

TOOLS FOR CREATING SUSTAINABLE RIVERSIDE DEVELOPMENT IN KHARTOUM-SUDAN

Ibrahim BAHRELDIN



Mr. **BAHRELDIN** Ibrahim is an Architect and Planner. He is also a lecturer of planning at University of Khartoum-Sudan. He worked as a part-time consultant in many architectural and planning firms in Sudan. He is currently on study leave doing a research leading to Ph.D degree in City Planning at Waseda University, Tokyo-Japan.

Mr. **BAHRELDIN** had obtained many local academic and professional awards as well as several international Scholarships and grants. He had published several conference papers, Journal articles and reports. His research interests focus on riverside development, community empowerment, and public participation in low-income communities.

About the Author

TOOLS FOR CREATING SUSTAINABLE RIVERSIDE DEVELOPMENT IN KHARTOUM

BAHRELDIN Ibrahim Zakaria

Department of architecture- Universty of Khartoum

P. o box 321 -Khartoum-Sudan

E-mail: ibrahimza@uofk.edu

1. Introduction

1-1 An overview of Sudan

Having an area of 2506000 km², Sudan is the largest country in Africa¹. The heart of the country, in terms of population lies at the confluence of the Blue and White Nile where the three largest cities in the country (Khartoum, Khartoum North and Omdurman) are located. The three cities forms the capital region and contains about 20% of the country population. The total population of Sudan was estimated as 30 million in 1999 , with an urban population estimated at 33% . Nearly 2.2 millions are still entirely nomadic.

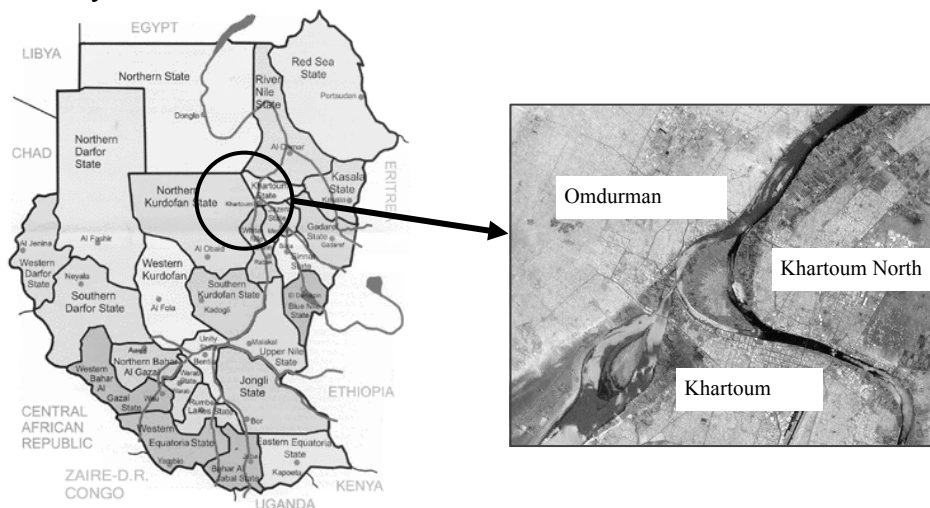


Fig. 1 location of the capital region of sudan (Khartoum)

1-2 Quality of place in Khartoum

Those who visited the capital city of Sudan " Khartoum" are immediately struck by strong quality of place. The horizontal expanse of the barren desert country, the slow movement of the great life giving Nile, the immense sky and the burning sun combined to create a singularly powerful environment ².

A lot of element are combined together to shape the quality of place in Khartoum, the confluence of the two rivers³, the narrow, fast Blue Nile and the slow, wide White Nile, the interesting natural landscape, the decreasing, yet, magnificent urban agriculture, the natural forest of Al-Sunnut and the vast desert. The above elements suggests that the living experience in the city of Khartoum very much linked to nature and to the riversides.

¹ After the secession of South Sudan the country area dropped to 1,886,068 km² .

² Towards a phenomenology of Architecture, 1980. Christian Norberg-Schulz, Academy edition, London.

³ Named as the White Nile and the Blue Nile



The confluence of the white and the blue Nile

The vast desert country

The quality of landscape (urban agriculture)

Fig. 2 The structure of the urban environment and the character of the city.

1-3 Flooding

As much as other river-side cities in Sudan, Khartoum suffers from frequent floods occurs during the rainy seasons (June -October). Although the city CBD is relatively secure ⁴, the majority of the riverside settlements in the city are not (Fig. 03).

Fortunately, the vast urban agriculture areas boarding the riverside act as flood control zones that absorbs and delay flood water progress . Most of those areas are located at Al-Sunnut forest ⁵, Tuti island and University of Khartoum riverfront.

