

## ABSTRACT

Title of Thesis: CULTIVATING PERUVIAN ROOTS

RENZO MORAN, MASTER OF  
ARCHITECTURE

Thesis Directed By: JAMES W. TILGHMAN

With the rising population in Peru, the country needs help to provide the necessities for its ever-growing communities. Many of these underdeveloped communities have been long forgotten by their governments, as there is no natural progression. The country has years of strong heritage and culture, yet it is not prevalent in the modern region. The aim is to redevelop the current communities so that they can be set up to prosper for the years to come. Improving the quality of life for many of these residents is vital. Creating public and social spaces in existing areas will help unite these communities and uplift their spirits so they can set out to seek their goals. Designing modular homes that the owner can easily manipulate would help facilitate the life of these dwellers, allowing them to add to their existing homes if they gather more resources or financial income—producing educational programs within the community so that the next generation has a solid foundation to build on.

BREAK.

CULTIVATING HERITAGE

BY

RENZO ALESSANDRO MORAN

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[2024]

## Dedication

To my dear friends and loved ones,

Your unwavering support, encouragement, and belief in me have been the foundation of this journey. Through late nights, endless revisions, and moments of doubt, your words of reassurance and gestures of kindness have kept me moving forward.

To my family and loved ones, whose love and sacrifices have made this possible, I am forever grateful. Your faith in me has been my greatest source of inspiration. My love for my country grew ever more with this thesis proposal.

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FIG 16 Site selection, Renzo Moran

FIG 17 Homes in the Lurin district stand near the pre-Columbian archeological site Pachacamac in Lima, Peru, Oct. 5, 2017.

FIG 18 Master plan, Renzo Moran

## Chapter 1: CONTEXTUAL ANALYSIS

Lima's architectural legacy traces back to its pre-Columbian origins, with the indigenous civilizations of the Inca and earlier cultures leaving behind traces of their architectural achievements. However, the Spanish conquest in the 16th century profoundly shaped Lima's architectural landscape. The colonial period saw the construction of magnificent churches, monasteries, and palaces, many of which still stand as iconic landmarks today. The Plaza Mayor, with its grand colonial buildings and baroque facades, remains the heart of Lima's historic center and a testament to its colonial heritage. The colonial architecture of Lima is characterized by its ornate facades, intricate woodwork, and elegant courtyards, reflecting the fusion of European and indigenous architectural styles. The Basilica Cathedral of Lima, the Church and Convent of San Francisco, and the Archbishop's Palace are examples of the city's colonial treasures. These architectural gems serve as reminders of Lima's colonial past and as symbols of its cultural and religious identity.

The 19th and 20th centuries witnessed significant urban expansion and modernization in Lima as the city increased due to immigration and industrialization. The introduction of neoclassical, art deco, and modernist architectural styles left their mark on Lima's skyline, with new buildings and infrastructure projects reshaping the urban fabric. The National Theater, the Congress of the Republic, and the Central Post Office are notable examples of Lima's modern architectural heritage, reflecting the city's aspirations for progress and modernity. Despite its architectural richness, Lima faces challenges of urbanization, informal settlements, and

environmental degradation. Rapid population growth has led to the proliferation of informal housing developments on the city's periphery, resulting in overcrowding, inadequate infrastructure, and social inequalities. Additionally, traffic congestion, air pollution, and lack of green spaces are pressing issues that impact the quality of life for many residents of Lima.

Rapid urbanization and population growth in developing nations have strained market-driven approaches to addressing housing needs. Market shortcomings in constructing new and affordable housing have resulted in challenges for households living below the poverty line, compelling them to reside in substandard, overcrowded dwellings in deteriorated central city areas or informal settlements on the outskirts of urban areas. Inadequate housing conditions affect a considerable portion, potentially exceeding 50%, of urban residents in the developing world.

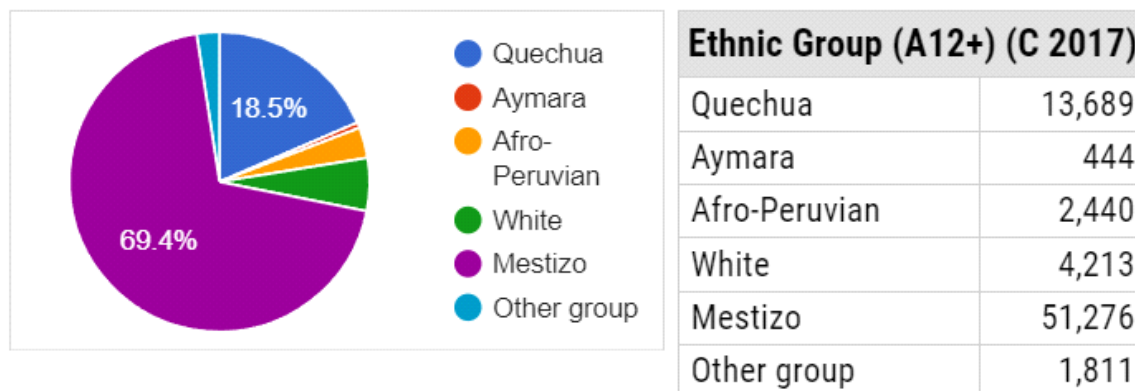
Furthermore, deficient urban infrastructure, inefficient services, lack of formal land ownership, and generally poor local environmental conditions have become prevalent features of cities in developing nations. Many of these impacted nations occur within Latin America. Lima, the capital city of Peru, is a vibrant metropolis with a rich architectural heritage that reflects its diverse history, cultural influences, and urban evolution. From its pre-Columbian roots to its colonial past and modern-day developments, Lima's architectural context provides a fascinating lens through which to understand the city's identity and character.

## **URBAN INEQUALITIES**

Since its establishment during colonial times, inequality has been a central theme and a key influence on Lima's development. Like many colonial regimes, the political structure from the outset was based on the hierarchical coexistence of two distinct republics: the "Republic of the Spaniards" and the subjugated "Republic of the Indians" (Indigenous Peoples), each assigned different roles and responsibilities within colonial society. Different cities exhibit diverse neighborhoods due to variations in geography, history, culture, economy, political governance, size, and pace of change. In Lima, Peru, the distinctive factor lies in its location within an extensive coastal desert, diverging from patterns observed elsewhere in Latin America, where illegal private subdivisions and sale of agricultural land are prevalent. Approximately half of the desert areas occupied by squatters around Lima are on public land, while another third are under dispute. While Peruvian law encourages homesteading, there's also a provision where land reverts to the state if unused. Interestingly, Peruvian governments have sometimes tacitly supported squatter "invasions" of land as a populist gesture or to stimulate commercial redevelopment within the inner city. Special legislation targeting organized yet unauthorized land invasions has been in place since 1961, but despite this, the practice persisted unchecked into the mid-1980s. In 1984 alone, there were thirty-five such occurrences (Caretas, 1985a). It wasn't necessarily that others had specific intentions or claims for the government-owned desert land that was occupied. Still, the bureaucratic process of transferring ownership from federal to municipal authorities and obtaining legal title involved an extensive procedure, requiring 105 documents and a minimum of 44 months, as indicated by a study conducted by El Instituto de Libertad y Democracia.

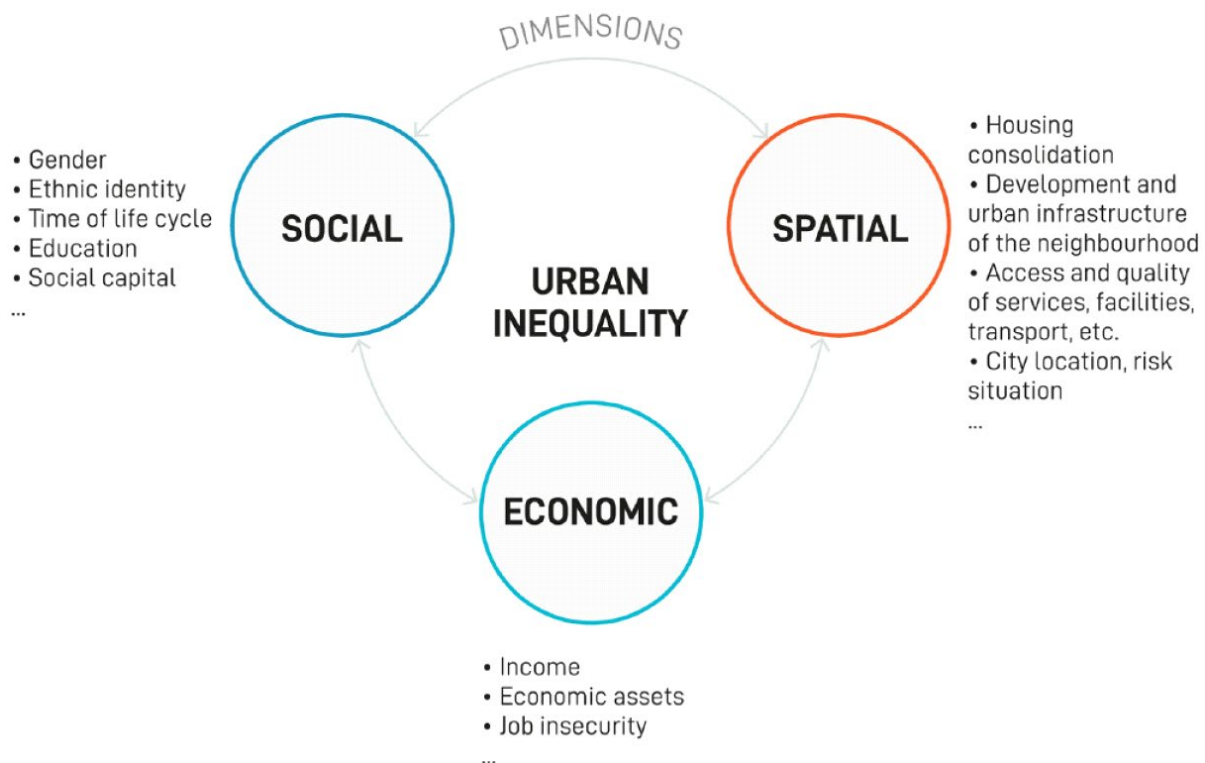
Of the many consequences of market failures leading to housing shortages and inequities in developing nations is the emergence of slum areas on the outskirts of nearly all urban centers. These areas are usually inhabited by recent migrants from rural areas and other low-income demographics and frequently lack adequate political and economic support. With high population and dwelling densities, substandard housing conditions, limited access to services, elevated pollution levels, and restricted opportunities for employment, education, and healthcare, these slums perpetuate a complex cycle of poverty that significantly impacts the health, livelihoods, and overall welfare of urban residents living in poverty.

Peru has long grappled with pronounced inequality, particularly along ethnic lines, referred to these disparities as horizontal inequalities encompassing economic, cultural, and political realms. Identification with the indigenous ethnic group is often associated with being born in the Sierra, although excluding residential areas of major provincial cities where mestizo populations predominate (**fig1**).



**fig 1**“America.” (District, Lima Metropolitan Area, Peru) - Population Statistics, Charts, Map and Location. Accessed July 8, 2024. [https://www.citypopulation.de/en/peru/limametro/150119\\_lur%C3%ADn/](https://www.citypopulation.de/en/peru/limametro/150119_lur%C3%ADn/).

While using birthplace as a proxy for ethnicity is flawed due to measurement challenges, especially concerning second-generation migrants in urban centers, it provides a closer approximation than spoken language. Research indicates ethnicity significantly impacts educational and employment opportunities and social status, yet mainstream discourse in Peru tends to downplay its significance. This reluctance may stem from the very importance of ethnicity rather than its insignificance. However, studying these dynamics is complicated by a lack of shared vocabulary and the tendency for individuals to define their identity in terms of class, region, or occupation rather than ethnicity. (fig2)



**Fig 2** Desmaison, B., Ramírez Corzo Nicolini, D., & Rivero, L. R. (2023). Building common understandings of urban inequalities to generate relevant solutions in Lima, Peru. *Environment and Urbanization*, 35(1), 30-48.

