

Therapeutic Spaces for Healthy Aging

Integrating Biophilic Design for Human and Environmental Wellbeing

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Healthful Ecotopian Visions for Architecture and Urbanism

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5.6

THERAPEUTIC SPACES FOR
HEALTHY AGING

Integrating Biophilic Design for Human and
Environmental Wellbeing

Terri Peters and Ashita Parekh

Introduction

Environments that promote both human and ecological health are central to sustainable design practices. Our buildings use precious natural resources, and need to be worth investing in, maintaining, and sustaining over time. It is evident that the qualities of our everyday living and working environments greatly impact our moods, health, and wellbeing. The qualities influence our ability to communicate effectively with others, to heal, and recover from stressful conditions and situations. In architecture and design, there has been a growing interest in the benefits of incorporating nature in buildings, and in the past decade, there has been a significant increase in published peer-reviewed design research relevant to biophilic design in buildings (Gillis & Gatesleben, 2015; Yin et al., 2018). The term 'biophilia' refers to people's innate affinity to the natural world, and this concept has been explored in psychology and sociology since the 1980s. Interest has increased since Ulrich et al.'s 2008 comprehensive review of the impact of health environments on people's recovery, although the role of biophilia was not directly reviewed (Ulrich et al., 2008). The design of nature-focused spaces reflects a shift in priorities in architectural practice and in academia from minimizing resource use and the benefits of building performance, to a more holistic understanding of the potential benefits of how buildings can maximize positive impacts and shape people's 'performance' or wellbeing in buildings. Sensory experiences are especially important for how people experience buildings, so the design of air quality and flow, lighting, sound, smell, and textures, are all becoming more widely studied and quantified as important aspects in building performance. These 'invisible' aspects can be hard to draw or measure, but they impact how we feel and experience the indoors. The World Health Organization cites depression and mental health issues as the leading cause of disability worldwide (World Health Organization, 2020) and since people spend 90% of their time in buildings (Klepeis et al., 2001) now is the time for implementing healthful ecotopian visions for buildings and cities.

Biophilic Design

The translation of 'biophilia' into architectural design has been a focus for researchers Browning, Ryan, and Clancy (2014). They have characterized biophilic design for human health and wellbeing in buildings into three main categories that are divided into 14 patterns: Nature in Space Patterns



Biophilic Design Strategies in Long-Term Residential Care Environments for Persons with Dementia

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ABSTRACT


The number of persons living with dementia and related cognitive disorders is predicted to increase dramatically in the coming years. As a consequence, the need is increasing for appropriately designed long-term care (LTC) environments and design guidelines for these settings. This investigation presents the findings of a broad literature review on biophilic design and its application to a set of LTC architectural case studies selected for the degree to which each variously expresses key attributes of a set of ten biophilic patterns particularly rooted in the day to day experience of the aged in these care settings: visual connections with nature, non-visual connection with nature, non-rhythmic sensory stimuli, thermal and airflow variability, presence of water, dynamic and diffused light, complexity and order, prospect, refuge, and mystery. The three methodological aims are to conduct an in-depth literature review, to distill the aforementioned subset of biophilic patterns with respect to how the aged experience their built surroundings, and third, to examine these in light of their various expression in recently built state-of-the-art LTC settings for persons with dementia and related cognitive disorders. Residents' engagement with and proximity to nature and landscape, and transactions with biophilia-inspired artifacts was the principal focus. The case studies are further examined in relation to the planning and design of LTC environments in the context of the COVID-19 pandemic. Future biophilic-inspired directions for evidence-based research and design for persons with dementia and related cognitive disorders are discussed.


KEYWORDS

Architectural design; biophilic design; long term care (LTC); housing; aging; dementia

Introduction

The quality of the everyday living environment greatly impacts our moods, health and wellbeing. Its quality influences our ability to communicate effectively with others, to heal, and recover from stressful conditions and situations. It stands to reason that long-term care (LTC) environments for

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 Supplemental data for this article can be accessed at www.tandfonline.com/wjrh.

