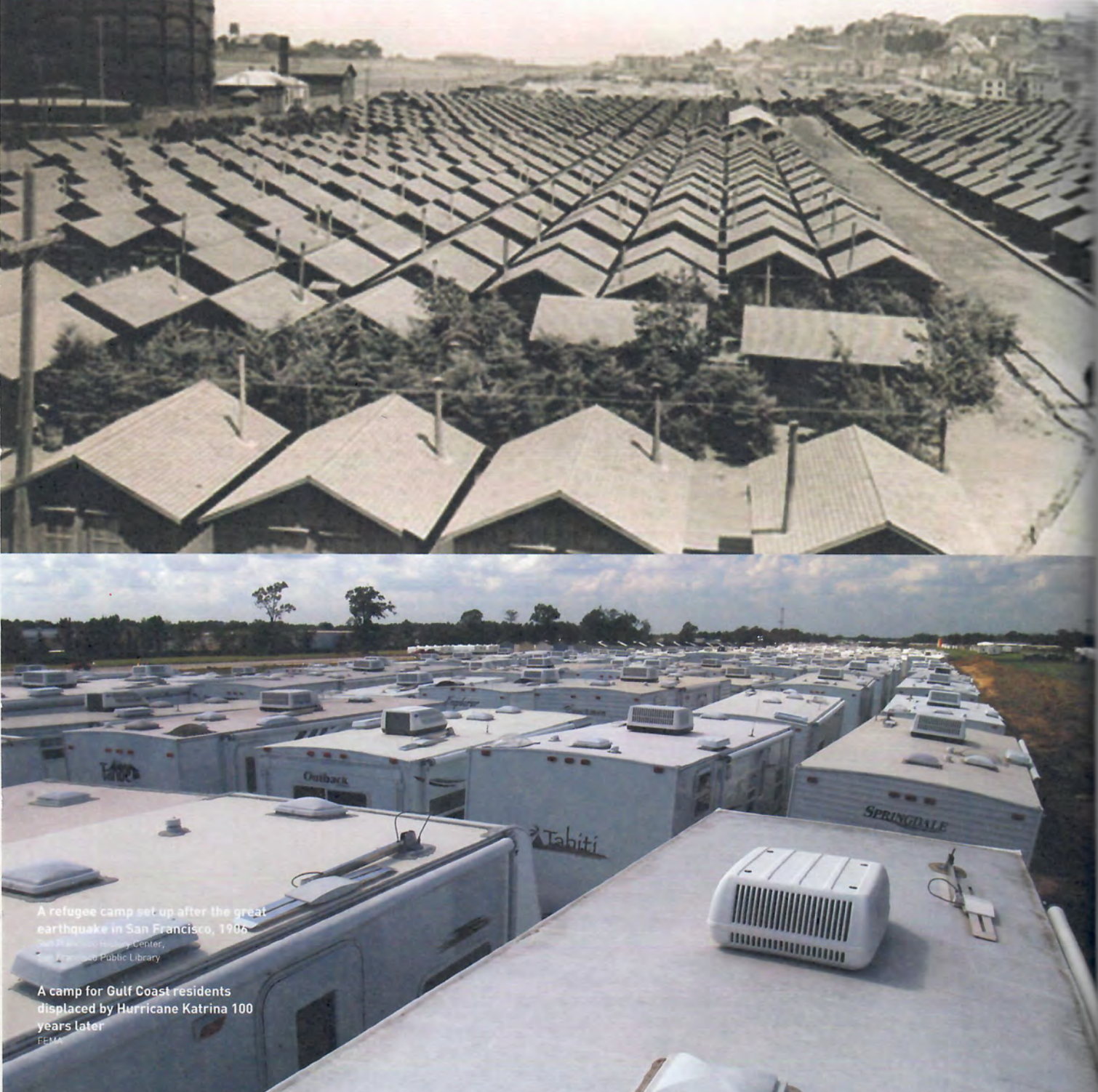
Design Like You Give a Damn

Architectural Responses to Humanitarian Crises

Edited by Architecture for Humanity

Thames & Hudson



A refugee camp set up after the great earthquake in San Francisco, 1906
[illegible] Center,
[illegible] Public Library

A camp for Gulf Coast residents displaced by Hurricane Katrina 100 years later
FEMA

100 Years of Humanitarian Design

Kate Stohr

At 5:18 in the morning on April 18, 1906, the earth heaved beneath San Francisco, California.

The earthquake lasted for less than a minute, shearing façades off buildings, ripping houses from their foundations, and opening a rift in the ground 270 miles (435 km) long and up to 21 feet (6.4 m) deep. "It was as if the earth was slipping gently from under our feet," wrote one survivor. "Ahead of me a great cornice crushed a man as if he were a maggot."[1]

But if damage from the earthquake was extensive, the fires that followed were catastrophic. With its rows of closely spaced wooden Victorian homes and unreinforced brick buildings, San Francisco at the turn of the century was a tinderbox awaiting a match. The fires raged for three days, charring more than 500 blocks—nearly a quarter of the city. By the time rescuers were able to sift through the cinders, more than a quarter of a million people were left homeless.[2] Although the official death count totaled 700, it is now estimated that the earthquake and fires claimed between 1,500 and 3,000 lives.[3]

San Francisco at the turn of the century was in every sense a modern city: it had telegraph lines and cable cars, a mix of ethnic groups, and a tremendous disparity in wealth. The earthquake marked one of the first major disasters of the industrialized age, and many of the housing strategies employed by nascent relief agencies and the Army Corps of Engineers would later be adopted by today's relief and development agencies—strategies such as micro-credit, appropriate technology, and sweat equity. Yet perhaps the most intriguing outcome of the relief effort was the innovative marriage of policy and design that led to the construction of thousands of small wooden cottages that found their way into nearly every pocket of the city.

In the immediate aftermath of the earthquake and fires, the US Army, a citizens' committee made up of 50 prominent San Franciscans, and the American Red Cross, which had been established only 25 years before, were the first and primary agencies to respond. Survivors who had the means either left the city or roomed with friends or relatives outside of the burned district. Those who remained were those with little alternative, primarily the working poor and the destitute.

Initially the Army, the American Red Cross, and volunteers provided tents. But as aid workers and officials shifted their focus from relief to recovery and reconstruction, a combination of grants and loans were given to middle-class families who owned land (or could afford to purchase land) and who could demonstrate credit-worthiness to support the building of permanent housing in the burned district.[4]

However, more than a month after the disaster some 40,000 "refugees" were still living in makeshift tent camps throughout the city.[5] The camps posed a new worry: How long would survivors live in the city's parks? Concerned by the possibility of permanent squatter settlements, the civilian committee charged with leading the relief efforts debated how to clear the camps. In the midst of this quandary officials noted that many of those remaining in the camps had not lost everything. They still had jobs. With these low-income wage earners in mind, the committee arrived at a novel solution, one that would provide temporary housing for the working poor while guaranteeing an end to the camps. At the center of this strategy was the design for a small wooden cottage.

Between September 1906 and March 1907 San Francisco built more than 5,610 cottages designed by the Army Corps of Engineers. The cottages ranged in size from 140 square feet (13 sq. m) to 400

Timeline of Disasters and Responses

1900s

1906
San Francisco Earthquake and Fires
San Francisco, Calif., USA

1910s

1911
Triangle Shirtwaist Company Fire
New York, NY, USA
A blaze in a garment factory claims the lives of 146 workers, most of them women. Public outcry leads to the creation of fire safety codes.

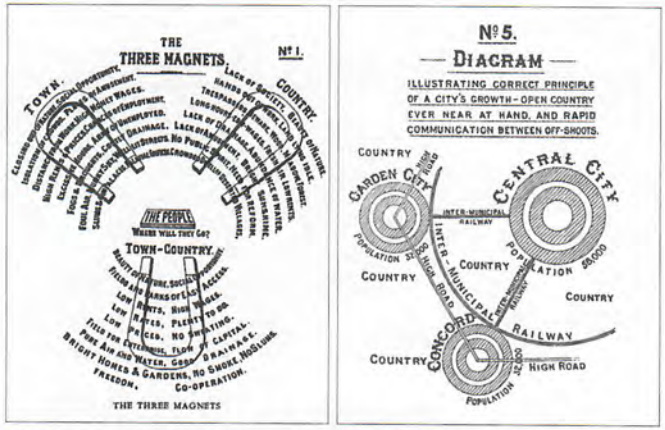
square feet (37 sq. m) and cost between $100 to $741 to put up. Constructed by union carpenters and painted "Parkbench Green," the cottages consisted of only two or three rooms and were as easy to relocate as they were to build. Families rented the small cottages for $2 a month, which went toward the full purchase price of $50. To free the city's public parks, occupants who could purchase or lease a lot were granted ownership of the cottage and allowed to move it from the park at their own expense. Failure to move the cottages out of the camps by August 1907, a year and a half after the disaster, resulted in forfeiture of ownership.[6]

In this way the cottages provided not only decent temporary shelter but also a path to homeownership for hundreds of San Francisco's low-wage-earning families who might otherwise have never had the means to purchase a home. By the time the last camp closed in 1909, new homeowners had relocated more than 5,343 cottages.[7] Some of them are still in use today.

Until recently, the great earthquake of 1906 was considered the biggest natural disaster in American history. In its aftermath San Francisco implemented safer building codes and designed a more reliable water-supply system.[8] In addition, researchers conducted a thorough survey of the reconstruction effort. The *San Francisco Relief Survey* remains one of best-documented case studies of postdisaster shelter efforts to date. But if the earthquake offered lessons to future relief experts, they were lessons that would have to be relearned and rediscovered.

"Housing in the twentieth century has been one continuing emergency," wrote Charles Abrams, a prominent advocate for housing reform, in 1946. Today these words seem prophetic. For more than a 100 years housing has been gripped by a cycle of war, natural disaster, and poverty. Slums, whether cleared by earthquakes and floods or urban planners with bulldozers, disappear only to regenerate and grow larger. Refugees threatened by ever-more deadly conflicts flee across borders seeking shelter in neighboring territories. And, whether in countries rich or poor, nature has proved that no feat of engineering can completely shield a city from the rumblings of the earth or the rising of its waters.

For decades architects have been called upon to provide solutions to the world's shelter crises. However, as designers embraced the



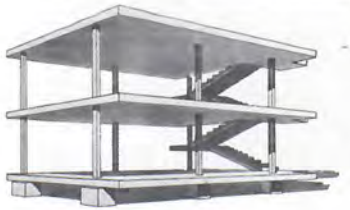
Ebenezer Howard's Three Magnets and No. 5 diagrams illustrate his concept of a planned community that would offer the best of both town and country.

idealism of the machine age, the increasingly technology-driven, often utopian ideas they proposed would carry little resonance for aid workers and others wrestling with the day-to-day realities of providing a roof, clean water, and sanitation to families in need. Over time, the worlds of relief and development became divorced from the worlds of architecture and design. What architects considered a design challenge, aid workers considered an issue of planning and policy.