<https://doi.org/10.1177/09562478221144403>

## Chapter 2: PERUVIAN HERITAGE PRESERVATION & INTEGRATION

### **Background**

Peruvian culture has a rich history that spans from the ancient Inca Empire to Spanish colonials, and it has continued to diversify into modern-day culture that includes a variety of traditions, languages, and architectural heritage. The legacy of the Inca Empire is maintained through the archeological wonders that continue to attract tourists, such as Machu Picchu and remnants of Inca infrastructures in Cuzco. However, the diversity of Peruvian culture continues beyond its historical beginnings through the varied geography of the Andean Highlands, Amazon rainforest, and coastal plains. Just as Peru's cultural history has been influenced by different cultures, the differing terrains have nurtured an array of peoples, each with their unique slang, traditions, and ways of life. Despite these differences, Peruvians remain united under their sense of national

identity, which adheres to their shared cultural values of hospitality and strong community bonds.

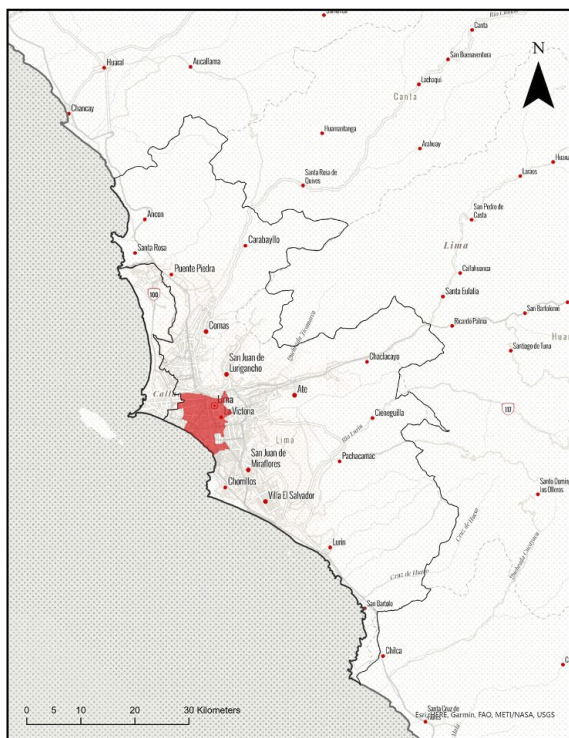
## **Separation**

Before Peru's era of colonization, the country boasted a variety of indigenous ethnic groups, laying a solid foundation for its varied composition. However, the period of colonization welcomed a new wave of additional diversity with the arrival of Spanish settlers, enslaved Africans, and indentured Chinese laborers. Consequently, the spectrum of ethnic identities in Peru expanded to encompass a multitude of indigenous groups alongside the new emerging groups forged from inter-ethnic unions. From these unions, contemporary Peruvians navigate the complexity of ethnic affiliations, resulting from an array of indigenous heritages varying from African lineage to European ancestry. Peruvian culture is interwoven with a multitude of ethnicities, including but not limited to Amerindian and Amazonian indigenous groups, Afro-Peruvians, Mestizos, Zambos, and those of predominantly European descent. The linguistic landscape mirrors this diversity, with Spanish as the dominant language alongside indigenous tongues such as Quechua and Aymara. Not surprisingly, bilingualism is prevalent, particularly in regions like Cusco and Puno, where Quechua and Aymara coexist alongside Spanish, lending a distinctive sound to the Peruvian dialect of Spanish enriched by indigenous linguistic influences.

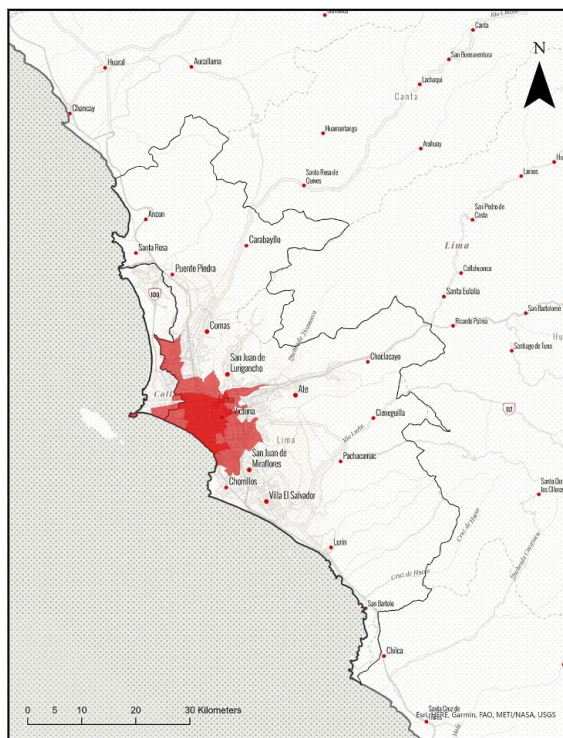
## **Heritage Preservation**

Conservation in Peru spans back more than 12,000 years. Beginning in the sixteenth century with the arrival of European settlers, this pivotal movement marked the

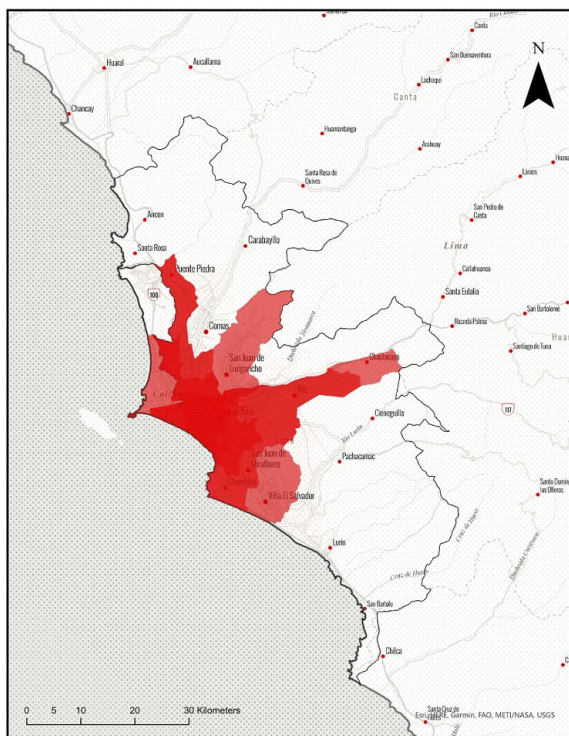
inception of multiple of the country's present day cities. Over the centuries, these cities have served as dynamic hubs of human activity, continuously evolving to meet the demands of life. A striking characteristic of Peruvian urban landscapes is the seamless integration of traditional architectural elements with modern structures, reflecting the enduring connection between past and present. This juxtaposition of the old and the new pays homage to Peruvians' deep-rooted affinity for their historical heritage.



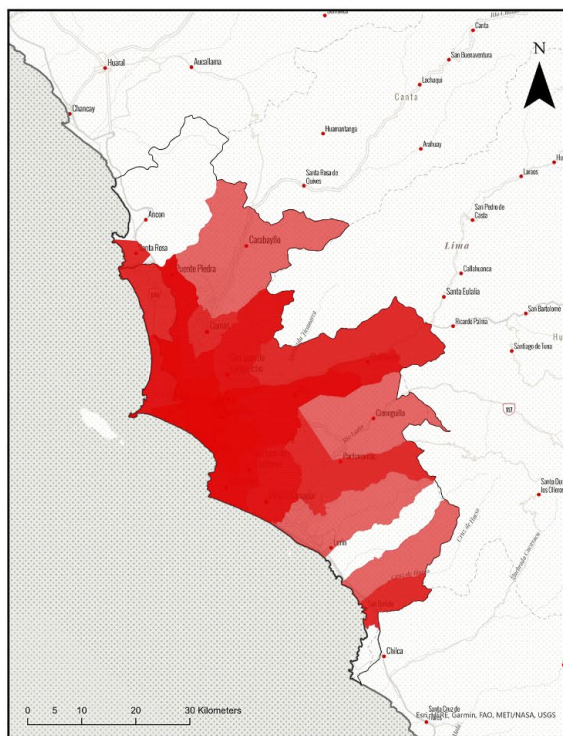
Lima - 1940



Lima - 1960



Lima - 1980

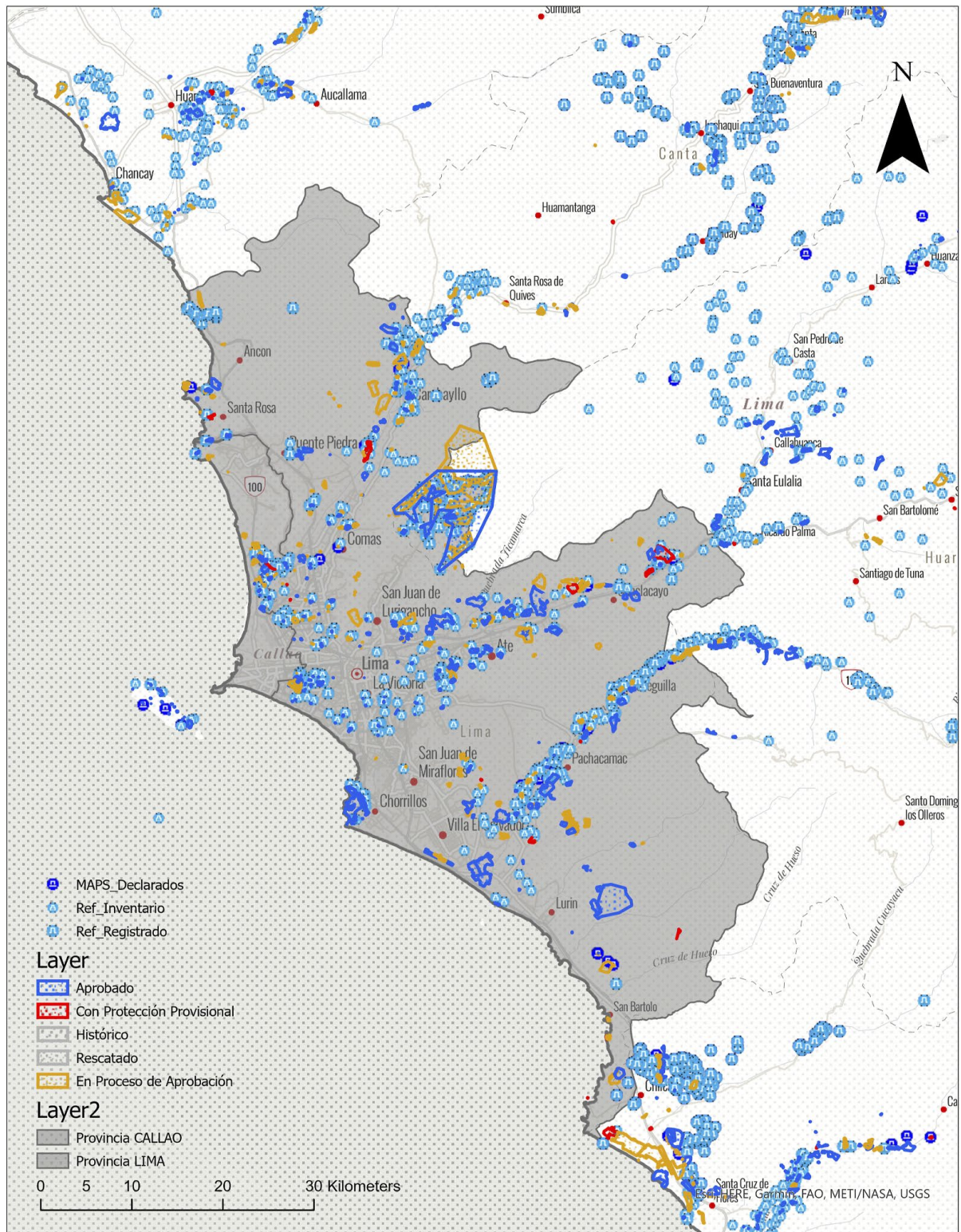


Lima - 2000

**fig 3** Alexandrino Ocaña, G. (2023). Reclaiming heritage and citizenship: urban pre-colonial cultural heritage management and heritage grassroots organizations in Lima, Peru. *Journal of Social Archaeology*, 23(3), 303-325.  
<https://doi.org/10.1177/14696053231189947>

## **Archaeological Sites**

Peru's cultural landscape is enriched by a wealth of pre-Hispanic archaeological sites, some of which are nestled within bustling urban centers. These sites serve as poignant reminders of the country's ancient civilizations and play a pivotal role in fostering a sense of cultural identity among its inhabitants. The presence of these archaeological treasures serves as a catalyst for the preservation of built heritage, prompting reflection on the significance of historical continuity and the importance of safeguarding tangible traces of the past. **(Fig 3)**



**fig 4** Alexandrino Ocaña, G. (2023). Reclaiming heritage and citizenship: urban pre-colonial cultural heritage management and heritage grassroots organizations in Lima, Peru. *Journal of Social Archaeology*, 23(3), 303-325.

