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AN EVIDENCE INFORMED APPROACH TO DEVELOPING AN ADAPTABLE REGENERATION PROGRAMME FOR DECLINING INFORMAL SETTLEMENTS

AUTHOR: **Kayvan KARIMI**
Space Syntax Limited, United Kingdom
e-mail: k.karimi@spacesyntax.com

Ed PARHAM
Space Syntax Limited, United Kingdom
e-mail: e.parham@spacesyntax.com

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Abstract

This paper introduces a new approach to creating a regeneration framework for deteriorating unplanned settlements, or areas that often are regarded as 'slums'. These areas are often in an irreversible cycle of deterioration, or 'a vicious circle of decline', which pushes the areas to worsen all the time. The main argument of this paper is how this process of decline could be stopped and reversed to create a positive cycle of change, or a 'virtuous circle of improvement'. The guiding idea behind this transformation is that by understanding how a settlement grows, evolves and functions, we can identify an urban structure which shapes the internal functionality and external interactions of the settlement. This structure, which is strongly associated with movement, use, density, social interaction and other urban attributes, often suffers from multiple failures, which pushes the area into a descending cycle of decline. Fixing these fundamental problems will reverse the process of change, but it is a huge task and needs great resources that could not be provided in the beginning of the regeneration process. The paper argues that a highly adaptable regeneration programme, based on the most fundamental concepts of growth, could provide the basis for an incremental and sustainable process of regeneration for declining informal settlements.

This entire methodology has been built on extensive research into the regeneration of the informal settlements of the city of Jeddah, in Saudi Arabia. By developing a series of analysis based on space syntax methods (Hillier & Hanson, 1989; Hillier, 1996), the essential spatial structures of the areas are established. A design process attempts to resolve the fundamental problems of these areas by improving the internal and external spatial structures. This is followed by an evidence-informed distribution of land uses, densities, facilities and urban centres. In order to create flexibility and adaptability, a number of interchangeable regeneration scenarios are created that offer a range of variable solutions. A total redevelopment scenario, which is sometimes desired by some authorities, is complemented by at least four other scenarios, which seek different levels of intervention and physical change. The last of these scenarios is an improvement plan to only introduce the most efficient way of distributing and prioritising the regeneration efforts and external

funding to optimise/enhance the living conditions and urban performance of the area. The product of this approach is not only a versatile and flexible plan for authorities, but it is intended to become a guide for residents, NGOs, charities, and everybody else, who is concerned with the well-being of the people who live or work in declining informal settlements.

1. THE CHALLENGE OF INFORMAL SETTLEMENTS IN MODERN CITIES

According to UN-Habitat's ground breaking report, The Challenge of Slums, in 2003, 924 million people, or 31.6 per cent of the world's urban population, lived in slums or squatter settlements. The majority of these settlements were in the developing regions, accounting for 43 per cent of the urban population, in contrast to 6 per cent in more developed regions(UN-HABITAT, 2003)." These figures are unfortunately in continuous rise according to internationally verified statistics (UN-HABITAT, 2006). Due to complexities of defining a slum area, these figures don't necessarily include the 'slum-like' conditions of many other deteriorated urban areas, such as historic centres, which would not automatically qualify as a slum. These deteriorated areas are even found in most developed countries (Pile, Mooney, & Brook, 1999, pp. 71–80). This is a very disturbing picture, which emphasises the magnitude of the problem and the significance of any help that we can get to tackle it.

The distinction between an informal settlement, an unplanned settlement, a slum, or a deteriorated urban area is not very easy (Elsheshtawy, 2011; Dovey & King, 2011) (Doherty & Silva, 2011). In reality all these areas often overlap in terms of their characteristics, function and appearance. Not always is an informal settlement a slum, or is a slum created in unplanned areas, but it is fair to say that in most cases slums happen to be informal or unplanned areas that are suffering from multiple physical or socio-economic problems.

A provisional definition of slums by UN-HABITAT and its partners defines a slum as a settlement in an urban area in which more than half of the inhabitants live in inadequate housing and lack basic services (UN-HABITAT, 2006, p. 18). However, they have moved on to develop an operational definition – based on measurable indicators – which focuses on the household as the basic unit of analysis. According to this definition a slum household is a group of individuals living under the same roof in an urban area who lack one or more of the following five conditions: durable housing; sufficient living area; access to improved water; access to sanitation and secure tenure (ibid, p. 18). This definition makes the identification of a slum area a bit easier, but adds more complexity to the problem from the point of view of urban regeneration and sustainable urban development. For instance, to what degree should an area lacking any of these household conditions qualify as a slum? Is it about the household conditions, or about the reasons that lead to certain conditions? Should we focus on the current conditions or on the forecast for household conditions in future? How about areas that are in urgent need of intervention for various reasons, but their household conditions would not categorise them as slums?

The fact is that the vast majority of slums have principally originated from fast urban population expansion (UN-HABITAT, 2003, p. 196). The problem is not only the slum areas in hand, but the areas that will potentially turn into slums in future, if they are not dealt with properly at the present. This is why in this

paper, we favour to focus on areas in an irreversible cycle of deterioration regardless of them being a slum already, or have the potential to become a slum in future. In this way we can look for solution to a wider problem and not be too restricted by certain household conditions.

The main problem of starting from household conditions in looking at deteriorated urban areas is that it shifts the attention from the causes to effects. We end up identifying the poorest areas that lack the above-mentioned five conditions, and after identifying the areas we spend all our thoughts and energy to address those conditions. Being confronted with the massive scale of slums, and the enormous budget that is needed to remedy the failing household conditions, many developing countries have almost abandoned doing anything to help these areas (Davis, 2006, pp. 61–69). In fact, even if they, or the international aid agencies, manage to do anything about it, it would improve (to a certain extent) only the current conditions, but would not necessarily reverse the process of decline and possible return to slum conditions in future.

In many developing countries, the governments that don't have the resources, or are highly influenced by economic, social and political agendas, resort to a variety of harsh solutions to transform the slums. Mike Davies in his influential book, *Planet of Slums* (Davis, 2006), gives a somewhat harsh, but very good account of these solutions. In his words: "urban segregation is not a frozen status quo, but rather a ceaseless social war in which the state intervenes regularly in the name of 'progress', 'beautification', and even 'social justice for the poor' to redraw spatial boundaries to the advantage of landowners, foreign investors, elite homeowners, and middle class commuters (Davis, 2006, p. 98)." In other words, the whole effort is sometimes about eliminating the question through removing human encumberments, urban evictions, city beautification, slums de-criminalisation, and so on, rather than finding a solution to create a condition that informal settlements could self-correct themselves.

Another major approach, which is almost the opposite, is the concept of 'self-help'. This is the other end of the regeneration spectrum, arguing that the slums have to be fixed by themselves. By helping people to help themselves, the life conditions will improve and the slums will be saved. Being much less costly, interruptive, and authority-dependent, this approach is favoured by institutions such as the World Bank, international aid agencies, NGOs and philanthropists. On the face of it, it looks like a good approach, but when it comes to the realities of the vast slums and deteriorated areas, the solutions do not seem to work. Mike Davis goes as far as calling it the 'illusion of self-help' and scholars such as Jeremy Seabrook, call it a misrepresentation: "it would be foolish to pass from the distortion – that the slums are places of crime, disease and despair – to the opposite; that they can be safely left to look after themselves (Seabrook, 1996, p. 197)."

In spite of the huge efforts of aid agencies and NGOs, there is little evidence of real impact created by the self-help approach. The aids, which are hugely short any way, seem not to have been spent or distributed optimally, and NGOs have not succeeded a huge deal where serious shortage in funding and government investments exist (Berner, 1997, p. 31; Imparato & Ruster, 2003, p. 255).

The very inherent problem in the concept of self help is that it does not try to identify the fundamental reasons that turn an area to a slum; it rather focuses on remedying the conditions by enabling people, assuming that by doing so problems will be resolved by themselves. In reality, both ends of the spectrum, the total elimination or pure self help approaches, lack rigour, evidence and a supporting urban theory, which is needed for creating a fundamental approach. This brings us back to the questions asked in the beginning of this paper: what causes an area to deteriorate and turn into a slum? Why do some deteriorated urban areas turn into slums and some don't? Why do some slums have better conditions than others? And, most importantly, how could we assist deteriorated areas to improve and not to turn into slums again?

2. THE VICIOUS CIRCLE OF URBAN DECLINE

In search for an urban solution for the problem of slums, this paper argues that we need to go deeper beneath the surface of the conditions and look for the primary reasons that create a slum. In order to do so, we need a theory and an objective methodology that can link the socio-economic conditions of the city with its spatial systems and planning features. In this regards, *space syntax* theory is immensely helpful since it not only links directly the physical manifestation of the city with it socio-economic attributes, but it provides methods of analysis to do this in an objective and evaluative way (Hillier & Hanson, 1989; Hillier, 1996). The strong link between society and its physical manifestation, space, has been shown in previous research on urban issues (Vaughan, 2007)(Hillier & Laura Vaughan, 2000; Penn & Turner, 2004), and more specifically where settlements are formed organically and without formal planning (Karimi, 1998). The use of *space syntax* analytical methods in planning and design has also been established in previous studies (Hillier & Stonor, 2010; Stonor & Karimi, 2001; Karimi, 2006).

