

THE EVOLVING RELATIONSHIP BETWEEN CLIMATE CHANGE AND SELF-HELP HOUSING

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Introduction

There is the need to recognize an evolving relationship between climate change and self-help. Because of climate change impacts – sea level rise, increased precipitation, rising temperatures and the increase in frequency and intensity of natural disasters – self-help as it is currently practiced will be challenged. Of necessity, self-help remains the principal tool of low- and middle-income families to address their shelter needs. Climate change will change the shape, densities and infrastructure of cities that will affect low-income families. It will also increase the vulnerabilities of communities located on marginal land. Climate change will require that the quality of self-help construction evolve to become more resilient and improve to avoid catastrophes such as the earthquake in January 2010 in Haiti brought on by faulty building practices. Shelter is judged on the durability of its building materials and climate change will cause a rethinking of the criteria by which building materials are judged. Climate change can promote a greener building materials market and the choices of materials families select to build their homes. Climate change becomes an advocate for cleaner, less energy intensive, more climate friendly self-help initiatives.

- Climate change can bring technology and self-help together through innovative building systems and a more diverse range of building materials for resilient, participatory, climate-friendly urban growth
- Climate change can promote a new model and definition of “durable materials” from one of energy intensive production to renewable resources and other more climate-friendly materials for self-help
- Self-help supports the goal of home ownership but climate change may open the dialogue to include rental housing, especially for low-income families, to address their shelter needs in higher density, low-rise construction developments.
- Climate-friendly small business development requires access to credit to impact building materials markets in a significant way by offering alternatives to the current supply of building materials.

This chapter presents examples of government initiated, self-help housing projects that brought self-help initiative into formal sector shelter policy. Successful housing projects carried out in Ecuador and Panama in the heyday of the sites-and-services boom in the 1980s serve as examples of public policy that demonstrated the viability of public-sector, self-help shelter strategies. However the detached, single-family self-help, housing model contributed to urban sprawl, a development strategy climate change challenges. Yet now, climate change and disaster risk reduction militate for the resurrection of and new thinking about new self-help shelter programs to address climate change impacts. The connection between disaster reconstruction and longer term urban and shelter development highlights the constructive role of self-help shelter kits and core housing. New self-help shelter options are an adaptation strategy.

The world is urban

According to the UN-HABITAT's *State of the Worlds Cities 2006/2007*¹ the world is now urban. More than half of the world's population lives in cities and the world's urban population will continue to grow from 3.17 billion of a total of 6.45 billion to 5 billion urban dwellers by 2030. That population will be distributed across a range of city sizes and locations. It is estimated that fifty percent of the world's population now live in cities of 500,000 or less; and twenty percent live in cities of between 1 and 5 million.² While it has been the megacities that received investments in infrastructure and housing, it is the medium sized cities that will need to acquire the skills and resources to guide their growth as resilient communities. The number of poor will also concentrate in cities. Governments cannot continue to avoid offering new shelter options that low income families can afford; options that will grow through self-help. Dealing with climate change just may be the push governments require to rejuvenate their urban and housing policies to offer alternatives to slums.

Climate change will impact informal settlements; their current settlement patterns; how and who builds them; and the materials that will be used for construction; and the implications of their manufacture. How the local enabling environment supports opportunities for the poor to become active

¹ UN-Habitat. 2006. *State of the World's Cities 2006/7*. UK-USA: Earthscan

² Ibid, P. 5.

participants in the future growth of cities and reflect the imperatives of climate change, will spell how well or badly the urban future will become.

Self-help and the formal housing sector

The “discovery” of self-help in the 1960’s by architects and planners working in the developing world on the “housing problem” changed the development institutions’ approach to housing. It was observed that families were building their own communities, some illegally, without the help of government, as they could and with what they had. Large *barrios de invasion* were organized by squatter developers; families were supplied with or purchased materials; and found a place on usually marginal land or were instructed on which lot in the squatter community to erect their shack. Development agencies realized that it was not the house so much that families worried about; it was security of tenure, access to credit and basic infrastructure that were the issues donor support could provide to support poor families’ initiative. To enter the formal housing sector, government housing institutions offered families shelter solutions they could afford – sites and services, core houses - and so it was that “affordability” became the key to home ownership. “Housing” became “shelter” making housing a “process” not a “product.”

Affordability

Affordability was a strategy for shelter development that planned for incremental development. Affordability was based on family income and a percentage a family was willing and able to spend for shelter. That amount became the basis for translating capacity-to-pay into shelter solutions. Thinking programmatically, climate change adaptation needs to embrace affordability and self-help as the basis for shelter development for the poor. An affordability approach is now required to allow low-income families to benefit from advances in incremental design, technology and the knowledge base for resilient housing and land development.

