Biophilic design attributes include: dynamic natural light, natural ventilation, access to open and/or moving water, frequent opportunities for spontaneous interaction with nature, sensory connections with nature, complexity and order, mystery, prospect and refuge, fundamental natural forms, and local natural materials.

Biophilic design attributes are elements and qualities of the physical environment that connect us to the physical, psychological, and cognitive benefits derived from direct experiences with nature.

Biophilic design attributes include: dynamic natural light, natural ventilation, access to open and/or moving water, frequent opportunities for spontaneous interaction with nature, sensory connections with nature, complexity and order, mystery, prospect and refuge, fundamental natural forms, and local natural materials.

Preliminary Analysis Of The Biophilic Design Attributes Of The Optimum Performance Home™ At The Sea Ranch

Sustainable design and development, in its many definitions and interpretations, is gaining tremendous momentum in the United States and around the world in both developed and developing countries. Standards for sustainable building materials and technologies, and environmentally responsible design strategies, such as those outlined in U.S. Green Building Council’s Leadership in Energy & Environmental Design (LEED™) rating program, have made environmentally responsible design and building more accessible and easier to evaluate. In the U.S. alone, over 531 million square feet of commercial building space has been registered or certified under LEED since the first LEED rating system was released in 2000. With the creation of the new LEED for Homes rating system, interest in residential sustainable design is expected to soar in the next few years as homeowners discover that living in a healthy, resource-efficient sustainable home is not only possible, it is highly desirable.

However, sustainable design is typically regarded as a collection of “best practices” for resource conservation and improved environmental quality that rarely addresses the physical, psychological, and social consequences associated with living almost exclusively in built environments designed primarily to isolate and insulate us from nature. Although all sustainable design strategies and standards—including LEED—involve some considerations for human physical health, such as improved indoor air and environmental quality, many design professionals and environmental scientists believe that we must do even more. If sustainable design is to be truly embraced by the public, it must expand its considerations to include quality of life issues involving total human physical and psychological health and well-being.

When Harvard biologist Edward O. Wilson introduced the concept of Biophilia in the world in 1984 the concept of Biophilia (the inherent need of humans to interact and affiliate with nature to achieve and maintain optimum health and well-being), he laid the foundation for the development of a new design paradigm. Based upon research in multiple disciplines revealing that interaction with nature provides a variety of physical, psychological, and cognitive benefits rarely found in built environments, this new design paradigm expands significantly upon the definition of sustainable design to include the essential relationships between human beings and nature, and between natural environments and built environments.

The following preliminary analysis of the Optimum Performance Home’s biophilic attributes is based upon the current site, landscape planning, and architectural design of the home as described in the first four issues of Ultimate Home Design magazine. These attributes will be expanded upon and enhanced through the biophilic interior design of the home.

Suggest that when we design and build without an understanding of this fundamental fact, we not only harm the planet, we diminish the quality of human experience and lose the wellspring of our health and well-being.

Biophilic Design Attributes

As discussed in Issue 3, May/June 2006 of Ultimate Home Design, the new design paradigm that takes sustainable design to the next level is called Biophilic Design. Biophilic Design recognizes the inherent human need for nature together with sustainable and universal design strategies to create environments that truly enhance life. The Optimum Performance Home™ at The Sea Ranch, one of two custom home projects in California in the LEED for Homes pilot program, provides an excellent opportunity to study the process of biophilic design from site development and landscaping to architecture and interior design. By utilizing certain design strategies called biophilic design attributes, the design of the home will connect its occupants to nature and its many benefits in a variety of ways. Biophilic design attributes are elements and qualities of the physical environment that connect us to the physical, psychological, and cognitive benefits derived from direct experiences with nature. We prefer these natural attributes in part because they literally bring buildings to life physically through the use of design strategies and materials, and symbolically through an understanding of deeply rooted affiliations, associations, and meanings. Biophilic design attributes include: dynamic natural light, natural ventilation, access to open and/or moving water, frequent opportunities for spontaneous interaction with nature, sensory connections to nature, complexity and order, mystery, prospect and refuge, fundamental natural forms, and local natural materials.