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FEATURED ARCHITECTS

100% Interior
Arup
CF Møller
Lyons
MASS Design Group
Montgomery Sisam Architects
Panoyra & Prasad

DESIGN FOR HEALTH

Sustainable Approaches to
Therapeutic Architecture

Our experience of hospitals and medical clinics is almost wholly determined by their architecture. The spatial and sensory qualities of our surroundings influence how we behave and relate to others, while also affecting our spiritual and physical wellbeing. It is proven that an abundance of daylight, access to fresh air and to low-stress uncluttered spaces aids the reduction of anxiety, elevates the mood and improves patients' outcomes. Sustainability is permeating all areas of architecture, and designers are investigating the connections between patient experience, wellbeing and long-term thinking in healthcare design.

This issue of *AD* seeks out innovative and varied sustainable architectural responses to designing for health, such as: integrating sensory gardens and landscapes into the care environment; specifying local materials and passive technologies; and reinvigorating ageing postwar facilities. Both qualitative and quantitative approaches to sustainability are explored. Design solutions range from those employing passive thermal strategies and recycled materials in construction to those giving careful consideration to the manner in which a structure is positioned on site and orientated. Each design makes its own unique interpretation of the sustainable brief. Drawing on international built examples that excel in combining the highest level of healthcare with an enlightened approach to architectural design, this *AD* highlights the importance of designing for the long term, creating inspiring spaces, and connecting healthcare to the wider community.

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DESIGN FOR HEALTH

Sustainable Approaches to
Therapeutic Architecture

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Siobella Sanitorium, Manitoba, Canada, c. 1910

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IBI Group, Kitewood Hospital, West Yorkshire, 2013

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Montgomery Slane Architects with Farrow Partnership Architects, St John's Rehab, Sunnybrook Health Sciences, Toronto, 2010

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SALUTOGENIC DESIGN

Designs that make people healthier and happier

“salutogenesis” is a term from sociology with that means “health origins”

RESTORATIVE DESIGN

Emphasizes the processes through which people restore the site and the resources that they have used

Restorative design goes beyond being “less bad”

Biophilic Design - Resilient architecture for the climate crisis

Government of Canada aims to achieve net-zero emissions by 2050

Ontario's Climate Change Strategy aims to reduce GHG by 80% below 1990 levels by 2050

Canada's Action on Nature-Based Solutions for Climate Adaptation



The Global Commission on Adaptation
(GCA)

Nature-Based Solutions Action
Track

Climate Adaptation Summit – January
2021

14 PATTERNS BIOPHILIC DESIGN

See Terrapin Bright Green's report <https://www.terrapinbrightgreen.com/reports/14-patterns/>

People are naturally attracted to other forms of life

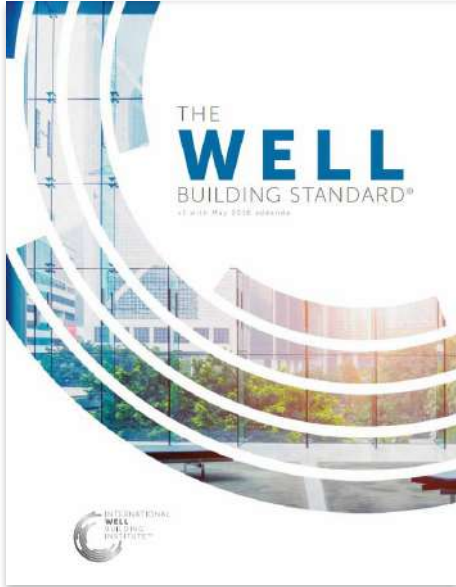
Biophilic design is linked to improved mood and reduced stress



