anchored to the ground by a 10-foot-deep, concrete substructure, which extends the width of the house. Tapered side walls act as the surface of a wing, and the arrangement of the house's three walls, combined with the angle to the flow line, have a shape and function like a wing in wind or boat foil in water, directing the flow of an avalanche around it.



The Ski Hut's "building envelope" reveals a curved concrete wall strong enough to sustain the impact of an avalanche and shaped to allow the snow to move around the structure.

"The shape and size of the house is designed to mitigate (a slide) and the wall being curved is like an arch on its side—it can't just break," Johnston said. "There are also buttress walls, which are at either end of the back wall holding it in. The whole system is anchored to the ground so it will not fall over or slide." In addition, the living space in the two units is elevated above grade with several accesses to provide safe egresses after the snow flow settles.

The curved roof and the divisions of the house are part of the avalanche-mitigation design. Construction includes a steel frame manufactured by a fabricator in Clearfield, Utah, that specializes in building roller coasters.

Johnston said he learned a great deal constructing his sustainable, avalanche-resistant house, which inspires him to do more. Most of all he enjoyed working with different shapes and contemporary building materials. "In the last two or three years, sustainable construction has paved the way to doing things a lot smarter, no matter global warming," Johnston said. "Why not design for the efficient use of materials and energy?"

writer: **Sabina Dana Plasse**
photographer: **David N. Seelig**

Emerging green builders

In the fight against global warming, the motor vehicle is often labeled pubic enemy No. 1. However, homes and buildings are bigger culprits when it comes to depleting energy sources.

The problem of diminishing resources and rising energy costs needs addressing, and the Wood River Valley is no exception. Fortunately, last July, the Emerging Green Builders set up shop in Blaine County to help local communities rise to the sustainable resource challenge.

EGB is a program initiated by the U.S. Green Building Council to integrate and advance young professionals into the green building movement. The council is the nation's foremost coalition of leaders from across the building industry working to promote buildings that are environmentally responsible places to work and live in.

"The EGB was started to create a network of emerging green building leaders, especially students and young professionals, to generate momentum for the green building industry," said Gunnar Gladics, co-chair of the Blaine County Chapter. "Most people don't even know that almost 50 percent of all energy consumed is by buildings. Our community is dreadfully behind many other resort and mountain areas."

Gladics' goals for the EGB are to advocate and accelerate the green building movement in the valley through education. "Right now we have architectural and engineering interns, contractors, developers, city officials, business and finance people working with us. We have been working with the Environmental Resource Center and Citizens for Smart Growth as well as the American Institute of Architects to help co-plan events."

For example, said Gladics, who works for local architecture firm Ruscitto Latham Blanton, the American Institute of Architects will host an educational workshop on alternative building energy systems in the valley this May.

Buildings in the United States are responsible for:

65% of electricity consumption

36% of energy use

30% of greenhouse gas emissions

30% of raw material use

30% of waste output... that's **136** million tons annually

12% of potable water consumption

SOURCE: USGBC.ORG

The EGB also arranges tours of LEED-certified green buildings in the valley. LEED, which stands for Leadership in Energy and Environmental Design, is the nationally accepted benchmark for the design, construction and operation of high-performance green buildings. Using a science-based approach, it emphasizes such factors as sustainable site development, water and energy efficiency, eco-friendly materials and indoor air quality. Buildings are awarded points for each factor they employ; the more points a building earns, the higher its LEED ranking.

The tour includes several private residences as well as the new Rocky Mountain Hardware building in Hailey. This is the first commercial building in the Wood River Valley to be certified LEED-NC (New Construction). Other local projects registered and working toward certification include the residential Sweetwater Development in Hailey's Woodside neighborhood, targeting certification under USGBC's new LEED-ND (Neighborhood Development) pilot program, and the forthcoming 22,500-square-foot home of the Sun Valley Center for the Arts in downtown Ketchum.

"...almost 50 percent of all energy consumed is by buildings. Our community is dreadfully behind..."

Gunnar Gladics, co-chair EGB Blaine County

"With so many components to sustainable building, it can be daunting," said Nicole Ramey, co-chair of the Blaine County EGB and an employee with architecture firm Michael Doty and Associates. "We want to make it easier for everyone to understand."

And people are beginning to understand. Whether it is creating an entire building to be LEED certified, adding photovoltaic panels to a roof or cutting home size to reasonable square footage, Ramey sees that people are beginning to be more active in seeking ways to incorporate green living into their homes. The EGB is there to encourage this kind of thinking and offer support in implementing the ideas.