The United States Agency for International Development’s (USAID) Housing Guaranty Program (HG) developed and financed low-income housing through out the developing world with public sector housing agencies during their most active period in the 1980s – 1990s. Under the Foreign Service Act of 1961, the HG program had to finance shelter solutions affordable to families earning below the median income. The

examples of successful shelter programs presented below in Ecuador and Panama illustrate the menu of affordable “shelter solutions” formal sector housing programs financed. The HG Program Agenda, similar to other multi-and bi-lateral donors, included:

1. Leveraged financing
2. Secure titled property ownership
3. Adequate and affordable shelter
4. Recoverable loans for shelter and infrastructure
5. Community participation
6. Private sector participation.

The menu of shelter solutions to be developed incrementally included serviced lots, *piso-techo*, or floor – roof models, and basic core housing. For the HG program self-help was institutionalized by law.

The issue was donors thought in terms of projects. The World Bank’s one-off projects did not “empower the poor and therefore the Bank’s approach did not replicate or become institutionalized by the national governments.”³ National public sector housing ministries and banks failed to replicate or integrate methods that, in fact, proved to be successful. The donors did not provide multi-year support to change the behavior of the housing institutions the donors helped create. Families, however, did engage and invest. The incremental shelter projects in Ecuador and Panama demonstrate that success.

Solanda in Quito, Ecuador and Torrijos-Carter and the home improvement program in Panama City, Panama

The Solanda and Torrijos-Carter projects were developed as an alternative to the growth of informal settlements in Quito and Panama City. The projects were based on affordability and resulted in an array of incremental “solutions” all of which required a family to upgrade and expand through self-help. In the 1980s, Solanda offered an alternative to the *Lucha de los Pobres* squatter settlement built on the slopes of the Andes where resilient construction technologies, site protection and quality controls were issues. The NGO, *Fundacion Mariana de Jesus*, the owner of a large flat site in the

³ Buckley, Robert and Kalarickal, Jerry. *Thirty Years of World Bank Shelter Lending: What Have We Learned?* The World Bank, 2006: p.62

south of Quito, decided to develop a low-income housing project for the poor. Solanda was a unique combination of local government urban services delivery, national government agency project sponsorship and financing, and NGO contribution of land, outreach and beneficiary selection.

As part of the political settlement that returned the Canal Zone to Panama, housing and the Housing Guaranty mechanism brought substantial resources into Panama for new self-help housing and home improvements projects. The projects were implemented in the San Miguelito area, a large informal settlement developing outside of Panama City.

Solanda was originally programmed to build 4,500 solutions but actually built 6,211 shelter “solutions” including:

1. Sites-and-services: 622 sites-and-services were a program of lots with basic infrastructure and a 12 m² sanitary core. Service provision was the part identified that families could not do for themselves. Sites-and-services were the most basic solution offered.
2. *Piso-techo*, or floor and roof schemes: 2002 *Piso-techo* solutions were simple structures of 24 m² to support a roof and provide a solid floor. The families enclosed the structure with materials of their choice and upgraded them incrementally.
3. Basic core units: 1,527 were basic core units: Basic core units were of similar dimensions as the *piso-techo*, enclosed in brick and block walls.
4. Walk-up and other units: 2,060 40-72 m² walk-up and other units: Walk-up units were also designed to be improved and expanded incrementally.

The USAID review of the Solanda program carried out in 2005 found that the Solanda population of 15,000-18,000 has grown since 1986 to more than 80,000 and 80-90% of the original residents continued to live there. The vertical expansion of Solanda, from a mostly single-story start, to the multi-story community it now is, demonstrated the capacity of and the investment in shelter by Solanda residents interviewed in the review. It showed that all of those interviewed had, over time, invested and expanded their unit through self-help.

1. 4.1% have added a floor
2. 58.2% have added two floors
3. 24.5% have added three floors

4. 4.1% have added four floors

A lesson from Solanda is that incremental housing requires structural specifications designed for consolidation and expansion, and the densification that climate change now advocates.⁴

“The missing piece is that the Solanda concept was only carried out once. It became one of many one-time-only ideas.” The lesson being that “the introduction of reforms and policy changes requires a more sustained support, regardless of how good they are, so they can turn into sustained processes in the future.”⁵ This is true for Torrijos-Carter and Panama as well.

In a review of the past 30 years of World Bank housing programs it was concluded that “what worked” in the World Bank’s shelter lending program was “progressive development” which was the foundation upon which low-income family participation in sites and services, slum upgrading and disaster reconstruction was built. The review stated that the World Bank needed to reconsider its urban lending programs to once again include new shelter options for the poor.⁶

The Home Improvement Program in Panama

The Home Improvement Program in Panama was structured as support for improving slums and incremental housing developed through the Ministry of Housing. Torrijos – Carter offered 2,553 single family, incrementally developed solutions including:

Basic core 180m2 lot - 1,874
Piso-techo 180m2 lot - 419
serviced lot 250m2 lot - 110
serviced lot 180 m2 lot - 150

The solutions were for detached and row houses and did not plan for vertical expansion as in Solanda.

