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Figure 1. A post-tsunami re-housing project for a Muslim community in Kirinda, Sri Lanka designed by Shigeru Ban. In almost all the houses, residents have covered the wall-less open area at the back of the house with either permanent or temporary materials for safety, privacy and culturally-appropriate gendered use of space. It is a classic case of not understanding the culture specific needs of the people.

# Resettlement housing design: moving beyond the vernacular imagery

Kapila D. Silva

## Introduction

Research on resettlement projects for post-disaster recovery efforts or those affected by myriad social, economic and political reasons suggest that, in most cases, the housing solutions given reflect the ideals of the providers (state, donors, and designers) rather than the true needs of the displaced and their culture (I. Davis 2006, Oliver 1986 & 2006). On the part of the state agencies and donors, immediate provision of adequate numbers of shelters has been the imperative. Resettlement projects, provided mostly for underprivileged segments of the society, are undertaken as low-cost constructions, swiftly built to respond to an impending crisis of housing with aims of efficient use of finite resources of land, infrastructure, and finances. The resettlement thus tends to be centrally controlled, turning the re-housed community into helpless passive recipients of relief.

On the design front, designers of re-housing projects make efforts to develop settlements that evoke regional and vernacular imagery in its formal and visual appearance, assuming that the new settlements would create a familiar place for the community which is in harmony with its regional environmental identity. Research suggests that simply emulating forms of local buildings does not provide the desired benefits in resettlement housing (Oliver 1986, Rapoport 2005, Heath 2009). Evaluation of post-tsunami resettlement projects in Sri Lanka indicated that designers often, erroneously, subscribed to the view that rapid provision of housing units would effectively solve the resettlement needs (Silva 2007).

Such misconceptions demand a critical rethinking of the way design and planning of resettlement projects are carried out. The reasons architects tend to capitalize on local building patterns indicate their belief that those vernacular buildings accurately represent what the displaced need. It also indicates the fact that the designers do not possess the type of knowledge required for handling resettlement planning and a framework of guiding principles. Many such projects have failed purely due to the inaccurate understanding of the vernacular context and its processes of building production (Rapoport 1983, 2005) and due to reducing a culture's architectural expression to basic physical attributes divorced from their function and social meaning (Heath 2009).

This paper argues that it is an understanding of the attributes of vernacular processes of housing, rather than the formal attributes of local houses, which would truly fa-

cilitate the creation of successful re-housing settlements. Based on a review of literature on resettlement housing and vernacular design, it first discusses some key objectives of resettlement programs. Those themes are then connected to the critical attributes of vernacular building processes in order to derive a set of principles that can be followed in re-housing efforts.

### **Successful resettlement planning: some critical concerns**

A review of literature on resettlement planning suggests that community building, community empowerment, and incremental development are essential components that guarantee success in resettlement projects, irrespective of whether the displacement was induced by development, conflicts, or natural disasters (Silva & Broderick 2007, Fernando, Fernando & Kumarasiri 2009). These components affirm that a fundamental theme in resettlement planning concerns the meaning attached to dwelling provision, in which housing should be identified as an issue of quality as well as quantity. It has been argued that there is a difference between the notion of *shelter* or *house* and the concept of home and that housing means not simply providing a physical shelter (a quantitative issue) but enabling displaced persons to make homes (a qualitative issue) (Cunny 1983, Davis 2006, Dayaratne 1995). It should be a process that engenders an emotional connection to one's house and community, through which one could gain hope and the capacity to achieve greater recovery in the social, economic, and psychological realms of life.

Such a process invariably involves steps taken to address the sense of incapacity and inadequacy experienced by displaced persons which is generated from the lack of opportunities for social equity (Silva & Broderick 2007, Fernando *et. al.* 2009). While design alone cannot fix the issues of social isolation and lack of community sense, opportunities for building their lives, skills, houses and communities should be made available. Opportunities for livelihood (Winchester 2000, I. Davis 2006, Subasinghe & Miranda 2007), a greater choice and control over housing themselves and building communities (Koenigsberger 1952, Turner 1976), capacity building in community organizing and construction skills, and engaging them throughout the housing process (Silva & Broderick 2007) are key aspects in this empowering process. In empowering the community, it is also important to appreciate the resiliency and resourcefulness in the displaced and not get trapped in the usual portrayal of the displaced as helpless victims. Community consultation and participation in recovery efforts could even happen in building transitional housing (Balikie *et. al.*, 2004, Subasinghe & Miranda 2007). Recovery could very well be based on local knowledge and capabilities rather than external input (Berke & Campanella 2006).

