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Modeling household building sustainability (HBS) with wood, stone and paint: Achieving spatial wellness in a West Walnut household of the San Gabriel Valley, USA

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Abstract

Populous urban regions can spawn creative knowledge in practice when re-using existing materials for sustainable development (Murphy and Pincetl, 2013:49–50; Naveh, 2007:1437–1438; Vatalis et al., 2013:754–755; Wu, 2010:2; Zaman and Lehmann, 2011:186). In this paper, I describe the use of reclaimed building materials (wood, stone, and paint) through three practical household plans, and how the negotiation of these materials, combined with one's ancestral knowledge systems (Moreno Sandoval 2012:23), and the household growing of food may lead to *spatial wellness*. As a result, building with reclaimed materials gives birth to new construction knowledge. When these new ways of building exchange between community members, human well-being, as considered by Meadows (1998:66–71), surfaces both physically and spiritually. In today's accelerated world (Steffen et al., 2011), when household risks, disease, and illness threaten our livelihoods, *household building sustainability* (HBS) and locally grown food combine to strengthen the *household clinic*. When met aggressively, modifying and negotiating materials and space with the hands represent one method of decolonizing the body and mind, while simultaneously combating the concerns regarding our natural environment, which is in line with the goals of sustainable development identified in the United Nations' 1987 report "Our Common Future".

Keywords: Household building sustainability (HBS); Spatial wellness; The household clinic; Reclaimed building materials; Hand-bone morphology; Ancestral computing

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1. Introduction

1.1. Sustainability in this paper

While numerous definitions exist for "sustainability", I follow the definition used by the United Nations' World Commission on Environment and Development (UNWCED), found in their 1987 report "Our Common Future", also known as the "Brundtland Report". It states the following:

> *"Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs".* (WCED, 1987).

In a stricter sense,

> *"no human being has the right to diminish the life and well-being of another and no generation has the right to inflict harm on generations to come".*

These are the words of David Orr (2006:266), who notes that issues of equity, justice, and future well-being are central to sustainable development.

The Brundtland Report called on world governments to adopt measures that would begin to regenerate natural habitats, and to slowly eradicate hunger and poverty, with the vast majority of these issues having their roots in the time of white-European colonization, industrialization, war, and, according to Vitousek et al. (1997:498–499), in the abundant and rapid development of modern cities. Steffen et al, (2011:849–853) refer to this phenomena as the "Great Acceleration" of the *Anthropocene*, a still informal geological period characterized by a sharp increase in the urban population, excessive water use (damming of rivers), mass production (capitalist economies), and the resulting adverse effects from these activities on the Earth's ecosystems (see Steffen et al., 2011 for a complete history of the Anthropocene). Indeed, solutions to our shared global problems would be realized through the adoption of sustainable development by all levels of governments and their peoples (Naveh, 2007:1437–1438; Vitousek et al., 1997:499; Wu, 2008:46–47).

Despite the efforts of many international groups and a growing concern regarding the Earth's wellness, large governments have been slow in rolling out sustainable-development initiatives. Environmental problems have received little attention during the Great Acceleration period (Steffen et al., 2011:850). Moreover, Newton and Freyfogle (2005) argue that sustainability alone lacks solid meaning as a tool with which to address the concerns of our time. As such, global problems (such as the spread of disease) are occurring at a rapid pace and they affect everyone, regardless of their social status, racial or ethnic identity. Thus, solutions need to be inspiring, with an ecological base and a health component, viewing organisms in terms of community and not in isolation (Newton and Freyfogle, 2005:30). To aid in that process, Paehlke (2005) views sustainability to be about product design, ecology, public policy, and in the United States, a radical socio-cultural adaptation concerning the material aspects of the American dream (Paehlke, 2005:37).In hindsight, sustainability links to how all nations understand the production, consumption, and termination of material resources, and their effects on the health and wellness of people.

In the following sections, I pull from both the understandings of Newton and Freyfogle (2005) and Paehlke (2005) to outline a *household building sustainability*(HBS) model, which addresses health and well-being through the reclaiming of building materials. It is a grassroots solution, a model that:

- operates at the household scale;
- seeks local resource availability (building materials); and
- requires human ingenuity, i.e., hand-bone morphology use, building, and experimentation.

By employing this solution, individuals cultivate their wellness at the household scale, yet they can still function within their communities, and this can spawn construction knowledge.

1.2. A largely ignored resource: Used or old wood, stone and paint

Most definitions of sustainability center on a problem asking for a better understanding of our relationship with the material spaces (households and buildings) that we live in, and, of course, the environment. It is no surprise that we, as a species, need improving. Bai et al. (2012), for example, identify the following threats that cities face: infectious diseases, chronic diseases, unhealthy lifestyles associated with poor diets, drug and alcohol abuse, and violence and crime. In many parts of the world, urbanization intersects with environmental degradation, social inequality, and poverty (Wu, 2010:2; 2013:39). These risks will continue to rise, as the UN forecasts that by 2050, 80% of the world's population will be urban (Wu, 2013:38). Humans are changing the Earth rapidly and the level of understanding surrounding those changes has not kept pace with the speed of development and exploitation (Vitousek et al., 1997:498). Moreover, as more people find themselves displaced from their native lands, the cultural sustainment of migrating people will also take precedence in meeting the goals of sustainable development.

In populous American states such as California, one challenge concerns the conservation of natural resources (Murphy and Pincetl, 2013:40), which links to the production, consumption, and disposal of all material goods made by humans. In the City of Los Angeles, for example, Murphy and Pincetl (2013) argue that despite multiple "zero waste" initiatives aimed at managing the city of 4 million's urban trash, resource conservation efforts have paid little attention to material waste that could potentially be used in end-of-lifecycle–post-use processes (Murphy and Pincetl, 2013:50). This represents a growing problem in the Los Angeles area, as city and suburban waste contains a mixture of building materials that may be used to re-generate human health and promote well-being. Un-used household scrap wood, stone, paint, metals, etc., which surface in many forms, make up a largely ignored resource that ends up in landfills—building resources with the capacity to regenerate our living spaces through their transformation. Similarly, 28% of landfill waste in the USA comes from leftover construction materials or from the demolition of buildings (Vatalis et al., 2013). Reusing reclaimed materials has become both a necessity and a challenge (Akinkurolere et al., 2013:1068).

This raises the question concerning where to begin in terms of the recovery and reuse of these material resources and of how a building plan employing them would work. One approach could begin in the household (the micro level) (Figure 1), from this point on, understood as the common, single-family residence. In this paper, I describe the HBS model (Figure 2), as it works in the household (Figure 3), through

three practical household plans involving the reuse of reclaimed building materials, wood, stone, and paint, utilized throughout the interior and exterior dimensions of my home in the West quarter district of the city of Walnut, a suburb twenty-three miles east of the major city of Los Angeles, in a region known as the San Gabriel Valley (SGV)—the indigenous lands of the Tongva people. For this reason, the focus is placed on how building with reclaimed materials can lead to the creation of construction knowledge, the strengthening of family and community, and ultimately, to spatial wellness. The modeling favors such materials because they are indiscriminately disposed of without regard to their reuse capabilities, making them an easily acquired building resource. In the SGV, recycling of building materials has been an "underground" hallmark of the immigrant household experience for generations. Still, the practice receives little attention in the research sector, and more often frowned upon by upper-class people and groups, with little to no support by local cities in encouraging the practice.