⁴ United States Agency for International Development. June 2005. *LAC Housing and Urban Upgrading Assistance Retrospective, Honduras and Ecuador, 1980-2005*, Research Triangle Institute,

⁵ p.I-45, Ibid

⁶ Buckley, Robert and Kalarickal, Jerry, *Thirty Years of World Bank Shelter Lending: What Have We Learned?*, The World Bank, 2006. p. 63,

For incremental housing, access to credit was, and remains, a necessary support program to improve and expand incremental housing families acquired as the first step to a safe, secure home. Self-help drove the process and the access to credit shortened the usually prolonged period a family required to complete its home. The home improvement program designed and implemented by the Ministry of Housing in Panama was a necessary addition to the menu of options and made incremental shelter work.⁷ The Program was national in scope and offered in both urban and rural areas to low-income families. Loans were prioritized according to need and improvement to be made: in order of priority – 1. families affected by disasters; 2. basic services; 3. structural improvements; 4. unit expansion; 5. to relieve overcrowding; 6. improved community planning; and 7. security.

The results of past self-help shelter programs are there to see in Solanda and Torrijos-Carter. The consolidation of the communities is testimony to the potential of families to build their own homes and improve their communities. Unfortunately, the multi-lateral banks and bi-lateral housing organizations concluded that the only way to go to scale with new shelter options was through large projects that required sites in outlying areas where large, reasonably priced land was available. But such strategies did not work well, since they were away from employment, services and amenities. An alternative could have been infill shelter projects that built on existing infrastructure that disperse low-income families on sites convenient to jobs. Climate change offers the opportunity to address urban growth through new shelter programs. Climate change can focus urban policies on green shelter delivery systems, long-term financial resources for multi-year shelter programs, low-income family access to credit, and building codes that support self-help. The growing awareness of climate change adaptation can encourage local government to become proactive about the growth of their cities and sustain urban shelter delivery systems.

Slums are not the only answer

The issue of slums has captured the attention and resources of the donor and international development community. Climate change brings an urgency to policies and programs that focus in retrofitting and, when necessary, relocating slums. The United Nations Population Fund estimates that one in

⁷ Ministerio de Vivienda. Marzo 1981. *Seguimiento a los Proyectos Roberto Duran y Torrijos-Carter*. Panama.

three city dwellers, a billion people, live in slums. UN-HABITAT's paper on Pro Poor Land and Housing suggests that if “preventative policies” that offer a better option to the poor are not implemented, slum dweller figures will grow to a projected 1.4 billion people living in slums by 2020.⁸ What is important is not the numbers, for they were already significant. What is important is the warning and guidance that calls for “preventative policies” that translate need into serviced land and incrementally developed infrastructure and housing programs for the poor.

Slums and informal settlements are the product of governmental neglect and shelter policy that ignores the fact that cities are consolidating once scattered rural poverty. When self-help, incremental shelter development and sites-and-services were part of the “answer,” climate change was not recognized as part of the equation. That has now changed, and with it, the role self-help may play in formal shelter development. Earthquakes will take a tremendous toll on lives and poorly built property if self-help does not improve the quality of construction and employ building technologies that are more resilient than the make shift methods employed in the past. Climate change will force self-help to improve its technical capacities.

Millennium Development Goal 7

Millennium Development Goal 7 (MDG 7) reflects the conventional wisdom of slums as settlements of hope; places where the poor, and often middle class, can establish a foothold in a city; invest as they can in the improvements of their shelter through self-help; and locate in an advantageous place close to employment if possible. The MDG 7 addresses slum dwellers but does not mention new shelter options. The MDG 7 is curious. In the late 1990's MDG 7 was targeted to improve the living conditions of 100 million slum dwellers, or 11 percent of the existing estimated slum dwellers. It remains unclear what would happen with the remaining 900 million slum dwellers. It is evident that the target was conservative since governments have collectively exceeded the slum target for MDG 7 by at least 2.2 times and 10 years ahead of the agreed 2020 deadline.” However, the absolute number of slum-dwellers has actually increased from about 777 to 827 million.¹⁰ Thinking programmatically about climate-responsive, slum improvement initiatives highlights the need

⁸ UN-Habitat Shelter Branch. 2003. *Concept Paper on Pro Poor Land and Housing*. UN-Habitat and Institute for Housing and Urban Development Studies. Nairobi. p. 3. Unpublished; UN-Habitat. 2008. *Access to Land and Housing for All: Focus Area 3 Policy and Strategy Paper*. Nairobi.

for retrofitting and resettlement to address climate change impacts. The figures are daunting.