Informal settlements, after all, are settlements that are shaped for reasons and the way they are shaped reflect what they are. Urban areas, as they grow, develop two types of structure: an internal – or local – structure, which facilitates the local functioning of the area; and an external – or global - structure, which enables them to interact productively and efficiently with the rest of the city (Hillier, 1996, pp. 343–4). The strength of each of these structures, and in fact the balance between these two, determines the overall performance of an area.

In reality the problem of slums does not begin with a physical manifestation, such as informal or unplanned growth; it rather begins with socio-economic forces. Poverty, migration, economic devastation, rapid growth, failing economies, and other reasons of this kind create a particular group or class of people, who have to find somewhere in the city to live: quickly and very cheaply. The obvious result is that these people tend to move to the most undesirable areas of the city. The urban swamps, transport residual lands, steep slopes, flood plains, old parts of the city, villages trapped by the rapidly-growing city (Dovey & King, 2011; Anyamba, 2011), as well the old or historic centres of the cities, are the types of areas that are chosen by these people(Patwari, Tang, & Mitchell, 2010). In most cases these areas have certain characteristics in common: they are segregated within the global urban structure (while they maintain an active edge in some cases), they have a problematic local system, and badly lack infrastructure (Dovey & King, 2011).

Informal settlements are shaped very quickly, normally lacking the length of time, or the economic conditions, that have created flourishing organic cities in the past (Karimi, 2002). These areas, in principle, do not have sufficient time to adjust, or self-correct their spatial structure. The accessibility is usually very poor, the movement network is inefficient, the social and urban facilities or the infrastructure networks are poor, and so are the public spaces or functional trade centres. The result is normally a segregated area with severe internal problems, occupied with social classes, which do not have the means, power, or even knowledge to improve their areas. It is not very far from reality to assume that the economic and socially decline of these area impact the physical conditions to become even worse. Things such as overcrowding, sub-divisions, sub-lettings, and encroachments on public spaces, added by city-wide planning decisions which totally ignore these areas (Dovey & King, 2011; Davis, 2006), are among the factors that make the internal spatial structure weaker and external segregation more adverse. As it can be seen in many unplanned settlements, worse physical conditions lead further to more socio-economic problems and this cycle goes on and on until the area reaches a hypothetical point that it cannot repair or regenerate itself. This process, we argue, is a 'vicious circle of decline' which impacts most slums of the world, and in fact, could be an efficient way to differentiate a slum from a non-slum area (Figure 1).

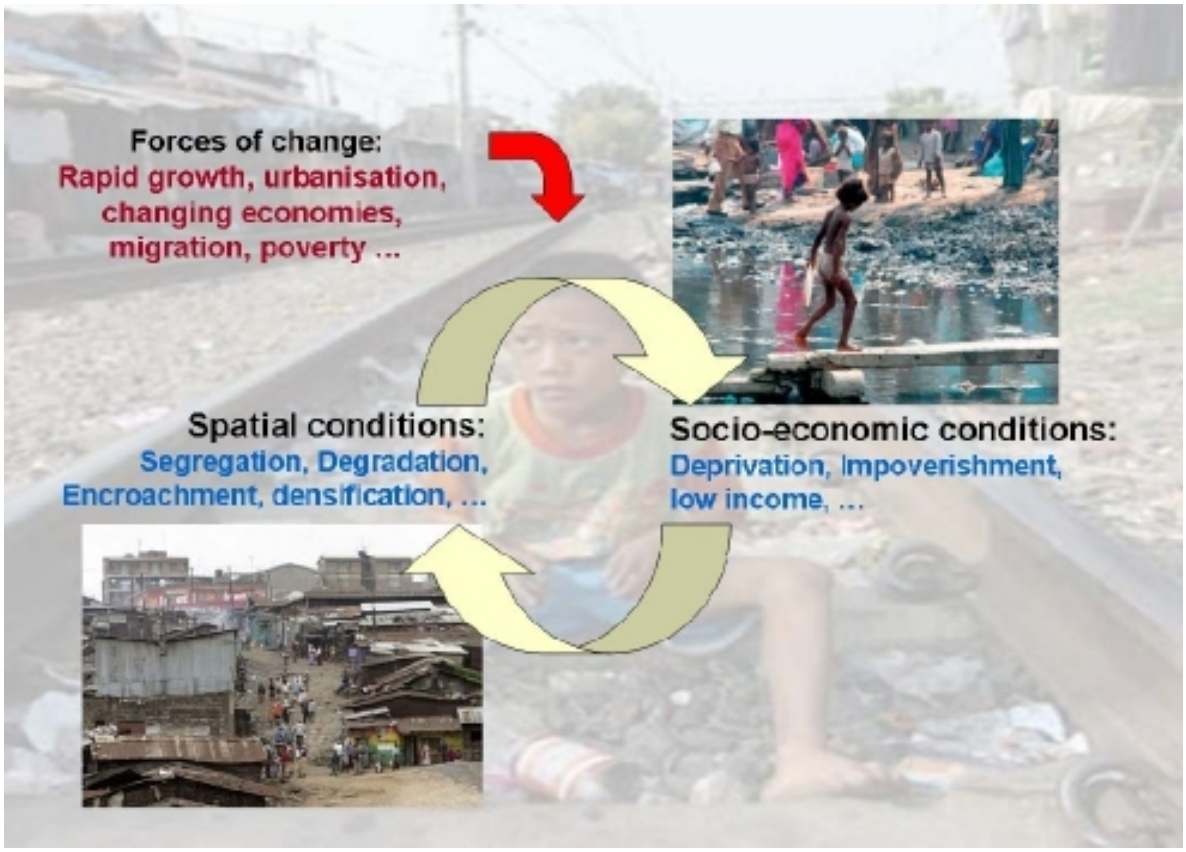

Figure 1: The vicious circle of urban decline

3. THE VIRTUOUS CIRCLE OF REGENERATION

Unfortunately, with the failure of total eradication of the slums, or regeneration by self-help, exacerbated by failing economic, shortage of resources, explosion of population, and governments' failures, the future of informal settlements does not seem very bright. However, if we could find a way to reverse the descending spiral of decline and turn it to an ascending spiral of improvement, there will be hope for all deteriorating urban areas.

The reality is that poverty and economic deprivation have always been and are very likely to stay with us for a long time. Designers, planners, community workers and to some extent even local authorities, cannot control the main social forces behind poverty and deprivation; what could be controlled, or at least be challenged, is how they manifest themselves in the built environment. This paper has no intention of finding solutions for eradicating poverty. Instead, it hypothesises that by a deep understanding of declining informal settlements, be it a slum or not, we can develop solutions that could lead to a process of regeneration based on adaptive corrections of the fundamental problems of slums. These fixes, which have mainly a spatial nature, will lead to initial improvement in socio-economic aspects of the life in these areas, and in return will generate better spatial conditions. The better spatial conditions will encourage/enable the residents to improve their socio-economic status further, or will attract social classes that could contribute more to this

improvement. The continuation of this circle will create a positive process, or a 'virtuous circle of regeneration', which in the longer term could permanently improve the household conditions that define an area as a slum. More importantly, this process, if implemented properly, will prevent other declining areas to become slums.