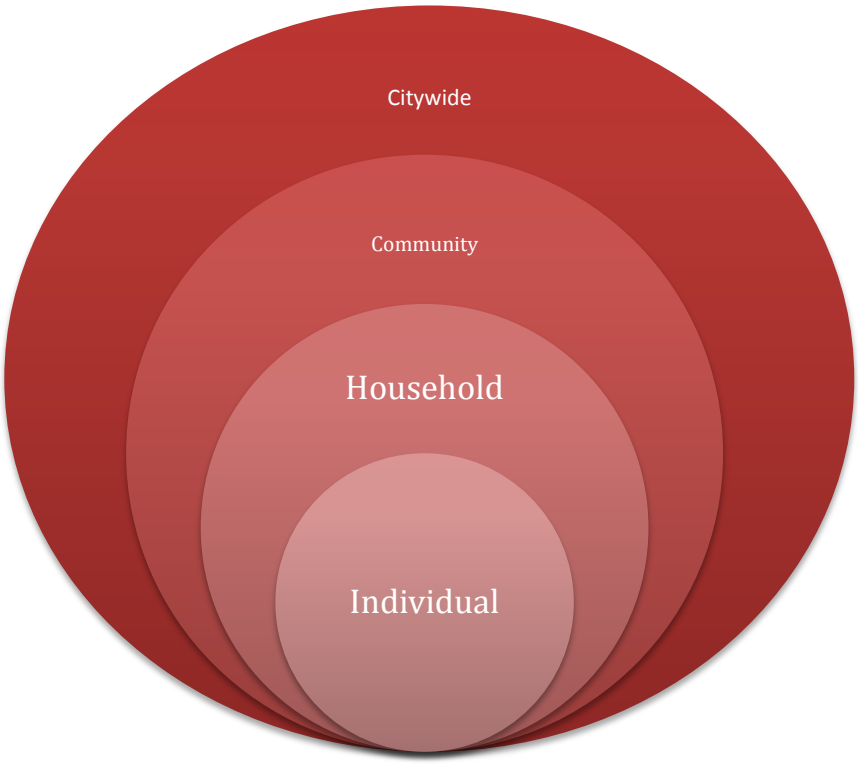

Figure 1. Scales where sustainable models operate. The individual and the household scale represent the micro level. The community and the citywide scale represent the macro level, and the state and countrywide scale represent the mega-macro level (not shown).

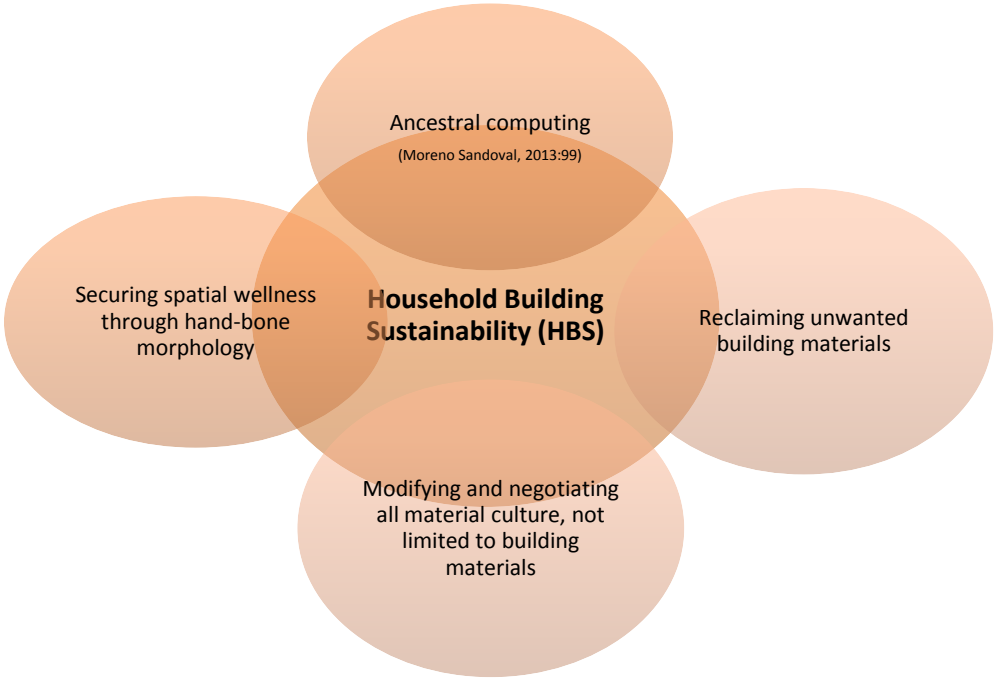

Figure 2. Household building sustainability (HBS) model

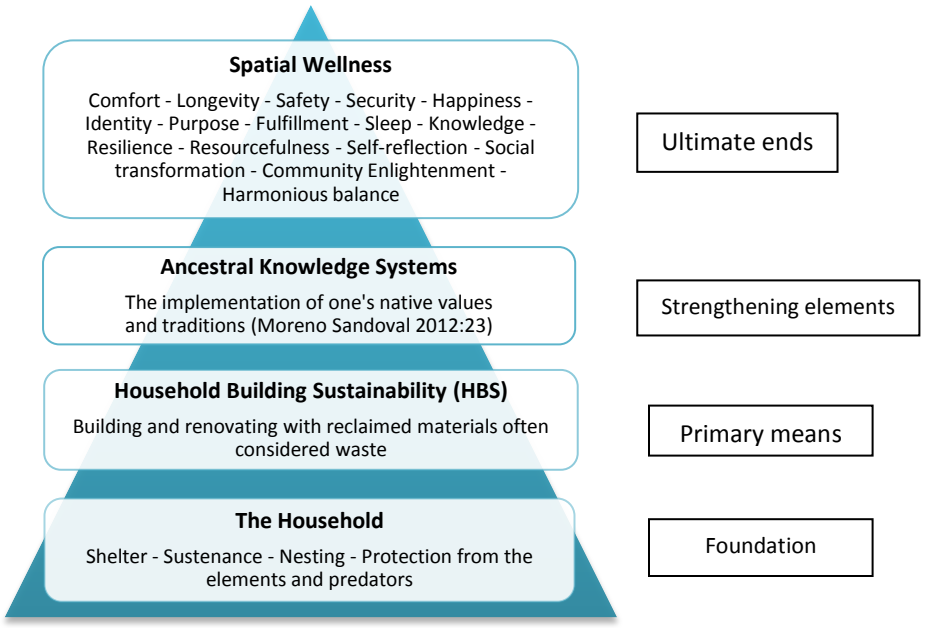

Figure 3. The household scale where HBS operates; the household is the foundation, whereby HBS is the primary means through which to achieve spatial wellness. HBS is strengthened when combined with one's ancestral knowledge systems (Moreno Sandoval 2012:23), or when bridged with primary means such as household gardening.

