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Between Building and Unbuilding: An Interdisciplinary Design Approach to Cohabitation, Material Cycles, and Traditional Ecological Knowledge

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ABSTRACT

In recent history, built environment practices have accepted a paradigm which underlines the land's static quality, prioritizes immediate utility, and consequently adopts design processes that inevitably accelerate assimilation. With the capitalist propensity to obtain control and enhance efficiency, those processes nevertheless privilege certain cultures while rejecting other forms of knowledge or living specific to the land. The design discourse, confronted with the rising pressure of global climate challenges and environmental inequity, suggests a shift of design pattern from static to responsive as a means to an end that is part of nature's transformation.

Located amid the semi-arid playa of Nevada in the USA, Fly Ranch sits on land remote yet crisscrossed by industrial activity, with extreme climatic conditions yet teeming with life and traditions. Working with these contradictions, "Lodgers," the project to be constructed in Fly Ranch, is grounded in three key approaches to challenging contemporary architectural practice. Firstly, prioritize the well-being of all plants and animals species, including humans, by creating cohabitation spaces. Secondly, utilize local or nearby building resources to minimize waste, maintain ecological balance, and rebuild the material cycle. Finally, integrate Traditional Ecological Knowledge with modern building practices and employ low-tech construction techniques to encourage community participation. As a pilot project goes into construction, the authors offer critical reflection on contemporary architecture practice, the design process, and the meaning of "unbuilding" as a response to climate challenge.

HIGHLIGHTS

- Proposes "unbuilding" to unlearn the human-centric design approach
- Reflects on the built environment practices challenged by climate change and environmental inequity
- Prioritizes the well-being of all species by creating cohabitation spaces
- Utilizes local resources to minimize waste, maintain ecological balance, and rebuild the material cycle
- Re-integrates Traditional Ecological Knowledge with contemporary architecture practice

KEYWORDS

Desert;
Interdisciplinary Studies;
Unbuilding; Lodgers;
Cohabitation;
Material Cycles;
Low-tech;
Traditional Ecological Knowledge

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1 The Exhibition

In September 2022, we collaborated with the Trienal de Arquitectura de Lisboa to open an exhibition titled "Lodgers: Between Building and Unbuilding" at the historic Palácio Sinel de Cordes, an 18th-century palace, in Lisbon, Portugal. The exhibition was the culmination of a three-year investigation into the material cycle, construction techniques, ecological conditions, and knowledge production in Nevada, with a particular focus on the Black Rock Desert and the Pyramid Lake region in the USA. The project was initiated with a winning design for the Land Art Generator Initiative (LAGI) 2020 Fly Ranch competition, which tasked designers with creating shelters and settlements in Fly Ranch, Nevada, USA.

As the centerpiece of the exhibition, a three-meter-tall pavilion that spanned two south-facing rooms in the Palácio Sinel de Cordes was installed (Fig. 1). This pavilion occupied an area of 80 m^2 and divided the exhibition space into four sections, each of which featured a topic that challenged people's contemporary understanding of the desert landscape and the modern construction methods utilized to build in such environments.

The pavilion featured a light-frame construction that is prevalent in the USA and an experimental thatched facade of reed leaves and tule stems, offering an organic and tactile quality to the space. Visitors who entered the first section, themed "Material," were confronted with a contrast of "low-tech" materials and neoclassical palace (Fig. 2). This pavilion encapsulated the intricate knowledge of the land and building materials that are native to the Black Rock Desert region and encouraged visitors to consider the interplay and overlap of different worldviews.

The second and the third sections were themed "Sight" and "Sound," respectively. Here, photographs of the Black Rock Desert, design drawings for the Fly Ranch competition, and the sound collected in the region from summer through fall in 2021 were exhibited (Fig. 3). These visuals and audio recordings allowed visitors to immerse themselves in the multisensory experience of the Black Rock Desert and Pyramid Lake region.

Finally, visitors entered the last section, themed "Archive." Here, they encountered a table that displayed political and material artifacts collected on-site, as well as past planning documents for the region that shed light on the historical and ongoing injustices in the distribution of natural resources (Fig. 4). This section served as a fitting and open-ended conclusion to the exhibition, highlighting the urgent need to address environmental and social issues through a more integrated approach to architecture, ecology, and cultural history.