Studies on post-disaster recovery suggest that the perception of urgency to provide permanent housing and relief is mostly misplaced and such urgency could lead to failures or poor results (Hass *et.al.* 1977, Quarantelli 1982, Schilderman 2004). Since communities cannot be created at once and at a large scale, community building and empowering, therefore, has to be a situation-specific incremental effort. This is also due to the limited, localized resources available and the long-term efforts required for alleviation of issues of social inequality. Such an objective requires housing solutions that match the given situation – places, groups, times, and the nature and type of displacement – which in turn requires time-consuming settlement planning. Research also suggests the effectiveness of re-building

lives within the original settlements rather than in new locations (I. Davis 2006, Oliver 2006). Thus, emphasis should be on small-scale, doable objectives where the provision and change of housing conditions is incremental.

### **Learning from the vernacular precedent**

This primary focus on community building and empowerment is indeed about the process of resettlement rather than the final *product* of the house and the settlement. Achieving these resettlement objectives on a physical dimension through planning and design mechanisms, therefore, requires a critical rethinking of housing provision. It demands going beyond the reliance on formal analysis and stylistic reference of a local building product, even if the harmonizing visual imagery thus created may have some familiarizing psychological effect on the displaced communities. Could the process of vernacular building production be emulated here, instead of the product, so as to come closer to achieving the objectives of the resettlement process?

Von Osten (2010) cautions us that any attempt to follow the vernacular precedent as a didactic model should be critically examined so as to reveal the true intentions behind such an exercise. She points out, based on an analysis of French colonial public housing in Morocco by Michel Écochard and others, that in the context of colonial and post-colonial modernity, the vernacular studies have been used to improve and affirm hegemonic design practices and their supremacy, rather than actually helping the poor. Her critique is clearly directed at the focus on formal and stylistic use of the vernacular and the exclusion of the inhabitants in the settlement planning process. Instead of top-down design, Von Osten advocates learning from every-day actions of people in their use, self-expression, and appropriation of space; in other words, the vernacular process of the production of space by the users themselves.

Study of the vernacular process has been marred by various misconceptions of the subject. Edge and Pearson (2001) mention that the view held by designers and planners on the vernacular environments of a region generally tends to be incomplete, static, and historical; based on partial information that ignores the evolving nature of vernacular traditions in response to a multitude of social, political, and economic forces. This is partially due to the narrow focus of academic studies on vernacular environments and due to their documentation and examination in terms of styles, technology, typology and geographic distribution. Such biases have defined vernacular environments as a historical category rather than an ever-emerging informal process of settlement production. The anxieties and prejudices of the design profession regarding the restrictive influence of vernacular precedents on creative thinking, and their perception as historical, static, and unprofessional examples of architecture, further limit perceptions of their ongoing relevance.

Addressing this issue of the relevance of vernacular precedent in both study and practice of architecture, Rapoport (1999) argues that one could either ignore it, admit its existence but still deny it has any use, copy it, or derive lessons and principles from it, and suggests that the latter is the way to deal with the vernacular precedent. Yet, if the focus is merely on the formal and stylistic analysis of vernacular design, this too could be limiting. As vernacular architecture is an evolving category and not necessarily historical, deriving lessons from both the vernacular product and the process is essential. Rapoport (1990, 1999)



provides an elaborate framework for such analysis which lays down sets of both product and process characteristics of vernacular architecture (Table 1).

Architects generally study buildings through a similar set of product characteristics as described in this framework. Yet designers are not very familiar with the characteristic processes of local building production, i.e. 'process characteristics' nor are they committed to learning from them. A careful analysis of Rapoport's list of seventeen process characteristics of vernacular precedent shows that these characteristics could be regrouped under five key themes that define some essential attributes of the vernacular process, as follows:

1. Prominent involvement of the users themselves in the design and construction process (process characteristics 1, 2, & 3)
2. The close congruence between the built environment and the culture of the group (process characteristics 10, 11, 12, 13, & 14)
3. Houses as well as other place-types in the settlement follow one or few model(s) and its/their variations (process characteristics 4, 5, 6, 7, 8, & 9)
4. Rate of change in the settlement, which is usually a slow, incremental process (process characteristics 15 & 16)
5. Process of the transmission of know-how of building production (process characteristics 13, 14 & 17)

I argue that these aspects of vernacular processes could be connected to the objectives of community building and incremental growth desired in resettlement planning in order to build a set of design applications for resettlement housing. As mentioned above, community building and empowerment requires greater community participation in the resettlement activity, rebuilding the existing settlements, and in-depth understanding of their needs and lifestyles. I argue that these relate closely to the vernacular process themes 1 and 2 mentioned above. In addition, building community capacities in construction relates to the process theme 5 above. The need for carefully planned incremental development could be achieved by adhering to the process themes 3 and 4. These connections and how they should materialize within the resettlement planning process could still be quite abstract and thus need more discussion, which is given below.