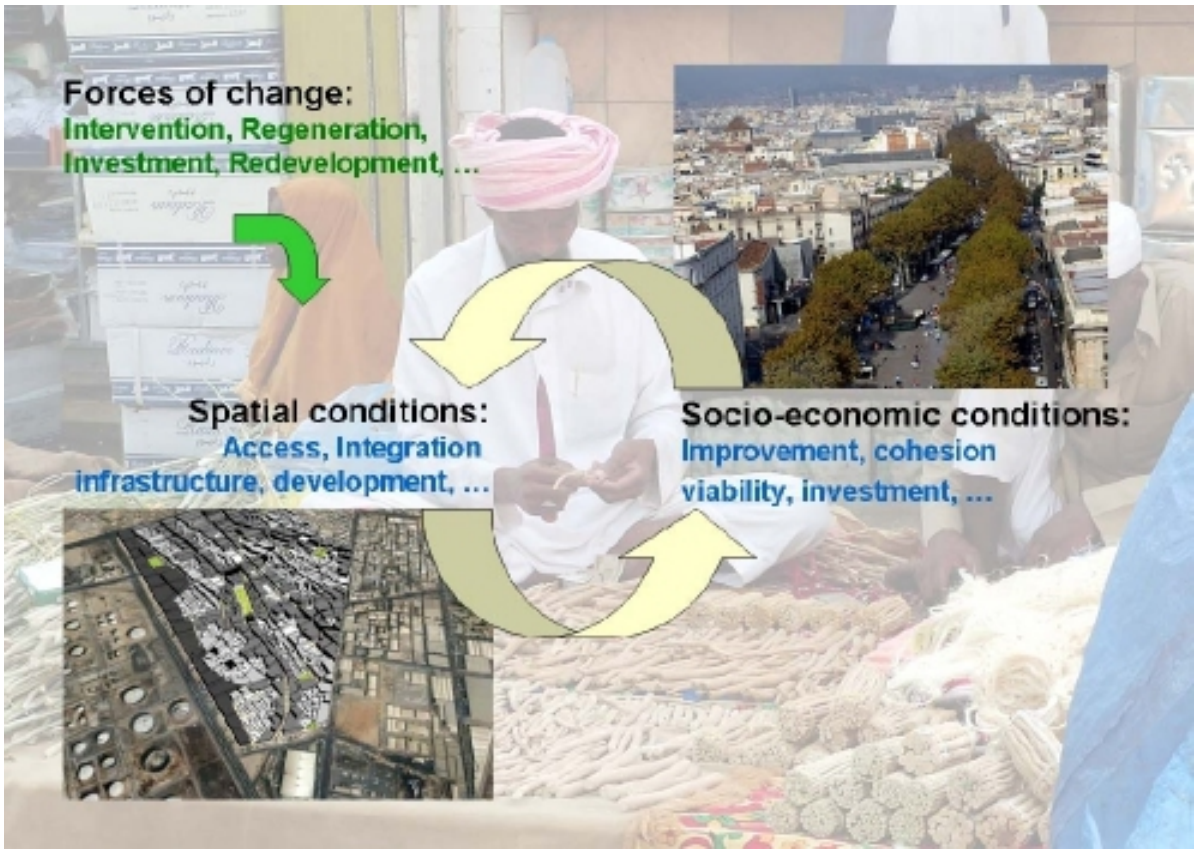

Figure 2: The virtuous circle of urban regeneration

Using the case of unplanned settlements, or slums, of the city of Jeddah in Saudi Arabia, we will introduce an adaptive methodology, which could generate a range of compatible solutions for regeneration to reverse the process of decline in these areas.

4. THE UNPLANNED SETTLEMENTS OF JEDDAH

With a current population of approximately 3.4 million, Jeddah is the second largest city in Saudi Arabia. Historically, and still today, it continues to function as the gateway to two holy cities of Makkah and Madinah, and as an important commercial hub for the entire Red Sea region. The city is experiencing a very rapid rate of growth and the projections for the city's population for the next 20 years show a population of 5-6 millions for the city (Municipality of Jeddah, 2009, p. 20).

The city of Jeddah before 1950s was confined within a very small boundary (about 1 sq Km), currently defined by the historic core of the city. At that time, there were also very small, organically grown villages outside the walled city, which had no urban significance, but traditionally functioned as a place for the non-urban population to settle in. The city has grown exponentially in terms of its area and population since the mid-Twentieth century and is currently hundreds of times bigger than it used to be in the past.

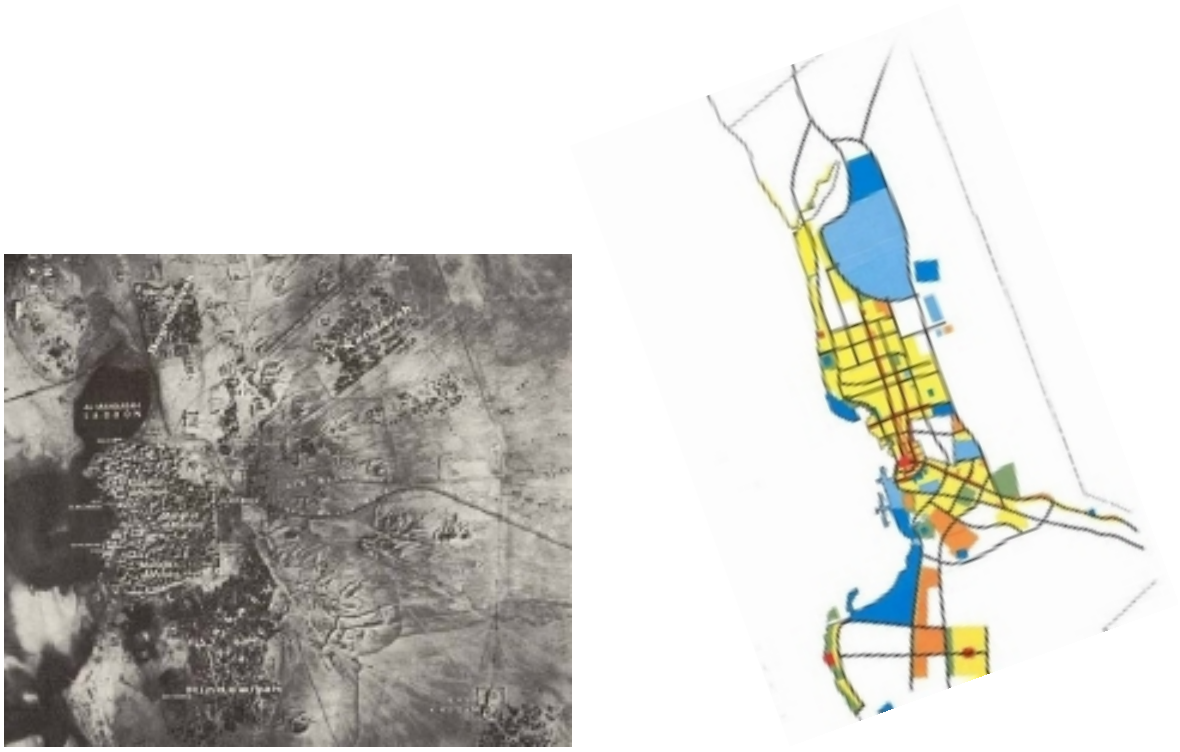

Figure 3: The old city of Jeddah c. 1948 (left). Proposed Masterplan for Jeddah, Sirt Jackson and Saudi Consultants 1978 (right).

In the 1960's and 1970's, the city grew very rapidly along the Makkah and Madinah corridors. This coincided with the creation of a rectilinear grid of very wide streets for fast traffic and large scale motorway infrastructure to the north and east. As a result, the modern fabric of the city has absorbed the older parts and invaded the hinterland. While the modern city was being shaped with planned streets and regular sub-divisions within the new urban blocks, the old villages turned into informal settlements. These areas, which used to be prosperous or at least well-functioning urban settlements, turned quickly into heavily deteriorated areas. At the same time, migrants and poorer Saudi families, who were in need of cheaper places to live in, created many informal settlements in the fringes of the city. These areas are also categorised by the city as 'unplanned settlements' or 'slums'. Currently there are around 50 unplanned settlements in Jeddah with an estimated population of one million people (Municipality of Jeddah, 2009).

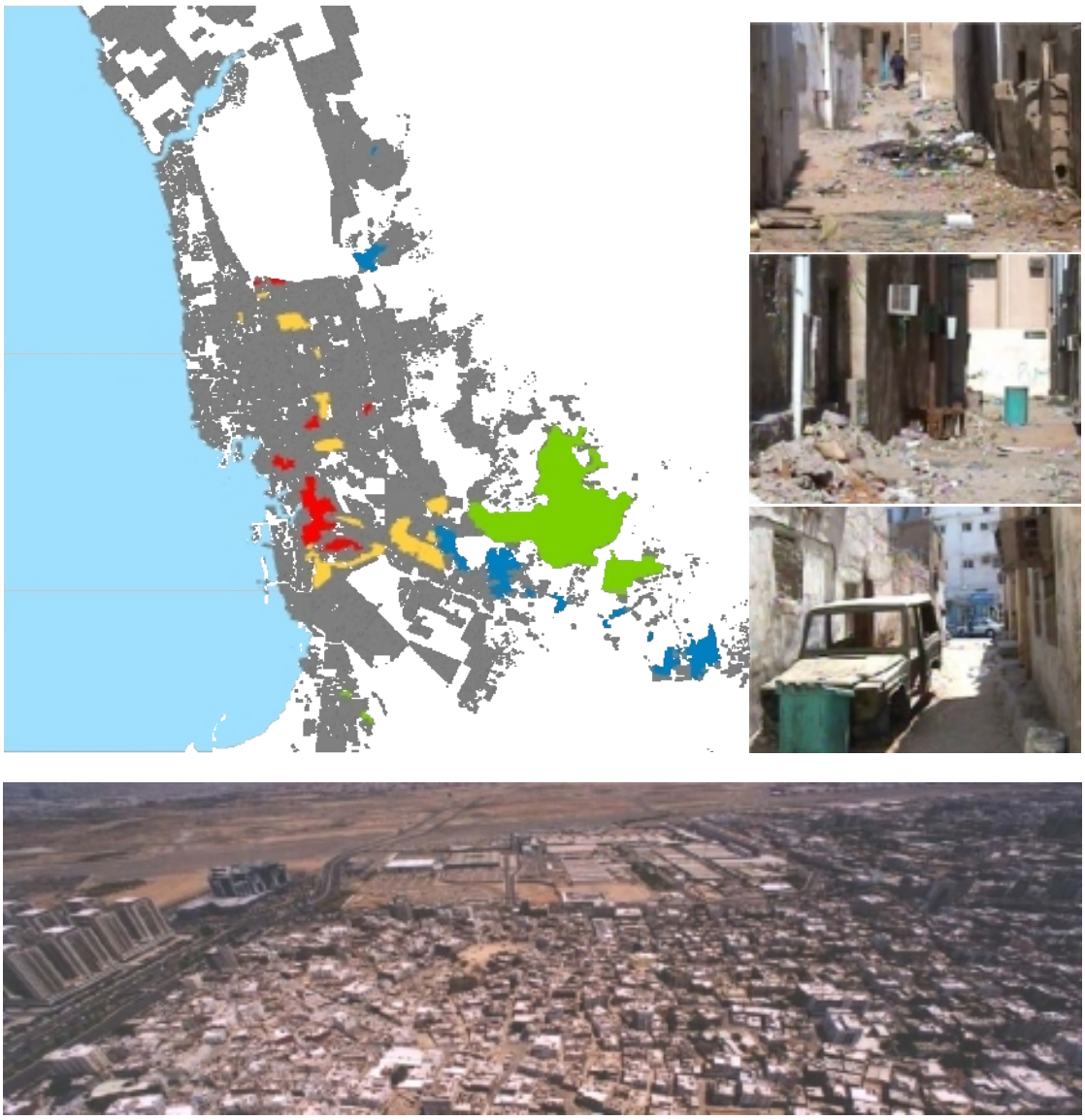

Figure 4: Unplanned settlements of Jeddah (red and orange: inner unplanned settlements; blue and green: fringe unplanned settlements).

