ABSTRACT: Being a developing country, the mindset in Turkey regarding slum upgrading plans is limited to an understanding of housing supply only in response to population growth, while the larger frame involving human resources is underestimated. However, creating a sustainable environment and improving life involves more than just providing housing. According to UN-HABITAT, Turkey has a slum population 23% of the total urban population (UN-HABITAT 2003). In response to policy initiatives, the country reduced its proportion of slum households from 17.9% in 2000 to 12.4% in 2010 (UN-HABITAT 2010). But this fact raises a question: how did it impact on the built environment?

In response, this paper considers the squatters of the settlements of low-income communities in Turkey. Revealing the existing social, environmental and design issues of those settlements, the potential role of sustainable housing strategies is researched within the frame of social justice and environmental development. In highlighting the problems that have accompanied slum-upgrading projects in Turkey, the paper will also propose social and design strategies for better and sustainable outcomes to meet the environmental and social needs of slum communities.

Keywords: squatter settlements, upgrading, sustainability

1. INTRODUCTION

The environment of slum settlements is a broad phenomenon involving many aspects. In Turkey, slums are not recognized and addressed by public authorities as an integral or equal part of the city. This leads to problems both in social and environmental means as no investments are challenged in these settlements. This paper demonstrates the social, environmental and design issues; potentials, characteristics and challenges in slum settlements of Turkey whilst proposing strategies for the provision of social sustainability in those environments. Revealing the deficiencies of design principles in upgraded squatter settlements in Turkey; provision of alternative responsive approaches as low-cost appropriate technologies and passive design strategies are the main objectives of the paper.

Forming under three main sections, the following section focuses on both negative and positive outcomes by pointing to the social and design perspectives of Turkey’s slum environments through a connected analysis to environment.

1.1. Negative aspects

Non-official nature and overcrowded formation of slums raise many issues. As building settlements is not only creating physical environments but also forming social environments, emblems of profound inequality and its consequences on physical nature is interrogated in the following.

1.1.1. Social dimensions

Poverty and rapid immigration are causes of complex urban and rural problems (Human Settlement Country Profile 2004). In postwar Turkey, migration to the cities was stimulated by Marshall Plan aid, the modernization of agriculture, and the growth of industries (Davis 2007). This attracted large number of villagers to big cities such as Ankara and Istanbul where housing shortage and high rent caused migrants to build unauthorized gecekondus on unsettled lands. In short of resources and incomes, migrants were forced to build their environments where they tried to adapt to urban nature of cities whilst retaining strong ties with the villages. However, inherited cultural values from the village clashing with modern city life caused loss of identities emerged due to rootlessness (Tas & Lightfoot 2005).

Meanwhile, implementation of urban projects in Turkey faced serious social difficulties, mainly because increasing for urban encouraged land speculation among the middle-income or city elites, and excluded low-income groups from the formal land market (Doğan 2009). This exclusion led to the acceleration of slums in Turkey’s urban sphere. Forming their illegal homogeneous communities, slum dwellers are excluded from many of the attributes of urban life that are critical to full citizenship. Remained as a monopoly of a privileged minority; low-income communities of today...
in Turkey are still lack of political voice, safety and the rule of law, good education, affordable health services, decent transport, adequate incomes and access to economic activity and credit (Garau, Sclar & Carolini 2006).

Yet, another fact that is revealed with the environment of slum settlements in Turkey is the insecure tenure. As illegal nature of slums consequently leads to unauthorized owner occupation of the land without any regulations, confronting high risks of demolition and thereby having no security of tomorrow effects the lives of low-incomes who live in shacks like dwellings where they are not encouraged to invest in their settlements.

1.1.2. Environmental dimensions
Living in a gecekondu is mostly problematic, as sanitary facilities are poor and basic municipal services are lacking due to their illegal formations. This lack of primary infrastructure affects all aspects of life including waste collection, sewers, water and electricity supply. Yet, another factor is important to underline as the causes of poor infrastructure investment. Squatter settlements in Turkey mainly occupy undeveloped and unauthorized lands on the fringes of big cities where the land is left undeveloped due to high risk of environmental problems. Contributing to environmental degradation at many levels, some of the major impacts can be mentioned as: (i) erosion occurring from unpaved and undrained roadways in informal settlements; (ii) residents without sewer systems increasing pollution of local water sources through prohibited discharge; (iii) garbage being dumped in piles along the road or in a local river (Tsenkova 2008). Leading to inadequate environmental quality and raising health related issues, especially in the first generation of squatter formations of Turkey, provisions of infrastructure are still inadequate (Faghih 1980). With the given background so far, a further analysis of environmental dimensions is out of scope of the paper.