The following preliminary analysis of the Optimum Performance Home’s biophilic attributes is based upon the current site, landscape planning, and architectural design of the home as described in the first four issues of Ultimate Home Design magazine. These attributes will be expanded upon and enhanced through the biophilic interior design of the home.

Some general strategies are described in this article, and future issues will discuss the development of these and other strategies that will be used to integrate biophilic attributes throughout the Optimum Performance Home at The Sea Ranch.

Dynamic natural light (rhythmic living light, patterns of brightness and shadow, sparkle)

The most significant difference between our experience of natural light and artificial light is that natural light is constantly changing in direction and intensity. The overall rhythm of sunlight moving from day to night and from season to season reveals and highlights colors, patterns, and textures; subdues and constantly changes them; then reveals them again in an entirely new way. Changing patterns of brightness and shadow, sparkle, and reflection capture and redirect our attention, helping to relieve stress and mental fatigue.

The correct placement and orientation of windows and skylights in buildings is critical to capturing dynamic natural light. Light should enter spaces from at least two different directions to enhance the experience of the sun’s movement, eliminate glare, and provide changing patterns of brightness and shadow. Each of the four directions provides distinct lighting effects and experiences. For example: southern exposure provides warmth with positive solar gain; northern exposure produces flatter, more diffused light, and eastern and western exposures afford the most dramatic experience of light movement.

Light should also enter spaces from different heights. For example, windows located high in the wall allow light to reflect off the ceiling and penetrate more deeply into the room. Light from above via skylights, transom windows, solar tubes, clerestory windows adds increased depth and movement.

The design of the Optimum Performance Home incorporates dynamic natural light in a variety of ways. The sun penetrates into and through the three-building compound with primary living spaces oriented east, west, and south. Natural light enters all critical spaces from two or three directions (none are required or desired in the wine cellar and home theatre). Southern exposure provides an infusion of bright, natural light through the solarium into the kitchen area and will provide passive solar warmth and ambient light to the kitchen, home office, and solarium. Skylights placed throughout the home provide infused, ever-changing light from above.

As the design of the interior of the home takes shape, materials that respond to changes in the light’s direction, intensity, and color will be used to enhance the experience of dynamic natural light. Artificial light will be designed to mimic natural light as much as possible and to provide individual control over brightness and direction.

Natural ventilation (movement of air, changes in air temperature, airborne scents)
Human beings were not meant to live in closed and sealed environments. We may be able to exist there, but we do not thrive there for long. The movement of fresh air through a space changes everything. It alters our perception of temperature, changes a static environment into one of subtle movement, and brings the world into our homes through scents carried on the breeze.

Few sites offer the potential for natural ventilation that The Sea Ranch site enjoys. The orientation of the home provides cross ventilation in all critical spaces through windows, doors, and operable skylights through which fresh air from the Pacific Ocean breezes will circulate. Interior materials and design elements that respond subtly to air movement will be used to enhance the experience of natural ventilation.

Access to open and/or moving water (visual, acoustical, symbolic qualities)

Water is one of the most evocative, universally shared symbols of life and a powerful biophilic attribute. We are instinctively drawn to water as a source of survival, as well as for aesthetic and recreational pleasure. In addition to human beings' historical patterns of habitat selection that have always favored living near the water, some of our most cherished and revered buildings, such as Frank Lloyd Wright's Fallingwater, use water as a primary design element.

Distant views of the Pacific Ocean from a variety of inside and outside spaces link the Optimum Performance Home to its symbolic associations with the sea. The planned excavated pond situated at the rear of the property serves not only a functional role as part of the hydrologic plan; it creates a biophilic focal point for the landscape surrounding the home and a habitat for local vegetation and wildlife.