For the urban poor and migrants unplanned areas have become the most affordable locations to live in, with foot access to facilities, services and sometimes jobs. The maintenance of urban infrastructure, however, has remained very poor in these areas while subsequent subdivision of the residences over time has led to high population densities. The highly localised pattern of street networks in conjunction with the smaller size of urban blocks and fragmented spatial structure display a sharp contrast with the characteristics of the city at a global scale, which is characterised mostly by the higher mobility of the better-off citizens.

In the past decade, the physical, social and economic deterioration of the unplanned settlements intensified to such a level that the governor and newly-appointed Mayor of Jeddah in 2005 made the transformation of the unplanned settlements a priority for the city and appointed a number of advisors to advise on this issue. As it could be anticipated in a developing city such as Jeddah, the first solutions that the city authorities had

in mind was about total redevelopment and reclamation of the informal areas. In their view, these areas were so bad that total demolition was the only possible way to change them. However, soon it became apparent that this cannot be done easily due to the shortage of financial, economic and socio-political power to undertake such a gigantic transformation.

As one of the city's advisors, Space Syntax limited [1] was appointed to undertake a study, called the Jeddah Strategic planning Framework, which was intended to provide the city with a strategic view about major issues of growth, planning and development. The study of unplanned settlements fitted very well into this Framework (Space Syntax Limited, 2006a). A major recommendation of this study was that a deep understanding of the informal settlements, based on an analytical and objective study of these areas, was needed to develop a long-term regeneration programme for the informal settlements. This research subsequently fed into the Strategic Plan of Jeddah, which suggested a Jeddah Without Slums Programme, for the city of Jeddah (Municipality of Jeddah, 2009, chap. 12).

Built on the recommendations of the Jeddah Strategic Planning Framework and the Strategic Plan, a series of further studies have been undertaken by Space Syntax Limited to develop a comprehensive programme for the regeneration of unplanned settlements.[2] A full discussion of all these studies is well beyond the scope of this paper, but, we will only focus on the essence of the proposed programme, particularly the methodology and principles, in order to introduce a new approach to the regeneration of deteriorated informal settlements in Jeddah and other parts of the world.

5. THE SPATIAL AND SOCIO-ECONOMIC CONDITIONS OF INFORMAL SETTLEMENTS IN JEDDAH: THE CYCLE OF DECLINE

Our earlier argument about the vicious circle of deprivation finds a very clear example in Jeddah. The syntax measures of angular segment analysis (Hillier and Iida 2005) for local and global radii reveal an interesting phenomenon: unplanned areas come out as areas with high measures of local choice while the citywide super-grid, underlined by higher values of global integration, run outside these areas, even the ones that are located in the most central parts of the city (Karimi, Amir, Sahfiei, & Raford, 2007). In sharp contrast, these areas develop a very distinct local structure, which is captured by syntactic analysis at a lower metric radius (for instance 1200m or lower), as shown in Figure 5, but this structure does not fit into the spatial structure beyond the boundaries of the unplanned settlement.

[1] Space Syntax Limited (SSLimited), is a spin-off company of UCL (University College London), that has been established to utilise UCL's research in providing consultancy for the real life projects. SSLimited has been working on a string of urban design and planning projects in Jeddah since 2006

[2](Space Syntax Limited, 2006b); (Space Syntax Limited, 2008); (Space Syntax Limited, 2009a); (Space Syntax Limited, 2009b);(Space Syntax Limited, 2010a); (Space Syntax Limited, 2010b); (Space Syntax Limited, 2011).

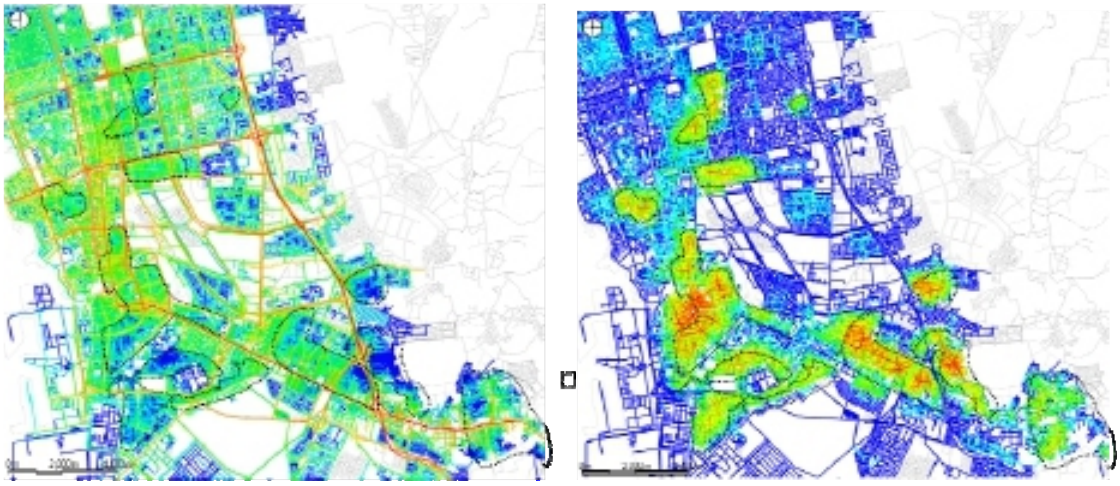

Figure 5: Segment angular analysis of Jeddah, global integration (left) and local choice (right)

The spatial discontinuity between the local and the global scale of urban grid impedes socio-economic improvement in long term, especially through decreasing the share of unplanned settlements from the global 'movement economy' (Karimi, Amir, Sahfiei, & Raford, 2007). This spatial condition correlates strongly with the socio-economic conditions of fabric of these areas which have adversely changed in the past 30 years.[3] The wealthier Saudi residents have been replaced by poorer Saudis and particularly by poor immigrants.[4] As a result, poorer residents have moved to areas with poorer spatial accessibility.

The dramatic change in the socio-economic fabric of these areas has led to further spatial deterioration. These areas have become exceedingly dense.[5] The housing conditions have become worse and physical dilapidations spread wider. There has also been more encroachment on the public realm and street network. Spatial degradations in return have led to further socio-economic conditions. For instance, there are high rates of crime in these areas, or at least high perception of crime, according to the authorities, which is in sharp contrast with very low crime occurrence in the rest of the city(Happold Consulting, 2007; Space Syntax Limited, 2010b). There are also reports of drug usage and prostitution, which are absolute taboos in the Saudi society.[6] This vicious circle of decline seems to be continuing and the slums of Jeddah are growing at a fast rate.

[3] Poor accessibility of the unplanned settlements to the infrastructure and service network is very common and reported before in the other cities of developing countries (Balbo, 1993). Similar studies, using space syntax methodology, have shown that spatial configuration plays a major role in the formation and consolidation of the informal settlements (Hillier, Green, & Desyllas, 2000).

[4] The latter group, who are predominately from poor Muslim countries, come to the Makkah region for performing Hadj (pilgrimage), but decide to stay there illegally since much better economic opportunities are available for them. However, they end up living in deprived areas of the city with very poor infrastructure and access conditions.

[5] The unplanned areas of Jeddah exhibit a population density of 300-500 ph, whereas the rest of the city is around 25 ph.

[6] These facts tend not to be documented in official reports due to general reluctance of the authorities to highlight them. However, in informal reports, or discussions, they are always brought up by authorities or experts on unplanned settlements.