This disconnect would eventually lead to a crisis of faith: What role should design play in providing basic shelter? How could architects best address the needs of the displaced and disenfranchised? And, at the heart of these questions: Should design be considered a luxury or a necessity? This issue would plague not just architects but also planners, policymakers, and aid organizations struggling to balance the logistics of providing shelter with the human longing for a place to call home.

1914–15
Maison Dom-ino
Paris, France
Le Corbusier

1914–18
World War I



1917
Demountable Wooden House
France (various locations)
American Friends Service Committee
Built by volunteers to house World War I refugees, each "demountable" wooden house consisted of two rooms.
American Friends Service Committee

"We are dealing with an urgent problem of our epoch, nay more, with the problem of our epoch. The balance of society comes down to a question of building. We conclude with these justifiable alternatives: Architecture or Revolution. Revolution can be avoided."

Le Corbusier, *Vers une Architecture*, 1923

Utopian Urbanism

The introduction of new building codes was just one of a series of profound changes that would affect the practice of architecture at the start of the twentieth century. The origins of humanitarian, or social, design can be traced at least as far back as the tenant movements of the late 1800s and early 1900s, when social reformers turned their attention to the housing conditions of the poor.

By the nineteenth century increased urbanization brought on by the Industrial Revolution had led to squalid conditions in the working-class neighborhoods of many cities. Photographers such as Thomas Annan in Glasgow and Jacob Riis in New York used their art to document the "insalubrious" living conditions of the "other half." Tenant associations formed, and worker housing initiatives took shape. Many of these housing projects, such as the Familistère in Guise, France, a "working-class palace" founded by the industrialist Jean-Baptiste-André Godin, were undertaken by companies on behalf of their workers.[9] Health, welfare, and productivity became inextricably linked to housing. The reform movement's call for sanitary living conditions led to the introduction of light wells and other design improvements for tenement housing.

Reformers also adopted the concept of town planning as an antidote to the social ills of the day. In 1898 Ebenezer Howard published *To-morrow: A Peaceful Path to Real Reform*. Howard offered a vision of planned communities free of "slums and gin palaces," where clean air, water, and opportunity would abound. In his plan, a central city surrounded by green space was linked by transportation to satellite towns. As illustrated by his famous Three Magnets and No. 5 diagrams, these satellite cities promised the best of both town (opportunity, amusement, high wages) and country (beauty, fresh air, low rents).[10] This concept of town planning combined with modernism would have a profound influence over the construction of low-income housing projects for decades to come.

Modernism

By 1913 the Industrial Revolution had reached a fever pitch. Reinforced concrete, first developed in the 1860s, was by now an accepted building material. Steel-frame construction, water pumps, and the invention of the elevator allowed increasingly tall buildings to soar to unprecedented heights. The devastation of World War I had led to acute housing shortages in much of Europe. At the same time, workers continued to migrate to urban areas, crowding into sprawling slums on the edges of cities such as Paris. This surge in demand called for new thinking about housing design as well as building techniques that not only met the needs of the new machine age but also co-opted its methods.

Today modernism is associated with a minimalist aesthetic of steel and glass, but it began as an attempt by architects and designers to harness the potential of industry to produce low-cost buildings, in particular, housing. The assembly line was revolutionizing the production of everything from toothbrushes to brassieres. Why not housing?

Le Corbusier expressed the new thinking best when he described the house as "a machine for living in." In 1914–15 the Swiss-born architect developed a basic, universal housing unit called the Maison Dom-ino. The unit consisted of little more than floor slabs of reinforced concrete supported by corner columns and lifted off the ground by pilotis, or piers. It could be repeated endlessly or stacked upon itself. Because the walls were not load bearing, the interior spaces could be configured in different ways to meet the varying needs of occupants.[11] Prefabricated walls and uniform door and window heights simplified construction further. Le Corbusier saw his system as a solution for the rapid reconstruction of regions such as Flanders, which had been heavily damaged during World War I. He

1919
League of Nations established
Versailles, France
Established after the end of World War I, the League of Nations' goal was to settle disputes between nations and foster peace. After World War II it would be replaced by the United Nations.

1923
Kanto Earthquake and Fire
Tokyo and Yokohama, Japan
200,000 people die; 370,000 buildings are destroyed. Frank Lloyd Wright's "earthquake-proof" Imperial Hotel (1916–22) is one of the few structures left standing.

1927
Mississippi River Flood
Lower Mississippi region, USA
The lower Mississippi River floods, inundating 27,000 square miles and shattering levee systems from Illinois to the Gulf of Mexico.

1927–32
"The Winona"
Sears Modern Homes
Akron, Oh., USA
Sears, Roebuck and Co.

"Architecture is a process of giving form and pattern to the social life of the community. Architecture is not an individual act performed by an artist-architect and charged with his emotions. Building is a collective action."

Hannes Meyer, director of Bauhaus, 1928 to 1930

Walter Gropius, slab apartment blocks on the Wannsee Shore, Berlin, 1931

built two prototypes based on his ideas for exhibition: The *immeubles villas* (1922) and the Maison Citrohan (1922), a play on the automobile name Citroën. Throughout the '20s Le Corbusier expounded on his ideas for a new industrialized architecture in a series of manifestos and urban plans.

Another early pioneer of prefabrication and component building systems was the German architect Walter Gropius. Gropius, who founded the Bauhaus and served as its director from 1919 to 1928, personified the architect as public servant and teacher. Throughout the '20s and '30s Gropius experimented with prefabricated wall panels and eventually whole structures. During his tenure and that of his successors, the Bauhaus became a nexus for socially conscious design.

Gropius, along with Marcel Breuer, is also credited with designing the first slab apartment block. This new building type, which would become the model for many future affordable-housing projects, was conceived to overcome the cramped, lightless tenement housing that had resulted from rampant land speculation at the turn of the century. The basic plan consisted of parallel rows of four- to 11-story apartment blocks. Each slab was only one apartment deep with windows front and back. The slabs were sited on a "superblock" at an angle to the street with communal green spaces between them to allow maximum sunlight into each apartment.[12]

Others would also experiment with standardized building components, modular systems, and prefabrication, including the French industrial designer Jean Prouvé and Frank Lloyd Wright, but perhaps none more passionately than the American inventor R. Buckminster Fuller.

Fuller arrived on what he termed "spaceship earth" in 1895. Like Gropius and Le Corbusier, he believed that mass-manufactured dwellings represented the future of housing. His most lasting contribution, however, was his fervent belief in the power of design to improve the human condition. In a sense Fuller, who was known for his eccentric use of language and his marathon lectures (the longest lasted 42 hours and only recently has been fully transcribed), was the first evangelist of humanitarian design.

In 1927, after the death of his elder daughter and the collapse of his first business, he found himself at the edge of Lake Michigan contemplating suicide. He was a failure, "a throw-away." What brought him from the brink, he later recounted, was the simple idea that his experience might ultimately be somehow useful to his fellow human beings. Rather than taking his own life, he decided to embark on a lifelong experiment, using himself as his own best research subject. He became "Guinea Pig B" (for Bucky), the world's first test pilot of a "design-science revolution," the sole purpose of which was to improve "human livingry," and he started with the house.

1930s

1929
Dymaxion House
Chicago, Ill., USA
R. Buckminster Fuller

1930
Housing Act of 1930
England

1930–39
Drought and Dust Storms
Midwestern and southern plains, USA

1931
Prefabricated houses built for the Hirsch Copper and Brass Works
Finow, Germany
Walter Gropius

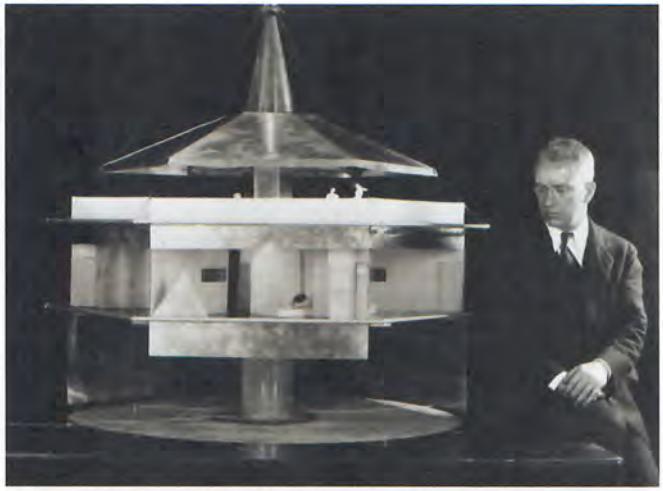
1931
Slab apartment blocks on the Wannsee shore
Berlin, Germany
Walter Gropius

Conventional "handcrafted" homes had undergone "no structural advances in 5,000 years," Fuller argued. They were poorly lit, required much maintenance, and did not make efficient use of raw materials. Most conventional buildings depended on gravity for their strength. But what if a building could be suspended, as a sail from a mast, allowing for greater strength and the use of fewer materials?

Fuller's thinking led to the design of the Dymaxion House, a small-scale model of which was first exhibited at a Marshall Field's department store in Chicago in 1929. His radical scheme embraced the principle of tension and aimed to do "more with less." It was spherical, to make efficient use of materials, and clad in maintenance-free aluminum. It was naturally climate controlled and could be lit by a single light source through a system of mirrors and dimmers. All the mechanicals, wiring, and appliances were built into the walls and mast to allow for easy replacement. The house was also one of the first examples of self-sufficient (or "autonomous," as Fuller put it) green design. Wind turbines produced energy. The roof collected rainwater. Water-saving "fog guns" handled washing (including people), and Fuller's "package toilet" composted waste and recovered methane gas.[13]

While the Dymaxion House was unabashedly ahead of its time (it would be two decades before Fuller could find backing to build a full-scale prototype), the concept of building with tension rather than compression would become central to Fuller's work and would eventually lead to his most lasting contribution to the field of humanitarian design: the geodesic dome. Fuller's principle of tensegrity became a staple of tent design, and by extension, emergency shelter, that endures to this day.

Like the Dymaxion House, few of these early designs for "factory-built" housing achieved widespread commercial viability. For example, Le Corbusier's low-cost housing for workers in Pessac, near Bordeaux, France, went unoccupied for eight years after it was built. However, this concept of mass-produced housing would have a number of lasting implications for low-cost shelter. It prefigured a move away from the craft of building toward the technology of building. It took design out of the realm of the many and put it in the hands of an educated few. Perhaps more important, it negated the need for a dialogue between the architect and the occupant.