1.1.3. Design dimensions
The built environment of slums is an evident instance of where urbanization and poverty collide. Being exposed to disasters, physical characteristics of slums not only magnify the consequences of natural or man-made disasters but also hinder rescue efforts due to poor land planning causing inadequate accessibility. And without subsidizes of the Turkish government, lone contributions of migrants to form their settlements still remains poor in terms of land planning. In order to highlight with a common instance, since most of the houses are built against hillsides, their subjection to landslides during heavy rain is a high probability.

However, issues are not only observed in urban scale. Evident problems in building scale are important to underline as well. Due to their densely packed nature and poorly built with substandard, temporary or even flammable materials, dwellings are often exposed to fire incidents where injuries become unavoidable (Unger & Riley 2007). Last to mention, but not the least, low inferior building standards along with poor structural quality cause many thousands of deaths from seismic hazards. Relaxed attitudes to enforcement of building regulations to urban poor in Turkey led to a heavy death toll and massive destruction when earthquake struck in 1999 (Davis 2007).

1.2. Positive aspects
Aside from the negative sides that are focused upon so far, slum settlements yet present some aspects which have been started to be seen positive by some analysts with the emergence of sustainable environmental development. They are not simply the only realistic option, but also have certain advantages over formal settlements; especially the government-built high-rise projects where the poor are often housed became a recent debate in housing industry. In the following, positive aspects are analyzed by employing same set of parameters in the previous part.

1.2.1. Social dimensions
It is a common mistake to believe that feeling of marginality and disorganization among the slum communities is a predominant social failure. In contrast, slums present a great deal of social organization and hope for the future where optimism is embedded in their social structure. With the minimum economical and resource inputs, the attitude to survive nourishes creativity. Their simplistic social approaches of occupying land create sophisticated solutions to the needs. To highlight this with an instance, in Turkey, squatters are mainly interested in consolidating their housing investment, and identifying themselves as respectable property owners (Doğan 2009). As a crucial part of the solution to that; self-help process is a major contribution where users become principle actors in housing issues. Self-help housing is neither new nor unique concept for the low-income; in fact it is a traditional way of house building of the rural population (Usavagovitwong 2008). Building their houses partly or totally, this participatory practice provides better outcomes to needs whereas creates effective management of the use of land regarding social equity, homogeneity and sustainable neighborhood.

In addition to the participatory process, another positive social feature is worth mentioning. Gecekondu is not a ghetto; in contrast, it is linked to other parts of the city and strongly interacted. Gecekondu areas in Turkey have a stable economic integration with the city where land settlements are mostly close to income resources enabling employment of the majority of population (Faghih 1980). As well as the proximity to city, they yet hold close links with the home village.

1.2.2. Environmental dimensions
Although having insufficient resources, slums contain attributes for environmentally sustainable settlements. Recently, these existing principles started to be frequently invoked by contemporary urban planners. Towards ecological sustainability, slums represent a light way of occupying land with minimum use of human and material
resources where their low-rise, high-density model emulates elevator-free and walkable environments. Having small alleyways, narrow streets in urban scale, slum settlements are considered as pedestrian-friendly. In addition, involving a mixed-use scheme means that housing and commerce mingle for which self generation capacity of settlements brings lower ecological footprints and leads to positive ecological outcomes.

Reflected nature of slums so far is more of a solution than being a problem. And recently, realizing this situation, the government of Turkey started to be more sympathetic by bringing services and infrastructure to squatter areas. Sanitation is achieved in most areas where water is piped almost into every squatter home (Dubrow 2010). To the ones that are further from the center, creation on their own water supply as in a village situation is employed as a strategy. Also, electricity has been provided to almost all second and third generation squatter settlements. Roads and streets are gradually asphalted by municipalities (Faghih 1980). Even though there are posed difficulties especially in older gecekondu settlements due to their complex patterns, still basic services and infrastructure is provided in the later phases of consolidation by contrast to the rest of the slum settlements around the world.

1.2.3. Design dimensions
As a general overview, the design layouts of gecekondu reflect a contemporary vernacular architecture where an extraordinary design approach is employed in response to the need for flexibility (Faghih 1980). In overall frame, it can be further stated that these buildings forming together resemble urban villages through positive adaptation by the rural masses to the urban situation. It is the successful solution to community housing where users become actors as both designers and builders of their environments. Considered as the inexpensive mass housing, a typical gecekondu adopts a harmonious built form resulting from anonymous building processes adapted to climate, patterns of life and to the environment.