UN-HABITAT defines a slum household as a group of individuals living under the same roof in an urban area who lack one or more of the following:

1. Durable housing of a permanent nature that protects against extreme climate conditions.
2. Sufficient living space that means not more than three people sharing the same room.
3. Easy access to safe water in sufficient amounts at an affordable price.
4. Access to adequate sanitation in the form of a private or public toilet shared by a reasonable number of people.
5. Security of tenure that prevents forced evictions.⁹

The issue with “durability” criteria is that they usually recommend energy intensive production and rule out traditional building materials that can play useful roles in shelter development for their renewable nature and self-help construction technologies, such as bamboo. Conventional building materials contribute to climate change in a significant way. However, information on renewable building materials’ durability may be useful for building materials production. Improving local building traditions is an adaptation strategy, especially those that employ renewable resources.

Climate Change and the Opportunity for New Shelter Options

New shelter options are an adaptation strategy. Climate change impacts will affect the security and efficiency of housing, especially in coastal areas and on steep slopes. What may be different from past experience is the enhanced role of local government and the strong leadership mayors can bring in creating housing options in planned, sustainable projects as an alternative to the informal development of cities as vulnerable, slum settlements. Climate change awareness at the local level is a growing force in urban management, demonstrated by local government associations such as that in the Philippines and the US Conference of Mayors with climate change agenda that make mitigation and adaptation a priority. It can be local governments that initiate programs to reduce the carbon footprint of cities based on affordability and self-help. New housing programs can support resilient

⁹ UN HABITAT. 2007 21st Session of the Governing Council. Nairobi

development for the world's growing urban population. The role of self-help in new higher-density, engineered structures needs to be accommodated.

Self-help and the new shape of cities

Climate change calls for the shape of cities to change from the urban sprawl that characterizes the expansion of cities to more concentrated, higher-density development. When participation and self-help became the key strategies for the poor to find shelter in the 1970s, the technical approach, especially the development of “tinker-toy technologies,” was replaced by a participatory, self-help processes. Lost were the investigations into low-cost technologies to “solve” the housing problem, and informal settlements changed from “*tugurios, bidonvilles, barriadas*” and slums, to “*pueblos juvenes*”, new towns of hope. Housing for the poor was left to the initiative of slum developers and self-help builders.

The demands of climate change will of necessity bring technology back into shelter strategies and programs, and put at risk the role of self-help, unless incremental growth of higher-density housing is designed for participation. The skills levels of small contractors and self-help builders will need to be trained to employ resilient building methods. No longer would it be the low-rise sprawl that characterized urban growth, through both formal project and informal settlements. Instead integrated, higher-density, walk-able communities will become the model. The marriage of technology and self-help is the challenge.

The new World Bank Urban Strategy clearly states, “Climate change and its impact on developing country cities will require retooling the approaches to urban environmental management. Urbanization if properly managed can also address the climate change agenda through the design of denser, more compact cities that increase energy efficiency and reduce travel time and costs for urban residents and businesses.”¹⁰ Thinking programmatically, the World Bank calls for capital investment planning as a multi-year endeavor that includes slum-upgrading at scale and the need for new shelter options, especially sites-and-services.¹¹ Climate change opens doors for urban planning and new shelter options as the shape of our cities evolves.

¹⁰ World Bank. 2009. *The World Bank Urban and Local Government Strategy. Systems of Cities: Harnessing Urbanization for Growth and Poverty Alleviation*. Washington, D.C. p.3.

¹¹ Ibid.

The shape of cities in the developing world, their layouts and densities, is influenced by the multi-lateral banks and bi-lateral development agencies through their lending programs. The availability of money for urban development often comes with cultural values and development standards of the lenders. The emphasis on the automobile and the road systems needed to facilitate its circulation at the expense of mass transit is a prime example. Security is an issue in cities; the gated community is one of the built environment's answers to that need. The gated community became an important organizer of new urban development for rising middle and upper classes as slums proliferated. However, the market did not respond to the needs of the poor. "The gated community shares many of the characteristics of post modernism: the privatization of urban services, the deregulation of public utilities, individualistic practices, selective socialism, the rejection of the best urban traditions and placing emphasis on the use of the private vehicle. If the value of urban development systems is assessed from a very broad perspective, however, private – and in particular, low-density – urban planning runs counter to the fundamental principals of sustainable development."¹²

Singapore is an example of high-density green development. The excuse of "Oh that's Singapore" cannot continue to ignore the value of good governance and the enforcement of green policies. Singapore has adopted urban planning and "greening" policies that significantly reduce air pollution and the use of private motorized transport. "Singapore has been so successful in preserving its old-growth tropical rainforests, protecting and planting green spaces, and promoting clean rapid transit that it has become the only large city in the world that acts as a carbon sink, soaking up more carbon than it produces."¹³

The definition of what new shelter options can be depends on the context of the city, its resources, culture and capacity to create and implement shelter programs. Private housing finance companies were expected to see the market in incremental housing but the administrative costs of small lending was deemed not good business. Addressing climate change will require the need for support systems to create the stream of resources for long-term initiatives. Resources are required for institutional capacity building; training of skilled and unskilled labor in resilient construction technologies; access to credit; the development and use of renewable resources for housing; and

¹² State of World Cities, 2006/7, UN-HBITAT, 2006. p.147.