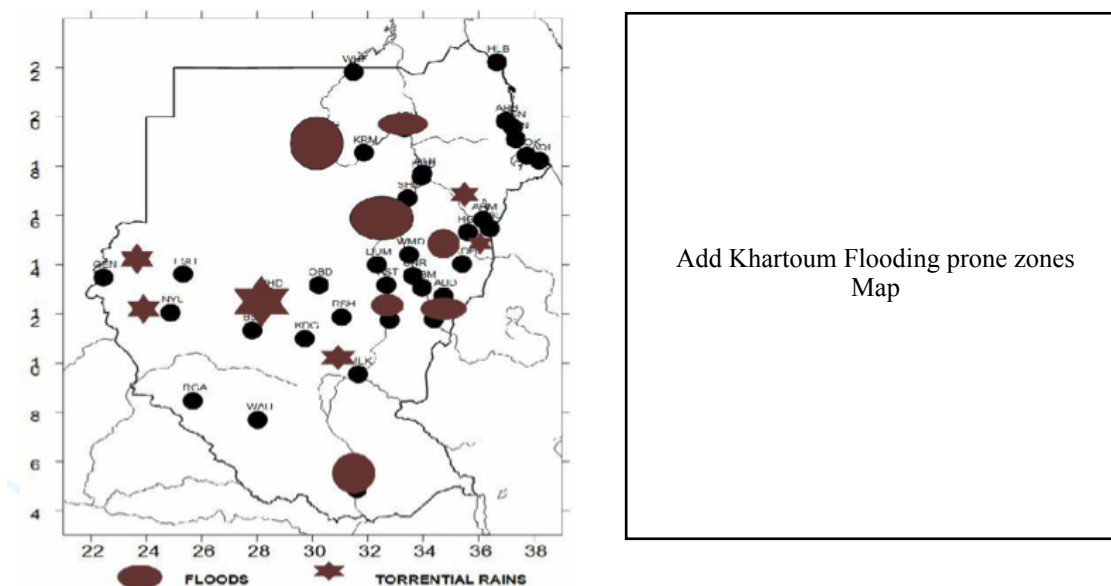


Fig. 3 Areas vulnerable to flooding in Sudan at the left and in Khartoum to the right.

1-4 Khartoum CPD

An interesting fact about khartoum CBD is that in contains the safest riverside edge along the city. In general, Khartoum CBD is composed of a very homogeneous activities that are dominated by commercial, business and services functions. A belt of mixed-multi-functional activities surrounds those functions. Ten types activities are traced within Khartoum CBD which covers about 430, 7 hectare and has a very low residential activities and up to 70% of its functions are allocated for commercial services and business activities.

⁴ The city CBD is where most of the government activities and buildings are located.

⁵ The only natural forest still preserved at the centre of Khartoum

The city of Khartoum itself accommodates about 4,000,000 inhabitants. While most of city settlers live in the periphery, the city downtown is generally empty a part from the business hours. This phenomena was reflected directly to the pattern of activities along the CBD riverside.

2. Introductions to the change project

2-1 General Introduction

The economic boom occurs in Sudan during the last 15 years was accompanied by rapid, uncontrolled development in the capital region. While Khartoum had witnessed three previous master plans since independence in 1956, lack of descent development policies and the weak planning institution had contributed to poor management and development along the riverside.

The geographical location of Khartoum as a city that is connected by the rivers (River Nile and its tribunes) places an opportunity of achieving an active city connection through the river. As a matter of fact, there are several ferry line working along those rivers, yet they are poorly maintained and generally inefficient. The connection to the historical old Tuti Island is not an exception.

2-2 Justification of change project importance

Despite the attention that has been brought forward to Khartoum riverside, the city is still unable to utilise the available resources and opportunities. Spatial design, urban morphology and infrastructure are not yet up to the challenge placed by the city growing urban changes. The poor utilisation of those resources can be traced back to:

- Uncompleted and unrealistic plans that has been made for the riverside and Khartoum at large.
- The missing functional connections between city and the water.
- Lack of proper development policies that guides and administer riverside development.

In general, the bad experience of dealing with development around the riverside and the city at large has led to lack of recognition of the important role of physical planning, both by the government and the public.

3. Objectives of the change project

The objective of this change project is to contribute to;

1. Guide development along the riverside to ensure that the development meets the basic principles of sustainable development ⁶.
2. To transform Khartoum riverside into beautiful, sustainable and liveable space, with several, parks and public spaces that can foster economic growth through strategic public private partnerships.
3. Create creative activities and re-defining how the city functions are connected
4. Create an integrated, yet, coordinated sustainable urban development in terms of:
 - a. The reintegration of the apartheid and the fragmented city of Khartoum.
 - b. The Integration among different income groups.
 - c. Integration of urban services through the influx of certain services in certain nodes, with reference to each node characteristics.
 - d. Integrations of the different department related to plan planning, plan making and plan implementation.
 - e. The integration of land uses with transportation planning and sustainable public transportation.

⁶ Lack of binding guideline of riverside development shows the necessity of principles-driven development.

4. Vision for this change project

Our physical development vision can be achieved through certain principles that we believe will enhance the green dimension of the riverside and reduce the passing through traffic, these principles are:

4-1 River as spine (mobility strategy)

This principle is based on seeing the river as longitudinal spine that connects the whole city of Khartoum through an active, yet, sustainable water based mobility system. The system suggested connects the major water nodes to land nodes. Each one of those nodes (on the water side) is favoured with strong connection to the important existing land node (public transport and bus stops) through an urban park.

This strategy is also based on improving the existing tourist-oriented kind of water-based transportation into a comprehensive transportation system that connects the city to water through water gates (nodes). The system proposed in this report is not an isolated system. It is rather a system that is synced to the existing land transportation network (see Fig.05). The mobility strategy also is based upon the human being as the standard mobility users and as a reference to the distance between proposed connections.

4-2 Clean, healthy, accessible river

The open and public spaces principle is based on the use of those spaces as connector between the proposed water mobility system and the existing land based mobility structure. This strategy also aims at using plantation to achieve two goals, the first is using plantation as an air filter⁷. The second is using it as space definer in which plantation will be used to visually define various spatial functions allocated along the riverside.

4-3 Hybrid & mixed use riverside

This principle allows for a functionally homogeneous mixed-development along the riverside by infiltrating the dominating government (administration) activities along Khartoum riverside.