<https://doi.org/10.1177/14696053231189947>

In light of this extensive historical backdrop, Peruvians are prompted to contemplate their relationship with their built heritage and the imperative of its conservation. These contemplations form the cornerstone of developing comprehensive educational programs focused on built heritage conservation. Addressing fundamental questions about the value of preserving architectural heritage in the face of modernization challenges, such programs aim to instill a sense of stewardship and appreciation for Peru's rich cultural legacy among present and future generations.

### **Integration**

At the human scale, architecture can influence daily life, community interactions, and personal well-being. Integrating Peruvian culture into the built environment cannot be overstated. It begins with understanding the human experience and how spaces can support cultural practices and social connections. This involves designing buildings and public spaces that reflect cultural values, support local traditions, and foster a sense of belonging. By doing so, we preserve our cultural heritage and create spaces that resonate with the people who inhabit them, fostering a sense of pride and belonging.

For instance, incorporating traditional materials such as adobe and wood in residential architecture can create a tangible connection to Peru's architectural heritage. Using courtyards and open spaces every day in conventional Peruvian homes can promote social interaction and provide communal areas for cultural activities. Additionally, including elements such as textiles, ceramics, and local art within the interior design can

enhance the artistic ambiance and create a home environment that is both aesthetically pleasing and culturally resonant.

Urban design plays a crucial role in shaping a community's identity. In Peru, cities like Cusco and Arequipa exemplify how urban spaces can reflect cultural heritage while accommodating modern needs. The preservation of historical centers, with their narrow streets, plazas, and colonial architecture, maintains a connection to the past and provides a sense of continuity. These spaces attract tourists and serve as vibrant centers for local life, where cultural events, markets, and festivals occur.

Integrating Peruvian culture into urban design involves more than preserving historic buildings; it requires creating new spaces that respect and enhance cultural identity. This can be achieved through thoughtful planning that considers the scale and character of existing neighborhoods, incorporating public art that reflects local traditions, and designing public spaces that encourage cultural activities. For example, creating parks and plazas that host traditional dance performances, music festivals, and artisanal markets can strengthen community bonds and celebrate cultural heritage. Sustainability is critical in contemporary architecture, and traditional Peruvian building practices offer valuable lessons. Ancient structures were often built using locally sourced materials and environmentally sustainable techniques and adapted to the local climate. For instance, the Inca's terraced agriculture and sophisticated water management systems demonstrate a deep understanding of ecological principles.

Modern architects can draw inspiration from these practices to create sustainable and culturally integrated buildings. Using local materials, promoting energy efficiency, and designing for climate resilience are ways to honor traditional wisdom while

addressing contemporary environmental challenges. Sustainable design that reflects cultural values minimizes ecological impact and creates meaningful and contextually appropriate buildings.



**Fig 5** Huaca Pucllana, Lima. Photo by Flickr user Robert Nunn. Creative Commons Attribution-NonCommercial 2.0 Generic (CC BY-NC 2.0).

## Challenges

A challenge is ensuring cultural integration is inclusive and representative of Peru's diverse population. Peru is a multicultural nation with a rich tapestry of indigenous groups, each with its architectural traditions and cultural practices. Inclusive design processes that engage local communities and respect diverse cultural

expressions are essential for creating spaces that reflect the true diversity of Peruvian culture.

Despite these challenges, integrating Peruvian culture into the built environment offers significant opportunities. It can enhance tourism, promote social cohesion, and contribute to a sense of pride and identity among residents. Moreover, it can inspire innovative architectural solutions rooted in tradition yet forward-looking.

### Chapter 3: **RESILIENT INFRASTRUCTURE & DISASTER MITIGATION**

#### **Seismic Activity Background**

Seismic activity, a pressing issue in many parts of the world, is particularly prevalent in regions like Latin America, where tectonic activity is frequent. Designing structures that can withstand earthquakes without incurring high costs is a matter of safety and economic well-being for these communities. This essay delves into the principles of low-cost seismic design, shining a spotlight on architectural approaches

and successful examples from Latin America. Lima, situated on Peru's Pacific coast, where the Nazca and Americana tectonic plates converge, is a prime example. The subduction of the Nazca Plate beneath the Americana Plate generates significant seismic activity in the region. By the end of the 19th century, Peru had recorded over 2,500 earthquakes. Low-cost seismic design strives to create structures that are both affordable and resilient. The core principles encompass local materials, simple construction techniques, and innovative design strategies that bolster the building's capacity to absorb and dissipate seismic energy.

When earthquakes occur, the energy generated shakes the ground. It moves through it in waves, spreading in various directions from the epicenter, similar to ripples when a stone is thrown into a pond. The most potent force is nearest to the epicenter. Buildings are typically designed to withstand vertical forces such as wind, rain, gravity, and weight, but not the horizontal forces produced by seismic activity. When the ground shakes, it causes floors, support beams, foundations, and walls to vibrate. The differing speeds and forces at which the top and bottom of the structure move pose a unique challenge to the integrity of the building. This can lead to the collapse of supporting frames, foundations cracking, and, ultimately, the building falling.

## **CASE STUDIES**

Several projects in Latin America exemplify the successful application of low-cost seismic design principles, such as those in Pisco, Peru, which used seismic-resistant Adobe Housing. After the devastating earthquake in 2007, efforts were made to rebuild Pisco using seismic-resistant adobe techniques. Engineers and architects developed a method that involved mixing adobe with straw and reinforcing it with a mesh made from

local materials. The walls were also anchored to a reinforced concrete foundation. This innovative approach not only preserved the traditional building style but also enhanced the structural integrity of the homes, demonstrating the practicality and effectiveness of low-cost seismic design.

### **PISCO, Peru**

Pisco, a coastal city in Peru, suffered extensive damage during the devastating 2007 earthquake. The earthquake revealed the vulnerabilities of traditional adobe housing, a standard construction method in the region due to its low cost and availability of materials. In the aftermath, architects and engineers faced the challenge of rebuilding in a way that preserved cultural heritage while enhancing structural resilience. This essay examines the development of seismic-resistant adobe housing in Pisco and its architectural efficiency, highlighting how traditional techniques have been innovatively adapted to meet modern safety standards.

### **ADOBE CONSTRUCTION**

Adobe construction, using sun-dried mud bricks, has been a prevalent building method in Peru for centuries. This technique is deeply rooted in the region's history and culture, offering several advantages such as affordability, thermal efficiency, and using locally available materials. However, traditional adobe structures are highly susceptible to seismic forces due to their brittleness and lack of tensile strength. The 2007 earthquake, which measured 8.0 on the Richter scale, destroyed many adobe buildings in Pisco, underscoring the need for improved construction methods. The challenge was to develop a seismic-resistant solution that retained the benefits of adobe while ensuring the safety and resilience of the structures.

## **LOW COST**

Adobe, a readily available material, kept costs low while the mesh reinforcement provided the necessary seismic resilience. This project demonstrated that traditional construction methods could be adapted to meet modern safety standards with proper design and materials. Adobe mud blocks are among the oldest and most commonly used building materials. Their use, involving sun-drying the blocks, dates back to 8000 B.C. Adobe is frequently used in some of the world's most disaster-prone regions, including Latin America, Africa, the Indian subcontinent, various parts of Asia, the Middle East, and Southern Europe.

In Pisco, several initiatives were undertaken to rebuild using seismic-resistant adobe techniques. These projects involved collaboration between local communities, architects, engineers, and international organizations. The following methods were successfully implemented: One approach was to improve the adobe mixture by adding stabilizers such as straw, cement, or lime. This increased the bricks' tensile strength and durability. Additionally, reinforcing the walls with a wire mesh embedded in the plaster significantly enhanced their ability to withstand seismic forces. Modular construction methods were developed using prefabricated adobe blocks reinforced with natural fibers or synthetic materials. These blocks were designed to interlock, providing excellent stability and ease of construction. Modular construction also facilitated quicker building processes and better quality control.

## **LOW COST AND INNOVATION**

Innovations in foundation design included using reinforced concrete footings and base isolators made from rubber or other flexible materials. These foundations

absorbed and dissipated seismic energy, reducing the impact on the structure above. Local builders and residents were trained in these new techniques, ensuring that knowledge and skills were transferred to the community. This empowerment allowed for sustainable rebuilding efforts and the maintenance of seismic-resistant practices. Using locally sourced materials such as adobe, straw, and bamboo kept construction costs low. The enhancements, although adding some expense, were affordable and justified by the increased safety and durability of the structures. Adobe's thermal mass properties provide excellent insulation, keeping interiors cool in the hot coastal climate of Pisco. This reduces the need for additional cooling systems, contributing to energy efficiency.

Preserving the traditional adobe construction technique maintains the region's cultural heritage and aesthetic. The adaptations made for seismic resistance do not detract from the conventional appearance, allowing new buildings to blend seamlessly with the historical context. Adobe construction is environmentally friendly, using natural, biodegradable materials with a low carbon footprint. Reinforcement methods using natural fibers and locally sourced materials further enhance the sustainability of these buildings. Residents gained valuable skills and knowledge about seismic-resistant construction by involving the local community in the rebuilding process. This empowered the community and ensured that future buildings would continue to adhere to safe practices. The figure below describes how implementing adobe reinforcement

can be inexpensive and super durable against seismic activity.

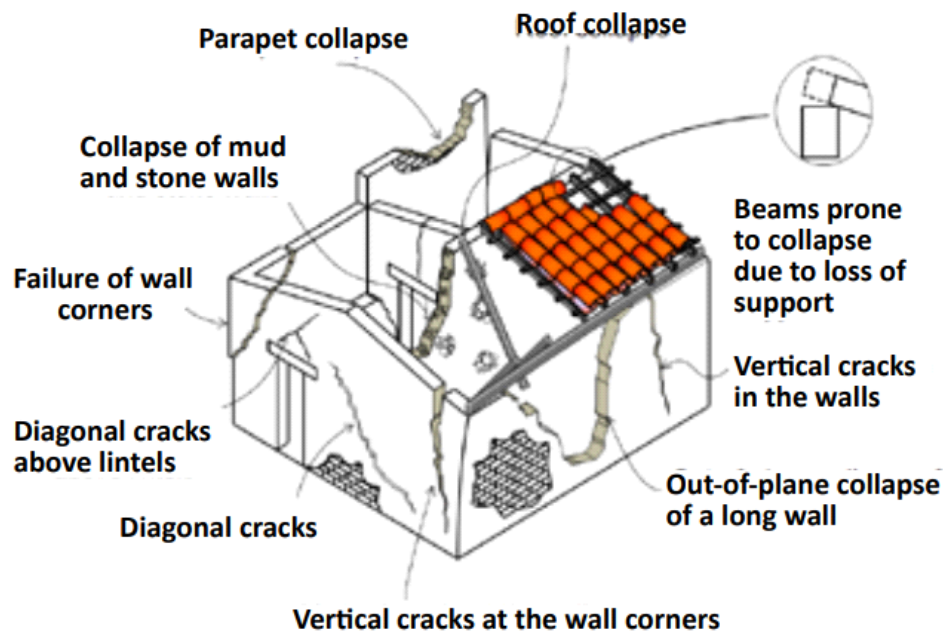
| Wall reinforcement scheme              | Type of building |          | Construction complexity |          |         | Cost |          |      | Seismic safety |          |      |
|----------------------------------------|------------------|----------|-------------------------|----------|---------|------|----------|------|----------------|----------|------|
|                                        | New              | Existing | Simple                  | Moderate | Complex | Low  | Moderate | High | Low            | Moderate | High |
| Internal cane reinforcement            | X                |          |                         | X        |         | X    |          |      |                |          | X    |
| External cane and rope mesh            | X                | X        | X                       |          |         | X    |          |      |                |          | X    |
| External bamboo and internal wire mesh | X                | X        | X                       |          |         | X    |          |      |                |          | X    |
| Welded wire Mesh                       | X                | X        | X                       |          |         |      | X        |      |                | X        |      |
| Polymer Mesh                           | X                | X        | X                       |          |         |      | X        |      |                |          | X    |
| Used car tire straps                   | X                | X        |                         | X        |         | X    |          |      |                | X        |      |
| Polypropylene band                     | X                | X        |                         | X        |         | X    |          |      |                |          | X    |
| Integral masonry system                | X                |          |                         |          | X       |      |          | X    |                |          | X    |

**fig 6** Brzev, Svetlana, and Álvaro Rubiños. "Earthquake-resistant Construction of adobe buildings: at tutorial."

Several specific projects in Pisco, like the Villa El Salvador Project, demonstrate the success of seismic-resistant adobe housing. This project involved constructing new homes with reinforced adobe bricks, improved foundations, and wooden bracing. The houses were designed to be aesthetically pleasing and culturally appropriate while providing enhanced safety.