¹³ Ibid. p.128.

retrofitting the existing built environment. Today, local governments can formulate affordable shelter solutions as part of their resilient city strategies. Partnerships are an increasingly important approach to scale up growth and the role the community and self-help can play in design and development. Self-help is an important tool in the climate -friendly development toolkit.

Community Participation

Engaging with communities raises expectations of benefits that will flow to them. Therefore, it is essential that donors, government and self-help practitioners develop methods and sensitivities to engage with communities and with groups that work with communities. Engaging with the community also recognizes that there is a shift in perception of the community by donors and government alike from being passive “beneficiaries” to view the community as an active “partner” in the self-help process. Transparency and consultation are the keys to building working relationships with counterparts and partners to create opportunities for communities to engage.

Climate Change Participation Chart

The following chart offers an array of engagement, including construction, where self-help and community participation can play significant roles.

<p>Disaster clean up: a. Rubble removal and recycling to useful purpose b. Site clearing and land conflict resolution c. Building materials collection and recycling</p>	<p>Environmental protection: a. Landscape restitution b. Mangrove recuperation c. Erosion control d. Site protection retaining walls, dikes, levees</p>	<p>Vulnerable population identification: a. Mapping vulnerable populations b. Identification of the type of care required c. Tracking of assistance provided</p>
<p>Shelter approaches a. On-site construction – self-help/ NGO support b. Relocation to a new site – self-help/Government</p>	<p>Shelter Solutions a. Shelter kits b. Sites and services c. Core housing d. Temporary shelters e. Completed housing f. High-density low</p>	<p>Local economy development Initiatives for the development of adaptation products design and delivery, skills development for</p>

c. Transitional housing – self-help/government d. Retrofit of existing structures- self-help e. Temporary shelter – Contractor/government with self-help consolidation	rise apartments g. Building materials acquisition and market development	the community in financial management, small business development, basic service delivery monitoring and evaluation.,
Skills training a. Improved local building technologies b. Environmental restoration, management and site-protection c. Sanitation, recycling and composting d. Micro-finance lending for small business restoration and housing e. Training-of-trainers f. Trauma mitigation: Victim identification, attention and treatment	Infrastructure retrofit and construction a. Schools, clinics, religious buildings, health and community centers. b. Community construction management	Basic services restitution a. Water supply, waste treatment and sanitation b. Mitigation and adaptation infrastructure including raised walkways, levees, seawalls c. Special requirements of vulnerable and women’s groups

Climate change, disasters and self-help

Climate change is responsible for more frequent and intense natural disasters that will affect vulnerable communities, especially informal settlements and slums. The need to upgrade and retrofit the existing built environment is a pressing issue, one that will require improved, self-help building skills and construction technologies. Pro-active shelter improvement programs will need to include access to home improvement loans. The role of self-help in upgrading existing communities will only grow as access to credit and targeted improvement programs become part of the donor and local government agenda. Home improvement programs, such as that in Panama, is an official programmatic response that addresses the new demands climate

change requires for more resilient building systems, retrofitting existing structures, and the purchase of more climate friendly building materials as they are brought to building materials markets. Just as the definition of urban infrastructure has to expand to include mitigation infrastructure, so too, urban development programs, because of climate change, will have to expand to include new shelter options and home improvement programs that engage with self-help.

Equally, the need for a local information base is essential. The information base needs to identify vulnerable people and places; safe sites for development; and areas that are not apt for development. Informed self-help programming is a potent remedy for existing vulnerabilities. The devastation of the self-built communities that crumbled in Port au Prince, Haiti in the January, 2010 earthquake are a lesson to take to heart on local building technologies and practice.

The Haiti Experience

On January 12, 2010, Haiti was struck by a magnitude 7.3 earthquake. An estimated 3 million people were impacted, and original estimates were that 50 to 80% percent of all residential and commercial buildings in the capital and surrounding areas were destroyed or severely damaged, 217,000 to 300,000 people killed, 300,000 injured, and 1.5 million people homeless. Shortly there after, on 27 February 2010 an earthquake in Chile of 8.8 magnitude occurred causing 300 deaths. One difference was the quality of construction and building code enforcement.