4-4 Creating Vibrant riverside

Making the riverside an active, liveable and accessible to public.

Our vision of the administration of the riverside development is based on a sincere and close collaboration through "a City Development Conference" developed by the major stakeholders. We believe that this Cooperation will create active and vibrant waterfront parks, public spaces, cultural institutions and diverse, yet, sustainable, commercial and residential communities.

5. Level in which change project could take place

In Sudan, the river is an essential life giving and structural element. The fact that most of the settlements are located around the river and its tributaries signifies the importance of this change project, which can then be applied at two main levels;

5-1 The regional level

Includes the use of water based transportation system at the regional level for passengers as well as goods exchange.

⁷ Khartoum is one of the cities that witness several dust storms during Summer

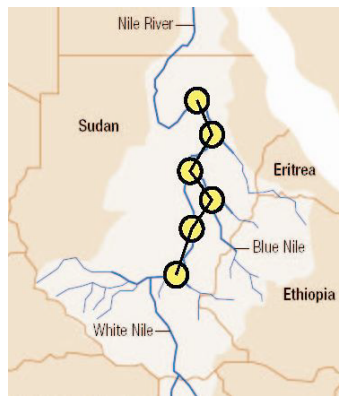


Fig. 4 Location of potential regional nodes along the country's riverside in which this change project can be applied

5-2 Local level:

Includes the adaptation of the previously noted visions at the local level of the city of Khartoum. This level will be dealt with in this report.

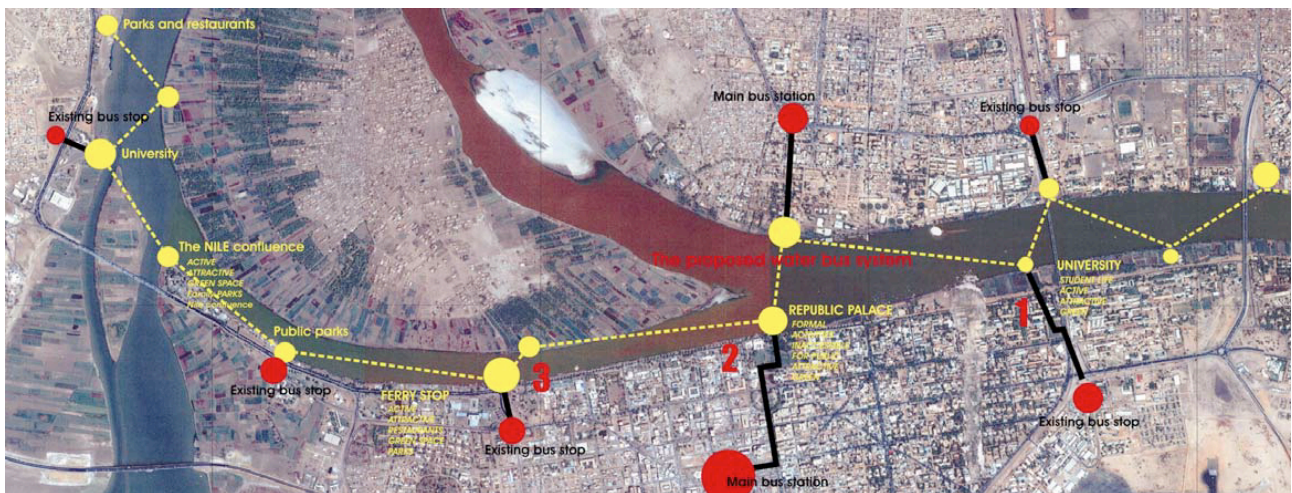


Fig. 5 the concept of integrating water-land transport system in the city of Khartoum at the local level

6. Basic SWOT Study for the change project

6-1 Strengths

- A high priority as a major development project.
- Possibility of being a pilot project at the National level.
- Potential of sustainable transportation integration system.

6-2 Weaknesses of the change project

- Lack of effective and sustainable development policies and binding bylaws.
- poor development directive provided by approved plans.

6-3 Opportunities

- Potential of implementing integrated, yet, sustainable mobility system.
- Potential of creating longitudinal multi-functional corridors that can enhance the existing functions (economy, culture, learning,).
- Potential of improving the sustainability of the tourist-oriented development.
- Looking at the Riverside as a motor for a high quality development (hybrid ,yet, knowledge-based development based on bringing more life to riverside).

- Better management of the investment influx .

6-4 Threats of the project

- The fast, uncontrolled developments driven by both the influx of investment.
- the lack of proper development policies.
- Poor flooding management and warning systems.

7. Situation Analysis

7-1 General Spatial structures that shapes the city of Khartoum

7-1-a City of Khartoum economic structure

Khartoum is favoured by being the place where most of the business activities are located. It's geographical location makes it as a major connecting hub to other Sudanese regions. The three cities composing the capital region are strongly dependent on each other. For instance Khartoum "the city" accommodates most of business and administrative facilities, Khartoum North is a growing centre for industrial development, Omdurman on the other hand, accommodates most of the heritage sites with some administrative and recreational activities. The capital region in general represents the main economic power of the country economy.

7-1-b Settlements structure

As mentioned earlier, in most of the Sudanese cities, human settlements are generally clustered along the river sides (the River Nile and its tributaries). The major settlements in Khartoum are generally located parallel to the white and Blue Nile with some nuclear development in between (Fig.6).