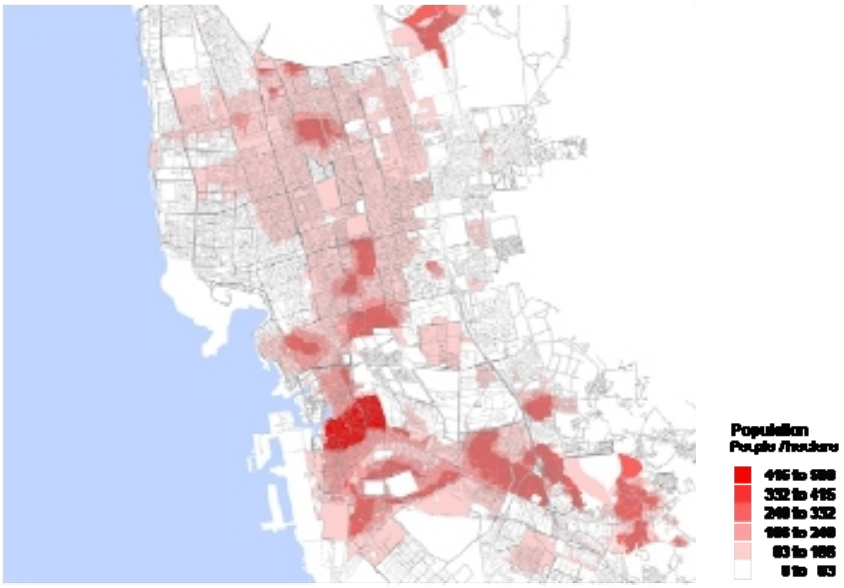

Figure 6: Jeddah, population density

6. AN EVIDENCE-BASED, ADAPTIVE REGENERATION PROGRAMME: REVERSING THE CYCLE OF DECLINE

As argued in the first part of this paper, the vicious circle of decline is very hard to break without various layers of intervention and a proper programme for change. The biggest difficulty for a large city, such as Jeddah, is that this programme needs to be a general programme for the entire unplanned settlements, but at the same time very specific to each area, and more importantly, it needs to be able to adapt when conditions, such as the appetite of the private sector for investment, confidence of an area in self-generation, availability of national and international funds, and current socio-political environment, change. Concurrently, the principles of the regeneration plan for an area cannot change entirely if some of these conditions change. This will cause an endless waste of time and resources that go into regeneration at each stage. In order to make all contributions positive and complementary, there is a need for a more objective and realistic programme, based on primary principles of regeneration, but flexible enough to change course, when needed.

This programme begins with an intensive analysis of the areas. Based on the analysis the areas will be categorised and specific strategies for each area is developed. Based on the analysis and area-specific strategies, a strategic design for the spatial structure, landuse, density, and infrastructure is proposed. A financial model, which depicts the economic viability of the plan, is developed to help develop different implementation scenarios, and a stakeholder consultation, forms the main concepts for implementation scenarios. The implementation scenarios are proposed as different variations of an Area Action Plan. A series of urban design guidelines is developed for each scenario to ensure an appropriate long term output of each scenario. Finally, an implementation phasing strategy is recommended.

6.1: Analysis

Rigorous analysis and profiling of each settlement was carried out using specially developed indices to understand the following existing conditions. The complete process of analysis in this study has been documented elsewhere (Karimi et al., 2007) and here we just refer to the elements of the analysis:

- Spatial accessibility
- Spatial structure
- Urban Morphology index
- Socio-economic index
- Transformability index
- Infrastructure indices, including:
    - Public Realm index
    - Utilities index
    - Social Infrastructure index

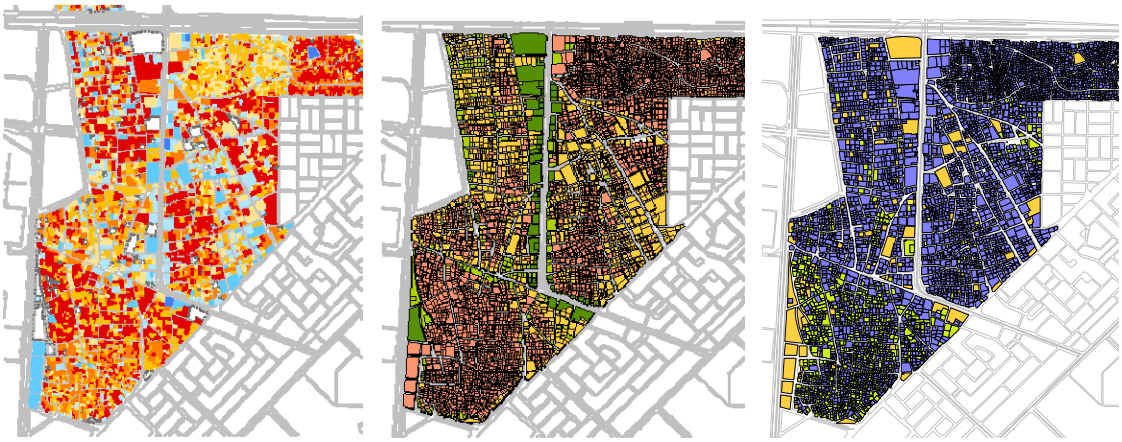

Figure 7: Some of the indices produced in the analysis phase: Transformability index (left), Public Realm Index (middle), and Utilities Index (right)

6.2 - Profiling and Prioritisation of areas

A very important study that has to be undertaken in any big city in the world is the profiling of informal settlements to create a detailed characterisation and typology of the areas based on their spatial, social, and economic factors. In Jeddah, this profiling study benefited from a series of syntactic, morphological, functional, social and economic measures. Through a process of consultation with the client, the measures and weighting given to each measure were discussed with stakeholders to find out the most effective combination. The areas were ranked based on their total scores and four categories of unplanned settlements were defined, with an internal priority ranking for each of these categories. The details and results of this ranking are beyond the scope of this paper, and hence has not been presented, but the concept of stage is an important element of the process and could not be left out in this paper.

6.3 - Defining strategies for each area

The intention of the area-specific strategies is to provide an individual, specific, needs based response that creates the minimum disruption but maximum benefit to each settlement. The first stage of this process is the analysis which was described earlier. The second stage is based on the analysis to understand the level

of intervention required. The intervention strategy identifies what is missing or underperforming in each settlement, and uses the intervention recommendations to allow the settlement to move from the existing situation to a target. The target provision levels were set by the Jeddah Strategic Plan (Municipality of Jeddah, 2009), international best practice standards, and consultation with stakeholders. By benchmarking each settlement's results an intervention strategy was generated to responds directly to the individual needs of the area (Figure 8).

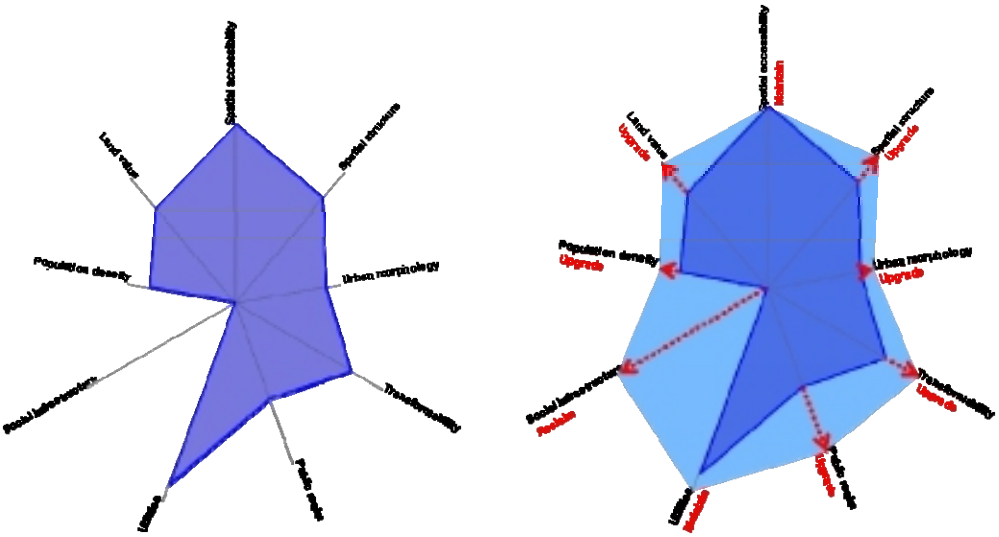

Figure 8: Existing settlement conditions (left), Target settlement conditions and proposed strategy (right).

6.4 - Strategic Design: Identifying the spatial Skeleton for Regeneration

The regeneration strategy that this paper proposes is built on the strategic challenges and opportunities that had been concluded from the detailed analysis of these areas within the context of the whole of Jeddah.

A major idea in this approach is to adapt the existing spatial structure to reconnect the isolated and fragmented core of the unplanned areas to the city-wide street grid while preserving the integrity of local physical and spatial structures as much as possible. Proposed spatial structures were informed directly by the analysis and deep understanding of the unplanned settlements. The aim of the design interventions was to link the local structure to the global structure using the minimum intervention to create the maximum positive impact (Figure 9).

