

# Underground Dwellings in China: Nature, the Technology for Sustaining Society

## Statement of Interest

We are without place, in the modern day world. Edward Relph defines “placelessness” as “the weakening of distinct experiences of and identities of places...marking a major shift in geographical bases of existence from a deep association with places to rootlessness.” This disconnection to place has become increasingly common, resulting in a high level of indifference towards the built environment. Place making satisfies man’s innate desire to create a sense of identity. With this sense of identity man not only kindles his sense of existence but also sustains the life he lives through the built environment.

The modern-day detachment from the built environment is largely a result of our separation from the process of building. The rootedness of primitive societies is grounded in the “communal art” of architecture “not produced by a few intellectuals or specialists but by the spontaneous and continuing activity of a whole people with a common heritage, acting under a community experience.”<sup>1</sup> This communal enterprise, embodied in the process of making, experiencing, and maintaining<sup>2</sup> architecture is vital to maintaining the significance of places as sources of identity.

This affiliation to place is rooted in nature. “Humans have a natural tendency to affiliate with natural systems and processes.”<sup>3</sup> This subconsciously innate tendency to identify with nature has been biologically encoded in us because “it proved instrumental in enhancing human physical, emotional, and intellectual fitness during the long course of human evolution.”<sup>4</sup> This relationship between man and nature can be traced back to the development of ancient civilizations and their built environment at a time when architecture did not go through “fashion cycles...because it served its purpose to perfection.”<sup>5</sup> Indigenous architecture’s building forms and construction methods were direct responses to local climate. “In the building of his shelter primitive man faces one supreme and absolute limitation: the impact of the environment in which he finds himself must be met by the building materials which that environment affords. The environment is scarcely ever genial, and the building materials are often appallingly meager in quantity or restricted in kind.”<sup>6</sup> As a result tradition, and therefore culture, was crafted out of necessity in response to the nature’s conditions. These traditions, in response to nature, evolved into different ways of **making** architecture, **experiencing** architecture, and **maintaining** architecture, holistically framing culture through the built environment through the processes of living. In this sense, Nature indirectly created Culture, and was the primary catalyst for sustaining a society through the act of place making where the “associated attachment to buildings and places” caused people to “exercise responsibility or stewardship to keep them in existence over the long run.”<sup>7</sup> Nature, by creating culture, sustains a society.

---

<sup>1</sup> Bernard Rudofsky, *Architecture Without Architects* (New York, NY: Doubleday & Company) 3-4

<sup>2</sup> Stephen R. Kellert, *Biophilic Design* (Hoboken, NJ: John Wiley & Sons, Inc. 2008) 6

<sup>3</sup> Kellert 3

<sup>4</sup> Kellert 3

<sup>5</sup> Rudofsky 1

<sup>6</sup> James Marston Fitch, “Primitive Architecture and Climate,” *Selected Writings on Architecture, Preservation, and the Built Environment*, ed. Martica Sawin (New York: W.W. Norton & Company, 2006) 134

<sup>7</sup> Kellert 5



Figure 1 Ariel view of underground dwellings at the Loess Plateau along the Yellow River.



### Project Proposal

More than 20 million people currently live in traditional cave dwellings in China. As primitive as they might be, these dwellings are still being built today. From a study of these Chinese cave dwellings, Jiang Lu, an assistant professor at Michigan University and an Earthwatch-supported scientist, reported that “almost all the features of the traditional cliff cave dwelling coincide with modern sustainable design principles...reflecting a core concept of Chinese culture-being in harmony with nature. They are the result of people adapting to their environment with

limited natural and technological resources. The people and their culture survived here for hundreds of years without leaving heavy marks on the environment.”<sup>8</sup> However, the traditions of these earth-shelters may soon be lost. Currently, many of these areas are under government speculation: some of the residents are already being relocated by the government under a massive reforestation program. With this grant it is our wish, through a thorough analysis of their invaluable sustainable living patterns, to preserve the diminishing cultural legacy of the underground dwellers.



Figure 2 Sunken courtyard space of underground dwelling

The underground dwellings, sunk into loess soil near Luoyang in northern China, are a radical example of how the element of *Earth* created the culture of a civilization and thus sustained a lasting society. With this grant we hope to understand how the underground dwelling culture, in its response to nature, sustained

<sup>8</sup> [http://www.earthwatch.org/newsandevents/pressreleases/2006\\_press\\_releases/03\\_31\\_06\\_chinese\\_caves.html](http://www.earthwatch.org/newsandevents/pressreleases/2006_press_releases/03_31_06_chinese_caves.html)

itself through the process of making, experiencing, and maintaining the local vernacular architecture.