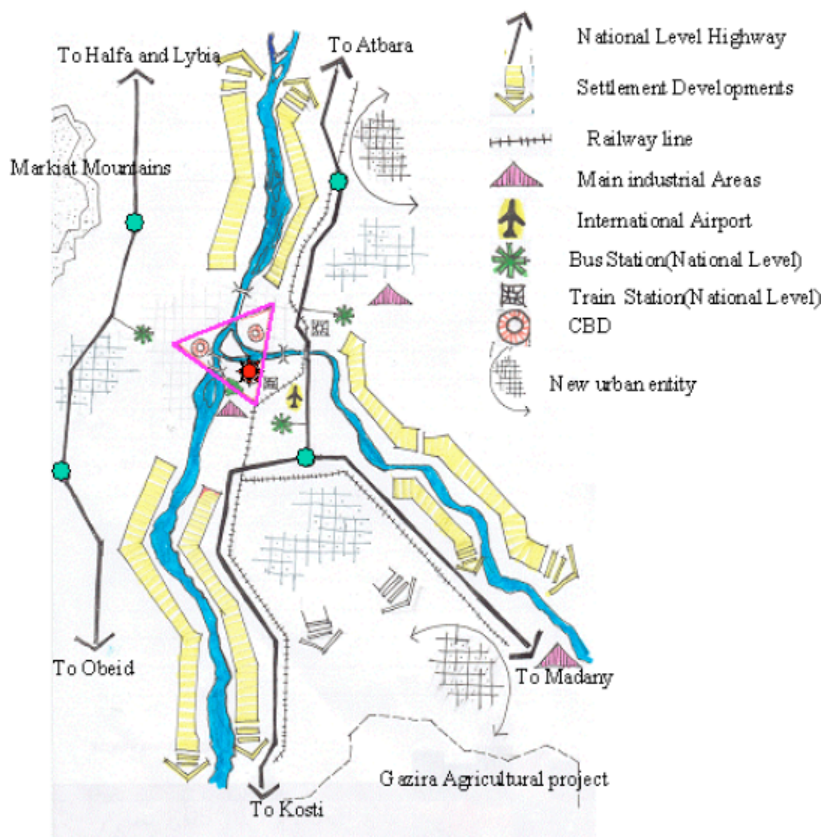


Fig. 6 Khartoum: Economic, Settlements and Mobility structure

7-1-c Mobility structure

Mobility and transportation issues in Khartoum are considered as the major challenge to the city urban future. Several reasons have contributed to this challenge including the high rate of urban growth, uncontrolled development, the mixture between different levels and hierarchies of roads and streets and of course the recent economic boom which resulted in an increasing number of private vehicles licensed every day.

One of the main challenges faced by transportation planners in Khartoum is that the local level roads

connecting the three cities are actually the same roads accommodating the passing-through traffic in the country highways.

7-2 Riverside oriented development in previous Plans

7-2-a Structure plan for Greater Khartoum-1990 (Doxiadis and A/Moneim Mustafa).

In response to the major challenges faced by the city of Khartoum, planning authorities initiated this plan to respond to those growing challenges. This plan suggested four new bridges to link Khartoum to other cities and reduce the traffic congestion. The plan also suggested the relocation of the a major governmental functions allocated along the Khartoum riverside. Although the main concern of this plan was to deal with the fast city growth, the reality did not show major improvement.

7-2-b Waterfront study 1992 (Urban planning directives)

This study covered Khartoum CBD riverside, which extends from the armed forces bridge in the far East up to the Al-Sunnut forest in the west. In this study, the riverside area was divided into six homogeneous divisions based on the type of activity occurs there. Although the study has comprehensively covered the physical settings inside Khartoum CBD, it lacked the river-side oriented development strategies and visions.

7-3 Types of water edges available at the riverside of Khartoum

The typologies of waterside in Khartoum are essential part of this study. The nature of water edge identifies methodologies and techniques of further improvement. This is essential as it help to develop the area in reference to how people interact with that place. Our study of sixteen different location along the riverside (Fig.7) found out that there are generally four dominant types of water edges, those are:

7-3-a Water edge space.

In this typology, there is always land-to-water access. Building blocks represents an intermediate lace between water and the city. Several examples of this typology can be identified In Khartoum riverside, for instance, the traditional defence wall built during the Mahadeiya in Omdurman (the Tabeiya), the recreational area and restaurants in Khartoum city riverside and Khartoum North residential neighbourhoods bordering the North waterfront of the Blue Nile.

7-3-b Perforated edge.

This type generally provides strong contact with water through a perforated passageway or terraces that act as an access to water. Some examples are the restaurants in Omdurman area and some of the residential neighbourhood in Khartoum North. In this typology, a passage way along the edge of the water or underneath the building is normally observed.

7-3-c Set -back building edge.

This is clearly the most common water-building relation in Khartoum CBD, where the space between the building vary from narrow passage “in Al-Kalakla)” up to a wide avenue in khartoum CBD waterfront.

7-3-d Beach/river Yard

This typology is also common in Khartoum and can easily be observed in Suba South of Khartoum, as well as in Al-Shigla riverside and it's surroundings. In general, in Khartoum, the White Nile riverside (which have a relatively shallow water level) is favoured by the most of this typology than the Blue Nile (Fig.07). Some few place in the Blue Nile do fell in this typology including the area in

front of the University of Khartoum and Ministry of External Relation (within the CBD of Khartoum).