By specifying the model, I also intend to lay down the thought process behind the building of future sustainable systems in the household using reclaimed building materials. These works in progress will be made available in real time on my website, available at: http://www.spatialwellness.com. The HBS model is explicated when suggestions are made regarding how HBS may be strengthened when combined with one's ancestral knowledge systems (Moreno Sandoval 2012:23) and by the household growing its own food.

1.3. Household building sustainability, spatial wellness and the household clinic

I follow Meadows (1998) overview of the "Daly triangle" (see Daly, 1973), which outlines the ultimate ends (indicators) of human well-being. According to Meadows (1998:66–71), these revolve around security, identity, fulfillment, realization, transcendence, and enlightenment, though this may include community, reciprocity, and social and environmental justice. In this paper, well-being and *spatial wellness* are viewed as synonymous. However, spatial wellness also links the relationship between mind, body (the hands especially, along with vital organs), and all material culture. In the household, I define spatial wellness as the ultimate end of the living space in response to social transformations and the negotiation of building materials. Therefore, HBS as a hands-on model aims to achieve spatial wellness within the home, where it is most likely to be cultivated and strengthened. The HBS goal is to achieve spatial wellness without compromising the same opportunity for future generations, in line with the Brundtland Report definition of sustainable development.

Spatial wellness of the long-term type cannot exist, however, in the absence of dialogue. This practice is vital to the establishment of knowledge and knowledge sharing among community. Supporting that dialogue is *love*, an act of courage, and commitment to others, as described by Freire (2000:90). In doing so, the road to spatial wellness asks that individuals be involved in building community, to commit to one another in new ways, so that risks become shared among individual members of the household and whole neighborhoods. Spatial wellness acknowledges the current and past experiences of all people in the process of achieving wellness, but welcomes the rigor of Western science to help alleviate risks. The capacity to acquire spatial wellness lives inside us all. As I will discuss throughout different parts of this paper, profound feelings resonate with humans when we select colors, manipulate materials with our hands, and create tiny eccentrics with our finger and thumb pads. These behavioral and social processes constitute a part of our human evolution, past and present.

In practice, HBS moves beyond building materials to invite the modification and negotiation of all material culture to achieve wellness. It asks individuals to develop awareness through ancestral computing (AC) (Moreno Sandoval, 2013) to best develop sustainable systems that are resilient, low-maintenance, and capable of restoration across time and space. In return, the sustainable house must provide the family with dietary, culinary, spiritual, and craft-activity services to aid human health and well-being. These represent the four major culturally sustaining components of the *household clinic* (Figure 4), and they work in unison with HBS to cultivate spatial wellness. This echoes the goal described by landscape scientists under the premise of landscape sustainability science:

"Landscape sustainability science is a place-based, use-inspired science of understanding and improving the dynamic relationship between ecosystem services and human well-being in changing landscapes under uncertainties arising from internal feedbacks and external disturbances" (Wu, 2013:999).

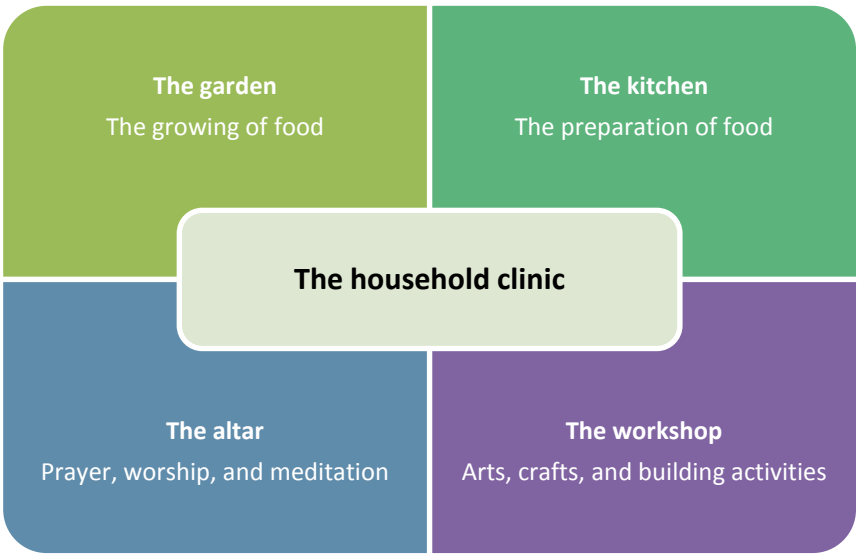

Figure 4. The household clinic.

The HBS model highlights how individuals should not only begin to consider similar processes, but should also further materialize their own sustainable systems that are specific to their spaces of living. Even if these systems are experimental in practice, people must view themselves as the inventers of knowledge and not merely as submissive inheritors of it. As Holling (2001:390) notes, in the "panarchy" of complex social systems, healthy systems invent and experiment; they benefit from inventions that create opportunity without becoming unstable due to excessive exuberance. In a healthy socio-economic system, the panarchy is both conserving and creative, as the interactions combine learning and continuity (Holling, 2001:390). Similarly, through experimental building, individuals negotiate and modify the use of materials, create household knowledge when quickly correcting building mistakes, and arrive at complex solutions of the sustainable type.

1.4. The role of ancestral computing in household building sustainability

One method of improving well-being calls for a linkage between sustainable development and the native values and beliefs (arts, crafts, music, dance, theater, foods, etc.) that correspond to the family. Moreno Sandoval (2012:23) refers to these as *ancestral knowledge systems*. Zev Naveh (2007:1438) made this point, when he stated that landscape scientists should strive to include their native cultural values in their work.

For sustainable development to work it must include not only the economic aspirations of people, but also their spiritual needs, dignity, and equity (Naveh, 2007:1438).

For example, in response to the rapidly industrialized, Western-influenced China, which favors the one-sided economic goals of quantitative and materialistic values, Naveh (2007:1438) wrote the following:

> *"They [China] still have the opportunity to develop their own version of sustainable development, based on authentic and indigenous natural and cultural values and traditions, such as shaped by the naturalism of La-Tzu, the social discipline of Confucius, and the concerns with personal enlightenment of Buddha."*

When situations exist where there is an absence of ancestral knowledge, whether it be the household, work place, or school, people have the capacity to reintroduce a certain level of native values and practices into the living space through self-reflection, dialogue, and culturally responsive and sustaining teaching and learning. The challenge lies in the modernization of native cultural values through careful transformation, but not through Westernization (Naveh, 2007:1438).