### **Guiding principles for resettlement designs**

Emulating the *vernacular process* of environmental production in resettlement planning could be further discussed under the following themes, which could be suggested as guiding principles in the design process.

#### *Just folks, not professionals making decisions*

Vernacular architecture is generally characterized as the buildings by people for the people or architecture produced without architects' involvement. This is not necessarily accurate – there are many instances where trained craftsmen and developers were involved in creating vernacular settings throughout history (Rapoport 1990). Nevertheless, participation of owners or users in the creation of their home environments is an essential factor in a vernacular

context. Not only are users engaged in building, but they also design their environments (Hubka 1986). If emulating vernacular examples is an objective in resettlement housing, the future residents should then actively participate in the production of their future home environment. This should not be limited to the self-help construction of houses; but at all levels of the decision-making process, including the design of the settlement and houses.

Oliver argues that active community engagement in housing is both an ethical imperative as well as a success determinant in resettlement housing:

The ethics of one-off elite architecture may require that the designer meets the brief to the best of his creative abilities, but the ethics of housing for communities requires more. The architect may design responsibly, but the process fails when he ignores the values, *morés*, building skills, experience and wisdom of the cultures whose housing needs are to be met. Housing that involves the active participation of the community, which accommodates its values, relates to its vernacular traditions while meeting its aspirations. That which retains or remains substantially as the housing of and by the people, is the housing most likely to succeed (Oliver 2006: 408).

For more successful outcomes, community involvement should occur at greater depths in every step of the decision-making of the resettlement project, including decisions to relocate or not, studies on defining rehousing priorities, settlement patterns, and cultural life patterns, site selection, site layout planning, determining essential physical and social infrastructure, stabilizing local economy and livelihood, designing dwellings and community facilities, construction skill training, self-help construction, and community governance. People's participation is also important in self-initiated action towards the disaster hazard mitigation, out of their own self-interest for safety and economic stability (Prakash 2008). If rehousing is for an eclectic group of displaced individuals coming from different places, their collective participation is critical for bringing them together to form a new community.

A greater degree of community participation means that the professionals involved should take the role of community organizers, motivators, counselors, advisers, trainers, and arbitrators who facilitate community decision-making rather than the role of decision-makers and executors. Professionals would in this case offer 'another' point of view, instead of 'the only' point of view. Their role should be to help and initiate the development, not to control it (Koenigsberger 1983). In order to play this role constructively, an attitudinal change is necessary. Howard Davis (2006) reminds us that professional expertise does not mean professional dominance: a genuine respect for the community, an interest to learn from the community, and be willing to follow the situations is needed rather than forcing community cooperation. Establishing trust with the community, maintaining a collaborative spirit, and adhering to the collective will is salutary for better results.

Professionals should also devise ways of encouraging the community's active participation in this process. This approach is quite unfamiliar to architects, especially in the case of architectural design. Sanoff (1979) has devised many tools and techniques that designers could deploy in making community involvement in design and planning housing a more effective, easier, and efficient activity. These methods could be appropriately modified

to match the local context, morés, and needs. Engaging the community in the design process also engenders a design sense and design education in future residents, which is crucial in maintaining the character and design quality of a settlement (Jann and Platt 2009).

Another aspect is improving community's skill levels in construction. In constructing new towns for refugees in the wake of the partitioning of India, new settlers were educated in the construction skills not only for building their own houses but also for developing new infrastructure for the town. This has helped as well through initiating local economic productivity (Koenigsberger 1952). Pathiraja and Tombesi (2009) advocate developing a kind of 'robust' design languages and building technologies that make self-aided construction uncomplicated so that the final design outcome would not be hampered by the lower technical skill levels of the user-builders. Their proposed schema incrementally advances the local technical capacity to higher levels. An experimental house unit could be constructed as a pilot test for community feedback on the design and as a construction training mechanism (Heath 2009). Since resettlement takes time, for example three to four years in the case of post-disaster recovery (Quarantelli 1982), there is ample time for establishing proper community engagement.