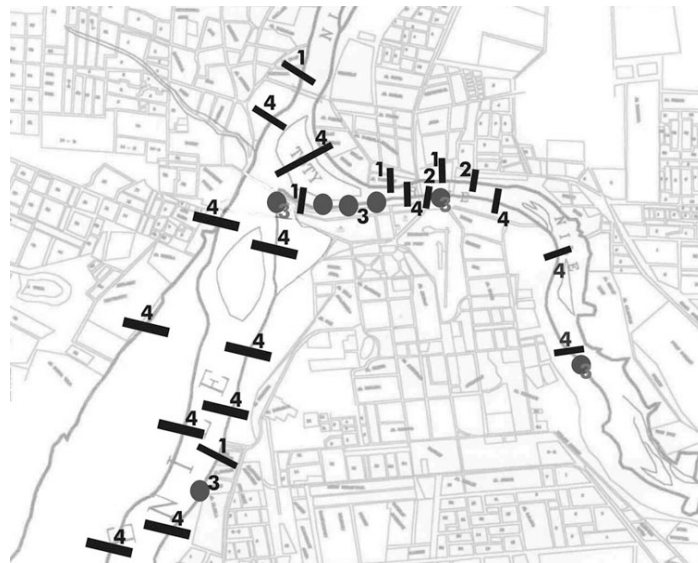


Fig.7 Typologies of riverside edges along Khartoum city waterfront

8. General strategies for riverside development

A part from the water based mobility integration system discussed, an open spaces and plantation strategy was also developed. This strategy is based on connecting most of the water-land nodes through a series of well-connected public squares and parks. this strategy is divided into three folds;

8-1 Mobility strategy:

The strategy is based on improving the existing tourist kind of water based transport into concrete system that connect all the city through gate to water, this system complimentary to the existing land transportation system.

Each nodes of this water-based transport system has its own characters. Each area is thought to be developed in away that strengthens the quality of the existing functions.

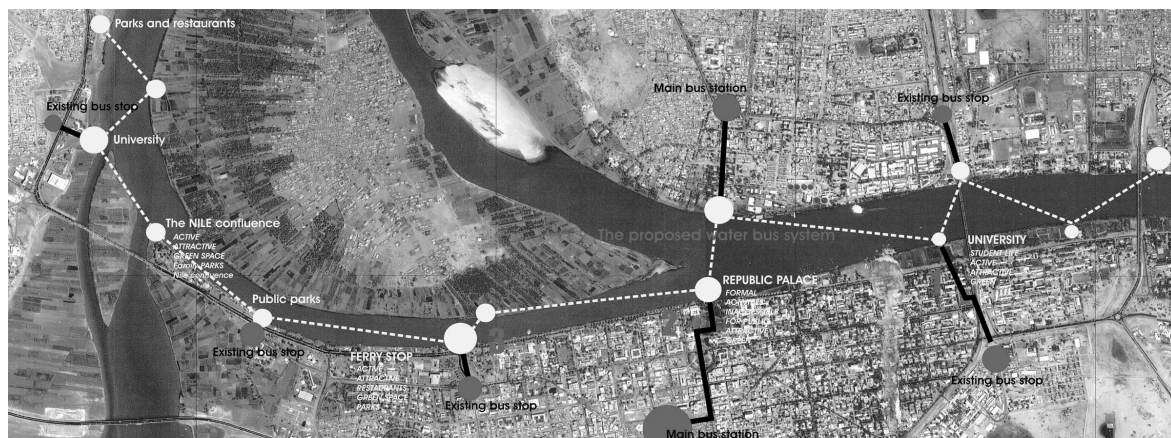


Fig. 8 Mobility Development strategy (River as city spine)

The size of the circle shows the importance of that node (the bigger the circle the important the node) the dotted line is the proposed water base transport system, while the black one is the connection in s to the existing transport network

8-2 Open and public spaces strategy

The open and public spaces strategy is based on the use these spaces as connector between the proposed water mobility system and the existing mobility structure.

Public spaces development direction is determined by the direction of passengers/peoples movement from the water-based transportation node to the land-based ones and vis-versa.

Development along these corridors happens either through enhancing the existing kind of functions or by adding new functions according to the nature of place.

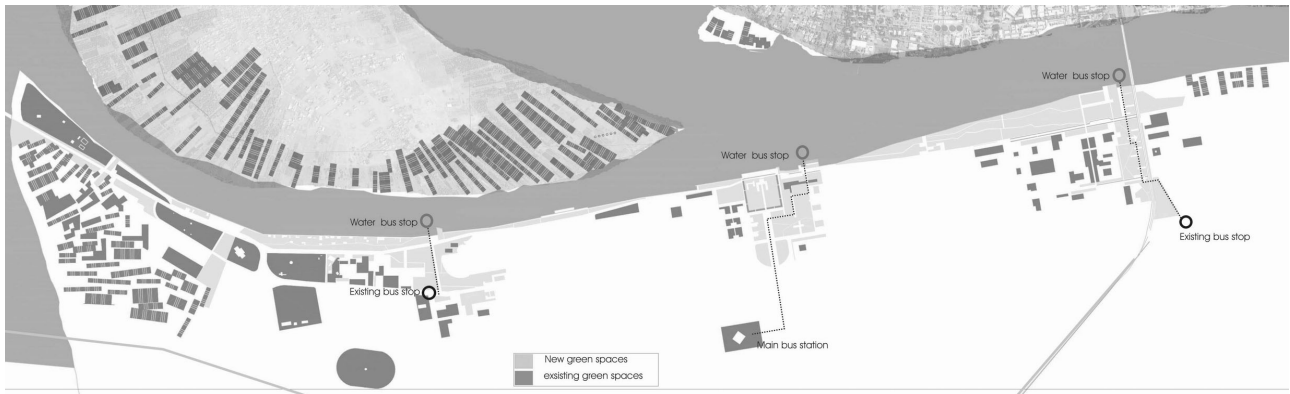


Fig. 9 the open and public space general strategy

8-3 Landscape strategy

This strategy is based understanding plantation as

1. Space definer.
2. As filter.
3. As typological connector .

Plantation as space definer include the use of plant to define the edge of the existing and the new programmed open spaces and functions., Using plantation as filter to purify the air particles and improve the temperature along the riverside area. Plantation as a typo-connector suggests the use of trees to connect the three different buildings typologies exists along the riverside (Fig.10).