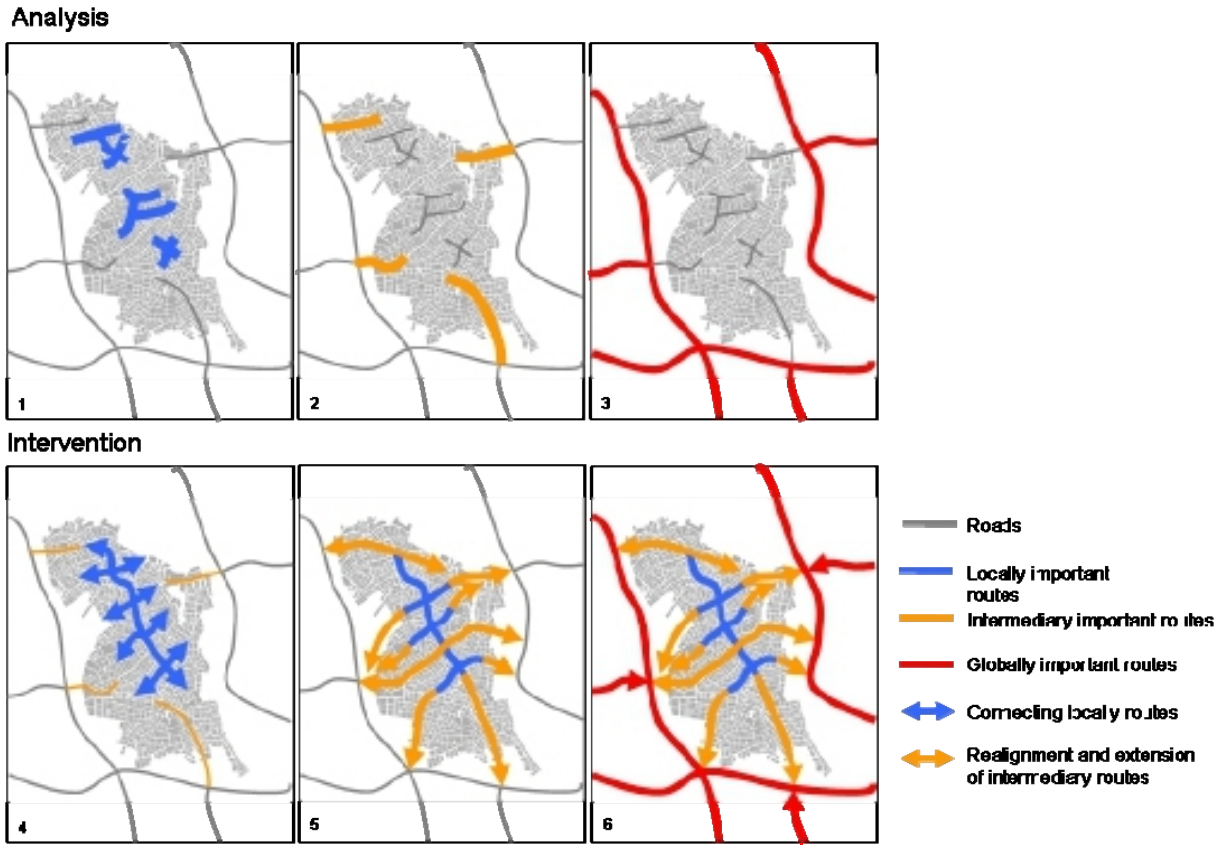

Figure 9: The main spatial concept of regeneration is to remedy the shortcomings of internal (left), intermediate (middle) and external spatial structures (right).

The design methodology was used to generate designs in the following stages:

- preliminary design
- review against analysis
- design testing
- design refinement
- detailed assessment
- route network definition
- spatial impact assessment.

The output of the design included:

- Route hierarchy

Based on the results of the impact assessment (stages four and eight), a route hierarchy was developed. The most accessible routes in the spatial analysis became the primary routes, next most accessible secondary routes, and so on. This approach ensures that the roads which are most accessible, and therefore are most likely to attract higher levels of movement have the highest capacity for all types of movement.

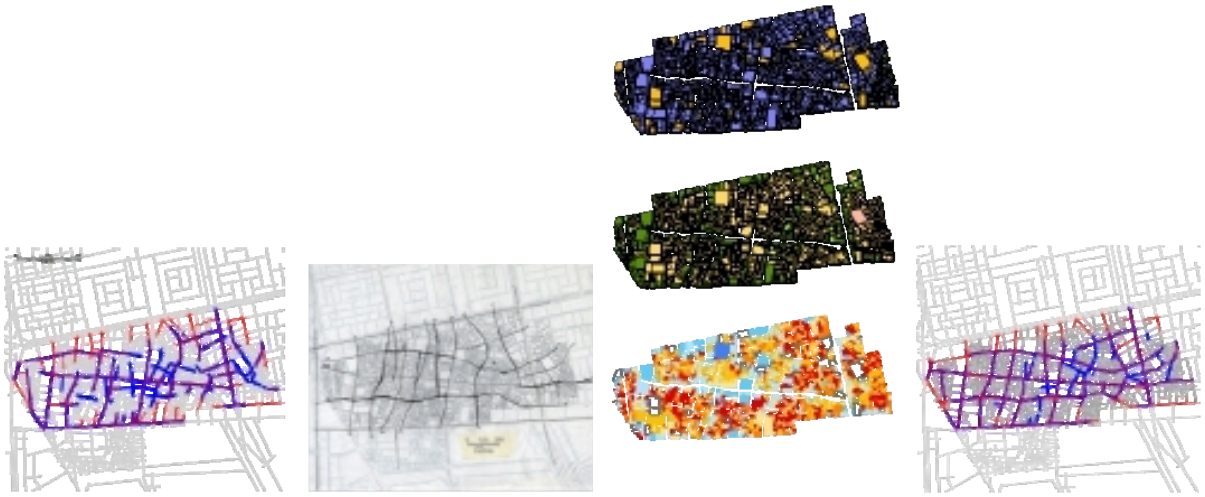

Figure 10: Stages of spatial design and introduction of a new route hierarchy.

- Functional distribution: land use

Using the same principles, outline design guidelines were prepared. Identifying the streets which will attract the highest levels of movement means that land uses can be distributed efficiently. Commercial uses which require exposure to pedestrian movement can be located in these places, while land uses which don't require exposure to movement, such as residential, can be located elsewhere.

- Functional distribution: density, FARs

Similarly, FAR (Floor Area Ratio, or the ratio of total floor area to plot area) can be distributed in the locations which can be accessed most easily, and which therefore can support higher levels of density.

- Functional distribution: social infrastructure

Provision of social infrastructure must be improved in unplanned areas to meet current standards. Major investment in social infrastructure is required and will bring long term benefits to levels of education and health care, which in turn will benefit the economies of these areas. The amounts of social infrastructures were calculated using the local, and best international standards, but were revised according to the realities of the unplanned settlements (such as very high population density and lack of open space). The calculated land uses were distributed according to the spatial structure and the length of access.

The result of the above mentioned stages is a skeleton Area Action Plan, which could be used as the base for different scenarios.