### *Consolidate, not relocate*

In the case of post-disaster recovery, the general tendency is to relocate the affected population. Research on post-disaster recovery suggest that the most beneficial and successful approach is to provide temporary shelter within or close to original settlements and then to rehabilitate the original housing rather than to relocate the displaced (I. Davis 2006). This approach preserves the means of livelihood, local economy, social ties, neighborhood stability, psychological comfort, territorial claims, ownership concerns, and place-attachment. Relocation, being unresponsive to these social, economic and emotional needs, could add another dimension of trauma on those already affected. Consolidation of original housing is, therefore, a far more acceptable approach than relocation. For example, Oliver (Chapter 23, 2006) describes how the towns in the Greek island of Santorini thrived due to the consolidation, rather than relocation of the original settlements following a devastating earthquake. Irrevocably damaged houses had to be replaced, but the new designs, developed through community participation, followed the vernacular patterns and allowed future expansions. "The over-riding impression was one of a continuing vernacular tradition," Oliver (2006, 408) observes, "which established continuity between the past and the future while meeting, with safety and sensitivity, the physical, social, and environmental needs of the culture."

The decision to relocate usually comes as a hazard mitigation solution; yet such policy could be based on unfounded fear and may bring unintentional negative outcome. For example, Ingram et. al. (2006) point out that the hastily designed buffer zone policy enacted in Sri Lanka after the tsunami in 2004 resulted in a reactive policy that increased long-term vulnerability of the affected population. Having given disproportionate attention to reducing exposure to future tsunamis, this policy incited a massive relocation of affected populations and resulted in social, economic, and environmental problems that threatened the well-being of poor coastal communities. Silva (2007) found this to be accurate in his evaluation of post-tsunami rehousing in Sri Lanka, especially in terms of the disruption to social ties and livelihood caused by the relocation efforts. Disaster mitigation strategies could be incorpo-

rated in settlement planning or in re-housing within original locations. Some hazard mitigation strategies include community protection systems (dams, levees, drainage systems, and the like), land use regulations, and upgraded building construction systems (Wu & Lindell 2003).

### *Study the patterns of settings and activities*

As already mentioned, the view held by designers on vernacular settings generally tends to be incomplete, static, and historical, based on partial information, that ignores the evolving nature of vernacular traditions in response to a multitude of social, political, and economic forces (Edge and Pearson 2001). When guided by this inauthentic view of local places and processes, re-housing planning would become unresponsive to the realities on ground. Rapoport (2005) points out that the relationship between the culture and the built environment cannot be easily understood until we study the connections between the activity systems, lifestyles, social patterns, and the place. Here instead of the house as a unit of analysis, the place should be conceived as a system of settings. The life-ways of the displaced is generally beyond the realm of the designers' personal experiences, and making uninformed assumptions of the former is clearly an erroneous point of departure. Detailed studies of both the place and people are, therefore, imperative before sketching the resettlement blueprints – based on the misguided assumption that the designers already know what the place and people need (Figure 1 and 2).

The studies should investigate the place, its use by people, and how it is understood by people. Local settlement patterns, housing genotypes and variations, trends of change occurring in housing in terms of design, use, materials, and technology, and the forces behind such change is useful. The projects in contexts where re-housing had previously been carried out should also be examined in order to understand the processes of assimilation, adaptation, or change that may have occurred in them (Oliver 1986). Rapoport & Hardie (1991) suggest examining the core social units (castes, kin, age, ethnic, social networks, etc), patterns of social interactions within group and inter-groups, institutions of the community (social, economic, recreational, ritual, political, etc), and the physical spaces that correspond to these social patterns. Privacy needs, gender-related spaces, ritualistic needs and the like, are critical aspects to understand. Koenigsberger (1952) points out the importance of studying people's attitudes towards outdoor space use, such as gardening and public gathering, in determining plot sizes and neighborhood planning. Engaging the community about to be settled in identifying the patterns of place and use is crucial as they could provide useful insights into these ethnographical aspects. As Oliver (1986) points out, need for resettlement means that the cultural change has already occurred and thus this change should be clearly understood before designing.

The value of such detailed study of place and people is amply demonstrated in a participatory housing initiative for 130 rickshaw drivers and their families in Vellore, India (Heath 2009). A team of architects, social workers, and community members collaborated on the project. Based on the principles of Pattern Language (see Alexander et.al 1977), the team undertook extensive fieldwork on existing settlement patterns in surrounding villages. This 'social mapping' exercise helped in developing about thirty-five specific observations on site organization, local building culture, and spatial behavior that had implications for the

site layout and design of community buildings and individual houses. These observations were discussed with the future residents, and verified and adjusted as needed. The resultant environment, thus, reflects the values and priorities of the future inhabitants, since the design team 'left themselves behind when they travelled to Vellore' and immersed themselves in the situational context of the daily life of the community (Heath 2009, 60).