Non-governmental organizations (NGOs) partnered with local communities to rebuild schools and community centers using seismic-resistant adobe techniques. These projects served as educational models, showcasing the benefits of the new construction methods. Programs that provided residents with materials and training enabled them to rebuild their homes. This approach reduced costs and fostered a sense of ownership and community solidarity. While there can be times that adobe can collapse, as shown in the figure below, it's essential to consider the benefits it can

provide for homes at a low cost.



**fig 7** Brzev, Svetlana, and Álvaro Rubiños. "Earthquake-resistant Construction of adobe buildings: at tutorial."

While the implementation of seismic-resistant adobe housing in Pisco has been largely successful, challenges remain. Ensuring consistent quality control, securing funding for widespread adoption, and continuing education efforts are crucial for long-term success. The development and implementation of seismic-resistant adobe housing in Pisco, Peru, represent a significant advancement in combining traditional construction methods with modern engineering principles. These efforts have resulted in affordable, sustainable, and culturally appropriate housing that can withstand seismic events. By focusing on material reinforcement, structural simplicity, and community involvement, Pisco has set a precedent for other regions facing similar challenges. The architectural efficiency of these solutions ensures safety and resilience and preserves the area's rich

cultural heritage, providing a model for integrating tradition with innovation in disaster-prone regions.

## Chapter 4: MODULAR HOUSE DESIGN

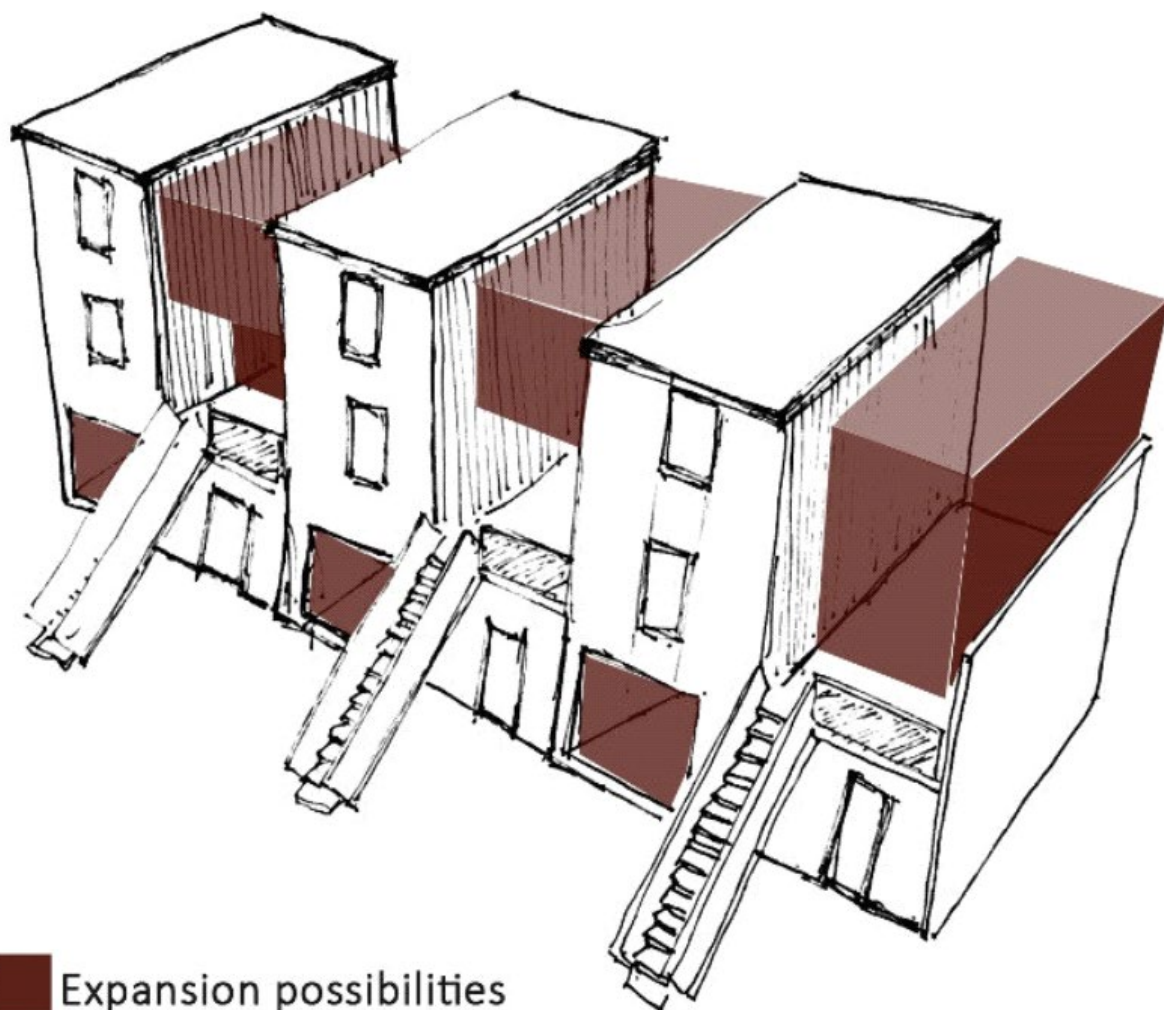
### **Modular house design**

Modular house design is increasingly relevant in Latin America and the U.S., particularly in older informal settlements and first suburbs requiring renovation and sustainability improvements. In Latin America, these older informal settlements, initially created as shacks and squatter areas in the 1970s and 1980s, have become integrated urban areas. They now need retrofitting to meet modern needs and incredibly sustainable housing. In the U.S., similar patterns are seen in the first suburbs developed from the late 1940s through the 1970s, where aging housing stock urgently requires energy-efficient upgrades to promote urban sustainability and reduce commuting.

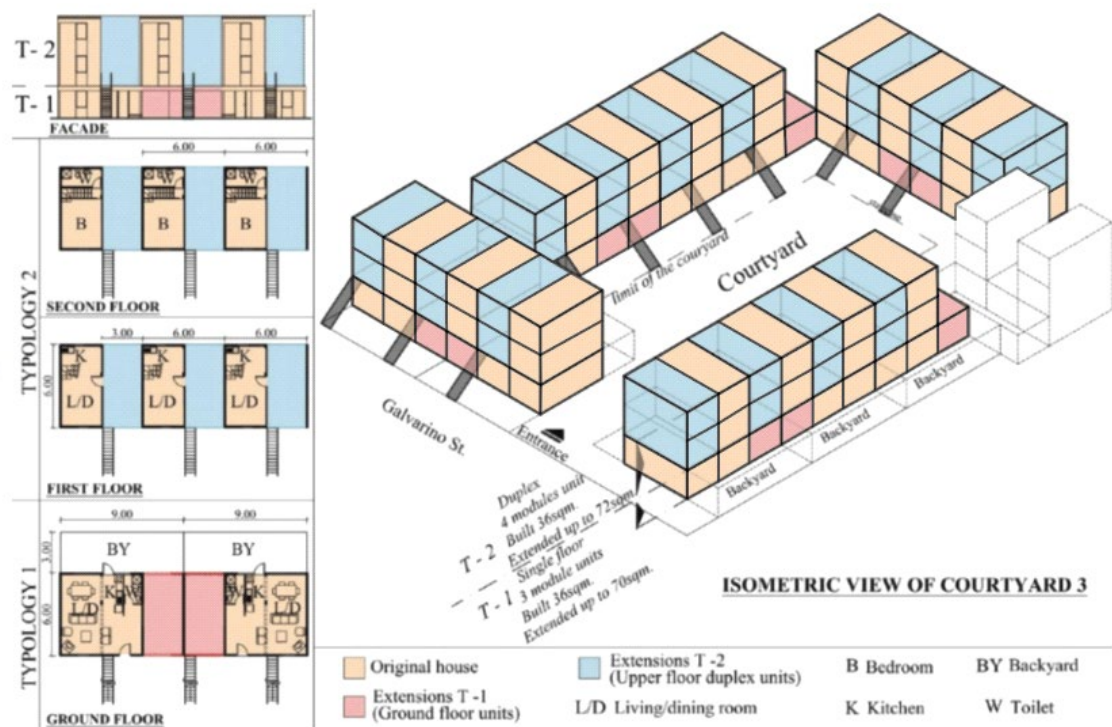
Despite the benefits of sustainable housing, such applications are often costly and more accessible to economically advantaged sectors. However, there is a growing awareness of the need for sustainable housing solutions to be made available to low-income communities to ensure social equity. Sustainable housing provides significant

economic and health benefits, such as lower utility costs and improved indoor air quality. Recent initiatives in both regions aim to broaden access to these benefits. In the U.S., weatherization programs and President Obama's stimulus package have emphasized the production and demand for energy-efficient housing elements. Latin American countries like Brazil and Mexico also invest in sustainable housing solutions, reflecting a commitment to addressing global warming and renewable energy usage in low-income housing contexts.

Modular housing, as seen in the successful example of Quinta Monroy in Chile, is an innovative solution for affordable housing provision. The project replaced a slum in downtown Iquique with a new affordable housing development, addressing challenges such as a limited budget of \$7,500 per unit and the need to build on the existing site without displacing residents to cheaper peripheral areas. By working collaboratively with the slum-dwellers, the design team created a core housing concept, allowing for future expansion based on the homeowners' building capacity. In developing countries, housing provision involves various systems, ranging from unconventional self-building approaches by urban households unable to access conventional housing to formal methods developed under official channels for land, finance, and materials. Modular housing fits into this landscape by offering a cost-effective and flexible solution that can adapt to the needs of low-income communities while ensuring access to essential urban infrastructure.



**fig 8** Quinta Monroy 2020



-Initial 'parallel housing' buildings and house typologies of Quinta Monroy. Source: Authors (2020).

**fig 9** Quinta Monroy 2020

## What is modular housing

Modular house design is prevalent in low-income and self-help communities in the U.S., particularly in peri-urban and colonial-type settlements. These areas, often found in southern states bordering Mexico, house very low-income populations, averaging around \$15,000 annually. Informal homestead subdivisions are similar but slightly better off, with average incomes around \$25,000, and are located further from metropolitan areas. These communities often rely on self-financing and self-help construction methods. Housing types include self-built homes, manufactured homes, and modular housing structures assembled on-site. While the policy agenda has yet to focus on sustainable housing for these areas traditionally, there is a promising shift

towards using sustainable and energy-efficient elements in new manufactured homes. This shift brings hope for a more sustainable and comfortable living environment for these communities. Affordability remains a key constraint, but the availability of low-cost sustainable technologies is improving, driven by greater public awareness and government incentives like the U.S. Department of Energy Weatherization Assistance Program.