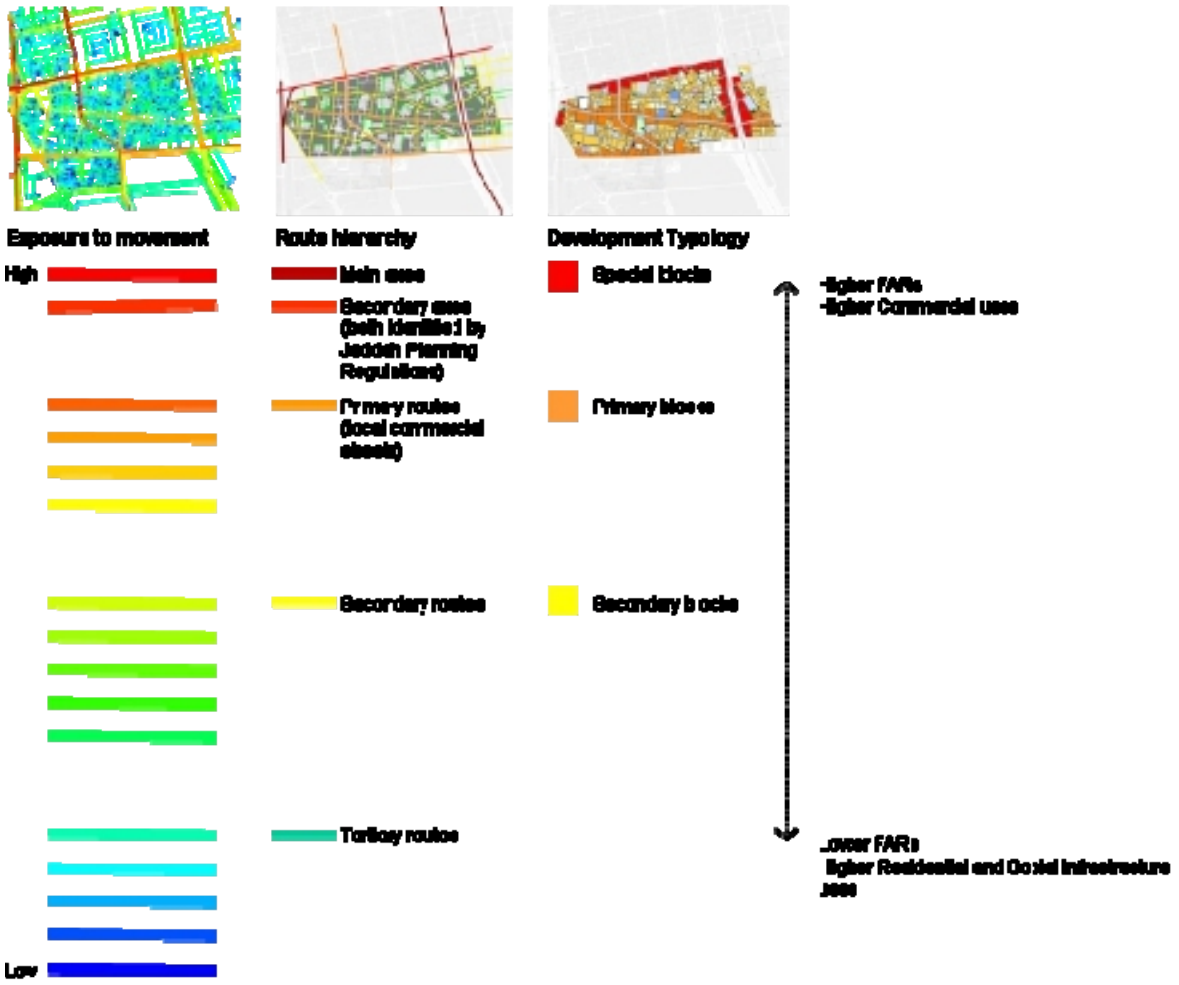

Figure 11: Distribution of land uses and densities according to the spatial structure.

6.5 - financial model and stakeholder consultation

To understand the level of investment required for delivering improvements, and to try to select the most suitable Area Action Plan option in relation to development conditions, a series of financial models was constructed. To develop cost models, an understanding of the amounts of existing land, building space, and proposed public realm was required for each regeneration scenario (to be introduced in the next section). Each settlement and scenario was subdivided into a set of smaller projects from which this information could be extracted.

Models calculate the costs required at each stage of implementation. Further analysis breaks down the cost of implementation by stage, by unit of settlement affected, and by unit of saleable space to allow a comparison of scenarios (Figure 12).

In parallel to financial modelling a series of workshop with stakeholders, such as the residents representatives, the chief (Omdah) of the community, the local municipality, and the city experts, were held to make sure that the proposed skeleton designs were compatible with what the stakeholders wanted (Figure 12).

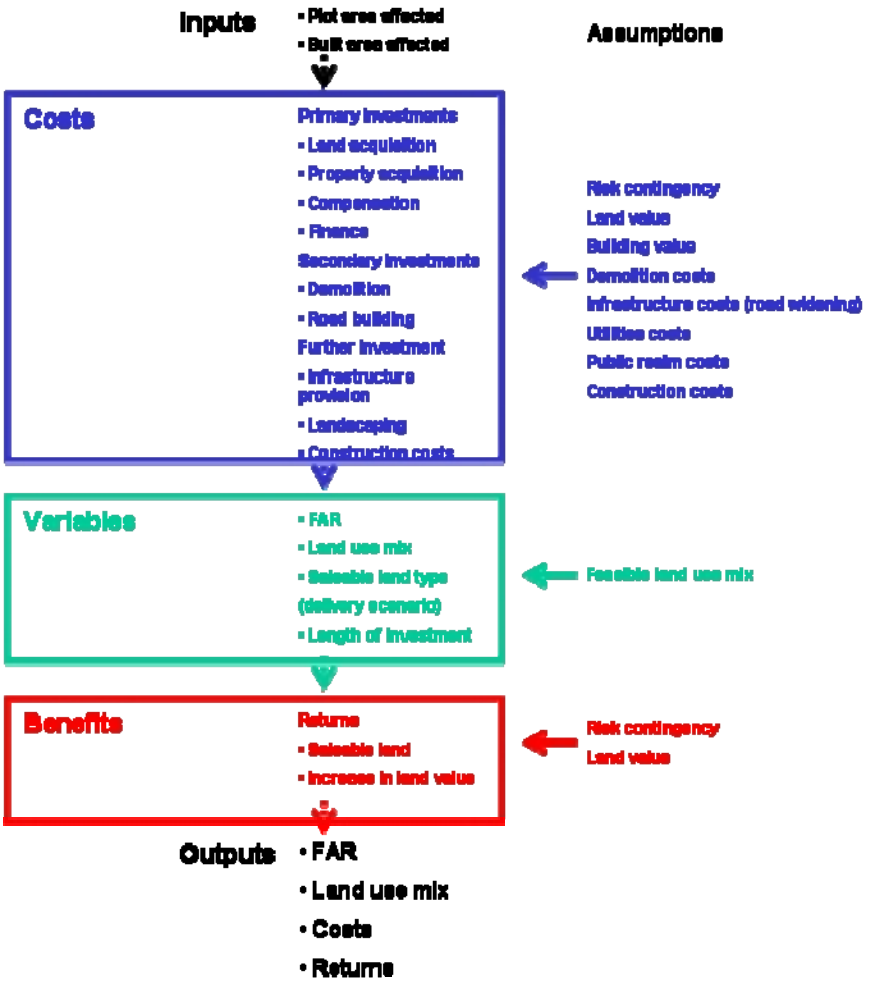

Figure 12: Financial modelling (top) and stakeholder consultation (bottom).

6.6 – Regeneration Scenarios: Area action Plan Scenarios A-D

Development scenarios are used to define the process by which Area action plans are implemented. The unplanned settlements cover a wide range of existing conditions and as a result vary in needs, urgency in receiving help, attractiveness to external investments, available internal resources and so on. Additionally, there is also the possibility of social, economic and political changes in future which would influence the regeneration strategy in all or specific areas. For a project to be able to optimise the available resources, development scenarios have to combine a series of variables to respond.

The main guiding principle in this process is to avoid unnecessary disruption to existing settlements and to create a targeted, incremental upgrading. Using spatial accessibility analysis the concept behind intervention is to develop a strong route structure and to identify a set of urban blocks on each side which could be redeveloped.

This approach also allows the designs to respond to the possibility that no private developer is interested in a settlement. In this case the Municipality or JDURC [7] could upgrade the roads to create the spatial structure and simultaneously implement a set of incentives and guidelines to encourage residents to redevelop their own plots. Four variations on this approach have been developed into scenarios, which have been tested in the financial model.

Definitions of each development scenario are therefore as follows:

- scenario A: complete redevelopment of settlement by super-blocks carried out by developers
- scenario B: street upgrade and construction of linear bands of new development by developers, self organising regeneration of the rest of the settlements by residents
- scenario C: street upgrade and formation of development bands by JDURC/Municipality, construction of development bands by developer, self organising regeneration of the rest of the settlements by residents
- scenario D: street upgrade by JDURC/Municipality, self organising regeneration by residents.

It is important to mention that Scenario A and even B would normally fall into more commonly known categories of gentrification and displacements rather than regeneration. However, these scenarios had to be built as part of a full spectrum of possibilities needed for a fully flexible programme. In fact, in the beginning of the process, the client and local authorities were convinced that Scenario A was the only way forward. It took some time to convince them that the more workable solution for regeneration is the one that could combine different approaches in one single programme.

[7] JDURC (Jeddah Development and Urban Regeneration Company) has been set up by the Municipality of Jeddah to lead regeneration projects in the city of Jeddah.

Figure 13: Area Action Plan, Scenario A. From spatial structure to an Area Action plan (left to right).

Figure 14: Area Action Plan, Scenario B/C. From spatial structure to an Area Action plan (left to right). Scenarios B and C have a similar physical definition, but vary in the implementation phase.

Figure 13: Area Action Plan, Scenario D. From spatial structure to an Area Action plan (left to right).

6.7 – Minimum intervention regeneration plan: scenarios E

After development of four regeneration scenarios, it became apparent that another scenario was needed when the local authority and the regeneration company wanted to minimise their intervention, or the budget available for regeneration was minimal. The aim of Scenario E is to create a framework that seeks to improve the area with the absolute minimum physical disruption to the existing settlement. In this scenario, major changes to the spatial condition are not sought; instead, the spatial structure of the area is used to optimise the improvement and distribution of aid in these areas. The founding principle of this scenario is to provide an upgrade in living conditions to the widest group of people. It does this by proposing a spatial structure which defines improvements in the areas which are most likely to be used by everyone in the settlement.

Improvements are proposed within the core categories of: Access and Public Realm, Utilities and Services, Socio-Economic and Social Infrastructure, and Face-Lifting.

The great advantage of this scenario is that improvements could be set up as small, independent projects which can be delivered by the Municipality, local NGOs, charities, or even by local residents, as and when funds are available. Such projects, if implemented well, have the potential to improve the overall character, sense of community and image of the unplanned settlements. In return, a social force will be created which will push the area to adopt more positive transformation of the spatial structure (Scenarios A-D).