### *Provide support structures*

Building local communities and fostering incremental development require laying down physical and social support structures. The community-level public domain (including site planning, infrastructure, public spaces, etc) can be provided by the state, designers and property developers. This physical and social support structure provides the general framework to be later filled in and adapted by the private domain: the individual dwelling units (Dayaratne 1995). The community can participate in the planning and maintaining of the support structures of the public domain, and the individual can exercise more control in the making of his/her dwelling. The public support structure should be sufficiently flexible to evolve as the nature and needs of the community evolve.

### *Design a model and variations*

Shelters provided in most resettlement projects tend to be rigid, standard, cookie-cutter designs in order to make them affordable and swift to build (Oliver 1986). While this may provide a uniform character to the new settlement, it rather neglects the diverse personal needs of dwellers and their desire for individual identity. Vernacular settlements also do look uniform in character, but that uniformity and harmony comes not from following cookie-cutter designs but from adhering to a relatively small number of design types or models that are adapted for various functional needs and other conditions (economic, site, material availability, etc) (Rapoport 1990). In some vernacular traditions, one or two 'models' or 'genotypes' would be employed for a range of functional requirements such as houses, religious buildings, and institutional buildings, albeit elaborated differently (Rapoport 1990). Hubka (1986) points out that the vernacular design method is characterized by a primary (convention-dependent) and a secondary (independent) design component in which the primary architectural arrangement (plan arrangements, room proportions, structural grid systems) is rigorously structured while allowing the designer a range of individual design interpretations in the secondary systems (such as materials and motifs and stylistic elements). This notion of 'model and variations' produces settlements of complex visual character, yet with an underlying harmony, order, and communal identity.

This essential characteristic in the vernacular design process can be effectively adopted for resettlement housing: instead of developing a single, standardised house design, designers and community collaborators could work out a few design types or models with possible variations of them, and then help the individuals in the community to select their preferred variant. Other community facilities could perhaps be based on the models developed for housing as well. The initial set of genotypes could be devised by studying the existing vernacular models and people's cognitive schemata of those vernacular types. A similar approach could even be followed so as to determine the range of the design vocabulary

available for other building elements such as fenestrations, roof forms, and materials. For example, Low and Ryan (1985) conducted a public survey in order to identify what specific features of a variety of building elements would define the sense of place of a particular rural setting. They developed a range of variations for each building element in question (windows, chimneys, roof forms, materials, shutters, porches, etc) and asked people to select the variations for each element category that would evoke the image of the place. The 'genotypes' identified by the locals were used to suggest design guidelines for preserving, modifying, or filling in the existing physical setting.

### *Make room for adaptations*

Another aspect related to the previous point as well as to the acceptability of resettlement housing, is the degree to which the new shelters facilitate personalization and future extensions by individual families. Need for adaptations could be immediate or arise later, induced by personal, cultural, and economic reasons. Provision of standard, 'cookie-cutter' designs restricts personal adaptations of house units and could lead to the unacceptability of the resettlement housing. In many rehousing projects, the inadequacy of the shelters provided becomes evident within a short period of time after the new users have moved in: one could see extensions built around houses for living spaces, kitchens, work yards, storage, barns, garages and the like with whatever materials available. For example, Oliver (1986) found, that in the case of several rehousing projects in Turkey, how settlers in one project adapted the housing by building extensions, in another, houses were used as barns and storage spaces rather than for living in. The nature of these adaptations – whether they are temporary or permanent, how quickly they occur, if attached or detached, and the purposes for which they are built – indicates the degree to which the initial housing was adequate and whether their designs inhibited or facilitated the need for adaptations.

In most cases such adaptations occur due to the lack of understanding of the users' needs, aspirations, lifestyles, and what constitutes their true 'home environment'. A home environment does not necessarily suggest that every household activity takes place under one roof within a single house unit. Activities of dwelling occur in many settings within and without the house unit as well as in and beyond the immediate neighborhood. Consequently, it is more meaningful to understand the home environment of a given community as a system of settings, and ensure that this organization of spaces and activities is culturally variable (Rapoport 2005). When conceived as a system of settings, a true dwelling cannot be created by just building a standard house unit without any opportunity given for adapting it and its surroundings for various activities of the group's lifestyle, cultural practices, and livelihood means. This is another reason for conducting a detailed study of the community and engaging them in the resettlement process.