The link between ancestral knowledge systems and sustainability is becoming better studied in US public schooling. Moreno Sandoval (2013:91–92) argued that ancestral computing (AC), as a culturally relevant tool that draws from indigenous ways of thinking and doing, aids in the solving of complex social problems. Citing Wood and Sullivan (2013), Moreno Sandoval (2013:99) notes that computing in Mesoamerica centered on reading, relating, and measuring outcomes. In one high school in North East Los Angeles, for example, Moreno Sandoval (2012:iii) found that students who identified with their Mesoamerican ancestry and old ways of computing fostered positive identities and academic success both in their community and in a computer science classroom. Her student narrative inquiry recorded the journey of student-led initiatives concerning the sustainability of food, community activism, and responsible computer science practices. According to Moreno Sandoval (2013), this revitalization of ancestral knowledge and practice acknowledges students' socio-cultural and historical experiences in public education, placing student teaching, and learning further outside the traditional dynamics of euro-Westernized learning. AC as a method of decolonizing the mind and body asks actors to return to a sense of interdependence with others and the environment (Moreno Sandoval, 2013:103).

In a recent online commentary, Moreno Sandoval (2014) took note of *Tlazolteotl* (pronounced tla-sol-TAY-otl), a Mesoamerican effigy that is associated with eating trash and making the world beautiful. The metaphor resonates with the purpose of this paper surrounding the conservation of natural resources, and represents just one example of how Mesoamerican studies can be modeled to serve as a culturally responsive and sustaining pedagogy. As a thought tool in sustainable development, AC challenges us to ask "how technology is being built, where computers are made, and how they are disposed of" (Moreno Sandoval, personal communication, May 19, 2014). When AC works in conjunction with HBS, reclaimed building materials compete for a chance to strengthen and retrofit a particular building task or project. This is the *relating* and *measuring* aspect of sustainability in the household, the computing — the solving of complex social problems that Moreno Sandoval (2013:92) refers too.

In sum, AC works to initiate the thought process behind sustainable development that is then materialized by way of HBS—hand-bone morphology use and all its accompanying materials and tools.

1.5. Acknowledging the indigenous Tongva of the San Gabriel Valley

Before the colonization of the Los Angeles basin by the Spanish monarchy in the early 1770s, the SGV was home to the Tongva people, or *Gabrielino,* a name given to them for their compliance with the Spanish mission San Gabriel (see Martinez et al., 2014 for current views on the Tongva). Tongva traditional territory extends to Malibu city in the north, Riverside city to the east, and Aliso Creek to the south. Lands also included the four southern Channel Islands of the Pacific Ocean: Santa Catalina, San Clemente, San Nicolas, and Santa Barbara. Their territory encompassed varied ecological zones that affected their subsistence patterns (McCawley, 1996). The Tongva of the SGV lived within the Prairie ecological zone and subsisted on acorns, sage, yucca, deer, small rodents, cactus fruit, freshwater marsh plants, and birds (Martinez, personal communication, May 20, 2014). Although villages primarily used the resources around them, the Tongva traveled to other ecological zones in order to obtain scarce food types(Bean and Smith, 1978). The Tongva spoke a language related to the Takic branch of the Uto-Aztecan language family (Castillo, 1999:47). Their values and traditions were rooted in a model that all plants, animals, and landscapes were connected to one another, and because so, each contributed to the others well-being (Bean and Smith, 1978:37–74; Castillo, 1999:47–48).

It is estimated that with the arrival of the Spanish, European disease in Southern California decimated the native population (indigenous Chumash and Tongva) from 300,000 to 17, 000 (see Castillo, 1999 for a thoughtful summary on Tongva and Chumash responses to pandemics). Despite the devastating effects of disease, in the 2010 United States Census, 2,903 people identified themselves as Gabrielino (D55)(United States Census, 2010). That represents an increase from 2,493 reported in the previous decade (Martinez, personal communication, May 20, 2014).

In this paper, I acknowledge the Tongva, and their ancestral lands of the SGV, as they fight for a continued recognition and inherent sovereignty.

1.6. Paper breakdown

In Part 2, I discuss how the use of reclaimed stone, wood, and paint can halt the costly over-consumption of building materials. In doing so, I show how the harmful impact on the environment is lessened, and how spatial wellness may develop in the individual and families through HBS. To end the section, I summarize how the evolutionary derived micro-abilities of our hand-bone morphology favor survival-related labor, and thus, how this remains important to sustainable development.

In Part 3, I describe the household garden, and how members of the household and community benefit from both the building with reclaimed materials, and growing of their own food. I summarize some of the health benefits encouraged by green dieting, by *juicing in particular*, and how building and gardening

strengthen the household clinic. To strengthen the arguments, I highlight smallholder agriculture models from Mesoamerica, and draw from my own experiences with suburban gardening.

In Part 4, I discuss the link between HBS and the indicators of well-being identified by Meadows (1998). I lay out some guiding parameters to help steer HBS, such as the importance of community planning, and AC, as an underlying thought, when negotiating material use. I reiterate the important role that healthy diets play in the fight against disease, and end by posing questions that deal with important points concerning sustainability in the household.

In Part 5, I describe how HBS modeling can be simulated through creative means not solely grounded in building. A plea is then made to direct any research efforts to the building of models that are freely accessible, and that are easy to both comprehend and implement. I highlight the sense of urgency and advocate a push to strengthen sustainable development at the household level, in which we build the household clinic from the bottom up, and not via a top-down approach.

In Part 6, I lay out HBS Plans 1, 2, and 3 by providing a series of photographs that demonstrate the three primary phases of HBS, first outlined in Part 2. These are:

- Phase 1. Reclaiming;
- Phase 2. Restoration; and
- Phase 3. Implementation.

Each household plan is practical in terms of building and purpose, though the strength of the model rests on how HBS can be applied to just about any building type of material waste, in addition to wood, stone, and paint.

2. Household building sustainability with wood, stone and paint

2.1. Household building sustainability

Consumers in major cities show no awareness that the systems of production have become flawed (Adams, 2006:8). The quality of materials has diminished, and the belief in the opportunity to consume without limits in an ecologically limited world is putting societies at global risk (Adams, 2006:8). This holds true in the home improvement industry, where the quality of the building materials and tools made today un-rivals the quality of those made, say, 25 years ago. This is not to say that improved building products do not exist—they do—but they have yet to be adopted on a wider level. Many “green” building solutions are still only available to wealthy groups of people, as they cost considerably more than their alternative non-green solutions (Kim, 1998:12). The problem is exacerbated when builders, as well as heads of households, fail to comprehend the lifecycle of materials, from manufacture to termination, or reuse. The “off-the-shelf” price only accounts for the manufacturing and transportation costs, the return on investment, but not for the social or environmental costs involved.