R. Buckminster Fuller with an early model of his Dymaxion House
Buckminster Fuller Institute

Suddenly a house could be designed, detailed, and delivered without the architect ever meeting its owner.

Manufactured Housing

Meanwhile, in the rest of America, the industrialization of architecture took a very different tack. By the early '20s the automobile had become an integral part of American life. Trailers were common and had been adapted by migrant workers and others into dwellings. With the onset of the Depression, the demand for cheap, portable housing grew. A mobile home seemed the next logical step. In 1936 Wally Byam built the first Airstream trailer, a steel-clad, aerodynamic embodiment of home on the road. Although the Airstream would eventually become an American icon, designs such as the Durham Portable House would prove far more influential.[14]

Not only did the Durham, which cost between $1,500 and $3,000, mimic the styling of a conventional home, it also was a precursor

1931
Flood
China
The Yellow River, the second largest river in China, floods. Death toll estimates range from 850,000 to four million. The flooding is followed by famine and outbreaks of disease.

1934
Modern Housing
Catherine Bauer

1934
National Housing Act of 1934
USA

1936
Airstream Clipper
Los Angeles, Calif., USA
Wally Byam

1937
Housing Act of 1937
USA

to the "double-wide" mobile home because it was transported in two parts and assembled on site to form a single dwelling.

Although its architectural merits have been the subject of contentious debate, the mobile home in many ways represents the dream of prefabricated housing come true. According to US census figures, the number of mobile homes has increased from 315,000 in 1950 to nearly 8.8 million today.[15] Approximately 18 million Americans now live in mobile homes. According to research by faculty and students at the Harvard Graduate School of Design, mobile homes have become the most common form of unsubsidized affordable housing in America—despite hostile community boards and zoning laws, higher financing rates for mobile homes than standard mortgages, and the tendency to use shoddy materials and construction. Today mobile homes account for an astonishing 25 percent of all dwellings in North America.[16]

The popularity of mobile homes raises an interesting question: Why have double-wides received such broad acceptance, while other seemingly better designed alternatives have not? The answer may lie in their mobility. With each "box" no wider than a standard highway and production rigidly controlled, the units were cost-effective to make and to transport. For the first time, housing became a product within reach for low-income wage earners and those on fixed incomes. Land could be rented at a nominal fee, and no complicated applications needed to be submitted for government handouts. Manufactured homes filled a growing niche in the housing market and quickly became a part of the American vernacular.

The mobile home was not the only successful attempt to market mass-produced housing in America before World War II. Between 1908 and 1940 the American retailer Sears, Roebuck and Co. sold as many as 100,000 homes from its catalogue.[17] While not truly prefabricated (the homes were delivered in some 30,000 parts by boxcar, complete with assembly instructions and two tree planters for the front yard), for a brief moment these "mail-order" homes offered an affordable alternative to traditional construction in places where materials and expertise were scarce. The homes could be purchased with no money down at prices starting from as little as $650, compared to the average home price of $1,000. What's more, the company guaranteed that "a man of average abilities" could build one of its kit homes in just 90 days.[18] The Sears approach offered a surprisingly efficient, well-crafted alternative to the concept of delivering fully finished prefabricated homes.

Most Sears homes used wood-frame construction and were conservative in style. However, in 1934 the retailer partnered with the General Houses company to exhibit a truly modern steel-frame home made from prefabricated wall panels at the 1934 World's Fair in Chicago. But by then the stock market had crashed. Homeowners defaulted on their mortgage payments in droves, and in 1940 Sears was forced to shut down its Modern Homes division.[19] The kit-home approach was never revived on a large scale, and mobile homes became the industry standard.

The Social Housing Movement

With the real-estate collapse brought on by the Depression, providing housing for low-income workers took on new urgency. High unemployment and rampant foreclosures sent many onto the street and into cities in search of work. Lending institutions became reluctant to make home loans, and with down-payment requirements as high as 50 percent, few people could afford one anyway. Deteriorating conditions and health concerns in rapidly expanding slums provoked governments to act, spawning a number of urban revitalization and progressive-era housing initiatives.

In England the Housing Act of 1930 tied the construction of government subsidized housing, or "council housing" (which had begun after World War I), to slum-clearance programs in the inner cities. With the Labour Party's ascension to power in 1934, London adopted the slogan, "A Healthy London: Up with the Houses, Down with the Slums."[20] Some 200,000 people were resettled, mostly from inner-city London to surrounding suburbs.

In America many of the programs that would fund the large-scale public housing and Urban Renewal schemes of the postwar era were conceived during the Depression. As foreclosures forced tens of thousands from their homes, a group calling themselves "Housers," which counted the activist Catherine Bauer among its leading members, lobbied Congress to intervene.[21]

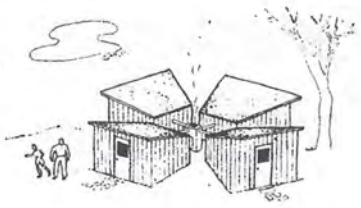
Congress responded with the National Housing Act of 1934. The act created the Federal Housing Administration (FHA), which

1938
Durham Portable House
USA
M. R. Doberman and John W. Davis

1939
Earthquake
Concepción and Chillán, Chile
50,000 are killed and 700,000 left homeless. 70 percent of Concepción is destroyed and virtually all of Chillán.

1939–45
World War II
Millions are displaced. Emergency housing is still being constructed four years after D-Day.

ca. 1939–45
Transportable Primitive Shelter
Helsinki, Finland
Alvar Aalto
Movable temporary shelters are designed to house war refugees.



1940s

1940
Dymaxion Deployment Unit
Various overseas US military bases
R. Buckminster Fuller
The units, produced by Butler Manufacturing, provide emergency accommodation for troops in various locations during World War II.
Buckminster Fuller Institute

"Housing in the twentieth century has been one continuing emergency."

Charles Abrams, *The Future of Housing*, 1946

guaranteed home-mortgage loans, making it possible for the first time for banks to offer individual home buyers mortgages on terms familiar today, such as 30-year repayment periods and 10 percent down payments. Considered one of the most significant acts ever passed by Congress, the National Housing Act triggered mortgage lending, stimulated a building boom, and opened the door to home ownership for millions of working-class Americans. It is credited with helping to increase the national homeownership rate from under 40 percent during the Depression to almost 67 percent today.[22]

However, the act also gave rise to the practice of "redlining." In order to reduce its financial exposure, the government developed a system in which lenders could refuse to make loans in neighborhoods considered high risk by appraisers. Residential areas were mapped, and neighborhoods that showed signs of decay or "undesirable populations," typically those with ethnic minorities, were marked in red. A single home occupied by a minority family in a distant corner could cause an entire neighborhood to be downgraded for federally backed home mortgages.

In addition, while the Housing Act of 1934 stimulated construction, it did little to shelter those who could not qualify for loans—the nation's poor. As a remedy Congress passed the Housing Act of 1937, which authorized more than $800 million in loans to local housing authorities for the construction of housing for low-income families. The act required that for every dwelling built, the equivalent number of substandard dwellings must be cleared.[23] It was a centralized, top-down approach. Policies were enacted at the national level and carried out locally.

Taken together, this legislation would have a profound effect on the landscape of American cities. By now urban and town planning concepts had gained critical mass in Europe and America. Housing activists extolled the virtues of "garden city" and "new town" planning concepts. Slums were to be cleared to make way for new planned communities. *The City*, a film sponsored by the American Institute of Planners in 1939, perfectly captured the populist, if somewhat paternal, idealism of the time.[24] "Order has come," the film proclaimed. "It's here! The new city, ready to serve a better age."

World War II

The true effects of these housing programs would not be felt for several decades, however. With the outbreak of World War II, the world's attention shifted. The search for a technological solution to the world's housing crisis was put on hold. Factories were retooled as technological advances made in the name of progress during the first few decades of the century were now put to terrifying use. For the first time in the history of warfare, civilian deaths outnumbered those of soldiers. The destruction of towns and cities was also unprecedented. American fighter pilots armed with just two atomic bombs leveled the cities of Hiroshima and Nagasaki in seconds. When the war ended in 1945, millions were left displaced or homeless.

Emergency shelter became a priority. The Finnish architect Alvar Aalto developed a temporary emergency-shelter system that could be trucked to the site and house four families with a shared central-heating unit.[25] Prouvé also developed a number of prefabricated shelters, including a metal-frame tent, demountable barracks, and schools for war refugees that he called *écoles volantes* (flying schools).[26]

The Marshall Plan pumped $12 billion into the reconstruction of Europe and became a model for postconflict humanitarian aid. Military agencies were tasked with providing engineering and technical assistance in the reconstruction of ports, roads, bridges, communication lines, and other infrastructure. It was a role they would play increasingly in postconflict and disaster situations.

The war also marked another major shift: the rise of the NGO, or nongovernmental organization. With the exception of the International Committee of the Red Cross, which was founded by Henri Dunant in the 1860s, most of the large organizations and agencies we've come to associate with humanitarian work today were born amid the suffering and remorse that followed World War II. These include not only the United Nations but also government agencies such as Danida and the United States Agency for

1943
Famine
Bangladesh and West Bengal, India (formerly Bengal)
Crop failures and political complications caused by World War II prompt a sharp rise in the cost of rice and cause widespread famine, malnutrition, and related diseases, killing more than three million people.

1943–48
Packaged House System
Long Island, NY, USA
Walter Gropius and Konrad Wachsmann

1944–47
Wichita Dwelling Machine
Wichita, Kan., USA
R. Buckminster Fuller
The dwelling, shown at right, is based on Fuller's original concept for the Dymaxion House.
Buckminster Fuller Institute

International Development (USAID); humanitarian aid organizations such as the International Rescue Committee, CARE, and Oxfam; and religious organizations such as Catholic Relief Services.

From this point on, NGOs would play an increasingly larger role in providing emergency shelter to refugees as well as responding to natural disasters. After the war the end of colonization ushered in an era of conflict as states struggled for independence. Aid agencies were faced with the need to provide emergency shelter—not just in Europe and America but also throughout the rapidly industrializing "third world."

As their number proliferated in the postwar years, NGOs became more involved in development work, building water and sanitation systems and affordable housing. And the field of housing became more specialized: Disaster relief and development work became two separate fields; slum clearance and urban renewal initiatives were now differentiated from the construction of low-cost housing in rural areas. Increasingly, NGOs cultivated areas of expertise and contracted with governments and other institutions to meet specific humanitarian goals, becoming in a sense specialized service providers. Some employed architects but most depended on engineers to design and oversee the construction of projects.