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1. The three-meter-tall timber and thatched pavilion spanning across the rooms

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2. Visitors were greeted with the pavilion at the entrance to the exhibition.
3. A multisensory experience through "Sight" and "Sound" sections
4. Entering "Archive" through the wrapped circulation around the structure

2 Reflections on the Lodgers Project

During the opening days of the exhibition, there were questions asked on the meaning of "unbuilding" of architecture, as indicated in the exhibition title, and on whether "unbuilding" could be the future of the built environment. Those were important questions that could speak to the broader challenges in contemporary architecture practice. By "unbuilding," the project intended to unlearn the contemporary human-centric approach to architecture and landscape design. To answer those questions, we looked back to the origins of the Lodgers proposal (a pilot project now under construction) and examined the history, context, and frictions that led to the project. By exploring the complex interplay between land-based environmental knowledge, contemporary architecture practice, and cultural history, we hope to provoke new ways of thinking about the built environment that are more responsive to

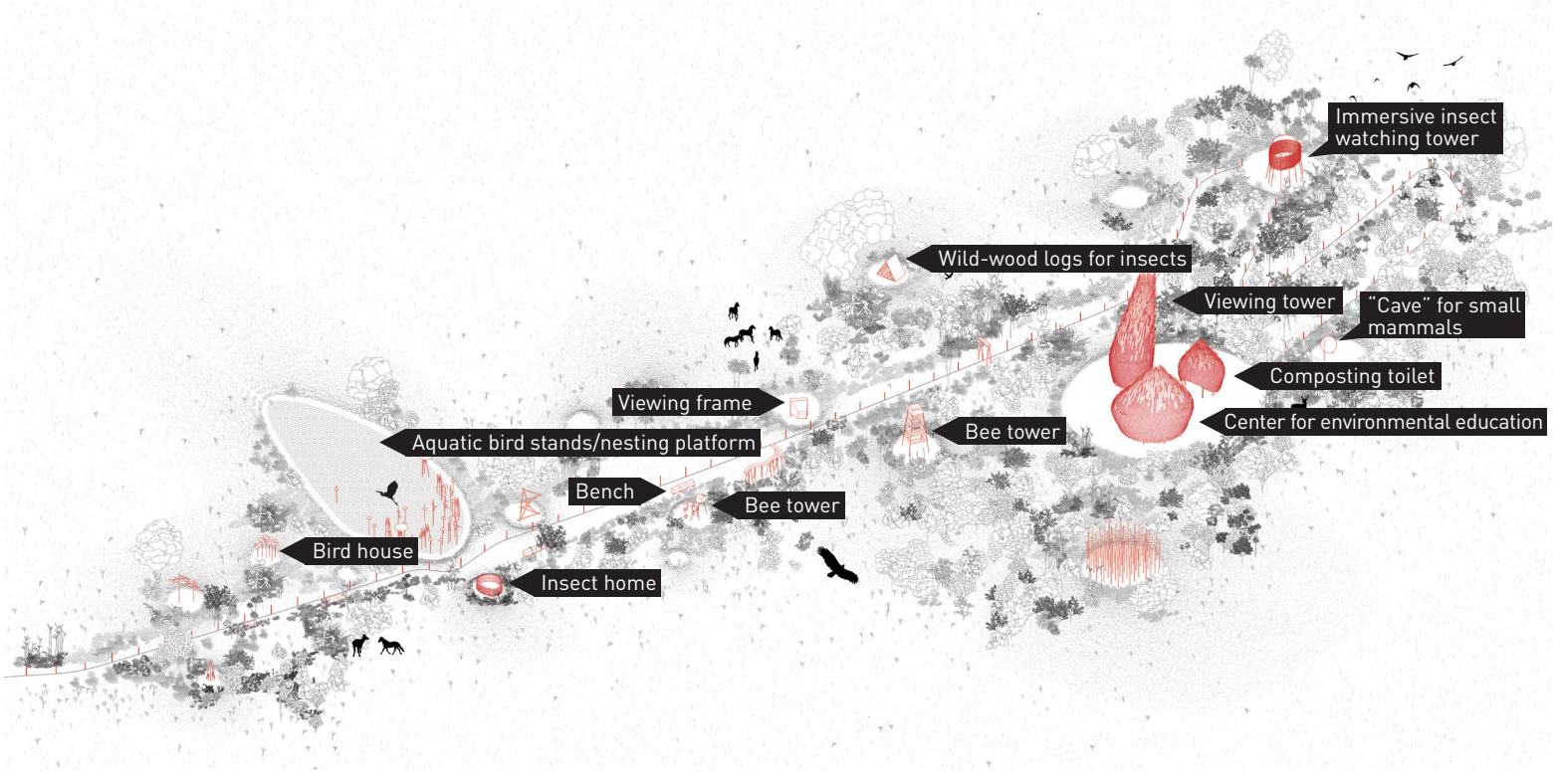
the urgent challenges of our time, specifically, the rising pressure of global climate challenges and environmental inequity.