The manufacture of building materials is responsible for the loss of wildlife habitats, erosion, and water and air pollution (Joseph and Tretsiakova-McNally, 2010:400; Kim, 1998:7; Vatalis et al., 2013:749). What is critical in terms of halting the over-consumption of building materials is a thorough understanding of the final phase, the "life cycle assessment" (Vatalis et al., 2013), when materials have subsequently deteriorated beyond their sufficient use. At this point, the materials are disposed of or recycled into reusable products. In the urban spaces of Los Angeles, and cities of the SGV, building materials such as wood, stone, paint, metal, PVC, sand, and gravel compile an abundant resource assemblage. As Wu (2010:2) notes, cities are cradles of knowledge production and offer a multitude of products that are important for achieving sustainability. Building resources in the SGV are often free, as every week on trash day (this varies from city to city) they pile up on curbsides, or in commercial waste bins. The reclaiming of unwanted building materials represents a focal practice of HBS when renovating with a human health and wellness focus.

The building materials used in my renovation projects (see Part 6. HBS Plans 1, 2, and 3) came from construction site-disposal bins and curbsides in Walnut and surrounding Valley cities. These represent an untapped, reusable resource, which surfaces in the form of unwanted furniture, waste, or raw materials. Most metals, for example, such as iron, steel, copper, and aluminum allow themselves to be cut, pierced, molded, and affixed easily to other durable materials. Wood also has similar useful qualities. As building materials can be fabricated, they are able to compete for similar uses; thus, eliminating the need for wasteful shopping trips to the builder's warehouse. Even materials that have deteriorated serve well to fill in hollow spaces or as an addition in the creation of new, usable materials, such as aggregate in concrete. The *relating*, *measuring*, and *negotiating* force backing HBS asks us to give a new opportunity to unwanted "waste" in an effort to halt over-consumption. The sustainable householder-builder relies more on human computing and the birth of innovation. As a result, reclaiming building materials saves family income, sweeps the city streets of "urban waste," which then lessens the impact on landfills.

As a goal, renovated spaces serve in the creation of new knowledge, the facilitation of dialogue, and the support of on-ongoing traditions. For example, meaningful, and creatively built homes foster intelligence in children, they are places where parents negotiate familial wellness and remedies, and spaces where the elders disseminate wisdom. Ritual, ceremony, healing, sleep, completing homework, writing, and sex all require adequate space. The home should be cultivated in a way that makes us want to come home after a long and emotional journey. Therefore, creative ways should be thought of to insert visually stimulating finishes where spaces are limited to make them a part of the greater feel of the house and its overall energy. Reclaimed materials such as wood, for example, are, in theory, sustainable and non-toxic (Kim, 1998:27), and when used in a finishing application, bring an outside feel to an interior space. Negotiating angles, contours, finishes, and creating different color schemes challenge traditional ways of building in the home.

2.2. Household building sustainability with wood

All wood can be reclaimed, restored (sanded, painted, and stained), and implemented as a structural or finishing solution. Wood is bold, wise, yet intricate and modern. It comes in dark and light tones, soft and hard compositions, and when placed appropriately, it can last a lifetime. Wood can be cut and carved to fit

any dimension, and finished to bring about any desired mood or sensation. When treated with sealers, wood can be used to make exterior steps, fences, garden gates, patios, household furnishings, instruments, and animal housing. However, care is advised, as many sealers and penetrants release harmful gases, even after drying. Although, as an alternative, I have found that natural kitchen oils, such as olive oil, also work well in sealing household wood furnishings. When cut, wood releases a natural aroma, and this invites us to learn about its history through its growth rings.

All wood is natural, a once-living organism, and even after death it has the power to purify the air and sequester carbon (Joseph et al., 2010:411). One German study (see Gold and Rubik, 2009:304) found that there was a preference for timber and its capacity to promote well-being and comfort. As wood can be seeded and grown, many consider it as a renewable source of energy (Lafleur and Fraanje, 1997:20; Kim, 1998:15). However, the growing and harvesting of wood is a leading cause of water, air, and soil pollution. Deforestation leads to a loss of biodiversity on a mass scale. Retaining our forests is vital to our humanity. It is common knowledge that photosynthesis removes carbon dioxide from the atmosphere to release clean oxygen. Yet, reclaiming wood is both easy and practical. In suburban neighborhoods, it appears in a variety of forms, weekly, on the curbs of households, oftentimes with a “free” sign.

Realized through time, space, and some creativity, wood and an abundance of reclaimed building materials can be put through a careful process of reuse (see Part 6.1. [Plan 1, HBS with wood]), that includes:

- reclaiming,
- restoration, and
- implementation.

These three practical phases represent the working components of HBS. These processes of material reuse, however, must be understood with foreseeable building challenges in mind. Like humans, materials are susceptible to corrosion, infection, and bug infestation. Steel, for example, rusts, drywalls can develop mold, and soft woods attract termites that result in damage. Knowledge regarding hazards such as extreme temperatures, wind, water, and snow, and even vandalism and intrusion must be taken into account during the process of building. This helps the builder and the householder decide how to better use reclaimed materials.

2.3. Household building sustainability with stone

Stone too should be appreciated in the same manner as wood and applied to both interior and exterior applications. Reclaimed pavers (see Part 6.2. [Plan 2, HBS with stone]), for example, can be used to make liners, planters, walkways, and benches, or applied in a retaining structure to support or terrace earth. Used bricks make appealing outdoor stoves, ovens, BBQs, and items such as pavers may also serve an earth-retaining purpose. Like wood products, bricks are made from natural resources such as sand and clay. Halting over-use through reclaiming will lessen the impact on their native habitat. When refurbished, broken concrete also has valuable applications and uses: It is easy to chip, sculpt, and is usable as construction media, similar to bricks. Old concrete is a favorite landscape medium of the urban farmer and builder, used to

terrace slopes, and retain earth. As an alternative to dumping, concrete rubble makes perfect cement aggregate for household cement pours.

The negative effects of cement manufacture on the environment are well studied. For example, manufacturing is responsible for generating carbon dioxide, carbon monoxide (CO), sulfur oxides (SOx), nitrogen oxides (NOx), hydrogen chloride, and volatile hydrocarbons (Joseph and Tretsiakova-McNally, 2010:405). Ten billion tons of natural rock and sand, and one billion tons of water are used annually by the concrete industry (Joseph and Tretsiakova-McNally, 2010:405). Halting the over-consumption of brick and concrete by reclaiming and reusing can lower air pollution, save energy, and slow down biodiversity loss (Akinkurolere et al., 2013:1069).

Precious stones like marble, granite, and quartz work well as finished interior and exterior pieces when found in a slab form, or as decorative arrangements in their raw form. Small-shaped minerals can bring out energy in dull corners or become handcrafted into jewelry. The Gulf Olmec of Mesoamerica (1500–400 BC), for example, the first complex society of the Americas (Coe, 1968; Cyphers, 1996), valued greenstones of the blue and green type for their perceived associations with wealth, maize, and agricultural abundance (Taube, 2004:20). Stone celts, in particular, represented reality and wealth through imagination, and were useful in daily life activities (Jaime-Riverón, 2010:131).