The Postwar Building Boom

The destruction of World War II, the return of veterans, and the prewar housing shortage combined to create an unprecedented demand for housing. As people tried to put the war behind them and reconstruct their towns and cities, modernism, with its implicit denial of the past and its promise of efficiency and affordability, seemed the perfect vehicle. In West Germany planners embraced the slab apartment block that Gropius and others had first explored in the '20s and '30s. In France Le Corbusier was called upon to put many of his earlier ideas into practice for a project in Marseilles, the Unité d'Habitation. Built between 1946 and 1952, the tower block was composed of 300 residential units stacked between shopping arcades and restaurants to form a sort of neighborhood on stilts. In the postwar years Le Corbusier would also be hired to create urban plans for Izmir, Turkey; Bogotá, Colombia; and Chandigarh, India. The communist states of Eastern Europe also co-opted modernism

"This is the real news of our century. It is highly feasible to take care of all of humanity at a higher standard of living than anybody has ever experienced or dreamt of. To do so without having anybody profit at the expense of another, so that everybody can enjoy the whole earth. And it can all be done by 1985."

R. Buckminster Fuller, lecture

as part of their ideologies. Shiny "new towns" emerged from the postwar rubble of such disparate places as Poland, Japan, and Israel.

Meanwhile, the war had done little to shake architects' faith in technology. Once again designers returned to the idea of mass production. Governments allocated grants for housing returning veterans, and dwellings such as Fuller's Dymaxion House and the solid-steel Lustron Home (1945–51) found their way onto magazine pages.[27] Gropius, having fled Nazi Germany for the United States, continued to develop prefab systems and partnered with Konrad Wachsmann and the General Panel Corp. in New York to market the Packaged House System (1943–48). The company built some 200 homes in California, but the venture was a financial failure and shut down after five years.[28]

In France a prefab system designed by Prouvé would meet a similar fate. Working from a design he had originally intended to house bureaucrats in French-colonized Congo, the Ministry of Construction in 1949 ordered 25 prefab homes for an experimental low-cost housing scheme. Unfortunately, no delivery instructions were issued and the houses were still waiting at the factory a year later. In the end only 14 were sited in a housing estate in Meudon, outside Paris.[29]

The limited success of these and other prefab projects did not prevent the idea from being exported to the desperate housing ministries of the developing world. For example, according to Charles

1945
Houses for Britain
USA
The US Federal Public Housing Authority prepares to ship 30,000 prefabricated temporary emergency family dwellings to Great Britain under lend-lease. Plumbing and fixtures are to be shipped with the structures, but not sinks or closet doors.
Library of Congress

1945
United Nations founded
San Francisco, Calif., USA

1945–51
Lustron Home
Columbus, Oh.,USA
Carl Strandlund
The Lustron Home retails for $7,000. Despite a government pledge of $40 million, only 2,498 homes are produced before the company forecloses in 1951.

Abrams, in the postwar years precast concrete walls poured in Europe were hauled to Ghana by a company that contracted with the government there to build 168 model houses as the start of a larger building program. When the cost of 64 completed houses ran up to $448,000, Ghana quietly abandoned the venture. In Karachi, Pakistan, small aluminum prefabs were constructed, which their owners promptly adapted and expanded with adobe, discarded wood, and other makeshift building components, making them, in Abrams's words, "the first prefabricated slums."[30]

Ultimately, the cost per unit of off-site manufactured housing made most prefabricated dwellings prohibitively expensive for those living on the economic margins. Though examples of postwar prefabricated homes dot America, Europe, and other parts of the world, in the end they could not compete with their more affordable mobile-home counterparts or the new suburban Levittowns that would soon become synonymous with the American dream and postwar prosperity.

The first Levittown, named after its developer, William Levitt, was constructed in Long Island between 1947 and 1951. At the time it was the largest housing development ever constructed by a single builder. But in terms of humanitarian design and construction, the landmark project was significant for another reason: It transferred the concept of assembly-line production from the factory to the building site.

Modeled after one of Henry Ford's wartime plants, the original Levittown consisted of 17,447 homes, each built by construction teams that moved from lot to lot, performing the same task over and over as trucks drove through the area dropping off supplies. The homes, which came in only two styles, were priced at less than $10,000 so that buyers could qualify for federally backed loans. Beginning in the 1950s Levittown-style developments cropped up in places as far-flung as Brazil and the Philippines.[31] Levitt himself went on to build developments in Iran, Venezuela, Nigeria, France, and Israel, and his model remains the dominant construction method for affordable single-family housing developments today.

Urban Renewal

The postwar years also saw the continuation—and expansion—of the slum-clearance programs begun during the Depression. In France the Debré Act of1964 authorized slum clearance in Paris. In Britain the unemployed and working poor were resettled into council housing built on land leveled by bombs during the war.

In America planning types were given sweeping new powers by the 1949 Housing Act, which financed slum clearance in aid of Urban Renewal programs and authorized the building of 810,000 public-housing units. The act's stated goal was to provide "a decent home and a suitable living environment for every American family." But its passage led to the destruction of more homes than were built, betraying the very families it was intended to help. Whole neighborhoods were bulldozed in the name of progress and replaced by freeways and government complexes. Zoning pushed low-income housing to city peripheries. At the same time, redlining triggered "white flight" in urban areas such as Detroit, increasing the segregation of America's inner cities and creating pools of poverty in once-vibrant neighborhoods. Rather than fulfilling the promise of decent housing, Urban Renewal programs left a legacy of corruption, rioting, poverty, crime, discrimination, despair, and isolation.

In the beginning many of these new developments consisted of low-rise apartment buildings, but over time Le Corbusier–inspired high-rises and slab apartment blocks of the kind designed by students of the Bauhaus became the norm. As a result, in the public eye at least, the modernist tower block became the scapegoat for an era of flawed housing policies. The sight of demolition crews dynamiting projects such as Pruitt-Igoe, a 33-tower public housing project in St. Louis, Missouri—once heralded for its innovative skip-stop elevators, communal laundries, and common spaces—just 20 years after its construction seemed to confirm public opinion. By the 1970s it was clear to many that the postwar approach to public housing had failed. Slums had not been replaced by "new towns" or "radiant cities" but by "vertical ghettos."

Poor siting, cost cutting, and shoddy construction compounded the problems associated with the new housing developments. In 1968 a gas explosion caused the corner of a tower block to collapse in the London docklands, killing two residents and injuring another 260.[32] Two years later in Korea, 32 former slum dwellers who had been relocated into a high-rise housing block were killed when it came crashing down.[33]

1946
The Future of Housing
Charles Abrams

1946–53
New Gourna Village
Near Gourna, Egypt
Hassan Fathy

1947–51
Levittown
Long Island, NY, USA
William Levitt
Levitt pioneers on-site assembly-line construction. The 17,000-home development foreshadows today's "blitz builds."
Library of Congress

1947–52
Marshall Plan
The United States commits $12 billion to the reconstruction of Europe.

Despite these warning signs, the "clean-slate" approach of Urban Renewal continued to shape the policies of overcrowded cities of the developing world, where they were embraced by governments struggling to cope with squatter invasions and exploding populations. Throughout the 1960s and 1970s governments in countries such as India, Zambia, and El Salvador approved wide-reaching slum-clearance programs in the name of economic development. However, housing construction could not keep pace with demand, and ultimately these programs did little to deter informal settlements. The population of Mumbai (formerly Bombay), for example, grew from nearly three million in 1951 to nearly six million in 1976, with 2.8 million people, or just under half the city, living in slums.[34]

Self-Help and Sites-and-Services Programs

Whether or not the design of these buildings led to their demise, the very public failure of modernist public-housing initiatives prompted a general loss of confidence in architecture and its ability to improve lives. As early as the '30s and '40s even some within the profession were beginning to question the role of architects in serving the needs of those who could least afford their services.

"Of all the participants in the business of home building, the architect is the only one qualified to guide the house and its environment toward a civilized form. Well-trained and possessed of practical experience, he should be intellectually constituted to prevent abuses, develop new methods and impart originality to the design. Yet he fails in each of these responsibilities," wrote Abrams in his landmark survey of the housing industry, *The Future of Housing*. Leadership in improving the design of low-cost homes was coming from the materials industry, he argued, not architects. Others felt that architects tripping over their own stylish egos in the pursuit of wealthy clients "had lost sight of the requirements for elementary shelter."[35]

A debate emerged in the profession: Should the work of the architect be limited to design? Or should architects roll up their sleeves and take on the job of the housing activist, working to influence not only implementation but also policy and planning decisions? Could architects play a meaningful role in providing shelter to those who needed it most? And if so, what should that role be?

The self-help housing movement grew out of this disillusionment. Homeowners had been successfully building their own homes for generations. Moreover, they had been doing it without the aid of government agencies, architects, or outside funding. What were slums but just another form of owner-built housing? Rather than pour money into government-built housing projects, why not use government funding to support and empower families to upgrade and build their own homes? This was the idea at the crux of the self-help movement.[36]

One of the most notable early experiments in self-help-style housing was the work of Hassan Fathy in Egypt. In the 1930s Fathy began experimenting with mud-brick construction. Trained at what is now the University of Cairo, he was inspired partly by the beauty and sustainability of traditional Egyptian architecture and partly by a shortage of timber, steel, and concrete during the war. After building a number of rural homes using traditional vaulted roofs and mud brick, including a demonstration home for the Red Crescent in a village destroyed by a flood, he was asked by the country's Department of Antiquities to design a large resettlement project.

The village of Gourna, Egypt, was situated near, or more accurately above, the Tombs of the Nobles. At the time its residents had a certain renown for finding suspiciously authentic Egyptian relics in their cellars. In an effort to protect the site from tomb-raiders, the government planned to resettle the community in a new village to be built nearby called New Gourna.