Garden courtyards of the Alhambra in Spain



Papyrus ponds in the homes of Egyptian nobles




		Core and Shell	New and Existing Interiors	New and Existing Buildings
Mind				
84	Health and wellness awareness	P	P	P
85	Integrative design	P	P	P
86	Post-occupancy surveys		P	P
87	Beauty and design I	P	P	P
88	Biophilia I - qualitative	O	P	P
89	Adaptable spaces		O	O
90	Healthy sleep policy		O	O
91	Business travel		O	O
92	Building health policy		O	O
93	Workplace family support		O	O
94	Self-monitoring		O	O
95	Stress and addiction treatment		O	O
96	Altruism		O	O
97	Material transparency	O	O	O
98	Organizational transparency		O	O
99	Beauty and design II	O	O	O
100	Biophilia II - quantitative	O	O	O
Innovation				
101	Innovation I	O	O	O
102	Innovation II	O	O	O
103	Innovation III	O	O	O
104	Innovation IV	O	O	O
105	Innovation V	O	O	O

100

BIOPHILIA II - QUANTITATIVE

Biophilia supports the idea that humans have an affinity towards the natural world. Evidence on the visceral and psychological benefits of nature is mounting. Research indicates that the experience of nature or nature-inspired patterns can improve experience, mood and happiness.

This feature calls for the provision of indoor design elements reminiscent of the natural environment, including solar features and planting, as well as access to outdoor gardens and landscaped areas.



Core and Shell

New and Existing Interiors

New and Existing Buildings

PART 1: OUTDOOR BIOPHILIA

At least 25% of the project site area must meet the following requirements:

- a. Features of the landscaped grounds or rooftop gardens accessible to building occupants.
- b. "Crests" of at minimum, 75% planting, including tree canopy to link the 25%.

PART 2: INDOOR BIOPHILIA

Wall and painted panels are incorporated into the design of interior space according to the following:

- a. "Plant-pieces" or painted beds cover at least 1% of floor area per floor.
- b. A plant wall per floor, covering a wall area equal or greater than 2% of the floor area, or covering the length of the exterior walls, whichever is greater.

PART 3: WATER FEATURE

All space one meter feature for every 6,250 sq ft (500,000 ft³) in projects larger than 6,250 sq ft (500,000 ft³) which meets the following requirements:

- a. At least 1.8m (5.9 ft) in height and 4" (10.1 cm) in area.
- b. Utilizes water or other technology to address water safety.

WELL Building Standard v1 Mind 154

HOW IS BIOPHILIC DESIGN MEASURED?

14 PATTERNS OF BIOPHILIC DESIGN

As defined by Browning, Clancy and Ryan 2014

Nature in the Space

- 1. Visual Connection with Nature*
- 2. Non-Visual Connection with Nature*
- 3. Non-Rhythmic Sensory Stimuli*
- 4. Thermal & Airflow Variability*
- 5. Presence of Water*
- 6. Dynamic & Diffuse Light*
- 7. Connection with Natural Systems*

From:
<http://www.terrabinbrightgreen.com/wp-content/uploads/2014/04/14-Patterns-of-Biophilic-Design-Terrapin-2014p.pdf>

Natural Analogues

- 8. Biomorphic Forms & Patterns*
- 9. Material Connection with Nature*
- 10. Complexity & Order*

Nature of the Space

- 11. Prospect*
- 12. Refuge*
- 13. Mystery*
- 14. Risk / Peril*

*Examples of integrating 14 patterns of biophilic design
in residential environments for the aged*

A view to elements of nature, living systems and natural processes

Leonard Florence Center for Living, Chelsea, Mass. USA 2010 // Architects: DiMella Shaffer



© DiMella Shaffer



© DiMella Shaffer

Visual Connection with Nature is the first Biophilic Design Patterns identified by Browning et al., 2014. They define this as “A view to elements of nature, living systems and natural processes.”

Haptic stimuli that engender a deliberate and positive reference to nature

Elderly Care Skärvet, Växjö, Sweden 2017 // Architects: Kjellander Sjöberg



Incorporating plants and nature indoors could be a deliberate and positive connection to nature, this could be potted plants, bird feeders, courtyard gardens, green walls, or vegetated roofs.