Among the Tongva certain stones and admirable minerals of different color served multiple purposes; recognized for their association with spiritual wellness and healing, similar to the Olmec. Elders that practiced medicine, for example, placed quartz crystals on ritual paraphernalia and kept them safe in their sacred bundles (McCawley, 1996:97) for when needed to cure the sick. Soapstone (dark steatite), brought from the Santa Catalina Island, was also used by artisans to carve small animals, beads, tobacco pipes, and ceremonial bowls (Johnston, 1962:31–32, 76).

Using reclaimed stone in the home represents both a long-term and resilient solution that further suppresses wasteful spending on this costly and not so eco-friendly building resource. On a smaller scale, precious stones can bring good energy to one's space, as they may be used to craft household eccentrics, and personal heirloom pieces that can be passed down generationally

2.4. Household building sustainability with paint

Old household paint should be recycled by mixing and matching, kept safe and stored, and used in the creation of household art, paintings, and murals (see Part 6.3. [Plan 3, HBS with paint]). Contrary to the builder's rhetoric, paint serves well as a wood sealer in exterior spaces, and if applied evenly on sanded wood, may last up to five years. Paint creates troublesome issues. It is costly to manufacture, expensive to purchase, and cannot easily be disposed of (see Segala, 2003:38–40). All paint is best recycled. In my particular case, gallons of latex paint and primer arrived in my classroom after a plea was made to my students for their unwanted and old household paint. This became a learning experience for everyone, as bonds were strengthened, and students were encouraged to procure and mix their own paint.

If the goal of a household project is to achieve spatial wellness, then paint-color combinations should stimulate the individual that created them. Room color should greet you when you walk in and talk to you when you sit down. With the right color in place, small spaces appear and feel larger. Guests in my home are always pleased by the different colors on the walls that are unlike any sold in the store, because they are. To add to the color, lighting in a room can also be enhanced with natural aromas that are easy to inject with resins, herbs, flowers, leaves, and branches.

2.5. Hand-bone morphology use and household building sustainability

The building, crafting, and handling of intricate objects with our hands (Photo 1) exemplifies a derived physical characteristic of our human evolution, dating back to when our hominin ancestors first began to identify objects, build shelters, and make tools. The finger bones of the extant *Orrorin* (a pre-australopithecine of 6 million years ago) reveal precision-grasping capabilities (Almécija et al., 2010:9) early in our evolution, comparable to modern *homo*. *Homo habilis,* "handy man" (1.8–2 mya), was subsequently the first toolmaker and user (Leaky, 1960). *Homo sapiens* (< 1 mya–present) represent the only living primates with precision-grip digits that further excel across a broad range of locomotive patterns (Jurmain et al., 2011:46). Unlike the great apes (chimpanzees, bonobos, orangutans, and gorillas), humans can craw, climb, push, and pull with a vast array of angles with distinct pressures unfamiliar to non-human primates. Hand-bone morphology use in the *Homo* lineage evolved after millennia of prolonged stresses related to tool-making and similar manipulative activities (Marzke, 2013:6).

Photo 1. The building, crafting, and handling of intricate objects with our hands

Through the work of Charles Darwin, the social scientist, Marxist Friedrich Engels, knew that the hand was the work of the evolutionary process. In *Dialects of Nature*, the book that Engels (1940:281) never finished, he called the hand the "product of labour," and the "organ of labour." Early man and woman had to procure food, build shelter, fend off attacks, and reproduce. These "primitive" strategies eventually allowed us to achieve spatial wellness early on. The mastery over nature, however, occurred with new advances as the hand and labor developed together (Engels, 1940:289). Engels (1940:289) writes that over millennia, the mind took over its advances, causing man to explain his actions from his thoughts, instead of from his needs. The same hands that led to our sustainability millions of years ago, when our earliest ancestors adapted to a life on land after moving down from the trees, eventually led to our rapid and modern development, without reason or rationale. Through the early and intentional use of the hands, I assert, this organ of labor may be the key to sustainable development once again.

3. Household building sustainability and growing your own food

3.1. Household gardening, health, and wellness

Household gardening practices include the building of small plots and terraces, often with reclaimed materials, and the cultivation of the earth for fruit and vegetable growing. Beets, carrots, cucumbers, and tomatoes (Photos 2, 3, 4, and 5) grow healthily in small raised beds of earth made of wood and brick, or concrete. According to Kiesling and Manning (2010:13), today's sustainable ecologically minded gardeners focus on duplicating ecological systems, capturing storm water, forgoing toxic pesticides, and utilizing native plants. The garden is a creative and public expression of both personal and social identity (Kiesling and Manning, 2010:315). Comstock et al. (2010:436) explain that gardens and public open spaces help in the creation of meaning on a personal level. Others, such as Lauren Lautenschlager and Chery Smith (2007:123, 129), argue that fruit and vegetable dieting promoted through youth garden programs combat childhood obesity, which is linked to type 2 diabetes, hypertension, and heart disease. In building with reclaimed materials, community gardens promote wellness by inviting people outside the home to form social relationships.

Residents who garden in the community proclaim a strong connection to their neighborhood (Comstock et al., 2010:435; Mares and Peña, 2011:9), and in many cases, to an ancestral practice and place of memory. For example, at *The South Central Farm* of Los Angeles, displaced Mesoamerican farmers of Mexico and Central America preserve heirloom crop varieties as well as their own cultural identities (Mares and Peña, 2011:209).As Mares and Peña (2011:208) note, such places represent spaces were people meet, learn about traditional foods from elders, feel more at home, and supply family businesses. At the household level, gardens persist as a sustaining part of the spiritual experience of the immigrant family (Mazumdar and Mazumdar, 2012:260). In their ethnographic research of Hindus from India and Buddhists from Vietnam living in Southern California, Mazumdar and Mazumdar (2012:260) recorded that native homegrown flowers,

fruits, and vegetables enhance the household altar, which for the immigrant family serves as the center for daily prayer and meditation.

The health benefits of plant-based diets are now well studied. *Juicing*, for example, the extraction of antioxidant-rich juice from fruits and vegetables (Wootton-Beard and Ryan, 2011:3142–3145), has multiple benefits concerning human health and wellness.

In one study, for example, there was enough evidence to suggest that green leafy vegetables (Swiss chard, spinach, kale, lettuce, etc.) help to prevent the development of type 2 diabetes (Carter et al., 2010:4). Cancer too, a malignant neoplasm characterized by abnormal cells that leads to the development of tumors which destroy tissues, organs, and the lymphatic system, may be halted during the regulation of oxidative stress by antioxidants (Wootton-Beard and Ryan, 2011:3138). Two common ingredients used by juicers, the kale plant (*Brassica oleracea acephala*) and ginger spice (*Zingiber officinale*), promote human wellness. In an intervention study of thirty-two men in Korea with hypercholesterolemia (high cholesterol), kale was found to protect against coronary artery disease (Kim et al., 2008:95). The other ingredient, ginger, a widely used medicinal plant in Ancient China, contains the anti-viral capacity to prevent the contracting of human respiratory syncytial virus (HRSV) (Chang et al., 2013:149), the leading cause of respiratory diseases (the common cold, bronchiolitis and pneumonia in infants). Beetroot (*Beta vulgaris*) (Photo 2) surpasses leafy greens in antioxidant levels (Wootton-Beard and Ryan, 2011:3142–3143), having detoxification and cholesterol-lowering properties (Ninfali and Angelino, 2013:196), and one study (Siervo et al., 2013) found that beet-juice supplementation reduces blood pressure in adults, and as a result, may prevent cardiovascular diseases.