Despite a massive international response that emphasized housing and shelter, OCHA and OIM estimated that as of January 12, 2011, one year after the earthquake, 810,000 people-- 30% of the metropolitan population-- still remained displaced and living in camps.¹⁴ While these findings are now being adjusted down through additional studies and assessments, the fact remains that the disaster was horrific and continues to be. Rubble still fills Port-au-Prince and will continue to cause problems as damaged structures are demolished. Unfortunately, families, not wanting or able to wait any longer for a safer home are rebuilding in ways that caused the vulnerabilities in the first place.

¹⁴ USAID/Haiti. May 13, 2011. *Building Assessment and Rubble Removal in Quake-affected Neighborhoods in Haiti. BARR Survey Final Report*. LTL Strategies. Haiti

The NGO Cordaid “*in close collaboration with all stakeholders and the government of Haiti had drafted a Neighborhood Return and Housing Reconstruction Framework (Govt. of Haiti and the Interim Haiti Recovery Commission) and defined the work ahead as: The challenge for Haiti is to marshal the available resources behind the entrepreneurial capacity of the Haitian people, in order to restore housing, communities and livelihoods, and ultimately to create an improved quality of life for all those affected by the earthquake.*”¹⁵

Self-help is the corner stone for recovery in Haiti. Yet in conversations with bi-lateral disaster assistance officials it was stated that, “This is more a construction disaster than an earthquake disaster.” It was the poor quality of construction that families had carried out because of a lack of access to technical resources that brought the city down. Self-help needs to demonstrate more technical capacity to confront the increased perils climate change will bring.

Disaster Response and Shelter Kits

Emergency relief all too often relocates "victims" into "temporary housing" away from their community. On-site relocation and “shelter kits” are an alternative approach. Habitat for Humanity International employs the shelter kit concept as the first step in its Pathway to Permanence strategy to support an on-site recovery approach based on self-help; it moves families from dependence to participation and from dislocation to re-establishing life’s routine on-site. Shelter kits are a standard product to limit competition among donors and comprised of a set of components that include tools, poles for support, roofing materials and temporary wall materials configured to suit the family’s needs. Shelter kits lend themselves to self-help methodologies and were successfully employed in the reconstruction of Timor L’Este after its independence.

Timor L’Este Case Study

¹⁵ CORDAID. June 2011. Unpublished Job Description for an Urban Planner. Haiti.

A United Nations taskforce and the *Concelho Nacional Resistencia Timor* (CNRT) agreed that the United Nations High Commissioner for Refugees (UNHCR) would be the coordinating body for a reconstruction program based on the distribution of Shelter Kits to 50,000 affected families. An assessment of the reconstruction program¹⁶ found:

The program was on-site reconstruction with emergency assistance. Goods distributed included tarpaulin for shelter, as well as blankets, buckets, mats, food staples and other basic household supplies. The first phase was quickly followed by an on-site reconstruction phase featuring shelter kits. Temporary barracks or refugee camps were not a part of the response strategy.

The kits proved to be a valuable resource to families: they provided quick protection to families remaining on their property so they could go on with their daily activities and pursue their livelihood. Through self-funded improvements, shelter kits evolved into secure permanent housing. This is in line with the Sphere standards that aim to “enable affected households to incrementally upgrade from emergency to durable shelter solutions within a reasonably short time and with regard to the constraints on acquiring the additional resources required.”¹⁷

Shelter Kit Methodology Outcomes

The Shelter Kit program in Timor L’Este successfully integrated self-help strategies into its implementation. The result is a combination with clear advantages over off-site temporary shelter. Key outcomes of this integrated strategy include:

1. Equity

Community involvement in family selection ensured fair distribution. The shelter kit itself was an adaptable, progressive housing solution that proved useful for any family. The kit’s components could be used to build a shelter or repair a damaged one in a manner appropriate to the culture and climate.

2. Community Cohesion

Because it was implemented through existing community governance structures using participatory methodologies, the shelter kit approach contributed to community cooperation and cohesion. Groups of families

¹⁶ Weir, S., Kessler, E. June 20, 2006. *Community-based Disaster Response: Only One Component of an Effective Shelter Framework*. Habitat for Humanity. Singapore.

¹⁷ Ibid.

working together to build each other's houses were also rebuilding relationships. The satisfaction of being able to put a roof over their families helped participants to move beyond a state of dependency. No longer "victims," the beneficiaries became program "partners."

3. Livelihood Development

Shelter improvements were the incubator for local economic activity. In contrast, a contract-build approach often ignores the potential for local sourcing of materials and manpower and the opportunity to build up local skills and business enterprises.

4. Scale

Coordination of NGOs' participation contributed to greater scale as did using a replicable model. NGOs were non-competitive because their areas of activity and the product being provided, the shelter kit, were clearly-defined by the UN provisional government. Having a program coordinator helped to avoid redundancy, duplication and waste. Concentrating on a single product avoid communities playing one donor or NGO against the other such as sometimes happened in the Aceh tsunami response, where competition had raised reconstruction shelter costs and standards.