**Making.** In a region where there is a shortage of wood and a surplus of people, a house that requires little material resources other than the site itself is highly advantageous. The process of making these underground dwellings was born out of necessity and limited by nature's conditions. Through speaking with the local residents of the Jingwan Village we hope to:

-Gain insight into their communal way of building in response to Nature and how this perhaps molded the dwellers' culture and sense of belonging to place, inevitably leading to long-term sustainability.

-Understand the element of time and direct community involvement in the process of place making and how this key element differentiates it from the modern day dwelling, often lacking in culture and a sense of permanence.

-Understand the elegant affiliation of Man and Nature through the local built environment, where the builders do not attempt to dictate the conditions of the Earth, but work with the natural limitations of the Loess silt while “welcom[ing] the vagaries of climate and the challenge of topography.”<sup>9</sup>

**Experiencing.** The conditions that Nature set on the way of building in the Jingwan Village framed a way of living and experiencing the local vernacular architecture. The Earth dictated how these underground dwellings were built, but also created a sense of place for the community through its immediate connection with the ground and the way-of living framed by the limitations of the Loess silt. We want to understand this way of living with nature and hope to:

-Speak to the dwellers about their cultural respect for the land as a result of their practical every-day experience of living with the Earth. Every function of space is carved into the Earth, right down to the smallest of functions: storing water. There is also the

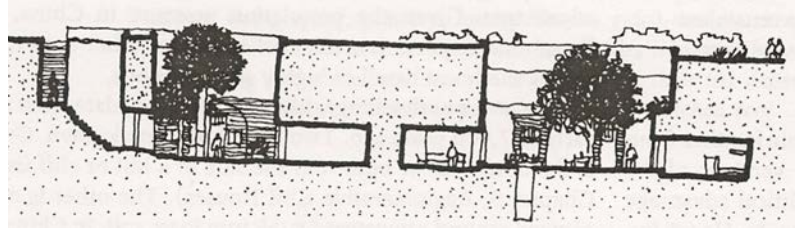


Figure 3 Husband and wife sitting on kang

use of the Kang, which recycles heat from the cooking fires to warm a platform of stone, on which the people sit during the day and sleep at night. The Earth is thermal mass, storing heat from cooking, and slowly releasing it. The perceptual relationship to the ground as a source of heat and perhaps life itself, amplifies the connection the people have with the Earth as the lifeblood of their community.

<sup>9</sup> Rudofsky 4

- Experience and understand how the dwellers established, through years of empirical and embodied knowledge of the Earth, the spirit of a place, “signifying the built environment [as something] life-long and serving as the as the motivational basis for long-term stewardship and responsibility...sustaining human culture and ecology over time”<sup>10</sup> The figure above shows a section through two adjacent units of an underground dwelling. From left to right one descends down through a threshold/vestibule-like space into an open courtyard with a well and a tree. The process of descending parallels a gradual transition from public to increasingly private. One starts off at ground level, where there is an open field for community gathering space, oftentimes used by the residents for growing their crops. When one descends down through the vertical passage (shown to the left), Earth’s embrace starts to isolate shadow, sound, and perhaps even smell. We want to understand the underground dwellers’ personal experience of Nature, and how Earth not only frames the transition of spaces, but also the transition of the senses.



-Understand the thermal properties of the Earth, or Loess silt, and how this affects the community’s connection to nature. The temperature of the shelters, cool during the summer and warm during the winter, are magnified by the transition from above ground to underground. “To enjoy being warmed or cooled we need some awareness of the process...clues from other senses can help us derive more enjoyment from them.”<sup>11</sup> The changing of levels in the underground dwellings magnifies the contrasting thermal conditions above ground and below ground. The subtle shift enhances the understanding of both the space and the environmental qualities inherent to this vernacular way of building. The sensory variability found within this experience contributes to “human fitness and survival,” which “requires coping with a highly sensuous and variable natural environment...”<sup>12</sup> We plan to survey the local residents about their individual relationships to natural climate and the local architecture that so readily embraces it.

<sup>10</sup> Kellert 13

<sup>11</sup> Lisa Heschong, *Thermal Delight in Architecture* (Cambridge, MA: The MIT Press) 25

<sup>12</sup> Kellert 9

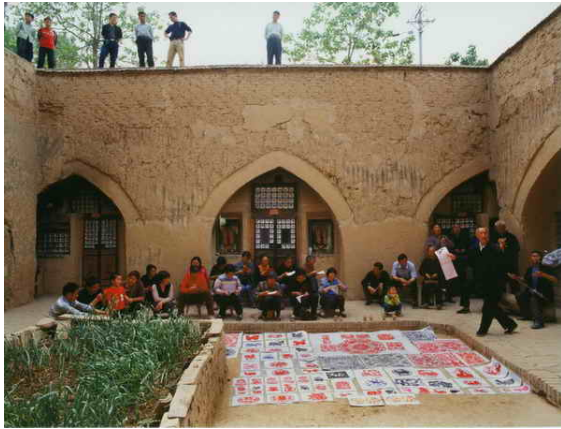


Figure 2 Community engages public gathering event in the sunken in private-public courtyard.