For Fathy the project presented an opportunity to test out his ideas of a low-cost architecture based on the sustainable building techniques that had sheltered centuries of Egyptians. To him, "apostles of prefabrication and mass production" did not appreciate or understand the depths of poverty in places like Egypt. "There is no factory on earth that could produce houses these villagers can afford....To talk of prefabrication to people living in such a condition is worse than stupid. It's a cruel mockery of their condition," he wrote. Nor, he felt, could government largesse alone effectively address the problem:

> It is a pity that government authorities think of people as "millions." If you regard people as "millions" to be shoveled into various boxes like loads of gravel...always needing things done to them, you will miss the biggest opportunity to save money ever presented to you. For, of course, a man has a mind of his own, and a pair of hands that do what his

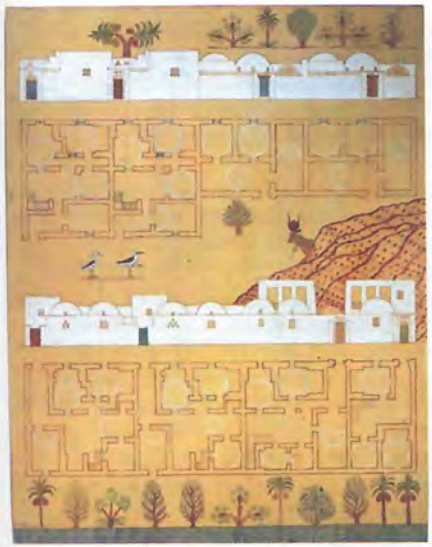
1948–49
Geodesic Dome
Asheville, NC, USA
R. Buckminster Fuller
Fuller teaches at Black Mountain College and invents the geodesic dome. Over the course of the next several decades he will refine and expand on the basic design. At right, an early example of a geodesic dome is lifted into place.
Buckminster Fuller Institute

1949
1949 Housing Act
USA

1949
Tsunami
Hawaii, USA
50-foot waves, some moving as fast as 490 mph, kill 96 people in the city of Hilo and destroy 46 homes. The Tsunami Warning System is created, with five seismic stations around the Pacific Rim.

1950s

1953
Storm Floods
North Sea, northern Europe
100-mph winds cause a sea surge to crash into coastal Britain, Holland, and Belgium. In Holland the tidal waves cause dikes to break in 65 places; in Britain sea walls are breached in 1,000 spots. Flooding causes 1,800 deaths. The disaster leads to the creation of the national Storm Tide Forecasting Service and the erection of the Thames Barrier, the world's largest movable flood barrier.



Hassan Fathy, plan of New Gourna Village, Egypt, 1946
Aga Khan Foundation

> mind tells them....Give him half a chance and a man will solve his part of the housing problem—without the help of architects, contractors, or planners—far better than any government authority ever can. Instead of one architect in an office sitting up all night to find out how many houses of each size will best fit the masses to be housed, each family will build its own house to its own requirements, and will inevitably make it into a lively work of art. Here, in each private person's longing for a house, in his eagerness to make one himself, is the alternative to the disastrous mass housing schemes of so many governments.[37]

Fathy saw the role of the architect as that of personal consultant yielding his or her training to the aspirations of the homeowner and to the demands of local construction methods and materials. New Gourna was to be a village built by the villagers themselves. Work on the new community, which was planned to include a mosque, a school, a theater and other amenities as well as housing, began in 1946 and continued through 1953. All the buildings were constructed using mud-brick and traditional craftsmanship, down to the doors. But the project did not to live up to Fathy's expectations. From the beginning he found it difficult to develop a true client-architect relationship with the villagers, who resented being resettled and expected their homes to be delivered as finished products. Fathy had envisioned training villagers in the craft of mud-brick building and employing them to build their own homes, but because of their opposition toward the project as a whole, he was forced to hire outside labor. Construction was slowed by "application-in-triplicate" supply procedures, snafus, and a lack of support.

Government ministers viewed the project as a sentimental folly at best and a waste of time and money at worst. The most damning critique came from other architects, who felt that the town failed to fulfill its residents' desires for modern living. The people of Gourna refused to move to the new village. When Fathy went back to the unfinished village some 20 years later, he found it all but abandoned.

Even in failure, however, the New Gourna experiment left a lasting legacy, not the least of which is *Architecture for the Poor*, Fathy's detailed and moving account of the project and its shortcomings.[38] Written 20 years after construction at New Gourna was halted, it offers solace to all architects who find themselves in the soul-destroying task of trying to overcome institutional obstacles beyond their control. Fathy's philosophy of building by the poor for the poor would have a profound influence on a growing cadre of architects working on issues of housing in the developing world.

At the same time that Fathy was building New Gourna, an even more ambitious and far more successful "self-help and mutual aid" project was under way in Puerto Rico. It was initiated as part of a government resettlement and land redistribution program. Some 67,000 farm workers were given small plots of land averaging three acres each. Housing construction began in 1949, and families were organized in groups of 30 to work on each other's homes. Revolving loan funds were set up, and officials traveled to each village to encourage participation. Once families signed on, a construction supervisor and a social worker were assigned to each group. Unlike in New Gourna, families were free to design and build their homes using any method that made sense—whether that involved

1955–63
Lafayette Park
Detroit, Mich., USA
Ludwig Mies van der Rohe and Ludwig Hilbersheimer (completed by other developers and architects)
Part of a federally subsidized Urban Renewal project, the development includes town houses and 21-story apartment blocks, grassy expanses, and a system of closed streets.

1958
Earthquake
Arequipa, Peru
10,000 houses destroyed. John F. C. Turner initiates a self-help rebuilding program.

1958
Low-Income Housing
Chandigarh, India
Pierre Jeanneret
James Burke/Time & Life Pictures

traditional construction or not. Between 30,000 and 40,000 small houses were built by the early 1960s.

This program would eventually influence a number of self-help and mutual-aid housing initiatives, including the work of John F. C. Turner, who launched a similar program to rebuild some 10,000 homes destroyed by an earthquake in Peru in 1958. Turner later adapted (and simplified) the model to implement a number of slum-upgrade programs, negotiating one of the first loans from the Inter-American Bank for housing aid in Peru.[39]

Over time a variety of approaches to the basic self-help housing concept emerged. One variant was the roof-loan scheme. In this approach, first developed by Abrams and Otto Koenigsberger as part of a United Nations mission to Ghana in the 1950s, families who had built the foundation and walls of a structure themselves received loans from a revolving fund, repayable over a fixed period, to buy the roof, doors, and windows. Another variant was the "core-housing" scheme, in which agencies provided a number of identical "cores," typically consisting of one room that in some cases included basic services such as water and electricity. The families could then expand these cores as time and money allowed. Many houses erected in the later years of Puerto Rico's self-help program followed this "core" model.

Then in 1968 a young American couple named Millard and Linda Fuller took the basic tenets of self-help and mutual aid in yet a new direction. The idea for Habitat for Humanity was born at Koinonia Farm, a small, interracial Christian farming community founded in 1942 outside Americus, Georgia, by farmer and biblical scholar Clarence Jordan. Working with Jordan the Fullers helped set up a revolving loan fund and orchestrated a program to build 42 homes. Future owners and volunteers worked "in partnership" to construct the homes, which were sold to families in need at no profit with no interest. Jordan died before the first home was completed, but the Fullers carried on his work.

Although Habitat for Humanity is considered an American organization, the first housing project the Fullers undertook on their own was in Zaire (now the Democratic Republic of the Congo). Starting in 1973 they built 100 cement-block houses over three years. On returning to America they officially formed Habitat for Humanity International in 1976, with its headquarters in Georgia. The mission of the organization, which the Fullers described as a "Christian housing ministry," was to eradicate "poverty housing" by building "simple, decent homes" based on the "economics of Jesus." Within 30 years Habitat for Humanity would claim to be the fifteenth-largest homebuilder in the United States.

The Habitat for Humanity "partnership" model offered a number of advantages over typical self-help and mutual-aid programs. Whereas prior self-help initiatives relied primarily on the labor of families themselves, often forcing wage earners to give up paid work, Habitat for Humanity involved volunteers, speeding the construction process and lessening the burden on already struggling families. Moreover, whereas administrative and organizational costs absorbed as much 25 percent of the funding for a typical self-help and mutual aid program, Habitat for Humanity relied on the built-in organizational skills of local churches to help set up and run its housing initiatives. This not only cut down on costs but also helped overcome local resistance and potential siting hurdles, while guaranteeing a steady supply of volunteers and funding.

Habitat for Humanity published a how-to guide entitled *Community Self-Help Housing Manual* in 1982.[40] It included everything from basic house plans (which have changed little since then) to family selection guidelines to instructions on setting up your own Habitat for Humanity affiliate. Perhaps more than anything else, however, it was Habitat for Humanity's ability to build a grassroots network of zealous housing advocates, including former President Jimmy Carter, that secured its success.

The 1970s also saw a number of significant policy shifts. As the concept of self-help gained momentum, the poor were seen no longer as a burden but as a resource. The United Nations held a number of conferences focusing on urban settlements, at which Turner and others presented their work, and in 1972 the World Bank, drawing on the work of Abrams, Turner, and others, launched an urban lending program that paved the way for slum-improvement initiatives. Rather than investing in housing, the bank advocated investing in land, services, and utilities and, in some cases, granting secure land tenure to residents in existing squatter settlements.

One of the first of these "sites-and-services" projects the bank

1961
The Death and Life of Great American Cities
Jane Jacobs

1964
Architecture Without Architects
Bernard Rudofsky
The exhibition and publication of the same name celebrate the beauty of vernacular architecture, leading to a renewed appreciation for traditional building arts.

1964
R. Buckminster Fuller's geodesic domes and other forward-looking ideas earn him the cover of *Time* magazine.
Time Inc.

funded was in Lusaka, Zambia. Carried out between 1972 and 1975, it provided the construction of roads, installation of piped water to standpipes, security lighting, and garbage removal. The project also offered small loans to residents for housing improvements, including $375 to those forced to relocate to an overspill area to make way for the new services.[41]

Gradually slum redevelopment gave way to "upgrading."[42] The introduction of micro-credit lending helped spur the construction of pit latrines, water delivery, and self-help housing in former squatter settlements. Architects such as Reinhard Goethert and nonprofit groups such as the Cooperative Housing Foundation (CHF) in America and FUNDASAL in El Salvador began to play a significant role in advising governments on housing policy and implementing large-scale self-help and sites-and-services programs.[43]

Unlike previous government-managed programs, the sites-and-services and self-help models promoted self-reliance over institutional support. In terms of sheer numbers, at least, it was difficult to find fault with the approach. For example, between 1969 and 1984 the Kampung Improvement Program, funded by the World Bank, brought essential services to some 15 million people in Indonesia, and by 1996 Habitat for Humanity alone had dedicated some 50,000 homes.

In time housing experts recognized a number of shortcomings to the approaches.[44] Because people were unlikely to invest time and money in building or upgrading homes they didn't own, the self-help and sites-and-services models could not be adopted in areas where formal land-tenure was a political impossibility. Others pointed out that both models tended to relocate people who relied on work in the inner city to the city's periphery.

The need to meet financial targets placed an emphasis on quantity above quality. This resulted in homes so basic as to be almost bereft of design, lessening their value over time. Program mandates and policies did little to encourage green building or to mitigate the impact of human settlements on the environment. And whereas public housing—permanent and well serviced—had provided shelter at little to no cost to the tenant, self-help and sites-and-services occupants invariably paid more for less. In most areas, improvements still struggled to keep pace with population growth.