In contemporary society, the concept of the desert has taken on a multitude of meanings and imaginations, transcending its status as a physical place. Often perceived as a hostile, uninhabitable wilderness, or utopian paradise that offers respite from urban living and modern civilization, the desert has embodied an idea more than a tangible place. However, the true nature of the desert extends beyond such typical connotations and is, in fact, a product of the human culture that reflects specific societies at certain moments in history[1].

The Lodgers project is situated within this type of complex and layered environment, i.e., the Black Rock Desert region, which is the ancestral homeland of the Paiute people[2]. The area was first visited by European colonists in 1843, marking the start of a violent conflict against the Paiute people where settlers seized indigenous homelands for livestock herding. Invasive agricultural practices and continued settlement radically altered the ecology of the region, disrupting the Paiute's subsistence on the land. For example, the National Reclamation Act, signed by President Theodore Roosevelt in 1902, allowed the redirection of water from the Truckee River to the Reno region, leaving severe environmental consequences in the Black Rock Desert region. This act symbolizes a top-down approach to land management that prioritizes the land's usefulness to a particular population while disregarding indigenous land stewardship and agricultural practices such as fishing and foraging.

Despite the presence of a nearby Paiute reservation and the migration of cattle herders to other regions, the narrative of the land continues to evolve. Since 1990, the Black Rock Desert has been home to the annual Burning Man event, a temporary city that rises and falls each summer. More recently, the Tesla Gigafactory and other mega-industries have entered the scene, further exacerbating long-standing tensions over water access[3]. With escalating global climate challenges and intensifying human activities in the region over recent decades, the desert environmental system is close to a tipping point where urgent amends are called for.

The Lodgers project grapples with this fraught history and context, seeking to address the legacies of dispossession and environmental degradation in the area through an interdisciplinary design approach. During the project's development in 2020, the team constantly questioned how architecture could ethically and sustainably coexist with the land, and whether and how the discipline can engage native knowledge and local ecologies in the process. This inquiry led us to embrace the concept of "unbuilding" as a means of disrupting the extractive and exploitative practices of the contemporary conventional architecture. The project aims to create structures that invite non-human species to enter a shared domain with humans and will decay over time, prompting a critical conversation about the future of the built environment in this complex and contested landscape (Figs. 5, 6).



5. A trail of Lodgers in Fly Ranch. Inundated with plants, animals, and lodgers, the trail establishes a democratic relationship between humans and animals. Animals are here for food and shelter, while humans come to observe and learn from a distance.

3 Design Approaches

The design philosophy presented in Lodgers is the result of a critical examination of existing paradigms in built environment practices. These paradigms prioritize immediate utility over the dynamic and evolving nature of the land, resulting in design processes that accelerate assimilation. Our research-based design-build project challenges these paradigms by centering the land in the design process and seeking to incorporate the forms of knowledge or living specific to the land, which have been neglected land management and built environment practices in past decades.

Our design is grounded in three key approaches. Firstly, prioritize the well-being of all plants and animals species, including humans, by creating cohabitation spaces. Secondly, utilize local or nearby building resources to minimize waste, maintain ecological balance, and rebuild the material cycle. Finally, integrate Traditional Ecological Knowledge (TEK) with modern building practices and employ low-tech construction techniques to encourage community participation.

The heart of the design approach is the inclusion of living species currently inhabiting Fly Ranch, by centering their preferred habitat conditions in the design considerations. We began the research process with great intention to understand the life forms and their entanglements. Fly Ranch in the Black Rock Desert region has a rich biodiversity, thanks to the centuries-long land stewardship by the Paiute people. It is home to dozens of animals and more than 100 plant species, forming a complex yet stable food chain that needs to be attended to when planning for human interventions. Therefore, we took a deep dive and categorized 142 plants, 103 birds, 14 mammals, 10 reptiles and fish, and 23 arthropods observed at Fly Ranch based on their behaviors and habits, locations, and preferred habitat conditions[4]. We then devised design mechanisms for the Lodgers' formal expression and materiality that can have a deep connection with native species' habitats. For example, the facade can integrate reclaimed wild wood glazed with sugar to provide food and foster breeding for the beetle larvae (*Paracotalpa granicollis*); the form can provide an articulated crown in the shape of the tree crowns for the Great Blue Heron (*Ardea herodias*) to nest (Fig. 7); and the in-between spaces in the facade can store gathered plant debris to provide food for the arthropods.