Even as square footage of homes in the valley continues to escalate, Gladics and Ramey are optimistic about the future. "People are aware of the energy a home consumes and are looking to become more responsible members of society," said Ramey. "A sustainable home is a healthy home, and helps to create a vibrant, healthy community."

—Timi Saviers

online resources

www.usgbcidaho.org
www.greenbuildexpo.org
Blaine County EGB 721.0175

sun valley GUIDE

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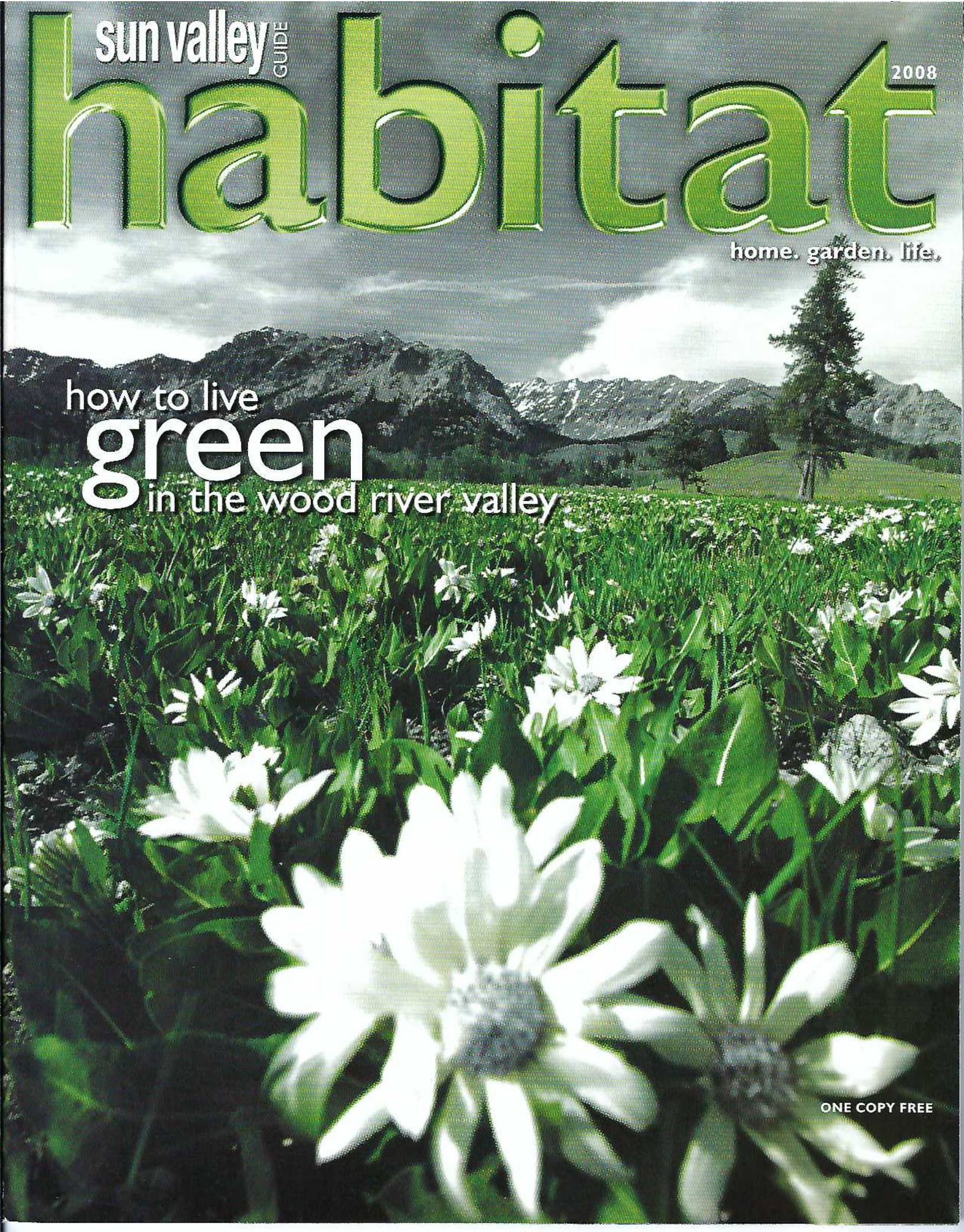

how to live green in the wood river valley

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