Although architects participated in and in many cases mobilized self-help housing programs, the very concept was a negation of the traditional role of the architect. Design was not perceived as adding value. Architects in the self-help housing model were mere trainers if not unnecessary inconveniences. As Turner, one of the movement's most prominent advocates, put it:

> The certified professional makes a fool of himself, and often does a great deal of harm to other people, by assuming that he knows more than the uneducated by virtue of his schooling. All that second- and third-hand knowledge and intellectual exercising does for him, however, is to reduce his ability to listen and learn about situations significantly different from his own social and economic experience—with consequences that can be tragic when he has the power to impose his solutions on those who are not strong enough to resist.[45]

Once again the relevance of design and of the design professional was called into question. It would require a new generation of architects, policy makers, planners, humanitarian aid workers, and others to bridge the gap between design and policy. In doing so, they would not only reaffirm the essential role of design but demonstrate the importance of building sustainable communities.

The work of two mavericks stands out: Fred Cuny, who made the connection between disaster relief and development work, and Samuel "Sambo" Mockbee, whose thoughtful structures in rural Alabama brought the practice of architecture back to the design of low-cost shelter. In many ways the two led parallel lives. Both men operated on an act-first-and-ask-permission-later basis. Both were shunned by the establishments within which they operated, and both would be outlived by their charismatic, larger-than-life personalities.

When Cuny entered the field of disaster relief in 1970, not much had changed since World War II. Tents were the standard shelter response, and little attention was paid to camp planning. In most countries the military took the lead in responding to emergencies, followed by various housing ministries and other departments or agencies. For example, in the United States no fewer than 100 agencies were tasked with responding to disaster in one form or another. (It was not until 1979, when Carter created the Federal

1970s

ca. 1970
New government-subsidized low-cost housing in the Philippines (above) and Brazil (below).

1972
Freedom to Build
John F. C. Turner and Robert Fichter

1972
Pruitt-Igoe Housing
St. Louis, Mo., USA
Minoru Yamasaki
St. Louis Housing Authority begins demolition of the 33-building public housing complex.
Wide World Photos

Emergency Management Agency, that the many responsibilities for disaster assistance and response were consolidated into a single agency.][46] This led to duplicated efforts, complexity, and confusion.

What's more, little coordination existed between the nonprofit sector and government agencies. As Cuny would later write: "Most of the agencies operating at the time were oriented toward relief and charity. Development concerns were emerging, but few had yet seen a broader role for the voluntary agency. The favored relief approaches still relied mostly on short-term staff and volunteers. Because of high staff turnover, little accumulated wisdom was incorporated into the basic response pattern of the agencies."[47]

Designers offered up a steady stream of innovative emergency-shelter systems, from inflatable warehouses to polyurethane domes, but most were too costly or too cumbersome to implement. Prototypes for "instant housing" that had failed in one disaster would reappear in slightly altered form in the context of another.

"[Architects] were typically doing these Darth Vader things with helicopters and gee-whiz materials. They came at it with enthusiasm or commercial interest. There was a lot of experimentation going on. The fact that shelter had to come out of local material and processes eluded these people. When you told them that you can build a permanent house in Bangladesh in three days for the same amount of money they were proposing to spend on temporary housing, they ignored you," recalled architect Ian Davis, a shelter consultant with the United Nations and a colleague of Cuny's.[48]

Meanwhile, tents—the solution of choice for most aid agencies—would be shipped over great distances at great cost only to go unused because they arrived too late or were sited in camps away from homes, businesses, and livestock.

At the same time studies began to make a correlation between substandard housing, increased urbanization, and a community's vulnerability to natural disasters. "The study of disasters is almost by definition a study of poverty within the developing world," wrote Davis in his book *Shelter After Disaster* (1978), one of the first analyses of the design, as opposed to the logistics, of emergency shelter.[49] Yet in the reconstruction of housing in disaster-prone areas, aid agencies paid scant attention to disaster mitigation in terms of design, siting, or environmental impact. By the 1970s it had become clear to many relief experts that the standard modes of shelter provision needed to be drastically overhauled—particularly in handling natural disasters.

Enter Cuny, who, in the words of one biographer, was a "take-charge Texan who spent his life chasing trouble."[50] Cuny's first encounter with the world of disaster relief came when he volunteered as a pilot for the Biafran airlifts in 1969. The tragedy had begun two years earlier, when Nigerian forces cut off supplies to secessionist minorities in the country's southeast. Cuny arrived as aid efforts were coming to an end. Troubled by what he'd seen and seduced by the adrenaline rush of disaster-relief work, at the age of 25 he founded his own for-profit consulting firm, Fred Cuny & Associates, later called Intertect. (It sounded better than "Save the Peasants," he once deadpanned.[51])

Less than a year later, Cuny found himself working as an engineering advisor to Oxfam for the Bengali aid operations in East Pakistan (now Bangladesh), where a cyclone had left 300,000 people dead and millions more homeless. The disaster exacerbated the area's political instability, and the country descended into civil war, causing some 10 million people to flee. Arriving at the refugee camps that had sprouted up along the India-Pakistan border, Cuny was appalled by the disorganized tangle of agencies and NGOs that comprised the international community's response. A *Frontline* documentary described his reaction this way:

> For lack of trucks or road repairs, emergency supplies rotted in warehouses while people starved a few miles away. Refugee camps were constructed with no discernible thought to such basic matters as location or sanitation, with the result that some had scant access to water, others were washed away in the first rains, while still others were turned into death camps by cholera epidemics. Especially galling to Fred—the consummate studier of local conditions—was that many relief groups seemed oblivious to the most basic facts about the region and its cultures. One relief agency had distributed heavy woolen jackets, apparently not realizing that East Pakistan was in the tropics with a median annual temperature in the high 70s. Another handed out cans of pork and beans to the hungry, seemingly unaware that the refugees had no way

1972
Polyurethane Igloo
Masaya, Nicaragua
West German Red Cross and Bayer Company
Experimental dome structures provide emergency housing in Masaya, near Managua, Nicaragua, after three consecutive earthquakes strike the area, killing 20,000 people and rendering 250,000 of Managua's 400,000 residents homeless.
Oxfam

1973–76
Habitat for Humanity builds first project
Zaire
Millard and Linda Fuller in Zaire.
The Fuller Center for Housing

of opening the cans, no way of heating the contents, and that neither Muslims nor Hindus ate pork.[52]

Returning from Bangladesh, Cuny began to develop ideas for refugee-camp planning and design. He recognized the importance of sociology in successful relief operations, and believed that better designed camps, which took into account political realities and cultural mores, could save both money and lives. Whereas most camps at the time were designed in a grid, with multiple families housed in military-style barracks, Cuny's design housed victims in single-family tents clustered around open common spaces. Each cluster had its own latrines, cooking areas, and other basic services. With the tightly knit clusters Cuny hoped to encourage ownership, thereby preventing the camp's infrastructure from being over-burdened, which in turn would help prevent the outbreak of disease and allow for better management.

He first tested his ideas in Managua, Nicaragua, in 1972 following an earthquake in the area that left thousands homeless. The results were dramatic. While nearby camps built by the US military experienced a continual surge of refugees, making any attempt at planning a farce, in the camp Cuny designed for Oxfam the population quickly stabilized. Whereas other camps initiated mass inoculations to curb the outbreak of disease, at Oxfam's camp there was no major outbreak of disease and therefore no need for mass inoculations. Likewise, while security issues plagued other camps, at Oxfam's camp cottage industries and self-help organizations sprouted instead. Moreover, Cuny estimated the camp cost 40 percent less to operate than its counterparts.

Calling on many of the design improvements that had permeated development work, over the course of the next 20-odd years Cuny and his associates at Intertect would rethink virtually every aspect of disaster relief and reconstruction. For example, after an earthquake hit Guatemala in 1976, Cuny adapted the self-help model to train families in seismically safer construction techniques. Rather than bulldozing disaster sites, removing debris, and bringing in imported materials as was typically done, he encouraged aid organizations to pay families to clear sites and salvage materials from the rubble to erect temporary and permanent shelter. And instead of handing out tents, he set up programs to provide families with roofing and other building supplies that could later be used for permanent housing.

Oxfam Emergency House-Making Unit in operation following an earthquake in Lice, Turkey, 1975
Oxfam

It was not that Cuny's design ideas were necessarily trailblazing. Others pioneered cluster-based planning, core-housing, and seismically safer construction techniques. Nor was he the only consultant making the connection between disaster and development. But the force of his personality, his ability to implement new approaches under duress, the emphasis he placed on appropriate design, local materials, and labor, his penchant for publishing his ideas, and his role as an independent consultant working with a wide range of agencies made him an ideal catalyst for change. What's more, his military aspirations as a youth (Cuny was a Marine officer candidate before poor grades and a college prank prematurely ended

1975
Oxfam Emergency House-Making Unit
Lice, Turkey

1976
Earthquake
Hebei and Tangshan, China
Leaves 242,419 dead and 182,000 homeless. China refuses international aid.

1976
Earthquake
Guatemala
Fred Cuny works with Oxfam and World Neighbors to design housing "pictographs" to educate Guatemalans in safer building techniques after an earthquake there kills 23,000 people and injures another 76,000.
Fred Cuny/courtesy InterWorks

1976
United Nations Conference on Human Settlements (Habitat)
Vancouver, Canada
Leads to the formation of UN-HABITAT.

Fred Cuny surveys a UN vehicle that was damaged in an attack by gunmen in Mogadishu, Somalia, 1992. Three years later, at the age of 50, he would disappear in Chechnya.
Judy Walgren/Dallas Morning News

his military career) lent him an easy manner with US and other military personnel, giving him access to influential decision makers.

In time Cuny became more involved with "complex emergencies," often in conflict zones. His work began to focus more on the logistics of providing aid and less on design and engineering. However, others carried on where he left off, including consultants such as Ian Davis and Lisa Dubin and groups like Oxfam, CHF, and shelterproject, to name just a few.

Cuny vanished at the age of 50, on a mission to Chechnya in 1995. His body was never recovered and the mystery of his disappearance remains unsolved. While his frank manner bordered on rudeness and his rule-breaking attitude won him as many enemies as friends, Cuny's influence can still be felt. Today, *Disasters and Development*, which Cuny published in 1983, is considered the textbook on postdisaster reconstruction—a fact made all the more remarkable when you consider that it is currently, like most of the works cited here, out of print.

Community Design

Meanwhile, a movement toward greater community engagement was taking shape in the worlds of architecture, planning, and design. Influenced by the failure of many of the large-scale public building projects of the '60s and the rise of the environmental movement, some architects began to see themselves not just as professionals bound to meet the needs of their clients but as stewards of the built environment and advocates for more sustainable development.