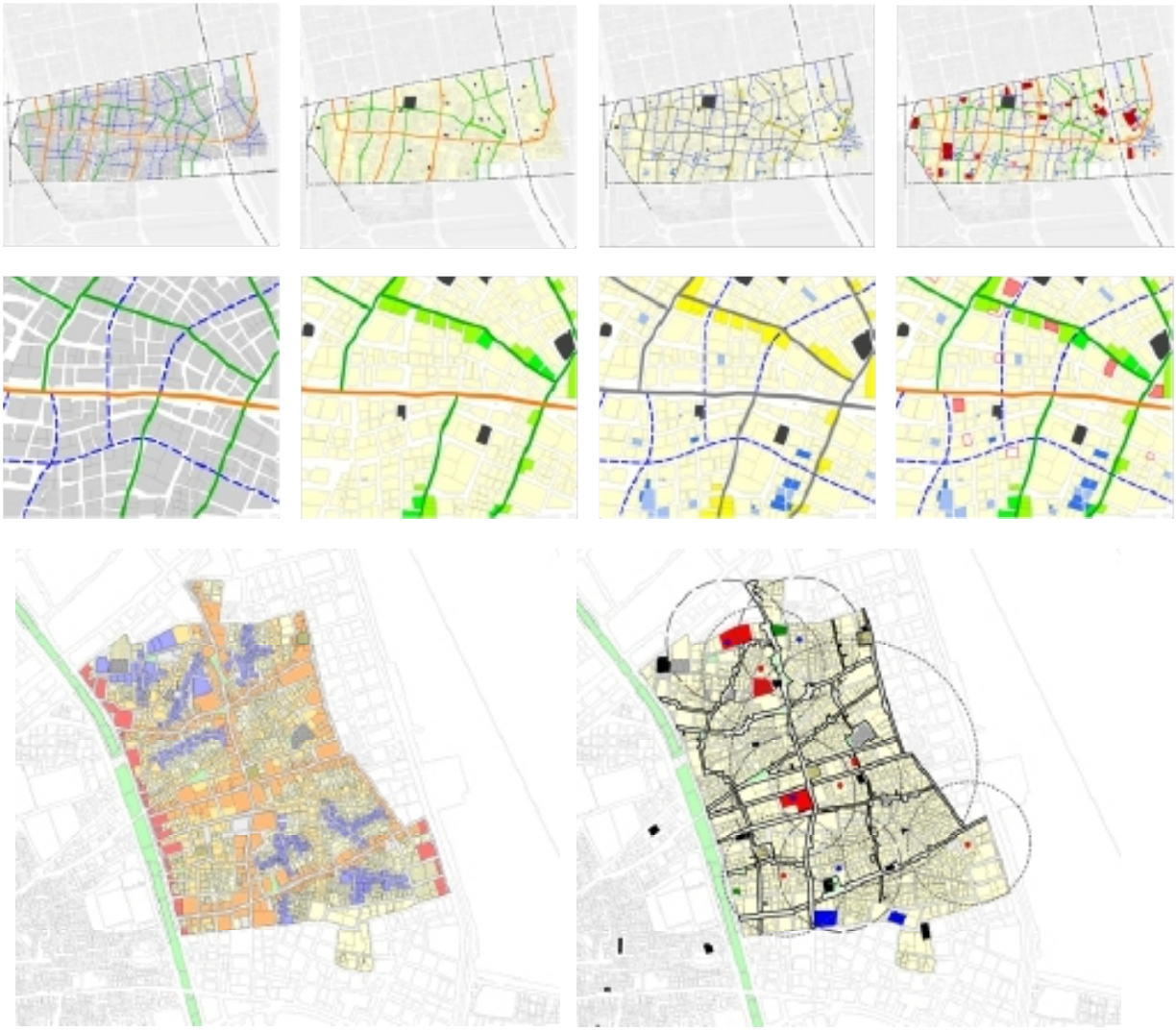

Figure 14: Area Action Plan, Scenario E. From spatial structure to an Area Action plan (top left to right). Area improvement guide (bottom left). Social infrastructure distribution and public realm project boundaries (bottom right).

6.8 – urban design/planning guidelines; implementation phasing

To make the self-generation of the Area Action Plans easier and coherent, a series of urban design/planning guidelines were developed to assist the local authority, developers and residents to coordinate and control the development of plots and public realm. These include guidelines for streets, public realm, block subdivisions, land uses, FARs, and many other issues to the level of urban blocks and plots (Figure 15).

Finally, a project implementation programme was proposed for each area to assist the phasing and staging of work within each scenario. This breaks the entire regeneration process into 3-4 stages, starting from the most feasible and pragmatic projects that have the biggest impact on the regeneration of the areas (Figure 16).

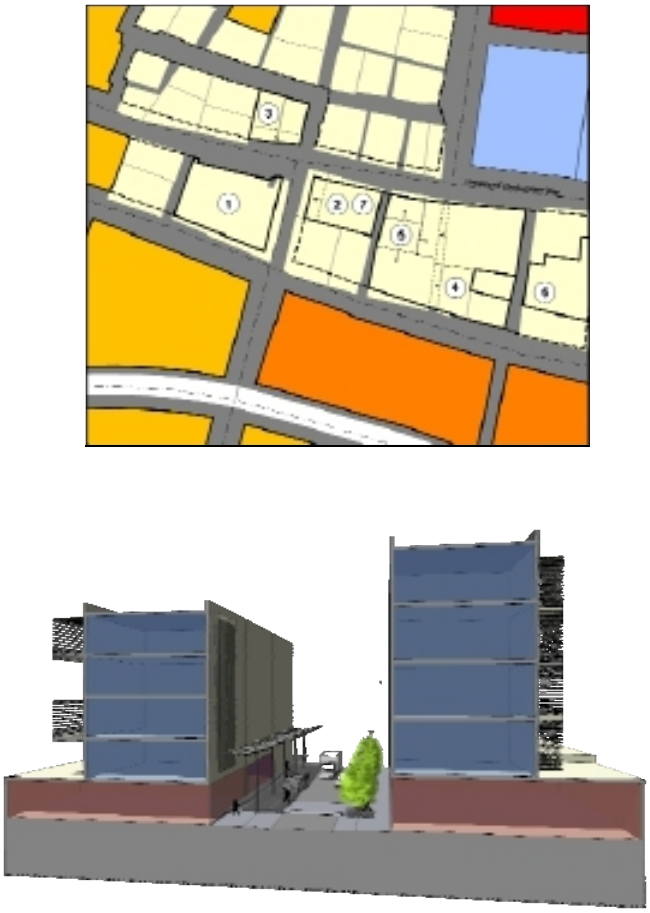

Figure 15: Examples of urban design guidelines: plot adjustments (left), and street character (right).

Figure 16: Examples of project definition and implementation phasing: Scenario E stage 1 (left), stage 2 (middle), and stage 3 (right).

7. ADAPTIVE REGENERATION SCENARIOS

While the outcome of each regeneration scenario is different, because they share the same spatial structure it means it is possible to combine delivery scenarios in each area. This allows the potential that, for instance, if developer interest is sufficient at the beginning of the intervention process, Scenario A can be followed to start the regeneration process. For any combination of reasons it may not be possible for Scenario A to be applied throughout the rest of the settlement. As a result of the way project boundaries have been defined it is possible to switch to Scenarios B to D in other areas. If none of the A-D Scenarios are possible, Scenario E could be adopted to work with whatever resources available and wait until more help is provided to switch to other scenarios.

In this sense, the regeneration process could be started with minimum resource (as little as a bucket of paint!) and progress further when more resources are available. Because all delivery scenarios are completely compatible it means that the approach to development is flexible enough to respond to any change in circumstances. More importantly, involved institutions, such as local authorities, NGO's, international aid agencies and local residents will have a reliable framework to consolidate their efforts and avoid making big mistakes or wasting resources.

Figure 17: Regeneration scenarios (left) and an example of a hybrid scenario (right)

8. CONCLUSIONS

In the fast-growing and rapidly-changing cities of the world, urban areas rise and decline constantly. The causes of these rises and falls are complex and not always easy to identify or to address. Declining informal settlements and slums are the harsh realities of the modern age. It is hard to envisage that there will be any ways to eradicate or avoid them entirely, but what we, as researchers, urban designers, planners and decision makers, could do is to develop solutions that would improve and upgrade them constantly within the constraints of their context. If the programme of change is effective and adaptive enough, it could reverse the process of decline, or 'the vicious circle of deprivation', to a positive cycle that gradually and incrementally makes the areas improve and become normal urban areas: a 'virtuous circle of improvement'.

This programme of regeneration is most efficient if it is based on an analytical and objective understanding of these areas and the causes of slum creation. By identifying the most fundamental problems, we can tackle them more efficiently. It is also very important that this programme becomes a flexible and adjustable framework that could adapt when the conditions change. A solid plan, no matter how good it is, will fail at a certain stage when its underlying conditions change.

This paper has introduced a programme of regeneration which is intended to have the above mentioned characteristics. Although it is predominantly based on research on one city, but the aim is to create a methodology, or an approach, rather than a final solution for a particular. This approach begins with analysis and develops solutions which are based on evidence and realities of the unplanned settlements. The output is a framework which provides a reliable skeleton for regeneration, but through interchangeable and adaptable regeneration scenarios, this programme tends to maximise flexibility and adaptability.

The evidence-based, adaptive framework for regeneration, described by this paper, has been developed for regeneration of the unplanned settlements of Jeddah, but it has the potential to be adopted for the regeneration of any declining informal settlements in the world.

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