One solution to this problem is to follow the 'model and variations' approach suggested above. Another solution is to develop house designs that could grow incrementally, over time, starting from a basic unit. Ideas such as 'core & infill', 'kit of parts', and 'growth corridor' have been developed by designers to facilitate such incremental transformations. As the individual families grow and gather resources, they could make the necessary adaptations of the basic house unit following the order embedded in the initial design. Habrakan (1976) has proposed a way to systematically design such incremental growth through a sys-

tem of supports, in-fills, and detachable units. Two proclaimed exemplars of an incremental approach to housing include Aranya low-income housing at Indore, India designed by B. V. Doshi (Sharma & Mehta 2007) and incremental housing at Belapur, India designed by Charles Correa (Correa 1996). No critical evaluation studies has been carried out on these projects so far, however, in order to determine whether the approaches adopted by the architects have actually delivered the expected results eventually and, if found to be otherwise, how to make such design strategies effective. This is a crucial gap in the knowledge on such incremental growth design strategies, which an essay in this journal has addressed (see Mathur).

Other possible design solutions could be identified by studying patterns of incremental growth that have taken place in public housing projects. On the one hand it provides critical information on user needs, patterns of space use, and the spatial configurations that promote or hinder adaptations. On the other hand, as Von Osten (2010) advocates, it points out the limits of contemporary design practices in public housing planning, ills of public policy and housing economics, and a political reading of people's resistance to such failed approaches.

In a study on user-initiated transformations in government-led low-cost housing in several developing countries, Tipple (2000) found that the physical characteristics of the houses are likely to have more effect in the decision to transform than the household size or income. Triggers for such transformations were the inadequacy of housing in terms of house size, plot size and privacy needs as well as due to the desire to stay within the community and the place. The user-initiated adaptations were inhibited by small plot size, ill-defined plot boundaries, siting of the houses in relation to the plot, streets, and adjacent houses that do not allow adequate space for expansion, house designs that restrict easy expansion due to tight spatial composition of rooms, internal circulation system, and roof forms, and lack of services, finances, and regulations. Silva (2007) found similar design problems in the post-tsunami resettlements in Sri Lanka, which have triggered users to build detached, temporary structures because the houses provided do not support acceptable types of transformations (Figure 3).

In order to facilitate user-initiated incremental growth, Tipple (2000) recommends the provision of larger and wider plots, rather than smaller and narrow plots; clearly demarcated plots; fairly spacious and roofed non-habitable spaces such as verandahs and balconies which could easily be transformed into habitable spaces; adequate structural systems that could carry the load of upward for extensions; high-enough roofs and roof forms suitable for easy extension without major changes to the roof system; cues and clues incorporated into the house designs that suggest possible expansions and direction of expansion; extendable service lines; and room and internal circulation configurations that facilitate expansions without major internal alterations. Tipple (2000) also argues for provision of finances and regulations that help such user-initiated adaptations, pointing out a range of positive effects such adaptations bring into settlements in terms of private investment in housing, higher densities, increased property value, efficient use of finite financial, physical and social resources, and neighbourhood-stability.

What Tipple's study indicates is that even if the design is a minimal standard house, provided on a low budget with urgency, it could still be designed to facilitate and guide future growth. What is important here is to accept the fact that no house-design is going to

remain unchanged forever and fit all types of households in a community, and then to take a pro-active approach to provide adaptable housing. Tipple (2004) also advocates maintaining a sense of realism in devising planning and design regulations and standards that acknowledge the need for eventual transformation in housing.

Planning for user-initiated transformations makes the provision of shelter a democratic process in which a greater degree of choice, control and freedom of home-making is transferred to the users. The resultant settlement would eventually bear the visual character generally inherent in organically developed vernacular environments, since users themselves have more opportunity to design and build their houses over time. Vernacular environments are never static and pristine; they are dynamic and ever changing, though the rate, degree, agents and nature of change may vary (Vellinga 2006). Making room for user-initiated adaptations in resettlement housing is, in essence, adheres to this dynamic attribute of the vernacular process.

### *Adopt traditional practices to housing construction and disaster response*

Studies evaluating resettlement programs indicate that adopting local technologies with some improvement is more beneficial in the housing construction than introducing alternative technologies (Mackay 1978, Maskrey 1995). Where resettlement housing is a response to a natural disaster, incorporating certain hazard mitigation mechanisms against future disasters in the housing planning and construction is imperative. In places where natural disasters are frequent, Schilderman (2004) points out that indigenous building practices for disaster mitigation and coping do exist and advocates incorporating such practices in resettlement planning. These practices may be inadequate for coping with hazards of great magnitude, may have been lost due to having followed fashionable trends in construction, or may have been ignored due to economic pressures or lack of knowledge in traditional craftsmanship.