Modular housing in low-income communities often suffers from poor design due to budget constraints and public perceptions that affordable housing shouldn't look too ideal. Quality design is crucial for instilling pride and dignity in residents and counteracting the adverse effects of living in unattractive housing. Good design fosters personal investment and self-respect, whereas poor design can lead to social and financial issues. Despite tight budgets, it is possible to improve the quality of low-cost housing through thoughtful design. The value of design should be considered, even in affordable housing projects.

In the context of Lean Construction, modular housing can address issues in affordable housing by combining the benefits of craft and mass production. Lean Construction, derived from Lean Production theory, aims to produce high volumes and various housing reasonably, avoiding traditional craftsmanship's high costs and mass production's inflexibility. This approach can improve the production and delivery of affordable housing, making it a viable solution for low-income communities. The emphasis on value generation and delivery in Lean thinking aligns with the need for efficient and cost-effective housing solutions in Latin America.

## **What's it for**

Modular housing aims to address the significant problem of affordable housing provision in Latin America. It seeks to provide decent homes for millions of families without proper shelter, recognized as a human right and essential for individual development. The efficiency of housing construction can be improved, making it more cost-effective and accessible for low-income families. This approach aims to improve the construction industry's overall efficiency and to enhance the quality of life for the poorest communities by ensuring better access to housing, health care, and education.

## **The benefits of using it**

Using modular and panelized construction techniques offers substantial benefits, particularly in reducing environmental impact through efficient use of materials and streamlined building processes. These methods enhance construction speed and quality and minimize waste generation compared to traditional building methods. Furthermore, non-profit organizations often facilitate these homes and sell the built units to low-income families. These organizations provide crucial subsidies for down payments and financing, making homeownership more accessible and affordable for disadvantaged communities. This approach addresses housing needs and promotes economic stability and community development by fostering homeownership among those who might not otherwise have such opportunities.

Modular housing is a strategic approach to seamlessly integrating buildings into their surrounding landscapes. This involves careful decisions regarding the building's orientation, topography, and the site's natural features, such as color and vistas. Design

priorities include ensuring year-round passive heat control and maximizing sustainability by reusing water runoff through sloped roof gutters and distributing it into the landscape. Additionally, solar energy recapturing through solar panels enhances energy efficiency. The design philosophy of modular housing emphasizes a wide range of design possibilities, aiming to achieve both practical functionality and aesthetic appeal in architecture. This approach allows for innovative solutions that harmonize with natural surroundings while meeting the functional needs of inhabitants, making modular housing a versatile option for sustainable and visually integrated building solutions.

Modular housing can be built much faster than traditional homes. Since components are prefabricated off-site, construction time on-site is minimized. This rapid construction is crucial in addressing urgent housing needs, such as after natural disasters or in rapidly growing urban areas. The manufacturing process of modular housing allows for strict quality control standards. Components are built to precise specifications in a factory setting, reducing variability and ensuring consistency in quality. This results in homes that are durable and meet safety standards, offering better living conditions to residents. Modular housing designs are versatile and can be customized to meet various housing needs. They can range from single-family homes to multi-story apartment complexes, accommodating different family sizes and urban contexts. This scalability makes modular housing suitable for both rural and urban settings.

Many modular housing companies prioritize sustainable practices. This includes using environmentally friendly materials, optimizing energy efficiency, and incorporating renewable energy sources. Sustainable modular housing helps reduce environmental

impact and lower utility costs for residents. Modular housing can be engineered to withstand seismic activity in earthquake-prone regions like many parts of Latin America. Prefabricated components can be designed to be more resilient, ensuring the safety of residents during earthquakes and other natural disasters.

## Chapter 5: Integrating Agriculture Infrastructure within a community

### **Abstract**

As the urban fabric grows worldwide, less space is utilized to cultivate crops or plan green zones. This can partly be understood as the increasing need for homes to supply families with an area to live. It could also be understood as poor urban planning,

as land could be more efficiently used to serve multiple needs. Agriculture is typically seen in the public eye as mass vacant lands used for cultivating crops or vegetation fields used to sustain the environment. Helping provide jobs while doing little to no damage to the environment. At the rate of population increase, fewer and fewer available fields will be seen shortly as the demand for housing and commercial zones increases unless agriculture infrastructure can be fused with residential planning so that the available land is utilized most efficiently. Doing so would positively affect its surrounding community and the environment. Creating a self-sustaining food source for the local community and providing economic opportunities to sell its food surplus to others. At the same time, it would help promote vegetation, which could help combat other environmental issues impacting an area or help promote sustainable practices. This opportunity to implement agriculture within the residential district can be used as a practice in the future. An area that has recently gained momentum and could be used as a practical plan for urban design soon. This idea will be examined and discussed throughout this chapter to see whether this is a viable style to be implemented in future projects.

### **Utilization of agriculture and its importance**

The impending need to promote sustainable designs continues to grow as the world looks to a “greener” future. The promotion of vegetation is typically seen as the superior method to help achieve this objective, as many benefits derive from the increased production of green spaces within an area. It helps fight against the heating effect, provides cooling to different places, and helps sustain the environment.

Agriculture contributes to the same goals and provides more opportunities, such as the cultivation of crops that can help maintain a community and much more. Thus, urban agriculture is gaining recognition for its potential to promote more sustainable urban development. It encompasses growing, processing, and selling food and non-food crops, medicinal and aromatic herbs, fruit trees, and animal products within urban and peri-urban regions. The benefit of implementing an idea like this in existing or future projects is that the scale of growing or harvesting food can vary due to location. More extensive communal plans could implement larger zones meant for growing food that can help feed the community or as a means of economic opportunity. For more minor scales, it can be as simple as growing fresh herbs and vegetables in vacant green zones. Creating mixed-use spaces where residents can be closer to fresh local produce helps positively impact the planet and is a step forward in the right direction.

### **Importance of how it can help self-sustain a community**

Many city authorities worldwide face the challenge of creating "sustainable cities" and finding solutions to provide urban residents with food, shelter, and essential services. Urban agriculture positively impacts food security, local economic growth, environmental stewardship, and community cohesion. To harmonize the demands of urban expansion with the valuable social and economic contributions of urban agriculture, it should be integrated into urban land use planning and subject to regulation by local governments. This ensures proper management and minimizes potential health and environmental risks. Designating open and green urban spaces for multifunctional urban agriculture, which combines natural habitat, food cultivation, and

educational, recreational, and leisure activities, is recommended. Such design initiatives should involve the active participation of urban planners, architects, urban farmers, residents, and inhabitants of informal settlements to foster ownership, engagement, and the efficient utilization of local resources. This inclusive approach enhances credibility and expands the reach of the urban agriculture process.

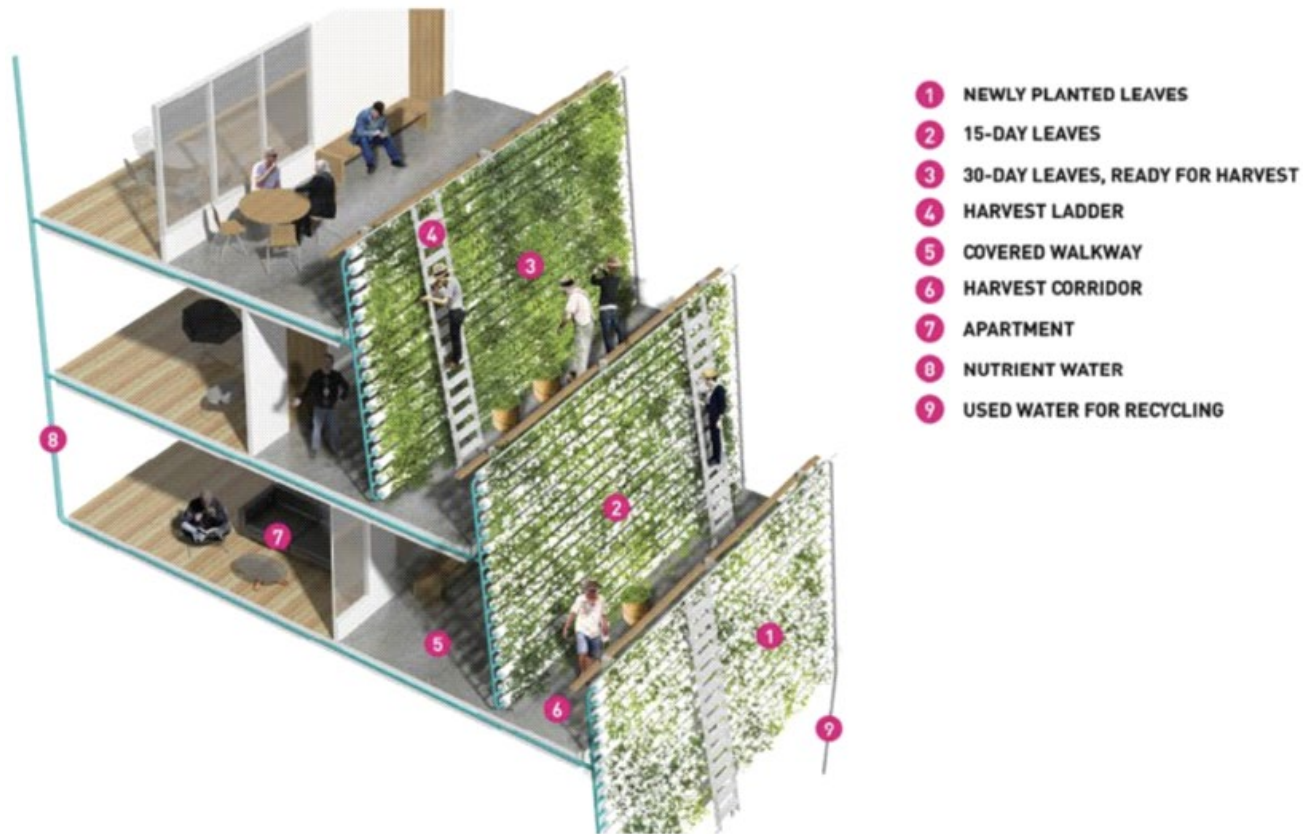
### **Positive effects it has on the surrounding environment.**

Integrating agriculture zones would benefit many sectors of human life and the environment. Vegetation in agriculture zones helps to absorb and slow down rainfall, reducing surface runoff and the risk of flooding in urban areas. This natural stormwater management can alleviate pressure on municipal drainage systems and prevent soil erosion, ultimately improving water quality in nearby water bodies. Urban areas often experience higher temperatures than surrounding rural areas due to the urban heat island effect. Agriculture zones with trees and greenery can help reduce this effect by providing shade, cooling the surrounding environment, and creating more comfortable microclimates for residents. Continuous urban development can lead to soil degradation and loss of fertility. Agriculture zones provide an opportunity to restore and maintain soil health through organic farming practices, crop rotation, and composting. Healthy soils support plant growth, water retention, and nutrient cycling, enhancing ecosystem resilience. Agriculture zones within residential communities offer opportunities for residents to engage in gardening, farming, and environmental education programs. This

fosters a deeper connection to nature, promotes sustainable lifestyles, and strengthens community bonds around shared green spaces. Finally, Agriculture zones with trees, shrubs, and other vegetation can act as carbon sinks, offsetting carbon emissions from nearby urban activities and improving air quality.