In Europe the concept of community design can be traced back to the 1969 Skeffington Report "People and Planning." The report accepted the need to involve the public in planning and made far-reaching recommendations that influenced subsequent legislation in the early 1970s. Publicity and consultation became required components of the statutory planning system, providing local people with opportunities to comment on and object to development plans and planning applications.[53] Architects such as Lucien Kroll in Belgium and Giancarlo DeCarlo in Italy actively sought community participation in the design process in an effort to make their designs more responsive to community needs.[54] In England Ralph Erskine based his office in a disused funeral parlor in the center of town during the design of the Byker Housing project in Newcastle-upon-Tyne to encourage residents to drop in talk to with the design team and raise concerns that went well beyond architecture.[55]

By contrast, the nature of the community design movement in America was more political, with roots in the civil rights and social justice movements of the late 1960s and 1970s. In 1968 the civil rights leader Whitney M. Young, Jr., then executive director of the Urban League, opened the hundredth Convention of the American Institute of Architects with these words:

> You are not a profession that has distinguished itself by your social and civic contributions to the cause of civil rights, and I am sure this does not come to you as any shock. You are most distinguished by your thunderous silence and your

1984–85
Famine
Ethiopia
Drought and political instability lead to food shortages, killing more than one million people.

1985
Earthquake
Mexico City, Mexico
E. V. Leyendecker, National Bureau of Standards

1985–94
Nemausus I & II
Nîmes, France
Jean Nouvel
The architect adapts an industrial aesthetic for the construction of 114 units of subsidized low-cost housing.
Ateliers Jean Nouvel

> complete irrelevance....You are employers, you are key people in the planning of our cities today. You share the responsibility for the mess we are in....It didn't just happen. We didn't just suddenly get this situation. It was carefully planned.[56]

According to Rex Curry, former president of the Association for Community Design, the concept for an alternative design practice emerged from this meeting: The Community Design Center (CDC), where volunteer professionals would provide architecture and planning services to nonprofit neighborhood groups free of charge.[57]

During the 1970s there were eighty CDCs sprinkled throughout the country. The centers brought design professionals, environmental engineers, government agencies, and clients together in the design process, usually through a series of workshops, site visits, and interviews. The approach, called "community design" or "participatory design,"combined the aspects of self-reliance and self-determination that made the self-help model so compelling with the same emphasis on design, technical expertise, and sustainability usually provided to private clients.

It was a way of working that came naturally to Samuel Mockbee, founder of the Rural Studio. Mockbee studied architecture at Auburn University in Alabama and developed his ideas and aesthetic while in private practice in Mississippi, first in partnership with Thomas Goodman in 1977, then with Coleman Coker and Tom Howorth starting in 1983. He became interested in low-income housing began in 1982 when he helped a Catholic nun move and renovate condemned houses in Madison County. He built his first "charity house" there for $7,000 using donated and salvaged materials and volunteer labor—a model he would later develop with his students.

In 1993 Mockbee returned to Auburn University and founded the Rural Studio. He saw the studio as a means of combating the entrenched discrimination, substandard housing, and poverty he saw around him, while giving architecture students hands-on experience missing from most curriculums. The homes the Rural Studio built were as exuberant as they were intensely customized. Like Mockbee's earlier work, they were the physical embodiment of a conversation between architect and client. It just so happened that in this case the clients were living on the poverty line in rural

"The main difference between success and failure is the degree to which poor people themselves are involved in determining the quality and quantity of the services they receive."

***World Development Report*, World Bank, 2004**

Alabama—people, as Mockbee described them, "left over from Reconstruction." What made his approach radical was not that Mockbee treated these prospective homeowners with hard-won dignity and respect, though he did, but that he treated them as *clients*. As he wrote:

> The professional challenge, whether one is an architect in the rural American South or elsewhere in the world, is how to avoid being so stunned by the power of modern technology and economic affluence that one does not lose sight of the fact that people and place matter....
>
> For me, these small [Rural Studio] projects have in them the architectural essence to enchant us, to inspire us, and ultimately, to elevate our profession. But more importantly, they remind us of what it means to have an American architecture without pretense. They remind us that we can be as awed by the simple as by the complex and that if we pay attention, this will offer us a glimpse into what is essential to the future of American Architecture: Its honesty.
>
> "Love your neighbor as yourself." This is the most important thing because nothing else matters. In doing so, an architect will act on a foundation of decency which can be built upon. Go above and beyond the call of a "smoothly functioning conscience"; help those who aren't likely to help you in return, and do so even if nobody is watching![58]

These were also buildings that one could describe in the highbrow language of architecture. That, too, was a revelation. With its meager

1989
Aranya Community Housing
Indore, India
Balkrishna Doshi, Vastu-Shilpa Foundation
Vastu-Shilpa Foundation

1989
Loma Prieta Earthquake
Wastonville, Calif., USA
One in five victims camps outside his or her home rather than use the officially designated communal shelters.

1990–91
Improved Quincha Earthquake-Resistant Housing
Alto Mayo Region, Peru
ITDG
Developed in response to the earthquake that struck in 1990, the design improves upon traditional Quincha building methods (in which walls are constructed from wooden poles infilled with smaller wooden poles) by adding roof trusses and making them more flexible and

budgets and scavenged materials, the Rural Studio had invented a new palette. Curtain walls were constructed from car windshields, columns from carpet tiles, yet nothing about the structures appeared recycled. There was certain poetry to their form that demanded—and received—critical respect.

Humanitarian Design Today

During the 1980s and 1990s others also worked to bridge the gap between providing basic shelter and building sustainable communities. In 1983 architect Balkrishna Doshi laid the foundations for what would become a vibrant, mixed-income neighborhood in Indore, India, by combining the best of the sites-and-services and self-help housing models with a more heightened design sense.

The project, which was undertaken by the Vastu-Shilpa Foundation (founded by Doshi himself), included 80 demonstration homes and an urban plan for a new mixed-income township in Aranya near Indore, India. With funding from the World Bank, the architect replaced the unsympathetic grid layout of the typical sites-and-service scheme with a cluster-based plan. The demonstration homes, which Doshi designed around a basic service core, included balconies, patios, and other harmonizing details. The project was intended to encourage new owners to expand their homes progressively as time and money allowed and to embellish them according to their tastes. In a testament to the project's success, by 1989 Doshi's original demonstration homes were selling for 10 times their original price.[59] The foundation later pursued an even more participatory approach in the reconstruction of Ludiya, in Gujarat, India after an earthquake hit Gujarat in 2001.

Other projects that incorporated a more sensitive approach to community development included low-income housing designed by Yasmeen Lari in Pakistan; the Alexandra Townships Housing project designed by Jo Noero in South Africa; and the work of Jan Wampler in Puerto Rico.

The 1980s also saw a renewed interest in adapting technology to better meet the needs of communities. In Canada John Todd and the New Alchemists designed ways of treating waste naturally on-site using plant life (see "Living Machine"). In parts of the developing world ITDG (Intermediate Technology Development Group), founded

"Everybody wants the same thing, rich or poor...not only a warm, dry room, but a shelter for the soul."

Samuel Mockbee, architect

Samuel Mockbee (center) with Anderson Harris (right) and family. In 1997 the Rural Studio would build the Harrises a home, affectionately called the Butterfly House, and in return the Harrises would donate land for the Mason's Bend Chapel.
Timothy Hursley

therefore more earthquake resistant. In 1991 another quake destroys 17,000 homes, but the 70 locally built improved structures withstand the tremor, demonstrating the effectiveness of the design and prompting the group to build another 4,000 homes.

1993
Mississippi River Flood
Midwestern USA
American Red Cross spends $44 million to help families recover. FEMA creates initiative to buy or relocate properties to prevent future flood losses.

1993
Rural Studio
Newburn, Ala., USA
Samuel Mockbee founds the Rural Studio at Auburn University.

1994
Rwandan Genocide
Burundi, Rwanda, Tanzania
Interahamwe Hutu extremists kill an estimated 500,000 to 800,000 Rwandans in 100 days. Two million refugees flee the country. The outbreak of disease in refugee camps claims an additional 80,000 lives.

in 1965, worked to improve the everyday life of large numbers of people by investing in small technological improvements, such as more energy-efficient stoves or earthquake-resistant adaptations of vernacular housing. The idea of technology for technology's sake gave way to the concept of "appropriate" technology.

However, for every project that pushed the boundaries of socially responsible design, there were many others that relied on formulaic solutions or excluded the community from the planning and design process. In the 1970s planners had responded to new statutes requiring public participation with enthusiasm, putting time and effort into preparing exhibitions and organizing community workshops. Yet public response was often disappointing, and this led many planning authorities to reassess their commitment and to carry out only the minimum work necessary. Public housing programs experienced drastic funding cuts, and in America many community design centers, which had relied on federal funding, shut down.

Likewise, disaster reconstruction efforts were equally varied. Two catastrophic earthquakes in particular demonstrated the extremes of response: The first was the 1985 Mexico City earthquake, which killed nearly 5,000 people and left 200,000 homeless. The second was the Hanshin earthquake that struck the industrial city of Kobe, Japan, in 1995, killing 6,300 people and leaving 100,000 homeless. Both disasters hit densely populated urban areas. However, Mexico City largely recovered after two to three years, while recovery in Kobe took substantially longer. According to Mary Comerio, who analyzed both disasters in her book *Disaster Hits Home*, the difference had as much to do with design and planning as it did with economic factors and politics.[60]

The Mexico City quake measured 8.1 on the Richter scale and lasted approximately two minutes. It leveled 2.3 square miles (6 sq. km) in the historic center of the city, which also happened to house the city's government buildings. A second quake the next day compounded the loss of life and material damage. More than 600 buildings completely or partially collapsed. Hardest hit were the city's *viviendas*, or low-income neighborhoods, where most occupants were renters rather than owners.

Because these residential buildings earned extremely low rents and almost none was covered by insurance, it was clear from the beginning that property owners would have little incentive to rebuild. Yet residents lobbied aggressively to stay in their neighborhoods. With funding from the World Bank and loans and concessions from the International Monetary Fund, Mexico responded by establishing a number of housing programs, the largest of which, Renovacion Habitacion Popular, was mandated to build or repair more than 48,000 housing units.

This ambitious undertaking combined the best of neighborhood-level community design with a government-administered housing program. Under the program, displaced residents in renewal areas were given a Certificate of Rights, which entitled them to low-interest loans to buy rebuilt units, thus converting them from tenants to owners. Residents lived in temporary metal sheds in public streets, parks, alleys, and other rights-of-way near their damaged homes while they worked with their neighbors to repair their community.