The open and public spaces as much as the landscape strategy is proposed to guide people movement and define spaces in between.



Fig. 10 Landscape Development strategy (Planting as Space definer)

9. Spatial development Concepts and Realities

The provision of sustainable transportation system in Khartoum riverside depend on reducing of passengers movement via unsustainable modes of transport. It also aims at providing high-density development with strong emphasis on transport. The change project includes the management and control of several projects such as:

1. Control and develop existing land based transportation system through a participatory approach.
2. Create corridors, nodes and mixed-use economic development.
3. Promote economic development through the provision of adequate spaces for infrastructure within the area, this include commercial, industrial and leisure nodes, the water act as spine that combines all these kinds of money generating economic activities.
4. Create open and public spaces.
5. Increase housing densities.
6. Provision of social and physical infrastructure.

9-1 Activity plan

Mobility integration (water-based and land-based mobility modes) represents the corner stone strategy in this change project. The nodes where mobility modes interchange occurs are also strategic places of intervention. Those nodes can be strategically identified through the proposed scenario of “Urban Management Conference” in which wide spectrum of stakeholders (citizens, public sector, local governments, land owners, Transportation Chamber, etc.) participate to identify, assess and prioritise development issues related to this change project. The proposed participatory decision making approach will insure a collaborative identification of key interchange nodes along the riverside as well as the functional typology/character of respective nodes. The proposed activity plan allows for knowledge-based method of integrating the existing mobility structure on selected nodes to the proposed water-based mobility. The activity plan suggests Initiating and developing projects on those identified interchange nodes to connect the water to land modes of transport through public parks. Nature of those public parks are defined by the type of the functional activity identified previously through the Urban Management Conference.

Setting out Public Private Partnership to develop those parks with reference to their functional typology.

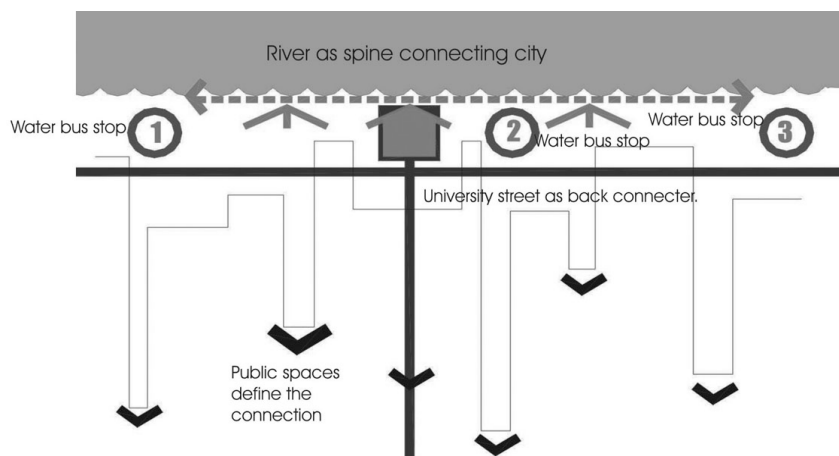


Fig. 11 The River as Water spine that connect the city

9-2 Activity Process

Identifying the most important nodes on the riverside, their characters and functions

An extensive analysis of Khartoum riverside identifies the strength and the weaknesses of each of the node in Fig.7. Accordingly, we proposed to develop these nodes through strengthening their dominant character and functions.

A simple survey has been also carried out by the University of Khartoum as apart of this project, the main task of the survey was to identify the location of the major possible interchange nodes that are likely to be developed to connect the land-based transportation modes to the proposed water-based modes (Fig.7). A parallel analysis was also carried out to identify the functional typology/character of each of those nodes.

For the purpose of this report, two out of sixteen identified interchange nodes (Fig.7 and 12) has been selected as the major development potential. The two nodes selected represent the diversity of the spatial characters identified through the nodes survey procedure.

Each one of the two nodes has been studied with special reference to its functional typology/characters. The outcome of this study is reported henceforth.



Fig. 12 location of the two nodes that has been selected for the purpose of this report

10. Schematic proposals for nodes development with reference to development strategy

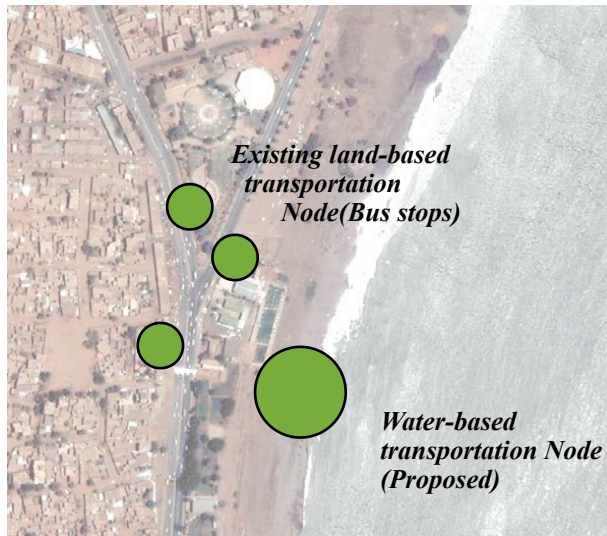


Fig. 13 The market & heritage interchange Node (Al-mawrada) Omdurman
Note: the small circles represent the existing land based transport nodes where the big one represents the proposed water based transport node

10-1 The market & heritage interchange Node (Al-mawrada)

Characteristic of node 01

located in the city of Omdurman, this node is an important land-based transport node in which access to most of Omdurman neighbourhoods is possible. This node is where the largest Fish Market in the city is located. Some other characteristics of this node are.