Stochastic and ephemeral connections with nature that may be analyzed statistically but may not be predicted precisely

La Paz Nursing Home Garden (O'Donnell), Spain, 2010 // Architects: Caballero Colón Architects



The provision of quality of outdoor spaces is central to biophilic design. The pattern Non-Rhythmic Sensory Stimuli can help create ephemeral connections with nature.

*Subtle changes in air temperature, relative humidity,
and airflow that mimic natural environments.*

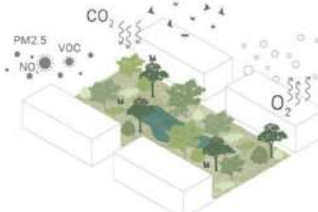
Fælledgården Nursing Home, Copenhagen Denmark 2010 // Architects: JJW Arkitekter



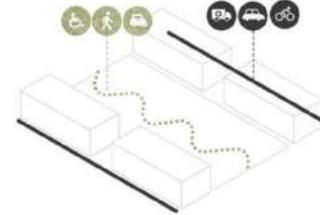
Thermal and airflow variability in spaces are one of the Biophilic Design Patterns identified by Browning et al., 2014. They define this as “subtle changes in air temperature, relative humidity, airflow across the skin, and surface temperatures that mimic natural environments.”

Enhances the experience of a place through seeing, hearing or touching water

Jin Wellbeing, Bangkok, Thailand 2020 // Architects: Shma Architects



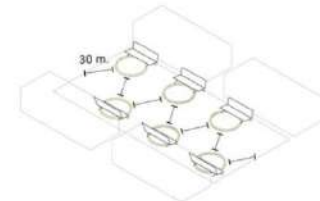
Forest Biodiversity
& Air Purification



All Ramp Access



Upcycle Water Management



Seating at every 30 m.

Sustainable Nature

Physical Wellbeing

A stream runs through the entire development at Jin Wellbeing, serving as a main drainage system for stormwater management and also a relaxing environment for staff, visitors and residents in this award winning mixed use development with 1400 seniors housing units

Varying intensities of light and shadow that change over time to create conditions that occur in nature

Camphill Ghent Assisted Living Nursing Home, Chatham, New York, USA 2017 // Architects: Perkins Eastman



Dynamic and Diffuse light are one of the Biophilic Design Patterns identified by Browning et al., 2014. They define this as the ability to leverage “varying intensities of light and shadow that change over time to create conditions that occur in nature.”

Awareness of natural processes

Peter Rosegger Nursing Home, Austria // Architects: Dietger Wissounig Architekten



The provision of quality of outdoor spaces is central to biophilic design. There are several Biophilic Design Patterns identified by Browning et al., 2014 that could be related to outdoor gardens. These include Visual Connection with Nature, Non-Visual Connection with Nature, and Non-Rhythmic Sensory Stimuli which serve to create ephemeral connections with nature.

*Symbolic references to contoured, patterned, textured or numerical
arrangements that persist in nature*

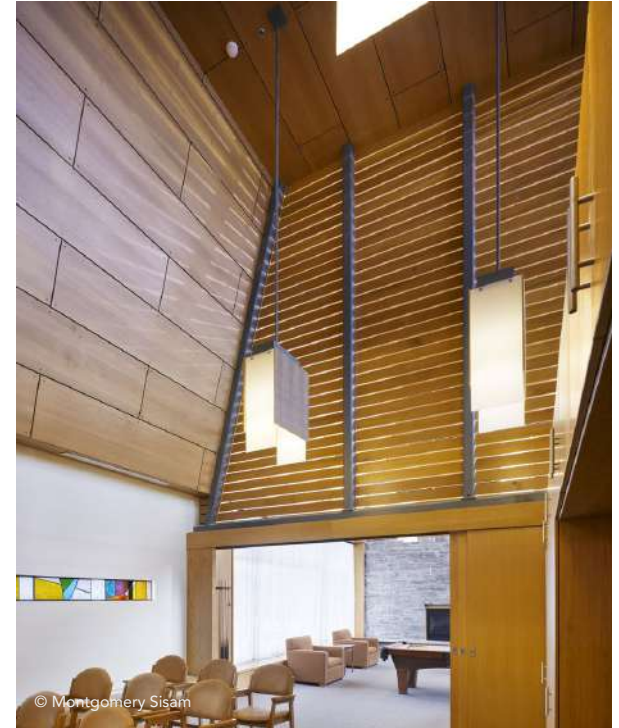
Housing for Elderly People in Huningue, France 2018 // Dominique Coulon & associés