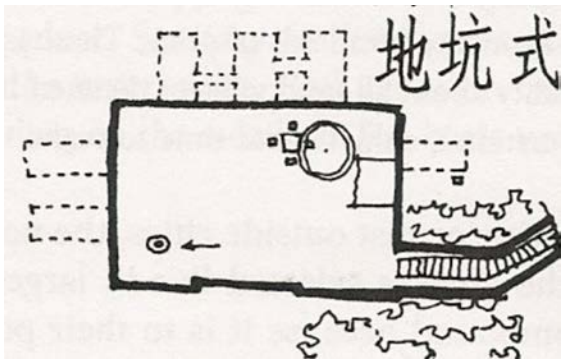


Figure 7 Plan of private-public sunken courtyard.



Figure 8 Wedding in sunken courtyard.

-Investigate the dwellers' communal way of living, a direct result of the architecture, as a way of establishing connection to place and a sense of permanence. The private houses are arranged in groups of three or four around this central courtyard. The top three rooms marked by dotted lines in Figure 7 show how multiple rooms are connected for bigger families through a private passageway. Each unit depends on the central underground courtyard space for light and air. This open-air core of space is used for inter-familial dining, cooking, and living space, and also for larger community events such as the ones shown in figure 6 and 8. We want to gain further insight into the culture and identity created through the interaction of the community, leading to long-term sustainability through the people's sense of connection with place as a side effect of the vernacular built environment.

**Maintaining.** In conjunction with the daily experience of these dwellings, we also would like to understand the ritualistic maintenance of these time-penetrable structures, which provide the community with a strong sense of identity and place. The "patina of time... is a dynamic progression that evokes a sense of familiarity and satisfaction among people. It may provoke an intuitive understanding among some people of the benefits flowing from the movement of nutrients and energies through natural systems."<sup>13</sup> The decay that is abundant in organic building materials promotes the awareness of the passage of time. We want to explore the established traditions of maintaining these underground dwellings, which may accentuate the community's affiliation with the natural element of Earth. We want to understand the process of maintaining as something that is embedded in their "tradition, which neither rots in the rain nor cracks in the sun."<sup>14</sup>

<sup>13</sup> Kellert 9

<sup>14</sup> Crouch and Johnson 3



ture. Now more than ever, man has reness of nature. “Western man, for en builds comparably less well than lies in consistent underestimation ities, and consistent overestimation a dissatisfied client. When the re.”<sup>15</sup> The opportunities that se. Nature has blessed man with th the built environment. Man can ss we are losing culture. It is not itself. “Every society lives in the and human culture, and each at results from this tension place making, and this strong

## Budget Outline

### International travel from New York City to Zhengzhou in Henan Province:

[http://www.worldfpa.org/?page\\_id=704](http://www.worldfpa.org/?page_id=704)

<http://www.yipias.com/Travel/2011/06/SD/18265366.html>

<http://flightfare.com/newworld.nyc-to-zhengzhou/04.html>

[http://www.earthwatch.org/FieldReportPDF/Feng\\_FieldReport2007.pdf](http://www.earthwatch.org/FieldReportPDF/Feng_FieldReport2007.pdf)

Arrival in Zhengzhou, stay in Zhengzhou to acclimatize (2 days)

-Hotel in Zhengzhou: 80USD per night

-Food per day: 20USD

### Travel to Luoyang, stay in Luoyang within 20 min. of Jingwan Village (10 days):

-Train from Zhengzhou to Luoyang: 5USD

-Hotel in Luoyang: 60USD per night

-Food per day: 15USD

### Travel to Zhengzhou for departure, overnight in Zhengzhou before departure (1 day)

-Train from Luoyang to Zhengzhou: 5USD

-Hotel in Zhengzhou: 80USD per night

-Food per day: 20USD

### Totals:

**International travel for 2 people: 4,280USD**

**Hotels for 13 days: 840USD**

**Food for 13 days: 410USD**

**Anticipated Miscellaneous Expenses (taxis, etc.) 100USD**

**TOTAL: 5630USD**

<sup>15</sup> Fitch 134

<sup>16</sup> Crouch and Johnson 2