5. Accountability

The definition of roles and responsibilities amongst the program's players allowed for the tracking of activities to identify snags in policy and implementation as well as identify and record lessons learned and good practice. Proper tracking and evaluation maximized the use of resources by allowing for the reallocation of resources to national and local entities such as the National Disaster Management Office to replicate and judiciously scale up successful efforts.

6. Sustainable Development

The shelter kit concept represented a link to midterm and long-term sustainable development issues, the use of improved traditional building materials and capacity building opportunities. An incremental development approach to shelter reconstruction depends upon support from community-based financial entities for home improvement and supports micro-finance concepts and their application to small business and local economic regeneration and development.¹⁸

¹⁸ Ibid. p. 11.

Resilient community action planning is a result that can be initiated through shelter kit construction programs. For Haiti, as for Timor D’Este, self help is the key to recovery. How this will fit with future growth strategies climate change is calling for remains to be seen.

Self-help and climate-friendly building materials

A climate friendly building materials market is one that controls the energy consumed in the manufacture of building materials as well as the cost of operations and maintenance of the structures constructed. Combining the annual energy required to operate residential, commercial, and industrial buildings along with the embodied energy of industry-produced building materials identifies the built environment as the largest energy consuming and greenhouse gas-emitting sector.¹⁹

Bamboo, the self-help material and more

Climate change requires that building materials production be seriously reconsidered. Renewable resources for building have the opportunity to reduce the carbon footprint of buildings and the construction industry. Renewable resources such as bamboo can play a significant role in self-help shelter construction. Bamboo’s multi-purpose qualities include being a seismically-resilient building material; having a fast 3-year rotation, or growth, cycle as a cash-crop; and requiring management skills amenable to small, medium and large-scale growers in working bamboo forests to increase the supply of bamboo to the market. Currently, research and product development are changing the image of bamboo as a “poor man’s material.”²⁰

Simon Velez, the Colombian architect, is a successful advocate for new uses of bamboo as a strong, eco-sustainable building material that can substitute for wood and concrete. “Given the world's environmental imperatives, including climate change, deforestation and endangered aquifers, Velez said it is only a matter of time before bamboo makes its own case as a logical replacement for traditional woods in construction projects.”²¹

¹⁹ Maseria, Ed. November 2011. Climate Change and Building. www.Architecture2030.com.

²⁰ Simon Velez stated in his interview with the Los Angeles Times "In Colombia, there is a stigma attached to bamboo as being the 'wood of the poor,' and many architects turn their noses up at it...But I've discovered it has a lot of advantages."

²¹ Kraul, C. *Los Angeles Times*. November 29, 2011.

Velez's projects have begun to change the image of bamboo and call attention to its beauty and construction attributes which, when figured as a weight-to-resistance ratio, is twice as strong as steel, according to Velez.²² Velez won the 2009 Principal Prince Claus Award in the Netherlands, which cited his "progressive approach to culture and development." Unlike most woods, bamboo is easily and rapidly replaceable; it regenerates itself yearly and can produce between four and 18 times the biomass of different types of trees over a comparable period.²³

Reforestation with and improved management of bamboo plantations are being experimented around the world. Bamboo could supply materials to meet the present and future demand for bamboo building materials, plant supports and value-added products. Training is required to plant bamboo and harvest the mature poles in a sustainable manner. Scaling up would respond to demand for construction materials and other value-added industries, using bamboo as the prime material. The multi-purpose benefits of bamboo include:

1. Assistance to support landscape restoration with bamboo: Small, medium and large farms can plant bamboo as a cash crop receive support to restored working forests. Marginal private and public lands in areas threatened by erosion or flooding may also be brought into production through the negotiation of long-term concessions with private growers. In addition, the establishment of bamboo nurseries is critical to scaling up reforestation.
2. Self-help home construction and home improvement programs in informal communities, can be prepared with local government, NGOs and the private sector that can upgrade informal settlements and build new community and housing structures through seismic- and flood-resistant improvements.
3. Collaborate with NGOs and private builders – both commercial and community-based – to improve bamboo construction. This collaboration can support the sustainability of an adequate supply of bamboo building materials to the building materials market to meet demands of urbanization.
4. Natural Hazard Impact Reduction Programs will be comprised of seismic hazard reduction activities, including: a) the identification and mapping of

²² Ibid.

²³ Ibid

high-risk areas within selected communities; b) the design and promotion of training and curriculum modules to increase seismic hazard awareness among school children, the general public, and public officials; c) development of building and land use codes and demonstration projects which reflect seismic hazard concerns; and d) training of bamboo labor in seismic-resistant construction. Retrofitting shelter and community infrastructure improvement programs can build demand for and improve local building materials supply and traditional construction systems.