We extracted and summarized a food chain with key species and cataloged their typical nesting conditions to inform the form and material selection. The structures and small devices, designed to serve as habitats to various species at Fly Ranch, form a trail of rich diversity that symbolizes a democratic relationship between humans and non-humans (Fig. 5). Although humans are the primary users of this sustainable built environment, the thriving communities should not be exclusionary to other species. This proposal aims to develop a symbiotic relationship that benefits all living beings by inviting ecological knowledge into modern building practices.

Considering local and regional material cycles, we take issue with the current construction practices. In the USA, the demand for wood frame construction has spurred a substantial growth in the timber and logging industry since the 19th century[5]. Unfortunately, this large-scale and rapid human intervention that prioritizes immediate utility and efficiency has drastically altered native forests and truncated the cycle from forest to building to waste, leading to a concerning increase in carbon footprint and emissions. To address these challenges, we selected local and reclaimed materials to construct lightweight timber-framed structures, whose facades are adorned with gathered grass materials and thatched to create protective barriers against wind and sand. Our aim is to introduce a paradigm of sustainability into the building process, one that considers the entire material cycle and prioritizes the long-term health of the environment (Fig. 8).

The final and the most inspiring design approach is the integration of TEK with modern building practices. TEK refers to a body of knowledge, practices, and beliefs of indigenous and local communities that have been developed over centuries of interacting and living in harmony with the land[6]. TEK construction method is often considered low-tech and makeshift, and yet we believe that TEK has much to offer, bringing knowledge of local ecosystems, weather patterns, plant and animal species, as well as their interactions to our current sustainable land management practices. The low-tech, community-engaged, and TEK-integrated construction method eliminates the need for heavy machinery or specialized training, making the process accessible to local communities.

As we delved deeper into the history of land stewardship at Fly Ranch, it became apparent that the indigenous people of the area, specifically the Numu (Northern Paiute) and the Newe (Western Shoshone), have a profound tradition of living in harmony with the land. For over 10,000 years, these communities have developed a unique way of life that prioritizes sustainability and resourcefulness[7]. The Paiute people, who lived as nomads, hunters, and gatherers, had a deep respect for the land and its resources[8]. They were acutely aware of the need to take only what was necessary to support their livelihood and yet create utilitarian and aesthetically pleasing tools from natural materials. This involved

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6. Lodgers as an invitation for conversations about the built environment's future
7. A Lodgers structure incorporates the tree crown shape for nesting
8. Lodgers use recycled and reclaimed local materials, low-tech, low-energy construction methods
9. Lodgers eventually return to the land
10. Lodgers will be part of an ecosystem of living devices to support local biodiversity

circular material cycles, gathering wild grass and willow branches to fashion fish traps, winnowing baskets, and brush shelters. The Paiute were particularly careful to minimize any harm or impact to the surrounding ecosystem, recognizing that their survival was dependent on the health of the land and its inhabitants.

Based on the three approaches outlined above, the design-built project for Fly Ranch encompasses a series of devices and structures that prioritize the needs of non-human entities in the region while serving human visitors. The structures and devices are designed with a life cycle of approximately 10 years, requiring periodic maintenance for structural integrity and thatching reinforcement. At the end of their life cycle, they can be left on site to decompose naturally, contributing to the area's life and material cycles and providing habitats for local flora and fauna (Fig. 9). This design approach challenges the conventional notion of architecture's permanence, reminding us that architecture weathers with time while its meaning and use transform. We embrace the temporality in architecture, inspired by the passing of time and changing of environment in nature, to propose a paradigm where architecture lives and decays with the environment over time rather than alters it irrevocably.

4 Prospects

The vision for Lodgers is to foster a symbiotic relationship between the land, humans, and other living creatures whose footprint preceded us and who may visit in the future, encompassing all inhabitants on the land, as well as the proposed "living" structures. Over time, Lodgers will inevitably decay and return to the land. As the land responds to the changing of the seasons and climate, it welcomes and responds to new Lodgers.

Contemporary architecture has been approached from a human-centric perspective. However, the Lodgers project explores an alternative vision for environmental stewardship and architecture, where human interventions are not prioritized over the biosphere and geosphere. In this case, architecture serves as a medium to

foster kinship between humans and other-than-human neighbors—a device that lives and decays with the environment over time, enriching biodiversity and environmental education (Fig. 10). By provoking critical reflection on contemporary architecture practice and promoting an interdisciplinary approach to sustainable design, the Lodgers project seeks to reimagine the role of architecture and art in relation to the land and its diverse inhabitants.