### **Case Study**

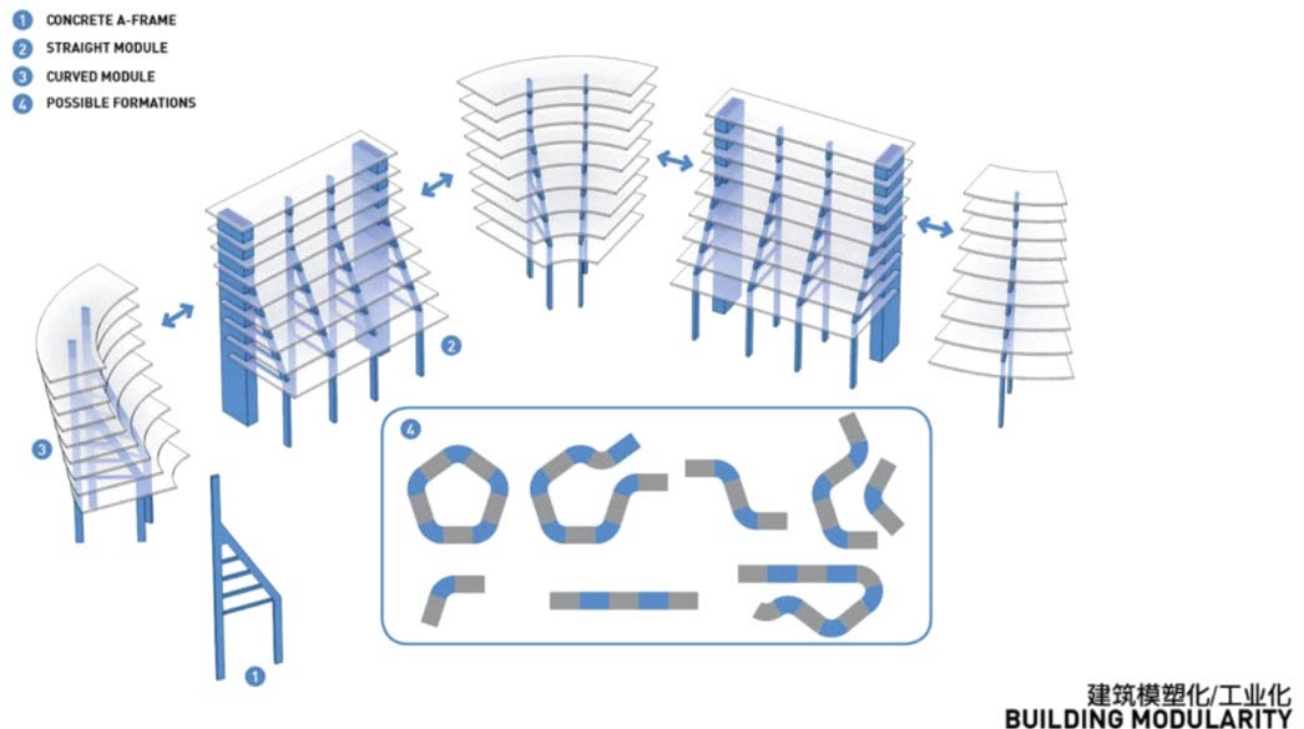
Many projects and concepts have been developed by architectural firms that have successfully combined residential and agricultural zones. One of these projects is Home Farm by the firm Spark Architects. The Home Farm project in Singapore by SPARK Architects represents an innovative approach to urban architecture that integrates agriculture and housing. Architecturally, the project features a series of residential buildings designed with rooftop gardens, vertical farming systems, and communal green spaces. These elements provide residents with access to fresh produce and create a sustainable and vibrant living environment.



**fig 10** "Home Farm." SPARK. Accessed July 8, 2024. <https://sparkarchitects.com/work/home-farm>.

The buildings are designed to maximize natural light and ventilation, with open-air corridors and balconies that overlook the greenery. The integration of agriculture into the housing complex serves multiple purposes. Incorporating urban farming facilities directly into the residential complex, residents have easy access to locally grown fruits, vegetables, and herbs, enhancing food security and reducing reliance on imported produce. The project promotes environmental sustainability by reducing food miles and carbon emissions associated with transporting produce from rural areas to urban centers. The greenery also helps mitigate urban heat island effects, improve air quality, and support biodiversity. Access to green spaces, gardening, and farming opportunities can positively impact residents' mental health and well-being. The presence of nature

within the built environment offers opportunities for relaxation, recreation, and physical activity, contributing to a higher quality of life. Also, shared gardening spaces and communal farming activities foster a sense of community among residents, encouraging social interaction and collaboration. Residents can come together to cultivate and harvest crops, strengthening bonds and promoting collective responsibility for the environment.



**Fig 11** “Home Farm.” SPARK. Accessed July 8, 2024. <https://sparkarchitects.com/work/home-farm>.

## Chapter 6: CREATING OPPORTUNITIES THROUGH CULTURAL LIBRARY

### **How libraries function to help grow a community**

Public libraries contribute significantly to community growth by serving as vital resources for businesses and economic development. A survey indicates that approximately one-third of companies across various sectors utilize public libraries extensively for their information and research needs. These businesses rely on general knowledge and specialized information from public libraries, often complementing their internal resources. Moreover, enterprises express high satisfaction with the resources and services offered by public libraries, highlighting their effectiveness in supporting local economic activities.

Despite their current role, there is potential for public libraries to expand their contributions further. Beyond traditional business reference services, there is a call for libraries to engage in activities that foster local economic development proactively. Many business owners may need to fully recognize the potential of public libraries in this regard, as librarians may lack specialized collections and training to meet particular

business needs. However, librarians are eager to support businesses. With enhanced resources and training, public libraries could be more pivotal in driving economic growth and innovation within their communities.

Libraries play a crucial role in the sustainable development of communities, particularly in the education sector. They serve as university intellectual resource centers, supporting teaching, learning, and research activities to enhance knowledge among students, faculty, and staff. Virtual libraries facilitate ubiquitous access to information, transforming research into a more accessible and engaging process. During emergencies like the COVID-19 pandemic, libraries have adapted by leveraging digital technologies to ensure continuity in education, bridging the digital divide through mobile applications for accessing, sharing, and disseminating information. Additionally, libraries significantly contribute to digitalizing educational resources, making knowledge more accessible and less cumbersome. They support various academic programs, including continuing education and distance learning, by providing printed and electronic resources. Electronic resources, in particular, play a crucial role in conducting problem-solving research and supporting teaching and learning activities.

### **Library as a central hub**

Public libraries are integral hubs within communities strategically positioned to support local economic development efforts. They offer a wide array of resources to foster human development, promote literacy from an early age, and enhance workforce

skills. More extensive public libraries provide access to business-related databases, career development tools, and expert reference librarians, facilitating individual growth and community prosperity.

Research consistently demonstrates that public libraries play a crucial role in local economic development. By providing essential data, workshops, and research support, they help small businesses reduce their market entry costs. This assistance strengthens existing businesses while fostering the creation of new enterprises, thereby enhancing community economic resilience and vitality. Academic and public libraries support economic restructuring and development, particularly in regions undergoing significant political and economic transformations. It is essential to support libraries and train librarians to develop business-related resources that are easily accessible to communities. Such initiatives are crucial for enhancing business education programs, supporting small businesses, and ultimately contributing to a country's overall economic health. Libraries can effectively support economic innovation, entrepreneurship, and sustainable development in evolving economies by providing essential information resources and fostering knowledge dissemination.

Politically and economically, public libraries are recognized as crucial community infrastructure components. They depend on a tax base often supported by local businesses, which underscores their mutual interest in supporting economic growth. Studies conducted to assess the return on investment in public libraries consistently show positive outcomes, affirming that these institutions not only justify public funding but also generate significant benefits for taxpayers and the broader community.

## **A case study in Nigeria**

In Nigeria, libraries contribute significantly to training professionals across various fields by supplying essential information materials required for academic programs and research. Nigeria's ongoing digitalization of educational resources reflects a shift towards making information more readily accessible. Libraries are instrumental in this transformation, adapting their services to meet the evolving needs of academic scholars. They provide printed and electronic resources to support diverse academic programs, including continuing education and distance learning initiatives. Electronic resources facilitate problem-solving research and enhance the educational experience, demonstrating libraries' crucial role in advancing sustainable development within the education sector.

Libraries in Nigeria play a pivotal role in supporting tourism by providing access to information that aligns with tourists' objectives and goals. As cultural institutions, libraries contribute significantly to the sustainable development of the culture and tourism sector. In recent years, the role of libraries in cultural tourism has expanded rapidly as tourists increasingly gather information about destinations before their travels. Libraries attract tourists through various means, such as organizing guided visits that introduce visitors to local cultural and historical landmarks, the library's history, book collections, and services.

Libraries also contribute to tourism development by producing directories that provide information on the locations of cultural and historical sites, hotels, and other tourist amenities. They collaborate with local communities, tourist guides, and stakeholders to enhance their visibility along major tourist routes. Additionally, libraries host cultural events, preserve local artifacts and photos, and organize activities that appeal to tourists, enriching the artistic experience and promoting tourism in Nigeria.

## Chapter 7: PROGRAM

In Lurín, Peru, an architecture program dedicated to modular housing integrated with agriculture and a new public library can profoundly improve the lives of underprivileged families. This initiative addresses critical issues such as housing insecurity, food scarcity, and educational deficits, offering a holistic approach to community development. By providing sustainable housing, agricultural opportunities, and educational resources, such a program can uplift the community, foster social cohesion, and create pathways for economic and social advancement.

Lurín faces significant challenges with housing insecurity, exacerbated by rapid urbanization and economic inequality. Modular housing offers a cost-effective, scalable solution to this issue. Prefabricated units can be quickly assembled, reducing construction time and costs, making housing more accessible to underprivileged families. These homes can be designed to be energy-efficient, reducing utility costs and providing a more sustainable living environment.

Integrating agriculture with housing can address food scarcity by enabling families to grow their own food. In Lurín, where access to fresh produce can be limited, community gardens or vertical farming systems within modular housing complexes can provide fresh produce, improve nutrition, and reduce grocery expenses. This agricultural integration not only supports physical health but also fosters a sense of self-sufficiency and community involvement as residents work together to cultivate their gardens.

### **Arcosanti Case study**

Arcosanti, an experimental town in Arizona designed by Italian architect Paolo Soleri, offers a unique blend of architecture and environmental sustainability. Soleri's vision, known as "arcology" (a portmanteau of "architecture" and "ecology"), aims to create highly efficient, autonomous urban environments. Arcosanti's principles can serve as a valuable blueprint for developing a similar project in Latin America, emphasizing efficient housing, sustainable agriculture, and community-centric spaces.

### **Efficiency of Housing**

Arcosanti's housing design not only minimizes environmental impact but also maximizes space efficiency and resource use, ensuring the comfort and well-being of its residents. The structures are compact and multi-use, integrating passive solar heating and cooling systems. The buildings are positioned to use natural light and ventilation, reducing the need for artificial heating and cooling. This approach not only conserves energy but also creates a comfortable living environment.

Applying these principles to a Latin American context, particularly in regions with a warm climate, could involve designing homes with thick, insulated walls to keep interiors cool. However, it's important to consider the potential challenges of this approach, such as the need for skilled labor and the initial cost of construction. Utilizing local materials, such as adobe or rammed earth, can enhance thermal performance and reduce transportation emissions. Multi-story buildings with shared walls can also minimize heat gain and loss, improving energy efficiency. Rooftop gardens or green roofs could provide additional insulation while creating green spaces for residents.

## **Sustainable Agriculture**

Arcosanti incorporates agriculture directly into its urban fabric, integrating greenhouses and gardens into the community. This promotes local food production, reduces the carbon footprint associated with food transportation, and supports sustainable living practices. The integration of agriculture within urban settings can create a symbiotic relationship where household waste products, such as greywater, can be used to irrigate crops.

In a Latin American project, this concept can be expanded by implementing vertical farming and aquaponics systems, particularly in densely populated areas where land is scarce. These systems can be integrated into the architecture, with crops grown on balconies, rooftops, and communal spaces. Such designs provide fresh produce and contribute to food security and resilience against supply chain disruptions. Community

gardens can be established in public spaces, fostering a sense of ownership and responsibility among residents, empowering them to take an active role in their community's sustainability.

### **Creating a Central Gathering Hub**

Arcosanti is designed with a central gathering hub as a focal point for community activities. This area includes spaces for cultural events, workshops, and social interaction, fostering a strong sense of community and collaboration. The central hub, with its role in promoting social cohesion and collective well-being, ensures that residents feel connected and supported in their community.

Creating a central gathering hub for a Latin American project can draw inspiration from traditional town squares or plazas, which have historically been the heart of social life in many Latin American communities. This space can accommodate various activities, such as markets, festivals, educational workshops, and recreational activities. Incorporating elements like amphitheaters, public art installations, and communal kitchens can further enhance the hub's functionality and appeal.