There are several Biophilic Design Patterns identified by Browning et al., 2014 that could be related to natural materials and textures including Biomorphic Forms and Patterns which are symbolic references to the patterns or textures of nature; and Material Connection to Nature, where materials reflect the local ecology or geology and instill a sense of place.

Materials / elements from nature that reflect the local ecology or geology and create a distinct sense of place

Norview Lodge, Ontario Canada 2005 // Architects: Montgomery Sisam



There are several Biophilic Design Patterns identified by Browning et al., 2014 that could be related to natural materials and textures including Biomorphic Forms and Patterns which are symbolic references to the patterns or textures of nature; and Material Connection to Nature, where materials reflect the local ecology or geology and instill a sense of place.

*Rich sensory information that adheres to a spatial hierarchy
similar to those encountered in nature*

Wellcare Garden Fukasawa, Tokyo Japan 2018 // Architects: Nikken Housing System Limited



© Nikken Housing System Limited



© Nikken Housing System Limited

Complexity and order is hard to photograph. The pattern refers to “rich sensory information that adheres to a spatial hierarchy similar to those encountered in nature”. Is the varying intensities of light and shadow that change over time shown here enough?

Prospect: An unimpeded view over a distance, for surveillance and planning

Refuge: A place away from environmental conditions / main flow of activity, where one is protected from behind and overhead

Prospect and Refuge

Residence for the Sisters of St. Joseph Care Home, Toronto, Canada 2013 // Architects: Shim Sutcliffe



There are several Biophilic Design Patterns identified by Browning et al., 2014 that could be related to circulation and wayfinding including Mystery, which refers to “the promise of more information, achieved through partially obscured views or other sensory devices that entice the individual to travel deeper into the environment”

Mystery: Obscured views or other sensory devices that entice the individual to travel deeper into the environment

Risk/Peril: An identifiable threat coupled with a reliable safeguard


Residence for the Sisters of St. Joseph Care Home, Toronto, Canada 2013 // Architects: Shim Sutcliffe



Mystery is also hard to photograph. The pattern refers to an environment where “there is the promise of more information, achieved through partially obscured views or other sensory devices that entice the individual to travel deeper into the environment”