Two private outdoor/nature areas are designed around water. Within the courtyard and visible from select interior spaces such as the master suite, the in-ground hot tub provides both visual and physical interaction with water in a natural setting. The private garden includes a water feature visible from the living room and the second-story library/music room. Additional interior water features will be designed to provide visual, acoustical, and symbolic connections to the compelling proximity of the water.

Frequent opportunities for spontaneous interaction with nature, including other species (integration of and free-flowing movement between interior and exterior spaces, visual and/or physical access to wildlife)

Biophilic design views the site and building as a series of exterior and interior spaces woven together in a tapestry. By integrating the natural elements of the site into the form of the architecture itself, we experience the unique relationships between interior and exterior from multiple perspectives as we move from space to space within the home. Visual and physical barriers between indoor rooms and outdoor spaces dissolve into a mosaic of inside-outside spaces.

By using the walls and wings of the home to define "outdoor rooms," the experience of living is extended into a sheltered natural environment. Both distant views and views of nearby nature are important to this experience. Distant views link us to the greater natural order of the site, while nearby nature links us to the intricacies and immediate sensory pleasures of the site.

The architecture of the Optimum Performance Home is formed within, around, and about the natural features of the site. Free-flowing movement between indoor and outdoor spaces is enhanced by multiple transition areas such as covered walkways, courtyard, decks, and a garden that visually and physically extends the livable space into the natural environment. Three levels of views will be enjoyed: controlled views that look into the courtyard, private garden, or prepared places on the property maintained by the owners; local views that look out onto nearby nature; and expansive views that look to infinity and include the Pacific Ocean and "big sky" views.

Permeable surfacing of the driveways, parking areas, and walkways maintain stronger connections with the natural immediate surroundings by eliminating solid pavement and retaining all potential runoff in the immediate watershed. The natural flow from inside the home to the outdoor paths link the home to nearby walking trails, gardens, stable, and riding trails along the 10 miles of coastline and further connects the occupants to the site and its natural surroundings.

Sensory connections to nature (physical, visual, material connections between interiors and nature)

While most built environments provide somewhat shallow and limited sensory experiences as compared to nature, biophilic design deeply engages all of the senses—in much the same way as sitting near the ocean, walking through the forest, climbing a mountain, or working in the garden. It is not a passive experience, but rather one that reminds us every moment that we are alive and a part of the life of the planet.

The four previously discussed attributes—natural light, ventilation, access to water, and opportunities to encounter nature from multiple perspectives—all directly enhance our sensory connections to the natural world and are abundant in the Optimum Performance Home. The surrounding natural setting of the home itself is so compelling, in part because it provides such a rich source of these attributes, and the site-specific architectural design takes full advantage of each.
The Sea Ranch site.

colors, patterns, and textures found at
multi-layered but elegant complexity of
furnishings, and details will reflect the
furnishings, and details will reflect the
facade, fenestrations, and scale and proportion appropriate to the
complexity of the natural world. Biophilic
cohere. Natural patterns of scale
learn, and thrive. But what makes it all
environments for all species to live,
atmosphere that surrounds us is the secret to survival."

Mystery arouses our intuition-driven
curiosity and encourages us to interact
more fully with our environments. In
nurtures. We are attracted to and
understand the quality of mystery that are found in
the building and interior spaces.

This is the environment from which the
Performance Home derives its form, its orientation, and its design. The
home overlooks the sweeping
view. The library/music room on the second floor is a particularly good example, with
a particularity of feature and
function. The interiors of the home
is designed utilizing
functions. It is designed utilizing
Fundamental natural forms (biomorphic
mosaic, fractal, natural progressions of scale, rhythm, proportion, repetition, symmetry, gradients)

Biophilic design views nature as the ultimate design model. Nature’s forms,
continues today to provide the benefit of
relief from mental fatigue and stress, as well as for aesthetic experiences.

Pulitzer Prize-winning Harvard biologist
and originator of the concept of Biophilia, Edward O. Wilson, observes our approp-
ria...