In terms of its minimal resource consumption and low embodied energy, gecekondu are often made of materials that would be piling up in landfills (Dubrow 2010). Using cheapest and most abundant building materials, building wreackages collected from demolition sites in central areas of the cities are recycled in gecekondu houses. However, certain recycled materials which are found to be less durable are gradually upgraded with locally available materials. Especially, the second generation house types are more standardized with abundant use of brick and concrete, together with a more skilled labor. Gaining more permanent character, elements from demolished buildings, such as doors, windows, etc., are largely being recycled (Faghih 1980). Referring these measures alongside with the physical structure, sensitive to nature and open to change, slums can be considered exceptionally ecologically friendly.

2. EVALUATION OF SLUM UPGRADING PROJECTS IN TURKEY

2.1. Social problems
Being as a developing country, in Turkey, the mindset regarding slum upgrading plans is limited to an understanding of housing supply for the population growth, while the larger frame involving human resources is underestimated. However, leading a sustainable environment, improved life is greater than by just providing housing. Besides, seen as the sources of ‘social ills’ in the urban system, urban renewal approaches in Turkey had a negative attitude to squatter populations and their housing areas (Tas & Lightfoot 2005). As a result, municipal demolition of gecekondu and replacement with high-rise buildings became popular in the mid 1980s (Dündar 2003). In 1984, by means of Mass Housing Law, a fund for mass housing was formed to clean up of squatter settlements and develop alternatives for opening new residential areas (Yüksel & Gökmenn 2009). Involving squatter transformation projects, Mass Housing Authority’s housing production models have implemented around the country. With the support of the government, apartment blocks that create a feeling of satisfaction for the residents by providing rich sanitary facilities and urban services to their residents were established. However, these housing projects were not based on the common grounds of affordability. Building housing all around Turkey, Mass Housing Authority did not consider economic conditions, housing needs and possible demands of settlement areas (Yüksel & Gökmenn 2009). Nevertheless, the approach of demolishing slum neighborhoods was not a way of reducing poverty; hence, it created poverty and contributed simple move of slum formation somewhere else (Garau & Sclar & Carolini 2006). Thereby, urban renewal process has not only seen as the clearance and redevelopment of such problem areas, but also displacing their populations who are termed to be marginal to urban life.

2.2. Environmental Problems
Alongside the social problems, this development raised issues regarding environmental sustainability as well. Entailing a vision of generating high density settlements is believed only to be through high rise buildings. The alternative approaches such as the use of horizontal blocks, which may leave less ground space but which might be fit for the existing cultural form layouts of slum settlements in the nation have been underestimated. Adopting the principle of economic and fast construction of many housing block by tunnel formwork system, repetitive social housing blocks which often neither consider the site conditions nor the local sources have been created. These identical buildings today have issues of flexible growth, sound and thermal insulation problems, excessive vertical density of high and wall-like or point blocks, unaesthetic city-silhouette, and too much space consumed on ground parking lots (Yüksel & Gökmenn 2009).
3. FROM SLUM SETTLEMENTS TO URBAN ECOCITIES: SUSTAINABLE HOUSING STRATEGIES FOR SLUM COMMUNITIES IN TURKEY

Regarding the unsuccessful attempts of Turkish government towards slum upgrading projects, a new way of approaching the issue is critical. This can be only through by overcoming mass housing behavior with sustainable housing strategies where environment is seen instrumentally and society demands are well understood by the participatory processes of slum communities. Evolving as a response to the social and environmental problems of slum settlement upgrading approaches in Turkey, this section brings a sustainable model for solving informal settlements considering the negative aspects and based on the potentials of existing slum settlements explained in Section 2. Revealing the social and design perspectives, location-based features will be proposed for Istanbul due to having highest concentration of slum settlements in the nation. Consequently, site conditions will be assumed similar to the site of squatters analyzed in the previous section.

3.1. Social strategies
3.1.1. Community Participation: Self-help housing
Collective action is required to resolve the built environment problems of low-income communities. As it is also stated in the Rio Declaration held in 1992, environmental issues can be best handled with the participation of all concerned citizens, at the relevant level (Bass & Reid & Satterthwaite & Steele 2005). Collaborating with the slum dwellers, this approach is highly essential in terms of understanding the social context to develop appropriate solutions. As well as the needs in social context, demands related to design and economical perspectives are supplied more properly. Regarding design dimensions, this collective approach is the opportunity for designers to learn local construction methods and the materials available in the site. Yet, another positive outcome in economical aspects cannot be underestimated. As communities work for the creation of their environments, reduction in the labor costs are crucially reduced whereas by learning construction skills, new employment opportunities are born for the slum dwellers.