Such limitations in informal approaches could be mitigated through training and improving upon construction practices. Adopting local approaches to disaster response in resettlement planning preserves local knowledge, strengthens social capital, and makes the reconstruction more acceptable to the community in terms of culture, climate, technology and economy. Schilderman (2004) mentions that such community-based planning for disaster mitigation has proven to be more successful than formal, institutional approaches imposed upon the community; since the new construction standards introduced by formal approaches usually tend to be alien and costly to local groups. Relatively small changes and improvements in traditional construction could make housing more disaster resistant, yet remain affordable and climatically and culturally acceptable. For example, in Bangladesh, a study led by the German Red Cross organization identified minor construction changes – using metal bracings for bamboo joints instead of usual nylon ropes, preservative treatment of traditional materials, and improvements to foundations – that would strengthen houses made predominantly out of bamboo against impact from cyclones (Haq 1999). In Peru, a local technology called ‘quincha’- a wattle and daub construction method – has been made more earthquake resistant with improvements in foundations, roof framework, and application of preservatives to timber poles (Schilderman 2004).

Incorporating new materials and technology into a local building culture should be



carried out in a careful and critical manner. New technology should not completely replace the local technology. A good practice is to replace certain steps in the building process, material procurement, material processing, and stages of construction, rather than propose a total negation of the traditional method. The intervention could take the form of incremental replacement in order to allow time for the local community and tradesmen to adjust to the new systems in their perceptions and skills. A small-scale semi-autonomous technology system, which still facilitates user involvement in the construction, is preferable to mass-scale autonomous systems that simply replace manual labour with heavy machinery. Another important factor is that the new technology should be, as far as possible, carried out on-site instead of off-site, whether it is the production of building material or assembly of building components. The introduction of a cement block-making machine is a good example of an unobtrusive, successful technological intervention into local practices of brick-making. It is a small-scale intervention that preserves user-participation in the on-site production of building materials.

### *Change perceptions on building standards*

Incremental growth also means the acceptance of substandard housing conditions of the communities to be resettled, not in any negative terms but in a more appreciative manner. As Rapoport and Watson (1972) show, expectations and standards on acceptable comfort levels may differ cross-culturally and intra-culturally. Conditions that designers think imperfect may be quite acceptable to the community. Such 'imperfect' conditions could form the starting point of housing standards, and part of these could remain for some time until each condition is eventually improved. All inferior situations do not necessarily require fixing at the outset: As Tipple (2000) mentions, maintaining a realistic perspective of housing standards is important. Thus, critically evaluating the substandard aspects, prioritizing what should be fixed first and allocating available resources to that end is important (Silva & Broderick 2007). The users themselves would determine what could remain and what should be changed in terms of their housing needs. Their view could change the designers' attitude of their dire living conditions.

One important aspect of this proposition is the re-thinking of conventional views on aesthetics and functional merits of certain building materials, technology, and spatial attributes (Silva & Broderick 2007). In occasions of severe economic conditions, people have shown how ingenious they could be in identifying the unseen potential of materials for sheltering. The functional value of salvaged materials and imperfect techniques can be improved dramatically if we change our conventional opinion of them. Some materials, such as bamboo, maybe abundantly available locally, yet their potential as sustainable low-cost building material may not have been recognized due to cultural misperceptions of their aesthetics, structural quality, and use. Developing innovative ways of using materials and promoting them aggressively is also vital.

### **Conclusions**

The points discussed above recur in many studies on resettlement housing, affordable hous-

ing, and post-disaster recovery projects, in some form, either as reasons for thriving projects or as those unheeded in failures. The question is why this knowledge is not transferred to design professionals who undertake resettlement housing projects. This problem of knowledge transfer is related to the management of knowledge on disaster prevention and response (Chua, et.al. 2007).

One reason is that such knowledge has been primarily accumulative than cumulative, in which a careful meta-analysis of research on these projects resulting in a set of principles to follow in resettlement housing designs have not been derived. This paper is an attempt to fill in this lacuna in the knowledge domain. Many similar attempts are desired in this respect. A related issue is the dissemination of studies on resettlement housing: they are rather scattered and appear in non-design disciplinary fora and thus are not directly accessible to design professionals.

It could be a problem related to the education of environmental designers, their professional elitism, and disciplinary isolationism (H. Davis 2006, Oliver 2006). Community design, especially examples where the communities are engaged in design processes as primary participants, should be encouraged as part of architectural curricula. Instead design-led curricula are primarily focused on producing aesthetically focused high-end design and shy away from projects such as resettlement housing. Such educational projects should involve hands-on learning models rather than merely hypothetical or theoretical exercises. They should involve input from other disciplines like sociology or economics, as well as public policy, fundraising, and community advocacy; as the knowledge and experience in these domains have become crucial for achieving truly civic-minded design (Capps 2011, Hawthorne 2011). Examples for such pedagogical efforts are abundant in the South American context (Di Paula 1996, Fernandez 2001, Jann and Platt 2009). Furthermore, new criteria should be developed to evaluate resettlement designs, in which the design priorities are more concerned with community development than purely high-end aesthetics (Hawthorne 2011). These criteria could also be aspects of continuing professional education for architects.