When embarking upon the construction phase of the pilot project in Fly Ranch, we are filled with a sense of excitement and trepidation. The three-year-long inquiry, multiple visits through seasons, and two exhibitions in different parts of the world have brought us to this moment, where we must confront the layers of friction between forms of knowledge, living, and building that are inherent in the process. As we position ourselves and our project between building and unbuilding, it is our aspiration that this project becomes an invitation to voyage into a different worldview, one that challenges the conventional notion of architecture's permanence, embraces the nature's temporality, and offers an unsolicited but much-needed wrinkle in the contemporary practice of architecture.

REFERENCES

[1] Cronon, W. (1995). The Trouble with Wilderness; or, Getting Back to the Wrong Nature. In: W. Cronon (Ed.), *Uncommon Ground: Rethinking the Human Place in Nature* (pp. 69–90). W. W. Norton & Company.

[2] Devlin, H. (2018, November 8). Scientists Reveal 10,000-Year-Old Mummy is Native American Ancestor. *The Guardian*.

[3] Kate Duffy. (2022, February 22). Elon Musk Dismissed Claims that Tesla's German Gigafactory Will Suck Up Too Much Water, But Experts Say There's Not Enough to Go Around. *Business Insider*.

[4] Sundquist, M. (2019). Fly Ranch, 2019 Roadmap. *Burning Man Project*.

[5] Wernick, I. K., Waggoner, P. E., & Ausubel, J. H. (1997). Searching for leverage to conserve forests: The industrial ecology of wood products in the United States. *Journal of Industrial Ecology*, 1(3), 125–145.

[6] Berkes, F. (1993). Traditional Ecological Knowledge in Perspective. In: J. T. Inglis (Ed.), *Traditional Ecological Knowledge: Concepts and Cases* (pp. 1–9). Canadian Museum of Nature.

[7] Cagle, S. (2019, November 21). 'Fire is Medicine': The Tribes Burning California Forests to Save Them. *The Guardian*.

[8] Knack, M. C. (1977). A short resource history of Pyramid Lake, Nevada. *Ethnohistory*, 24(1), 47–63.

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在建造与非建造之间
——面向物种共存、物质循环和传统生态知识的跨学科设计方法

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摘要

近代人居环境建设通常强调静态的建成效果和即时效用，因此相似的设计流程不可避免地加速了建成环境的同质化进程。由于资本主义的控制倾向和对效率的追逐，这些设计过程会优先考虑某些特定的文化，而忽略当地特有的知识或生活方式。为了应对不断加剧的、包括全球气候挑战和环境不平等在内的诸多压力，设计领域提出将设计从静态模式向响应模式转变，使之融入自然的转变之中。

“飞来农场”位于美国内华达州半干旱的干盐湖地区，地处偏远，但工业活动纵横交错；气候条件较为极端，但自然界生命力旺盛，当地文化传统而丰富。在很长一段历史里，飞来农场所在的布莱克罗克沙漠区域一直由原住民管理，直至1843年欧洲殖民者的到来开启了暴力冲突和土地侵占的历史。此后不断升级的农业和巨型重工业活动从根本上改变了该地区的生态。针对这些矛盾，将在飞来农场建造的项目“寄宿者”（Lodgers）中提出以“非建造”的途径来代替以人为中心的建筑和景观设计，通过寻求跨学科的设计方式解决该地区的土地侵占和环境退化问题。寄宿者项目提出了三种挑战当代建筑实践的关键方法：首先，优先考虑包括人类在内的所有动植物物种的福祉，并创造物种共存空间；其次，利用当地或周边的建筑资源，尽量减少浪费，保持生态平衡，重塑物质循环周期。最后，将传统生态知识与当代建筑实践相结合，通过采用低技建造方式来鼓励社区参与。随着试点项目进入建设阶段，作者批判性地反思了当代建筑实践和设计过程，并探讨了“非建造”途径在应对气候挑战时的重要意义。

关键词

沙漠；
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- 提出以“非建造”途径替代以人为中心的设计方法
- 反思在气候变化和环境不平等挑战下的人居环境建造模式
- 通过创造共存空间为所有物种增进福祉
- 利用当地资源进行建造以减少浪费，保持生态平衡，并重塑物质循环过程
- 重新整合传统生态知识与当代建筑实践

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