To ensure the central hub remains vibrant and accessible, it should be designed with pedestrian-friendly pathways, shaded areas, and ample seating. Connectivity to other parts of the community through well-planned walkways and public transportation can encourage frequent use and interaction among residents.

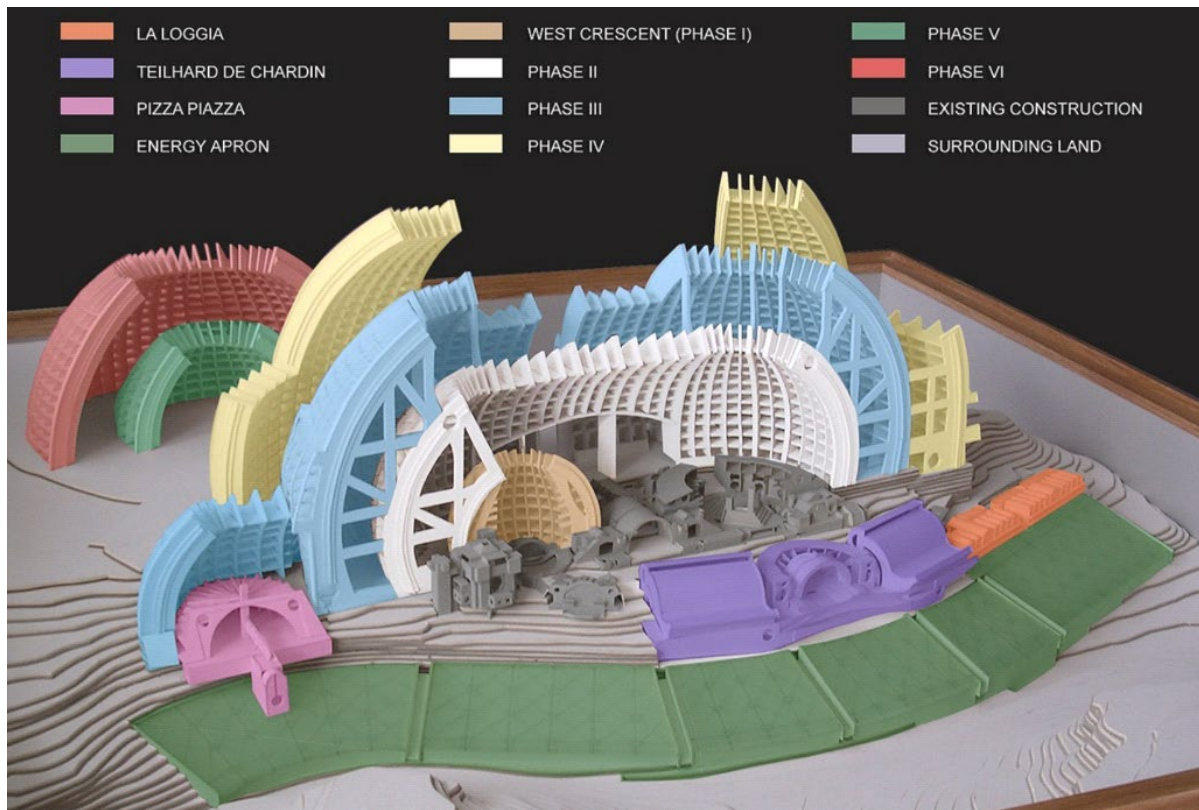
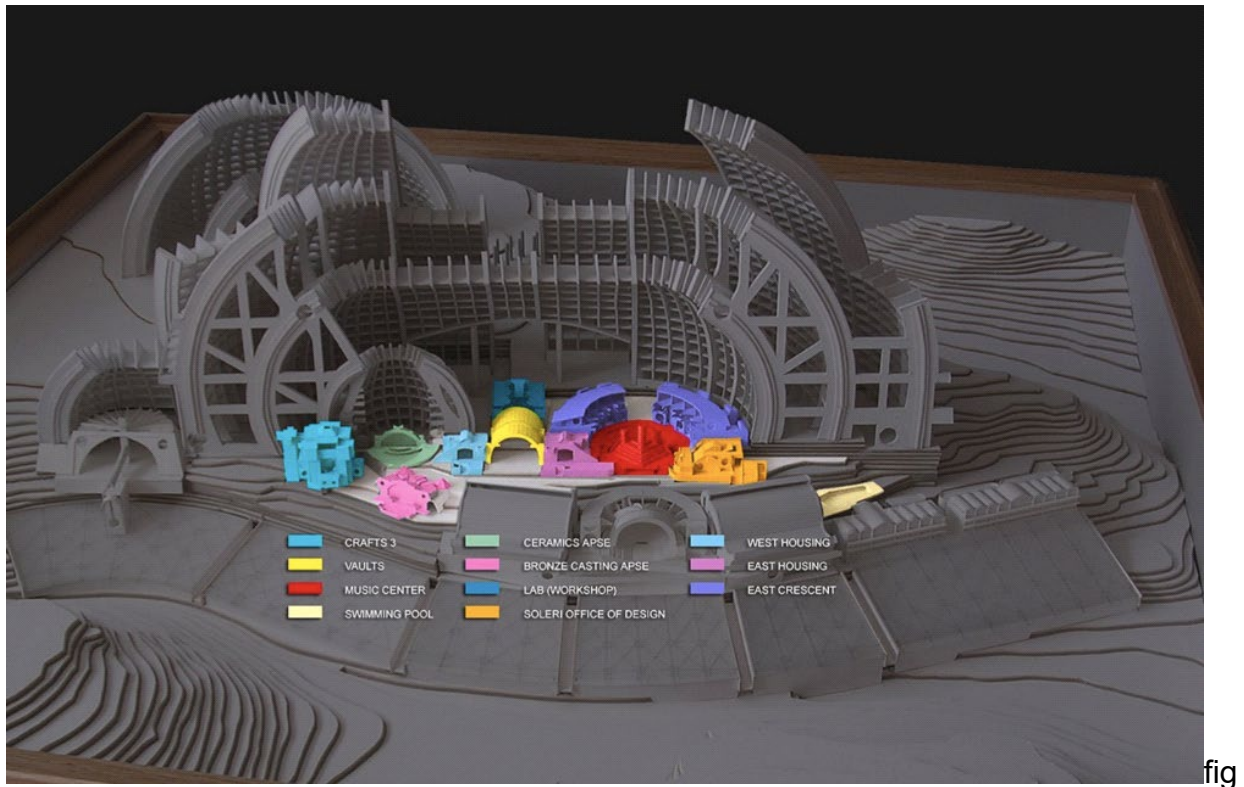


fig 12 <https://www.archdaily.com/796763/watch-how-paolo-soleris-experimental-city-of-arcosanti-is-designed-for-a-smarter-future>

The Arcosanti project offers a wealth of architectural and ecological ideas that can be adapted and implemented in Latin American urban developments. New projects can foster sustainable, resilient, and vibrant communities by focusing on efficient housing designs, integrating sustainable agriculture, and creating central gathering hubs. Embracing Soleri's principles of arcology can lead to urban environments that are efficient, sustainable, nurturing, and enriching for their inhabitants. Importantly, these projects should be developed in close collaboration with the communities they serve, ensuring that the unique needs and aspirations of residents are met.



fig

13 <https://www.archdaily.com/796763/watch-how-paolo-soleris-experimental-city-of-arcosanti-is-designed-for-a-smarter-future>

## Quinta Monroy Case Study

The Quinta Monroy project in Iquique, Chile, designed by the renowned architecture firm ELEMENTAL, presents an innovative approach to addressing housing needs for low-income communities. Led by architect Alejandro Aravena, the project employs a participatory design process and modular housing concepts to create sustainable, expandable living spaces. Quinta Monroy serves as an exemplary model for other regions grappling with similar housing challenges. By examining its principles and successes, one can envision how modular housing can uplift low-income communities and foster long-term development.

## Effective Use of Modular Housing

Quinta Monroy addresses the urgent need for affordable housing by using a modular approach that combines flexibility, cost-efficiency, and community participation. The project begins with the construction of a basic, half-built unit, providing essential living spaces such as kitchens, bathrooms, and structural elements. This "half-house" design allows residents to gradually complete and expand their homes according to their financial means and personal needs.

This incremental approach offers numerous benefits. It reduces initial construction costs, making housing more accessible to low-income families. By involving residents in the building process, it fosters a sense of ownership and empowerment. Additionally, the modular design allows for future expansions without compromising the overall aesthetic and structural integrity of the community.



**fig**

**14** [https://www.archdaily.com/10775/quinta-monroy-elemental/50102e2628ba0d4222001000-quinta-monroy-elemental-image?next\\_project=no](https://www.archdaily.com/10775/quinta-monroy-elemental/50102e2628ba0d4222001000-quinta-monroy-elemental-image?next_project=no)

Quinta Monroy exemplifies how innovative, community-focused approaches to housing can address the needs of low-income populations effectively. By leveraging modular housing principles, other regions can replicate its success, providing affordable, adaptable, and sustainable housing solutions. The long-term benefits of such initiatives extend beyond improved living conditions, fostering economic stability, social cohesion, and community resilience. Embracing the lessons from Quinta Monroy can elevate low-income communities, offering them a pathway to sustainable development and a brighter future.

## Chapter 8: SITE SELECTION

### **Abstract**

Peru is unique in the way its topography and environment change due to its vast area of land, desert, Amazon, and mountains. Different climates and altitudes affect how one lives and travels from location to location. Some may face more challenges compared to others due to local resources or connections to the major cities. Lima, one of the biggest cities in Latin America, is rich and has historical locations. Being the Capital of Peru brings many opportunities for its residents as they are exposed to more economic and social changes than other areas within the country. Nonetheless, the country still faces a housing crisis and other problems similar to those of Latin American nations. Throughout this paper, we will examine three possible locations within the country, state its strengths and weaknesses, and discuss how it would respond to the programmatic goals.

### **Sites**

The first site we will analyze is Lurin. Lima's unique and historical district was primarily established as an export zone for food and goods. It is mainly an Agricultural-heavy zone, with multiple fields of land occupied with crops and animals for harvesting or grazing. Food markets are spread along the area for residents or others passing by the location. Schools and churches can be found in many places within the city as it looks to improve the quality of life for its residents. Historical archaeological sites are very present within the region, and Lima boasts an astonishing number of historical sites throughout the country. Along this area, many buildings have been abandoned or are closing down due to poor economic moments within the country. This provides an opportunity to blend the existing background of agriculture with the inclusion

of homes to create a self-sustainable community. The area being examined within this district is next to an important archaeological site.

San Juan de Miraflores is similar to Lurin in that it is near significant infrastructure connections. However, many sectors within this area are blocked off due to urban sprawl. Causing informal settlements within the region. In recent years, the area has faced vast improvements in infrastructure, schools, and healthcare facilities. However, there is still a rising poverty rate among its community members. Implementing green building practices to construct affordable, energy-efficient homes using local materials. Rainwater harvesting systems and solar panels can be integrated to reduce dependency on conventional water and power sources. Creating urban parks, community gardens, and green roofs improves air quality, provides recreational spaces, and enhances community well-being. These green spaces can also act as community hubs and promote biodiversity.

## **Criteria**

Establishing a criteria list is crucial for evaluating these locations and their potential response to the programmatic proposal. The ten criteria, detailed in figure 1, will serve as a guide for this evaluation process. These criteria will help us assess the suitability of each location for the proposed programmatic goals, ensuring a comprehensive and objective analysis.