Moreover, it is crucial to identify how these concepts could be applied to given situations and to devise the appropriate strategies to implement them based on local scenarios. Innovative solutions could come from the community itself, from their ingenious ways of dealing with the difficulties of life. This would demand a repositioning of perceptions of both the professionals and the people alike on many facets of housing (Silva & Broderick 2007). Designers of resettlement programs should also educate other constituencies – development agencies, policy makers, and local authorities – regarding these principles and direct housing provision strategies along these lines. This is a real professional responsibility and it goes beyond the mere designing of physical shelters. Professional organizations of architects could take initiative in establishing specific programs for resettlement planning and disaster response and recovery in order to train and connect professionals with local officials and humanitarian organizations in post-crisis planning and rebuilding.

In summary, resettlements should be built upon the values and aspirations of the communities rather than any aesthetic preferences of designers or visual evidence of vernacular form alone. Salutory lessons are gained only when vernacular contexts are understood as a part of an evolving ecology rather than static, architecturally pristine, historic entities. Constructive dialogue between communities and designers is paramount for success.

Table 1: Attributes of Vernacular Design (based on Rapoport, 1990 &amp; 1999)

Process Characteristics	Product Characteristics
<ol style="list-style-type: none"> <li>1. Identify of designers</li> <li>2. Intentions and purposes of designers</li> <li>3. Degree of anonymity of designers</li> <li>4. Reliance on a model with variations</li> <li>5. Presence of a single model or many models</li> <li>6. Extent of sharing of model</li> <li>7. Nature of schema underlying the model</li> <li>8. Consistency of use of a single (same) model for different parts of house-settlement system</li> <li>9. Type of relationship among models used in different types of environments</li> <li>10. Specifics of choice model of design</li> <li>11. Congruence of choice model and its choice criteria with shared ideals of users</li> <li>12. Degree of congruence and nature of the relation between environment and culture lifestyle</li> <li>13. Use of implicit/unwritten vs. explicit/legalistic design criteria</li> <li>14. Degree of self-consciousness/ unselfconsciousness of the design process</li> <li>15. Degree of constancy/invariance vs. change/originality (and speed of change over time) of the basic model</li> <li>16. Form of temporal change</li> <li>17. Extent of sharing of knowledge about design and construction</li> </ol>	<ol style="list-style-type: none"> <li>1. Degree of cultural and place specificity</li> <li>2. Specific model, planform, morphology, shapes, transitions, etc.</li> <li>3. Nature of relationship among elements and the nature of underlying rules</li> <li>4. Presence of specific formal qualities: complexity. solid-void relations, fenestrations, massing and volumes, articulation, level change, use of flight, use of vegetation, etc.</li> <li>5. Use of specific materials, textures, colors</li> <li>6. Nature of relation to landscape, site, geomorphology, etc.</li> <li>7. Effectiveness of responses to climate</li> <li>8. Efficiency in use of resources</li> <li>9. Complexity of largest scale due to place specificity</li> <li>10. Complexity of other scales due to use of a single model with variations</li> <li>11. Clarity, legibility, and comprehensibility of the environment due to the order expressed by the model used</li> <li>12. Open-endedness allowing additive, subtractive, and other changes</li> <li>13. Presence of 'stable equilibrium' (vs. unstable equilibrium of high-style)</li> <li>14. Complexity due to variations over time</li> <li>15. Open-endedness regarding activities</li> <li>16. Degree of multisensory qualities of environment (large range of non-visual qualities)</li> <li>17. Degree of differentiation of settings</li> <li>18. Effectiveness of environment as a setting for lifestyles and activity systems and other aspects of culture</li> <li>19. Ability of settings to communicate effectively to users</li> <li>20. Relative importance of fixed-feature vs semi-fixed features</li> <li>21. The relative importance of, and changes among, different levels of meaning</li> </ol>

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Figure 2. A post-tsunami re-housing project in Tangalle, Sri Lanka, sponsored by HelpAge, Sri Lanka. When moved into the houses, the first thing people demanded from the sponsors was to build them a kitchen outside, since the one that was provided within the house was not appropriate for residents' way of cooking. The sponsors had to provide these temporary structures eventually. Such extensions, especially for kitchens, built by people themselves are common in other post-tsunami re-housing projects in Sri Lanka.



Figure 3. A post-tsunami re-housing project in Nonagama, Tangalle, Sri Lanka. In this house, residents built a kitchen outside, but cannot extend the existing roof, as it is too low.