After an earthquake struck Gujarat, India, in 2001, the Vastu-Shilpa Foundation facilitated a community-led effort to reconstruct the village of Ludiya. Here, residents outside their newly rebuilt homes.
Vastu-Shilpa Foundation

1995
Hanshin Earthquake
Osaka Bay, Japan
Dr. Roger Hutchison/National Geophysical Data Center

2000s

2001
Earthquake Reconstruction
Ludiya, Gujarat, India
Vastu-Shilpa Foundation

2004
Tsunami
Indian Ocean
175,000 people are killed and more than one million people in 13 countries are displaced.

Reconstruction plans were developed by community members aided by technical specialists, including some 280 architectural and engineering firms, and were based on a prototypical two-bedroom apartment unit in a three-story building with a single entrance gate. According to Comerio, by standardizing the building design, the city was able to process as many as 800 building permits a month and a single team of inspectors could monitor construction.[61]

In total the government repaired or built nearly 88,000 housing units over the course of two years. "Neighbors together with their neighbors animated by healthy solidarity, organized spontaneously and efficiently, were able to save lives, put an end to misfortune, rebuild the city and create a promising future," wrote a reporter for the newspaper *Excelsior* in a retrospective published 13 years after the disaster.[62]

By contrast, recovery from the earthquake in Japan took 10 years and exposed large gaps in the social net of one of the world's most developed countries.[63] With a population of 1.5 million, Kobe was Japan's sixth-largest city and the world's sixth-largest port. Although more than 90 percent of the damaged structures were residential, the city's economic importance meant that its commercial infrastructure was the first to come back on line. In the disaster's aftermath the government built 48,000 temporary housing units in parking lots and on undeveloped land and filled them with displaced residents by lottery. Two years later thousands of people still lived in metal crates in temporary camps sited on the city's outskirts.[64]

Kobe's slower recovery can be attributed to a number of factors. Before the quake Japan had no emergency-response system for natural disasters. A reliance on the private market to recover losses also contributed to the slow pace of rebuilding. Also, many blamed the decision by city authorities to place temporary housing outside residents' former neighborhoods, hindering families from returning to work, isolating them from their social networks, and preventing them from tapping local resources to solve their own housing crises.[65] But by far the biggest failure was that of the international aid community and officials in Japan to learn from the mistakes and success of other cities in coping with disaster.

In the years following the Mexico City and Kobe earthquakes, a series of floods, hurricanes, and other disasters did prompt local officials in some cities to take disaster mitigation measures. New codes forced owners to retrofit unreinforced masonry buildings, bolt structures to their foundations, install roof ties, build to higher flood elevations, and take other steps to strengthen buildings in disaster-prone cities throughout the United States, for example. Recognizing the role of environment in mitigating disasters, some cities, most notably Tulsa, Oklahoma, also implemented land-use controls, such as protecting important wetlands and preventing development in areas vulnerable to natural disaster.

Conclusion

A century after the San Francisco earthquake, the solution to housing the world's displaced and disenfranchised remains as stubbornly situation-specific and complex as ever. Even as we compiled this book, a series of tsunamis, hurricanes, and earthquakes reminded the world once again how vulnerable and unprepared we are against the awesome powers of nature—whether we live in the world's poorest country or its wealthiest. The Red Cross estimates that over the past two decades, on average more than 75,000 people have been killed annually by natural and manmade disasters, and another 211 million have been affected by disaster each year—more than 98 percent of them in the developing world. What's more, the agency reports that over the last decade the number of disasters—and the number of people affected by disasters—has climbed.[66]

Likewise, systemic substandard housing conditions continue to plague the world's cities. UN-HABITAT estimates that nearly one billion people, a third of the world's urban population, live in slums. The agency projects that number will double by 2030.[67]

Fortunately, we also live in a time when technology, particularly the ubiquitous Internet, has enabled the rapid exchange of ideas on an unprecedented scale. Groups such as Slum Dwellers International are using the Web to network and exchange models of development between slum dwellers in different countries. CAD software has made professional design services more affordable and enabled architects to volunteer their services in communities near and far. At the same time, computer modeling systems have led to technical advances promoting safer, more disaster-resistant building design.

2005
Operation Restore Order
Zimbabwe
Pres. Robert Mugabe orders a crackdown on "illegal structures," forcing slum dwellers to tear down their own dwellings throughout the country. Nearly 600,000 people are left homeless. UN-HABITAT condemns the slum-clearance program as indiscriminate, unjustified, and conducted with indifference to human suffering.

2005
Green Mobile Home
Mississippi State University, Mississippi State, Miss., USA
Developed by architects at the Carl Small Town Center, part of the College of Architecture, Art, and Design at Mississippi State University, this self-sufficient, solar-powered unit was designed as an alternative to the traditional mobile home.
Jason Pressgrove and Michael Berk

2005
Hurricane Katrina
Louisiana, Mississippi, Alabama, USA
145-mph winds tear a path of destruction through the Gulf Coast. The storm and subsequent flooding of New Orleans kill an estimated 1,325 people; more than one million people are displaced from the Gulf Coast region. Emergency officials respond by bringing more than 50,000 travel

The Engineering Unit of the Thai Army erected temporary housing in Ban Nam Kaem, Takua Pa province, Thailand, following the Indian Ocean tsunami of December 2004.
Roslan Rahman/AFP/Getty Images

A wider appreciation for the importance of design in disaster mitigation and community development has spurred greater collaboration between designers and communities. In addition to the many architects and groups engaged in community design and development profiled in this book, organizations such as the Aga Khan Development Network, Architects Without Frontiers, Architecture + Development, Architectes de l'Urgence, the Buckminster Fuller Institute, Builders Without Borders, Building and Social Housing Foundation, Association for Community Design, Architects/Designers/Planners for Social Responsibility, the Enterprise Foundation, Design Corps, Design Matters, Shelter Associates, shelterproject, World Shelters, the Volunteer Architects' Network, and many others have emerged, promising a more innovative and inclusive approach to designing shelter.

Will the start of the twenty-first century be remembered as the golden era of socially conscious design? The answer will likely depend on the willingness of architects and designers to reach beyond the design community and its traditional audience—to humbly venture into the communities in which they live, listen to the needs of their neighbors, and offer their services. As Samuel Mockbee once said: Proceed and be bold.

trailers and mobile homes to the area, but 100 days after the disaster, demand continues to outstrip supply. At right, FEMA tag on the door of a home in New Orleans indicates it has been searched for survivors.
Win Henderson/FEMA

2005
Earthquake
Pakistan-administered Kashmir
A month after the disaster the death toll estimate stands at 87,000; more than two million people are displaced. The United Nations exhausts its stockpile of tents. At right, desperate families in Muzaffarabad, Pakistan, set up a camp using recycled advertising billboards in an attempt to shelter themselves as winter approaches.
David Guttenfelder/AP Photo

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3 Philip L. Fradkin, *The Great Earthquake and Firestorms of 1906*, Berkeley: University of California Press, 2005, 209.
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5 Ibid., 71.
6 Ibid., 84.
7 Ibid.
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19 Sears, "Chronology."
20 Sandra Rihs and Daniel Katell, "The Evolution of Slum Clearance Policies in London and Paris," United Nations Centre for Human Settlements [UN-HABITAT], vol. 7, no. 3, Sept. 2001.
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22 Kerry D. Vandell, "FHA Restructuring Proposals: Alternatives and Implications," *Housing Policy Debate*, Fannie Mae Foundation, vol. 6, issue 2, 1995, 299–394.
23 Charles Abrams, *The Future of Housing*, New York: Harper & Brothers, 1946.
24 Ralph Steiner and Willard Van Dyke, *The City*, New York: American Documentary Film, Inc., 1939.
25 Ian Davis, *Shelter After Disaster*, London: Oxford Polytechnic Press, 1978, 87.
26 Robert Rubin, "Jean Prouvé," Yale School of Architecture, 2005, http://www.architecture.yale.edu/tropical_house/essay.htm.
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38 Ibid., passim.
39 Roberto Chavez, Julie Viloria, and Melanie Zipperer, "Interview with John F. C. Turner," World Bank forum, Washington, DC, April 2–3, 2002, www.worldbank.org/urban/forum2002/docs/turner-excerpt.pdf; Ward, *Self-Help Housing*, 23.
40 Robert William Stevens and Habitat for Humanity, eds., *Community Self-Help Housing Manual: Partnership in Action*, Croton-on-Hudson, NY: Intermediate Technology Development Group of North America, 1982.
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42 Nabeel Hamdi, *Housing Without Houses: Participation, Flexibility, Enablement*, London: Intermediate Technology Publications, 1995.
43 Ibid., 20.
44 Ward, *Self-Help Housing*.
45 Turner and Fichter, *Freedom to Build*, 147.
46 During the 1920s–30s a series of disasters (including the Mississippi River flood of 1927, which inundated an area almost as large as New England and left 700,000 people homeless, and the Long Beach, California, earthquake of 1933, which caused a number of school buildings to collapse) prompted the United States Congress to pass a number of flood control measures and other legislation aimed at disaster-mitigation and relief. The Reconstruction Finance Corporation gave disaster loans for repair and reconstruction of certain public facilities. The Flood Control Act gave the US Army Corps of Engineers greater authority to build levees and implement other flood control projects, and by 1934 the Bureau of Public Roads was given the authority to provide funding for highways and bridges damaged by natural disasters. Still, as in most countries, disaster recovery was funded on an incident-by-incident basis, and assistance to individuals was considered largely the domain of voluntary agencies and private charity. Congress did not establish a coordinated disaster relief program until the 1950s. "FEMA History," Federal Emergency Management Agency, Oct. 23, 2004, http://www.fema.gov/about/history.shtm.
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48 Ian Davis, telephone interview with Kate Stohr, June 13, 2005.
49 Davis, *Shelter After Disaster*, 11.
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Doshi designed a master plan and model homes for an innovative mixed-income sites-and-services development. Homes, which include balconies and look onto a shared courtyard, are grouped in clusters of ten along a central spine. Septic tanks are provided for each group of 20 houses, and electricity and water are available throughout. The new development will eventually house a population of 60,000.

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61 Ibid., 142.
62 Manuel Magaña Contreras, "The Greatest Catastrophe Ever Suffered by Mexico City," *Excelsior*, Sept. 20, 1998, http://www.tenorissimo.com/domingo/Articles/excel92098.htm.
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65 Davis, interview with Stohr.
66 Between 2000 and 2004 disasters affected one-third more people than between 1995 and 1999. International Federation of the Red Cross, *World Disasters Report 2005*, table 3, 196.
67 "Millennium Development Goals," 2003, UN-HABITAT, http://www.unhabitat.org/mdg/.