Photo 2. Beets grown in a household garden

Photo 3. Carrots grown in a household garden

Photo 4. Cucumbers and squash varieties grown in a household garden

Photo 5. Tomatoes grown in a household garden

3.2. Household gardening in Mesoamerica

Household gardening for food and wellness in the Americas is not new. Christian Isendahl and Michael E. Smith (2013) recently argued that among the Ancient Maya and Aztec, cities practiced a form of smallholder-intensive cultivation. Framed around Nettings' (1993) model of smallholder agriculture, Isendahl and Smith highlight the linkage between smallholder cultivation and urban sustainability resting on the principle of local control. By living close to their gardens, Maya and Aztec farmers practiced a form of bottom-up community organization that allowed farmers the control, not just of their food, but also of other aspects of social life (Isendahl and Smith, 2013:13). It was not uncommon for large Aztec neighborhoods of 100 to 200 residences to house a small temple, which housed its patron deity, and a school (Isendahl and Smith, 2013:140). At small sites such as Calixtlahuaca, even after the conquest of 1521 by the Spanish, the neighborhood combined narrow, terraced slopes, where both houses stood and maize cultivation took place (Smith et al., 2013:239–241). Isendahl and Smith (2013) believe that it was this strong communal bond that allowed urban Mesoamerican households to be more successful at solving problems than any tribute-collecting state or colonial government.

3.3. Household building sustainability and growing your own food

HBS and the household growing of food have the capacity to transform the living space, and, in turn, entire blocks and communities (e.g., schooling spaces). In urban spaces, for example, building and planting develop

teachers within the community that are needed for peer mentoring and guidance. Sowing, cultivating, and harvesting initiate a healing experience for all people. Gardening is a therapeutic remedy for bodily stresses (Barmelgy, 2013:2057) and one way to connect with the local earth. The sharing of food knowledge connects a community of teachers and students, on land, and on social media, strengthens the household clinic, and encourages the invention of household remedies, rituals, and ceremony.

My own lived experiences with planting confirm that maize, beans, and squash, the "three sister crops" of the Americas (Photo 6), contribute not only to the family diet, but play an important role in ceremonies acknowledging the change of seasons, and are symbolic in the rites-of-passage ceremonies of young girls, such as the Mesoamerican *quincieñera* maize ceremony that honors the arrival of womanhood in a young girl's life. As I related to my daughter during a maize-seed sowing ceremony in preparation for her coming of age: maize, beans, and squash plants grow together, look out for each other's health and well-being, and so should you in all your relations with family, friends, and earth.

In essence, growing food represents a teaching model of appreciation, grounded in respect for the earth, respect for the self, and reciprocity, ethos that cultivate spatial and communal wellness. The knowledge learned from sowing seeds, cultivating the earth, and harvesting foods has transformed my teaching into a critical culturally sustaining/revitalizing pedagogy (McCarty and Lee, 2014)that integrates the sharing of native planting strategies, recipes, and seeds with students and fellow instructors.

The students I serve, many of whom share a common indigenous Mesoamerican ancestry, vow to continue similar practices for dietary reasons, and cultural revitalization, with the best of human intentions. This is a teacher responsibility. As McCarty and Lee (2014:102) note: "Regardless of whether schools operate on or off tribal lands, in the same way that schools are accountable to state and federal governments, so too are they accountable to the Native American nations whose children they serve".

Photo 6. Maize, beans, and squash—the "three sister crops" of the Americas

4. Conclusions: Achieving spatial wellness through household building sustainability

Surveying your neighborhood for people's unwanted materials—that is, hauling "trash"—and fabricating them into sustainable systems contradict early era Anglo-American ideas of romantic living. Yet, this is occurring more frequently in populous cities across America as family incomes decline, and the prices of goods and household services soar. Many U.S. populations are now hauling trash. The fear of losing one's home, the high potential for illness and disease, and a loss of faith in elected leaders are all factors forcing families into becoming sustainable. As Bai et al. (2012:466) note, interventions to improve human health and well-being require actions beyond those offered by the formal health care sector. We need an all-out sustainability revolution, involving all of the committed actors from every occupation and discipline who are involved in the recycling and reduction of material flow and energy (Naveh, 2007:1437). Brower (1996) too reminds us that housing must not only correspond to the values of the household occupants, but the costs of housekeeping must not strain the householder's resources, or in essence, those of the community. One solution that may surface through HBS allows for the control of one's own living space, and as a result, of one's well-being—of spatial wellness.

For example, negotiating building materials, modeling how they enhance the living space, and how they serve our spiritual needs bring about feelings of *comfort* and *longevity*. The household is the first line of defense against intrusion and harmful elements. Homes that are solidly built allow for physical *safety* and *security* in life-threatening moments. When furthered by one's native food, smells, values, and practices, building and making things in the home with the hands allow people to establish and negotiate relationships with their family, community, and partners; thus, *making people happy*. The sustainable household allows people to have a sense of *identity* and *purpose* in times of despair and sickness. *Fulfillment* of the genuine type surfaces after a long day of building and making things, whereby, after the body is naturally tired, we capitalize on uninterrupted *sleep*, an essential aspect of re-generating the body. As the old ways of building are challenged when using reclaimed materials, new construction *knowledge* is born. Building sustainable systems, with reclaimed materials, through use of our hand-bone morphology induces *resilience* and *resourcefulness,* which lead to alternative solutions to our everyday living, and the solving of complex household problems. This is a human aspiration that we have carried with us for millions of years, so it should not be hard to re-imagine.

Sustainability in the household with reclaimed materials manifests over time with the appreciation of space that is durable, low-maintenance, and capable of restoration when it becomes used or weathered. The costs of reclaiming materials and the costs associated with labor and installations often cease to exist, since family members are asked to split the costs and energy invested. The motivational factor here then is an economic one, but also a communal one, since achieving sustainability asks for a collective effort, depending on the scope of the work and goals involved. Such ways of building are vital to the establishment of spatial and communal wellness. The household is the nest of *self-reflection* and so it inspires, poses alternatives, and leads the way in uncertain times. The sustainable household cultivates a critical consciousness that leads to *social transformation* and *enlightenment*. It establishes *community* between neighbors who are poised to establish wellness after many years of non-interaction, thus breaking down prejudices, and resentment, and

building communal strength in times of hardship. Since a goal of HBS calls for the conservation of resources for future generations, building with reclaimed materials initiates a *harmonious balance* between the Earth and humans.