- Loading and unloading of fish to local market.
- Un-programmed/informal trading place.
- Shopping as daily activity.
- Easy connection to heritage site “Mahdi Mosque (tomb) and the Tabiya (fort)”.
- Park and passive entertainment
- Fish Restaurants.
- Government owned land.
- Potential of high investment attraction.
- Strong city-water connection through beach and yard water edge.
- Cafes.
- low level of flood risk.
- Swimming and fishing place

Development strategy for interchange node 01

The development strategy in this node is based on enhancing the existing functional activities in regards to water-city connection (the public park). Thus our development strategy considers;

- A green corridor and public Park as the main “water node”-to-“land node” connector.
- The expansion of the existing park to include the proposed corridor park.
- Enhancing the existing economic activities (fish market, restaurants and cafes), these income generating activities will be used to channel the investment influx towards the project implementation.
- Rehabilitation of the heritage sites and encourage tourism industry on that node.
- Creating temporary flooding reservoirs that could act as amphitheater or seasonal swimming pools.
- Plantation as air filters and space definer.
- Heritage as an asset for local economic development.
- Pedestrian dominated space with easy access to other transportation modes.

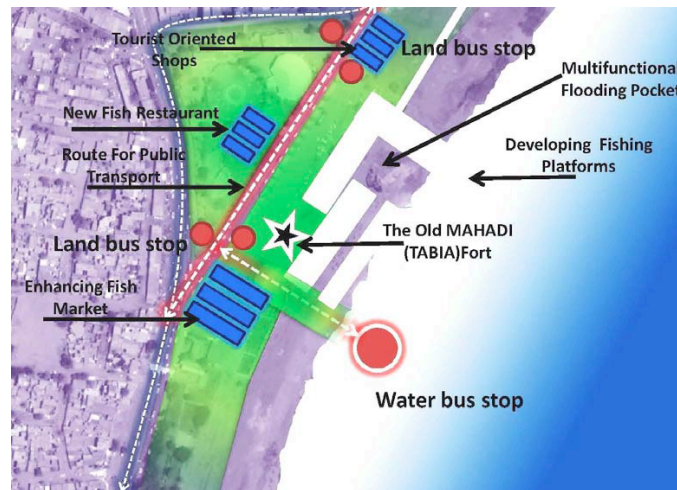


Fig. 14 Al-Mawrada Park Node, Development concept/strategy

10-2 University of Khartoum main Campus riverside (node 02)

Characteristics of node 02

located at the North of the main Campus of the University of Khartoum, this node is favoured with many characteristics including;

- Strong connection and easy access to the city CBD.
- Relatively quite ,yet, active riverside.
- Flooding covers the agriculture area between the Nile Avenue and the river.
- Urban agriculture zone.
- Strong connection to eastern part of Khartoum city (area east of Khartoum airport).
- Government owned land .
- Domination of University and research/teaching-related Activities.
- Key transport node from University of Khartoum to the rest of the city and vice versa.
- High investment attraction.
- A fishing and swimming place.

Development strategy for node 02

- Green corridor and public park as the main connector from water-based transportation nodes to land-based ones..
- Multi-function flooding reservoirs (flooding pocket to delay flood progress).
- Plantation as air filter and space definer.
- Potential of an integrated business development with university/research parks.
- The integration of the University of Khartoum Western playground as part of the proposed Park.
- Temporary flooding reservoirs could also acts as Amphitheater or temporary swimming pool.
- The proposed park accessibility and movement pattern has to be parallel to the site topography to allows for change of park elevation through different seasons .
- Plantation as space definer and air purifier.

7. Proposed new development concepts in University of Khartoum Node (02)

The development strategy for this area (Node 02) is based on enhancing the open sky sort of activities dominating the area through enhancing the following characters:

- Amphitheater.
- Play field (During flooding the Amphitheater and the play field turns to swimming pools).

- Planting as space definer.
- The Main pedestrian passage follow site topography, this will insure the accessibility of the park throughout the year.

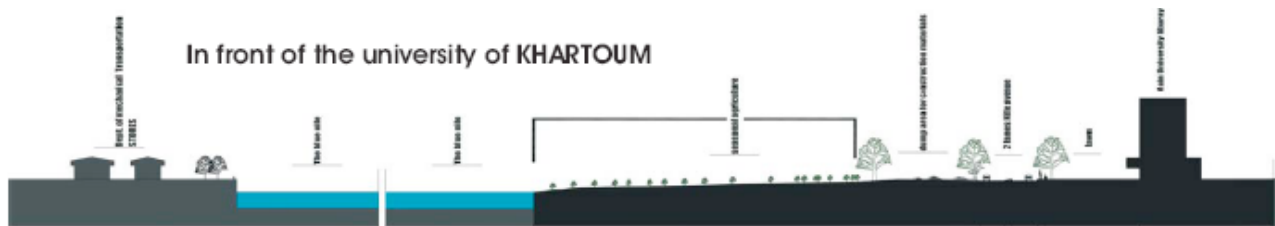


Fig. 15 the existing development type in front of university of Khartoum



Fig. 16 the proposed kind of development in front of the university area.