What can designers do? Connectivity, Mixed Use, Scale

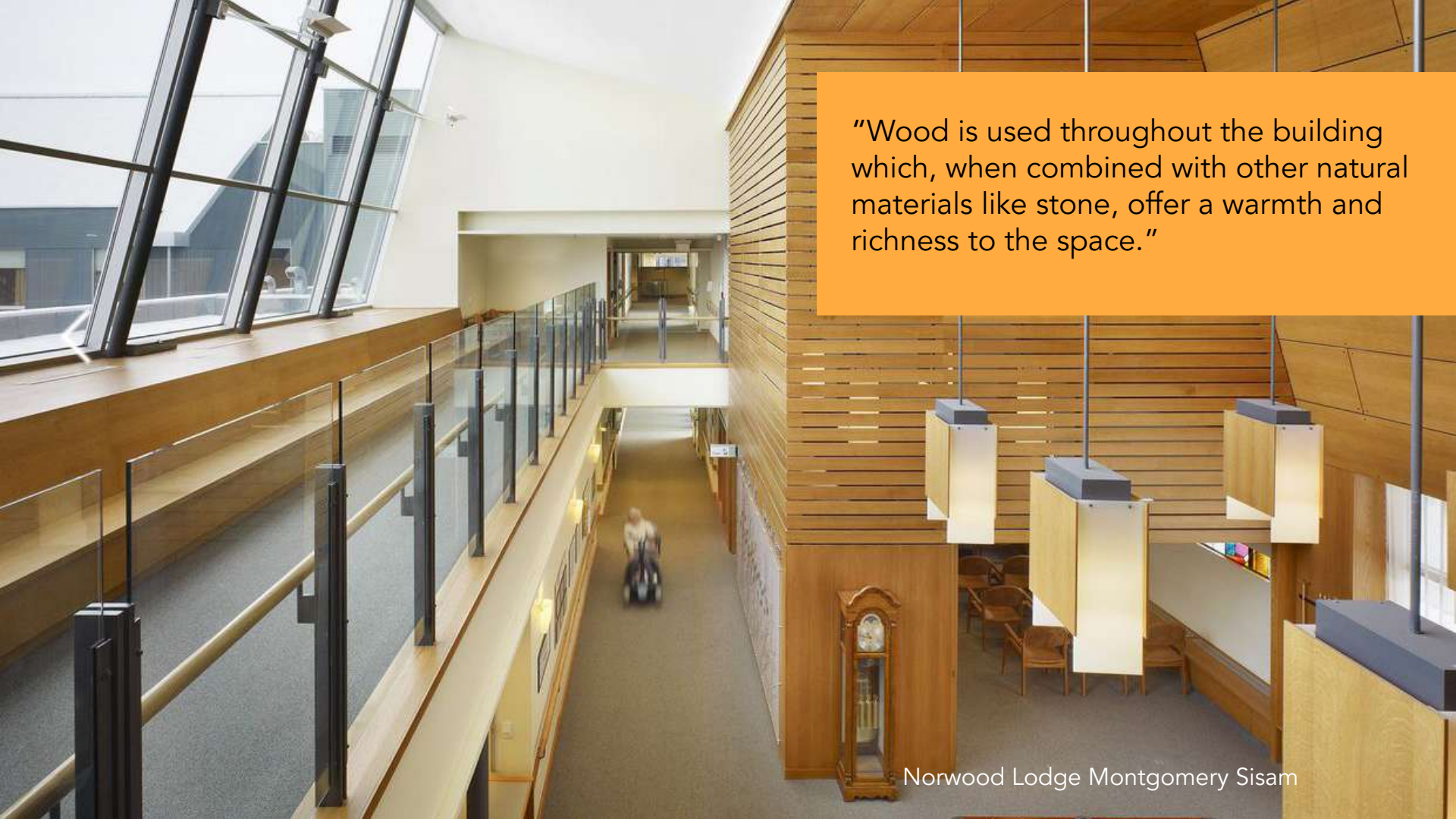
- 1) Consider indoor-outdoor **connectivity** as a priority, and not only a green view out the window. Biophilic design can be integrated into the design through choice of materials, water features, spatial variation, and creating views within and from the building.
- 2) Design environments that people want to visit. Consider what spaces encourage family visits, and residents being connected to the wider community. This might include **mixed-use**, like nursing home/public pool or nursing home/library.
- 3) The small house model of nursing homes focuses on creating a feeling of being “at home”. Smaller **scale** dining rooms and living rooms, short corridors, and decentralized outdoor spaces seem easier to work with for integrating biophilic design
- 4) Look for **co-benefits** for people and environment. Many of the biophilic design strategies that benefit people, like operable windows for fresh air, daylight, green views, also relate to building performance like reducing energy costs, managing stormwater, etc.



“We develop inviting houses that integrate into the city's life and share functions with it”



“Instead of a hallway this space is more like a long living room with the personal furniture of the inhabitants, arranged in an unobtrusive way”



“Wood is used throughout the building which, when combined with other natural materials like stone, offer a warmth and richness to the space.”



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