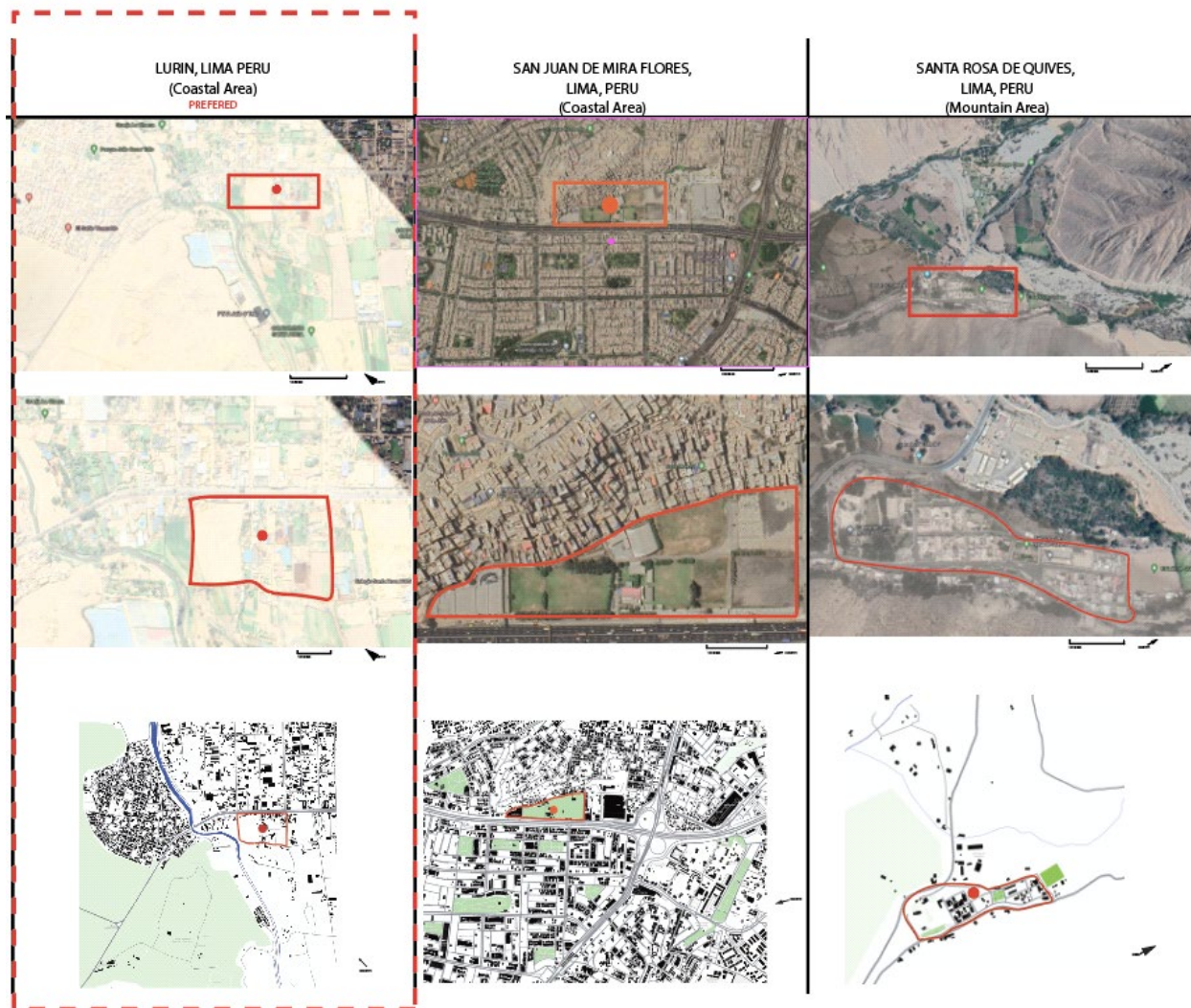


fig 15 site selection Renzo Moran

| SITE 10 CRITERIA<br>1- NOT PREFERABLE<br>10- PREFERABLE                                                                                                               | LURIN, LIMA PERU<br>(Coastal Area)<br>PREFERRED | SAN JUAN DE MIRA FLORES,<br>LIMA, PERU<br>(Coastal Area) | SANTA ROSA DE QUIVES,<br>LIMA, PERU<br>(Mountain Area) |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|----------------------------------------------------------|--------------------------------------------------------|
| DIVERSITY<br>(ethnic groups)                                                                                                                                          | 7                                               | 8                                                        | 5                                                      |
| ACCESSIBILITY<br>(roads, pedestrian, transportation)                                                                                                                  | 8                                               | 8                                                        | 6                                                      |
| SIZE<br>(area of lot)                                                                                                                                                 | 9                                               | 6                                                        | 8                                                      |
| COMMUNITY ACCEPTANCE<br>(whether or not the community<br>would prefer change)                                                                                         | 9                                               | 7                                                        | 9                                                      |
| SAFETY<br>(crime rate, visibility, etc.)                                                                                                                              | 8                                               | 7                                                        | 8                                                      |
| VULNERABILITY TO NATURAL/<br>SEISMIC EVENTS                                                                                                                           | 5                                               | 5                                                        | 5                                                      |
| TYPOGRAPHY<br>(flat or sloped terrain)                                                                                                                                | 9                                               | 8                                                        | 6                                                      |
| DEVELOPMENT OF AREA<br>(is the living condition poor, such as slums or<br>is the area just underutilized?<br>Meaning there are abandoned<br>buildings, plots of land) | 7                                               | 5                                                        | 6                                                      |
| DISPLACEMENT FACTOR<br>(are we pushing people out? If so is<br>there any nearby area where they can live?<br>or will it have to be provided?)                         | 9                                               | 8                                                        | 7                                                      |
| FERTILE ENVIRONMENT                                                                                                                                                   | 10                                              | 7                                                        | 10                                                     |

**fig 16 site selection Renzo Moran**

Diversity is critical, as Peru boasts a vast melting pot of immigrants. Targeting areas with a higher diversity population would be better, as this thesis aims to strengthen and unite the surrounding communities. Sites that embrace diversity allow for the expression of different cultures through architecture, public art, and communal spaces, enriching the cultural fabric of the area. Diverse architectural sites contribute to a strong community identity by reflecting the unique characteristics and heritage of the people who live there. Areas celebrating diversity often become attractive destinations for tourists and investors, boosting local economies and property values. Prioritizing diversity helps combat social segregation by integrating different groups into a cohesive community, promoting harmony, and reducing tensions in the country.

Ensure accessibility when selecting an architectural site for several reasons. Accessibility ensures that buildings and spaces can be used by everyone, including people with disabilities, the

elderly, and those with temporary impairments. This promotes inclusivity and equality, making the built environment welcoming for all. Accessible sites provide ease of movement for all users, including those with mobility aids such as wheelchairs, strollers, and walkers. Features like ramps, elevators, and wide doorways enhance user convenience and comfort. Sites that are accessible via public transportation benefit a more comprehensive range of users, including those who do not own a car. This includes considerations for bus stops, train stations, and bike paths.

Considering community acceptance as a criterion when selecting an architectural site is crucial for a project's successful development and long-term sustainability. Engaging the community in the site selection process builds trust between developers and residents. When the community feels heard and valued, it is more likely to support the project. A project that has community backing benefits from the cooperation of residents, which can facilitate smoother planning, approval, and construction processes. Projects selected and developed without community input often face significant resistance, leading to delays, legal battles, and increased costs. Involving the community early on helps identify potential sources of conflict and allows for resolving issues before they escalate.

The development potential of an area as a criterion when selecting an architectural site is essential for ensuring the project's success and long-term viability. Areas with high development potential attract investors and businesses, leading to economic growth and increased property values. Developing an area can create numerous job opportunities, both during the construction phase and once the project is completed, boosting the local economy. Areas with good development potential typically have or are planned to have essential infrastructure such as roads, public transportation, utilities, and services like schools, hospitals, and shopping centers.

The availability of amenities enhances the quality of life for residents and makes the area more attractive for future development.

## **Selection**

Through this site selection criterion, Lurin was chosen as the location boasts more opportunities for its residents and would create exciting opportunities for others to visit. Lurin, a unique and historical district within Lima, provides many different opportunities to help improve the quality of life of its existing communities. It contains diverse people of varying income levels and ethnic backgrounds. It is known for its famous agricultural sites and local sources of fresh produce. However, many communities need to be more developed within the area, and vacant homes or pieces of land are abandoned. This provides an opportunity to help improve the quality of life of the existing community without taking away homes or areas of importance. Creating affordable housing mixed with agricultural fields helps sustain these communities with local produce and economic opportunities. Utilizing the nearby archaeological sites helps give significance to the existing history within the area while also implementing new ideas that will

help the surrounding community prosper.



**Fig 17** Homes in the Lurin district stand near the pre-Columbian archeological site Pachacamac in Lima, Peru, Oct.

5, 2017.

## Chapter 9: CONVERGENCE

Many nations worldwide face social and economic problems that hinder the lives of many families and individuals. These different factors impact the quality of life and thus harm the chances of families becoming successful in the long run. To improve the quality of life for families or individuals, we must look at where this starts. Creating an architecture program dedicated to modular housing integrated with agriculture and a public library can significantly enhance the lives of underprivileged families. This approach addresses housing insecurity, food scarcity, and educational deficits, offering a holistic solution to some of the most pressing challenges marginalized communities face. By providing affordable, sustainable housing

combined with agricultural opportunities and educational resources, such a program can foster community development, improve living conditions, and create pathways for upward social mobility.

## **Modular Housing with Agriculture**

### **Addressing Housing Insecurity**

Modular housing offers a cost-effective, scalable solution to housing insecurity. These prefabricated units can be quickly assembled, reducing construction time and costs. For underprivileged families, this means access to affordable, stable housing in a shorter timeframe. Moreover, modular homes can be designed to be energy-efficient, reduce utility costs, and provide a sustainable living environment.

### **Promoting Food Security**

Integrating agriculture with housing can address food scarcity by enabling families to grow their food. Community gardens or vertical farming systems within modular housing complexes can provide fresh produce, improve nutrition, and reduce grocery expenses. This agricultural integration supports physical health and fosters a sense of self-sufficiency and community involvement as residents work together to cultivate their gardens.

### **Economic Empowerment**

Agricultural activities can create economic opportunities for underprivileged families. Families can generate additional income by growing and selling produce, which can be reinvested into other essential needs such as education, healthcare, or savings. Moreover, the skills learned through agricultural practices can lead to further employment opportunities in farming or related fields.

## **The Role of a Public Library**

### **Enhancing Educational Opportunities**

A public library within the community can serve as a vital educational resource. Libraries provide access to books, internet services, educational programs, and learning materials that might otherwise be inaccessible to underprivileged families. This access can support lifelong learning, help bridge educational gaps, and promote literacy and intellectual growth among children and adults alike.

### **Fostering Community Engagement**

Libraries can act as central gathering centers where community members engage in various activities, from educational workshops to cultural events. Such interactions foster community, reduce social isolation, and promote exchanging ideas and knowledge. Additionally, libraries can host classes and seminars on essential life skills, from financial to digital literacy, further empowering residents.

## **Professional Collaboration and Support**

A public library can also be a professional hub for meeting, collaborating, and supporting community initiatives. Libraries enable local professionals, social workers, educators, and health care providers to collaborate on community development projects by providing meeting spaces and resources. This collaborative environment can lead to innovative solutions to community challenges and provide residents with access to a broader network of support services.

## **Synergistic Benefits**

### **Holistic Community Development**

Modular housing, agriculture, and a public library create a synergistic effect, promoting holistic community development. Residents benefit from improved living conditions, enhanced educational resources, and economic opportunities, leading to a more resilient and self-sufficient community. The integrated approach simultaneously addresses multiple facets of poverty, creating a foundation for sustainable growth and development.

## **Environmental Sustainability**

### **Modular housing and urban agriculture promote environmental sustainability.**

Energy-efficient homes and locally grown food reduce the community's carbon footprint. Moreover, the green spaces created by community gardens enhance urban biodiversity, improve air quality, and provide aesthetic and recreational benefits. The public library can also contribute

by offering resources and programs on environmental stewardship and sustainable living practices.

## **Social Equity and Inclusion**

Such a program promotes social equity by providing underprivileged families access to essential resources and opportunities often taken for granted by more affluent communities. It ensures everyone can live in a safe, healthy, and nurturing environment regardless of socio-economic status. The program's inclusive nature fosters a sense of belonging and community pride, which is essential for residents' social well-being. Such programs would help facilitate better lives for its community members and help promote long-term success.

## **Iterations**



**fig 18 Master plan, Renzo Moran**

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