It can be reflected that, the synthesis needs to be embedded in the principles for ecological design in low-income communities where bottom-up self-help and top-down management to protect environmental performance is important (Hagan 2009). This approach should be acceptable to all but mostly about slums, as long as the managing is done in consultation with the managed, so such spatial changes are debated and understood.

3.2. Design strategies
Slum renewal is a complex phenomenon that involves redevelopment through clearance, rehabilitation through preservation of valuable building stock and finally regeneration which mostly refers to economy and social structure more than physical environment (Ejericioglu 2008). Referring the previous section, slum renewal approaches in Turkey mostly involve redevelopment schemes whereas rehabilitation projects have a minor impact by mainly focusing on infrastructure investments. Therefore, through several design guidelines, this paper attributes mainly to redevelopment schemes whilst bringing suggestions to slum rehabilitation projects.

As mentioned in Section 2, in Turkey, the housing industry in general is striving to implement sustainable building practices. However, the efforts should focus on higher-efficiency climate control systems and the recycled content of the materials. While these are important and necessary first steps, Mass Housing Authority has yet to change land-planning practices and housing designs to reduce the use of energy and resources. Over the life of the house, the greatest cost savings and environmental sustainability are achieved by intelligent land planning and design. Unfortunately, attributes towards slum renewal projects in Turkey do not consider passive energy measures that work with the local climate. Housing production is omnidirectional, meaning that no one side of the building is designed for any particular compass direction (Hosey 2008). Allowing houses to be placed anywhere on the site, in any orientation brings flexibility with a cost. And mechanical systems must be employed to compensate for inappropriate solar orientations in order to maintain a reasonable level of thermal comfort. However, the luxury of this kind of waste is not an option neither for the environmental sustainability measures nor in housing industry for the low-income communities.

For design to improve the lives of people in slum areas, sustainable models that integrate multiple sustainable strategies for habitat, energy, transport, water and sanitation are required (Materu 2008). However, being as the major issues in Turkey, this paper will mainly point to the strategies for habitat and energy in the following parts.

3.2.1. Physical Site Characteristics
Siting natural buildings is certainly one of the most critical design decisions that should be given at the initial design stage. The wrong choice can have long-lasting negative effects that are difficult to mitigate. The following suggestions highlight the basic strategies to be employed as an alternative approach of the issues analyzed in Section 2.

Slope: The right selection of land should entail the sustainable strategies for natural and built environment. Although highlands are often rejected as wastelands, good design decisions can overcome the idea of unfit for human habitation. Infrastructure expenses can be saved by utilizing the natural slope of the land which lends itself easily for drainage, water can be supplied by under gravity flow, and finally storm water pipes do not need to have an additional slope in relation to the road. Moreover, the waste-water can be easily let under the surface of the road for ground water re-charge with the sewage being led to leech pits to be dealt with locally (Jaunapur Slum Resettlement:

44th Annual Conference of the Architectural Science Association, ANZAScA 2010, Unitec Institute of Technology
Construction Techniques & Materials). However, in addition to the positive outcomes in infrastructure decisions, access to the site and dwellings should yet be wisely managed since very steep slopes may complicate access.

**Surface Geology:** Due to Turkey’s high potential of exposure to seismic hazards, determination of the site whether it is seismically stable is crucial. Especially in Istanbul where earthquakes often occur, the land should be analyzed in order to employ structural decisions properly. Yet, another issue regarding surface geology is the landslides. The land should be looked for evidence of landslides since site is located on a higland.

3.2.2. Climate Responsive Design: Passive Design Guidelines

In practical means, there are no real barriers to employ passive techniques for heating, cooling and daylighting. Often, there are no front-end costs for building in this manner and once built; houses that employ these strategies reap savings throughout the life of the structure (Hosey 2008). This raises a question of why these sustainable building strategies are not used in slum renewal projects. It is regardless that the design process is a complex set of acts in which the designer should aim to bring together a balance of all aspects of the problem to produce a solution. The climate, the energy use and thermal comfort are just some of the inputs to the process which would be focused upon. The use of the sun and climate for thermal comfort and energy efficiency is as important a part of the whole design. Some aspects of passive design are very simple, economical and successful to a solution. At each stage of the design process, those appropriate aspects should be carefully employed.