Reclaimed building-material solutions are required for the mere reason that urban contexts, which include single-family residences, apartment complexes, mobile home parks, and projects, are made-up of wood, steel, and material frameworks that need or will need rebuilding/retrofitted sooner rather than later. Sustainable development of the household type requires building with the material resources at our current disposal. Why? Because despite governmental efforts, human health risks remain vast, varied, and rapidly growing. Few, if any, programs exists that will subsidize the high costs of renovating many of the now depleted and rotted War era household structures that went up during the 40s and 50s.If we wait for city and state leaders and policy makers to lay out a household plan of wellness, it will be too late for many of us. Elected officials rely on recorded indicators of human health and wellness to make "informed" decisions, which they then subject to their own scrutiny and benefits. The spatial wellness of the masses will never come quickly enough in the hands of government. Do not get me wrong, I am not advocating violence or the overthrow of any particular government; I am only asserting the human capacity for being self-determined and autonomous in community.

Across the many different households, the sustainable house and its components should operate differently depending on the beliefs and morals of the family, the availability of materials, and needs of the community. In *the States,* it must entail radical views concerning material aspects of the American dream (Paehlke, 2005:37). It must be an effective strategy, of braided channels that different actors can own and drive forward (Adams, 2006:16). If householders and families are to invest in sustainable building, the goal at the household level should be to bridge a food-growing component in an effort to establish *huertos familiares* (family-kitchen gardens) (Mares and Peña, 2011:207) that model fruits, vegetables, and herbs from both a dietary and cultural perspective. In this paper, this is referred to as the *household clinic* (Figure 4) and properly includes:

- the garden for the growing of one's native foods, and/or healthy foods;
- the spiritual altar for prayer and meditation;
- the workshop to support building and maintenance of the household structure, and craft making; and
- adequate space for resting, healing, and reproduction.

Moreover, the education concerning food must be modeled in the classroom, and the importance of its planting, growing, and regeneration to aid sustainability needs to be stressed.

A radical shift in how people understand the material world, building in the home, and natural resources needs to dominate our everyday thinking (i.e., Naveh, 2007:1437). If the household is to sustain its own and stimulate spatial and communal wellness, how do we integrate vital and costly energies such as water, gas, and electricity into sustainable systems that return more than their traditional value in a manner that we can all afford? How do individuals and community build sustainable systems and have them work alongside the growing of our own food? As such, diet and better lifestyles are more powerful than any single factor alone in the fight against disease (Hu and Willet, 2002; Kim et al., 2008:95). This would further include inventing

homemade alternatives to synthetic cosmetics and medicines that are toxic to the human body. The building resources and networks are available to us and we should take hold of these, *embrace these*, to build diverse household clinics, to become our own physicians, to manage our health and well-being from the bottom up and not wait for top-down approaches. It would be of value to us all to begin experimenting in the household clinic and to begin training ourselves in the process of decolonizing through hand-bone morphology use.

5. Some final thoughts

Spatial wellness in my particular case was negotiated from a micro level (the household). I met the challenge by using my hands (building things), and by further enhancing the material systems around me with the native foods and practices of my Mesoamerican homeland. That will not be the case for everyone, although I do believe that the model may be modified to fit the needs of any household. The benefit of the HBS model (Figure 3) rests in the interchangeable "cartridge" as the primary means. Food-justice services, community outreach programs, and culturally responsive teaching and learning represent additional, primary action-based means. Modeling them would help us to understand their benefit in urban settings. We would all benefit from literature that is comprehendible to various learning skills, and accessible to all individuals and groups, regardless of race, status, or identity, outside of the institution.

At *Sciencedirect.com,* for example, anyone can pull up hundreds of articles outlining practical methods to help achieve wellness on various scales. What good, however, do these works serve when each download costs US$ 31.99 or more? These are inaccessible to poor and working-class people and independent researchers alike. In fact, this very point appears in the Brundtland Report where the authors argue that "free access" to alternative sources of technical expertise provides an informed basis for public discussion (UNWCED, 1987). Thus, the topic of sustainable development must dominate household and community discussions and forums. As Bai et al. (2012:47) note, facilitating cross-city learning will play a critical role in harnessing and up scaling the lessons from and the benefits of best practices.

A revival of blueprints, how-to manuals, and manifestos outlining sustainable development would be beneficial to all active participants who are not a part of research institutions where such information is readily available to scholars and scientists. Equally important, as researchers on urban life, or for anyone tackling the challenge, *they*, *we*, must operate beyond the macchair in collaboration with others and with a willingness to build with the hands.

6. HBS Plans 1, 2, and 3

6.1. Plan 1, HBS with wood

Old wood fence is taken off a street curb. One can notice that it was trash day in Walnut because the brown trashcans are awaiting pick-up (Photograph by author).

Phase 1. Reclaiming
(a) Over-consumption is halted
(b) The restoration process begins
(c) Critical consciousness develops

Old wood fence is cut, sanded, and treated. From this reclaimed material, I was able to fabricated wooden fence panels (Photograph by author).

Phase 2. Restoration
(a) Over-consumption is negotiated
(b) New building knowledge is created
(c) Community begins to take notice

Old wood fence fitted in a new application. The panels and the studs were from a previous old fence. Recycled paint was also used (Photograph by author).

Phase 3. Implementation
(a) Over-consumption is terminated
(b) Building knowledge is shared
(c) Communities begin similar processes

6.2. Plan 2, HBS with stone

These old pavers were reclaimed after responding to a craigslist ad for *free* pavers. Salvaging such stone lessens the impact on landfills and halts over-consumption by eliminating the purchase of new pavers (Photograph by author).

Phase 1. Reclaiming
(a) Over-consumption is halted
(b) The restoration process begins
(c) Critical consciousness develops

Stone pavers in the process of implementation. In a traditional setup, these pavers would not be stacked on one another, but placed side by side–thereby here new building knowledge is created in the process (Photograph by author).

Phase 2. Restoration
(a) Over-consumption is negotiated
(b) New building knowledge is created
(c) Community begins to take

The HBS process is complete. In this particular case, HBS is further bridged and strengthened with the growing of vegetables (leafy greens) (Photograph by author).

Phase 3. Implementation
(a) Over-consumption is terminated
(b) Building knowledge is shared
(c) Communities begin similar

6.3. Plan 3, HBS with paint

Gallons of old paint are mixed to create new, unknown colors. Gallons poured in after a plea was made to my students for their unwanted paint (Photograph by author.)

Phase 1. Reclaiming
(a) Over-consumption is halted
(b) The restoration process begins
(c) Critical consciousness develops

New paint colors are properly stored. In this application, I used recycled food containers to store recycled paint (Photograph by author).

Phase 2. Restoration
(a) Over-consumption is negotiated
(b) New building knowledge is created
(c) Community begins to take notice

Recycled paint was used to paint interior walls, shelves, and doors. In this application, I painted a shelving system (made from recycled wood) a light green color.

Phase 3. Implementation
(a) Over-consumption is terminated
(b) Building knowledge is shared
(c) Communities begin similar processes

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