5. Flood hazard reduction activities, include the identification and mapping of flood-prone areas; the design and promotion of community-based flood early warning and evacuation plans; promotion of community-based services to manage waterways and the improvement of degraded environments in watersheds through the development of bamboo forest restoration plans. Planting bamboo is a proven erosion control and soils retention method.

6. Livelihood activities will spread economic impacts beyond construction to include the manufacture of value-added bamboo products, urban agriculture, forestry, and watershed/environmental management activities in high-risk earthquake- and flood-prone areas. Bamboo products firms are just beginning to come onto the market and have begun to transform the image of the material from one of a “poor man’s material” to one that is contemporary and highly marketable.

7. Maintain and Increase Carbon Stocks. Bamboo accumulates biomass quickly and offers the opportunity to maintain and increase carbon stocks through carbon sequestration (one hectare of bamboo forest can absorb 17 metric tons of carbon/year). As long as it is not burnt, and is instead used for durable products, the absorbed carbon will remain fixed as long as the product lasts. This carbon sink potential of bamboo makes sustainable bamboo forests and their extracted products viable candidates for the carbon offsets market. For example the blending of 50% bamboo fibers in the creation of cement board can actually offset the carbon emissions associated with the cement production.

Bamboo Building Materials Markets

The issue of bamboo shelter has evolved from the design of a better bamboo house . The principal focus was to improve the design of houses built of bamboo. Arq. Jorge Moran U. the director of the investigative team of *Eco-Materiales* of Guayaquil, Ecuador has taken the discussion of bamboo housing in a different direction. His take on the issue is that the building

materials market needs to respond to climate change through the development of a reliable supply of building materials that are energy efficient and renewable. Climate-friendly building materials being produced can supply a self-help market that will become more climate-friendly. Materials include bamboo laminates for floors and wall panels, for molded roofing sheets, and for structural elements. The move to materials development carries with it the need for codes and standards to change to reflect the viability of renewable resources especially bamboo. It was in the reconstruction after the earthquake in Armenia and Pereira, Colombia that the technical standards included the area's ancient bamboo construction tradition and produced the first-ever national building code that recognizes bamboo as a legitimate building material. This changed the local regulatory environment to at last qualify bamboo construction as acceptable, something the people in the region have known for a long time.

The nature of the building materials market needs to reflect the fact that buildings consume more energy than other sectors. The building industry and the manufacture of materials, the construction processes and building maintenance and operation represent 48.7% of energy consumption in the United States while industry is 23.2% and transportation is 28.1%.²⁴ Regarding carbon emissions, with so much attention given to transportation emissions, many people are surprised to learn that the Building Sector was responsible for nearly half (46.7%) of U.S. CO₂ emissions in 2009. By comparison, transportation accounted for 33.4% of CO₂ emissions and industry just 19.9%.²⁵ How this plays out in the developing world and in the income sectors that employ self-help is to be seen. Now the model in developing countries is for "*materiales nobles*", or durable materials that produced by energy intensive methods - concrete block, steel reinforced concrete. The building materials supply chain needs to be changed to reduce energy consumption. The technical issues of new climate-friendly and self-help materials may be easier to resolve than the behavior change and the models of "progress" and "modernization" to which low-income families aspire.

²⁴ Maseria, Ed. November 2011. Climate Change and Building. www.Architecture2030.com

²⁵ Ibid.

Conclusions and recommendations

- Climate change can bring technology and self-help together through innovative building systems and a more diverse range of building materials for greener, resilient urban growth
- The public and self-help developers and builders need to be made aware of the relationship of climate change with the building industry to change the definition of “durable materials” to include renewable resources and other more climate-friendly materials.
- Access to credit for climate-friendly small business building materials is now too limited to impact building materials markets in a significant way to offer greener building technologies and materials choices to the current priorities that are energy intensive.
- Self-help needs to develop its technical capacity to address the increase and frequency of disaster events.
- Reconstruction initiatives based on self-help and climate-friendly technologies can apply the myriad handbooks, manuals, and guidelines that exist and currently languish on shelves in local government, NGOs and private sector offices just waiting to be employed.
- Disaster recovery and reconstruction programs need to link temporary shelter solutions with resilient technologies that self-help can implement as part of longer term shelter delivery systems
- Building codes and normative construction standards need to be modified and enforced to accommodate climate-friendly building materials such as bamboo and other renewable resources.
- Architectural design and planning for future shelter and urban growth need to incorporate incremental development strategies that self-help can support. This also applies to historic urban areas and basic urban infrastructure that now need to include incremental development strategies and mitigation infrastructure
- Self-help will remain the principal strategy for low-income families to provide their shelter that needs to be made resilient to potential climate change impacts.
- Self-help home-improvement and retrofitting initiatives can become advocates for resilient construction through access to credit that conditions loans to employ climate-friendly building materials and technologies.

- Climate change will add mitigation infrastructure and site protection to the self-help agenda for resilient communities.