**Solar Access:** As heating is the main requirement in this climate type, the design layout of buildings should aim at using solar energy to reduce energy needed for heating. In building scale, heating in winter time can be provided by design decisions which increase the effects of sun on the building. By simply locating windows on the south façades and allowing an unobstructed view to the horizon from the southeast and southwest can substantially increase the heat gains. Thereby, vegetation and especially trees (neither conifer nor deciduous) should not be planted in front of passive solar windows, but rather beyond 45 degrees from each corner (UCLA Energy Design Group 2009). It is highly essential that existing typical slum typologies should be encouraged to be improved in terms of reflecting slum dweller’s cultural patterns of life as well as being quite adapted to climate by having linear plan schemes (see Figure 2). These assumed to be self-build horizontal units settlements have to be deployed at a certain distance from each other in order to ensure sufficient daylight levels and benefit from solar design (Hagan 2009).

![Figure 2: Typical gecekondu plan schemes](source: (Faghih 1980))

**Shade:** Adoption of traditional pitched roof projected over the façades in one-to-two floor gecekondu typologies is an essential strategy by providing shading and consequently creating cool, comfortable retreat in hot summer times. In case roof is not providing adequate shading, additional support can be provided by window overhangs specially designed for this latitude. Alongside the design strategies in building scale, trees and vegetation located to the southwest and west of the site will keep dwellings cooler and moister. Deciduous trees can be especially useful since they block the summer sun but drop their leaves and let the winter sun through (Kennedy & Smith & Wanek 2002).

**Prevailing Wind Direction:** Direction of the wind on a specific site can vary enormously depending on the local topography. Having taken the prevailing breezes into consideration in building and landscape design decisions, noticeable amount of energy savings can be observed (see Figure 3). Especially in summer time, well designed floor plan and shaded windows that are oriented to prevailing winds can be potential for good natural ventilation (UCLA Energy Design Group 2009). Yet, it is also essential to provide vertical distance between air inlet and outlet to produce stack ventilation when wind speeds are low. This can be achieved through open stairwells, two story spaces, roof monitors for which are to be decided in design stage of the building blocks.
Figure 3: Use of landscaping and the building bulk deflect the cold winter winds to accept cool summer breezes

**Site Planning and Orientation:** In order to gain maximum solar efficiency, sun’s heat has to reach buildings when it is useful. The sun should be able to reach the collection area between 9 a.m. and 3 p.m. in winter with as little and interference as possible (UN-Habitat, 1990). Assuming a specific housing unit, nearby housing units and trees might shade the vital areas of the building. These sorts of obstructions should be avoided in front of solar windows by arranging beyond 45 degrees from each corner (UCLA Energy Design Group 2009) (see Figure 4). Therefore, this needs to be checked and the building located to minimize any such interference.

Figure 4: Sketches showing how the sun should have good access to windows that act as solar collectors

3.2.3. Appropriate Technologies

**Earthquake resistant structures:** As the potential to seismic hazards in Istanbul mentioned previously, adoption of an anti-earthquake development is necessary in the building site. This can be provided through an approach of low-rise urban layout with employment of proper structural strategies in housing units and building materials.

**Employing recycled and local traditional materials:** Encouraging materials with identified recycled content and local availability is crucial in slum redevelopment projects. This does not only lead to minimize the energy and resources but also minimizes the cost and pollution by transportation of materials. Since in the physical shape of gecekondu locally made and cheap materials are preferred (Mahmud & Duyar 2001), redevelopment projects should follow the same pathways. However, different from the materials that are often selected according to economical features in gecekondu constructions, material selection in redevelopment projects should consider principles of passive design as well. As the main material for a gecekondu is usually brick where the roofs are wooden with either tin or roof tile (Mahmud & Duyar 2001), new housing units should aim at using brick and other potential local materials which are suitable for storing heat whereas avoid wood or other light materials as having low-heat storage capacities.

Yet, another point to pay attention is the utilization of local materials which encourage local construction techniques. And in Turkey, since most of the slums are made up of reinforced concrete structures with brick infill (Faghih 1980), housing for squatters should aim at conserving this technique by considering construction skills of local labor and keeping in mind that waste from the demolition of slums can foresee the potential of especially bricks and roof tiles to be crushed back to their original state and reused in the manufacture of new housing blocks. Finally materials that are longer lasting or are comparable to conventional products with long life expectancies are highly recommended for building and construction use.
CONCLUSION

Housing plays a major role in improving the quality of people’s lives in low-income communities. Sustainable and affordable housing provides social, environmental and economic benefits. To achieve sustainability measures, it is necessary to consider each slum settlements in the context of their existing site. Planning and design principles should recognize the land is among one of the most finite resources, and its use and distribution is vital to the well being of the environment as well as in development of sustainable communities.

So far, the paper tried to point to problems and potentials of Turkey’s slums. And the issues revealed by the upgrading schemes implemented to these settlements. Towards sustainable low-income housing, it is unavoidable to hold a new environmental idealism to think outside the box, and a new environmental pragmatism to make it mainstream.

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