11. Project Time Frame & Implementation strategy

The implementation strategy is based upon an incremental planning approach carried-out by the proposed Urban Management Conference identified earlier. The two initial nodes studied are suggested to be developed within eight years timeframe. The project is suggested to be initiated by public authorities through public funding at the initial stages of the infrastructure provision. The rest of the project is suggested to be accomplished through public private partnership as shown in fig.17.

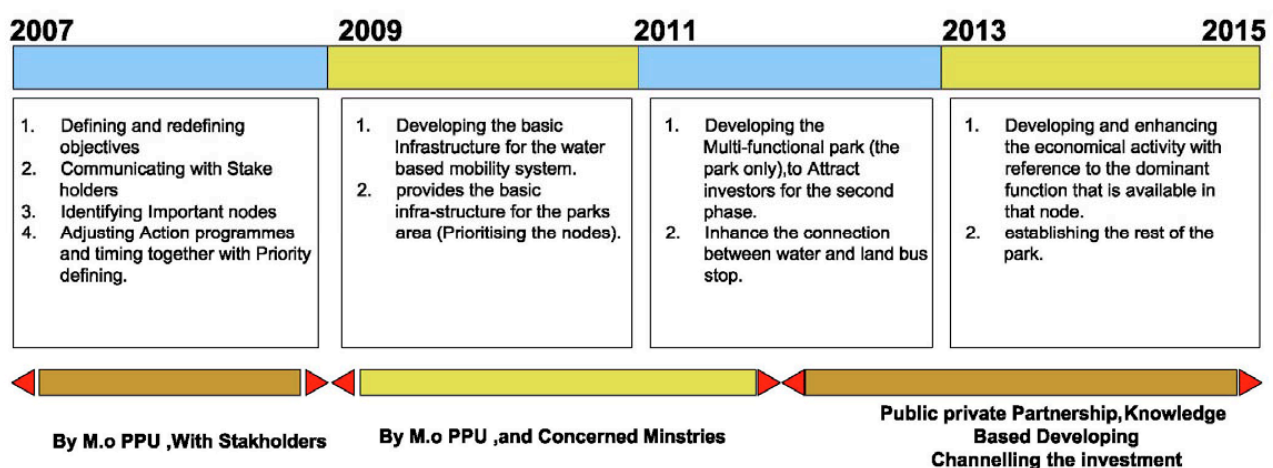


Fig.17 the change Project proposed timeframe

The change project implementation strategy is generally summarised in four steps as follows

Step.1

Creating the connection between the water bus system and the existing land bus system with reference to the selected nodes.

Step.2

Creating a series of public and open spaces (including water space) that link the two transportation nodes as well as enhancing the character of that specific node.

Step.3

Provision of public facilities and social Infrastructure along those developed parks

Step.4

Provision of the specific functional spaces identified at each node.

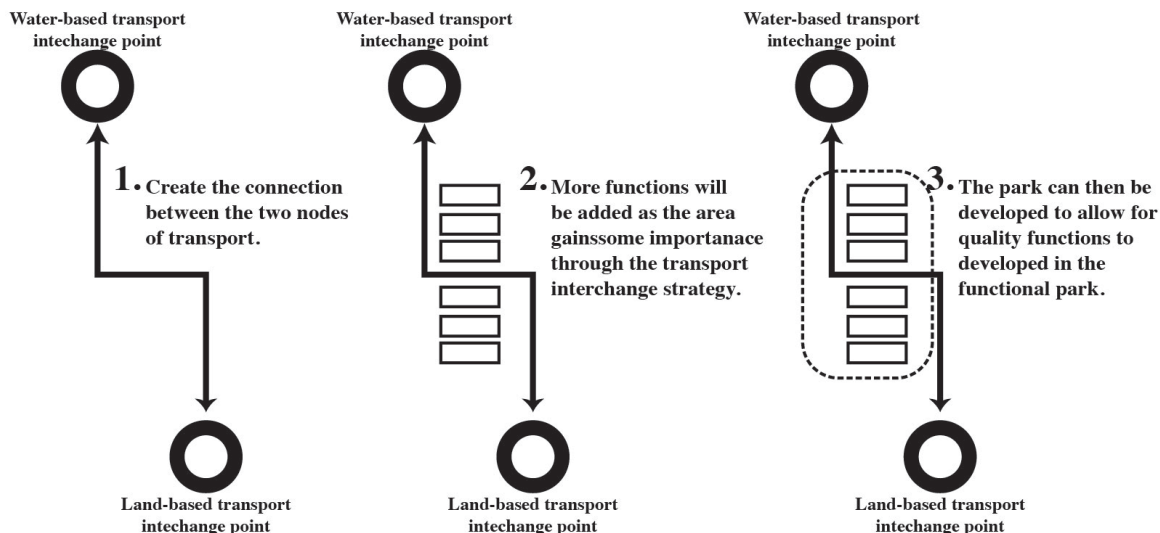


Fig.18 Implementation Strategy of the change project

12. Expected challenges

Many challenges are expected to face this change project. Those challenges can generally be grouped into

12-1 Physical planning-oriented challenges

1. The mono-functional domination in the CBD riverside.
2. Although several river-fronts in Khartoum are active and popular, the process of the privatisation of the riverfront activity is rapidly increasing.
3. The influx of investment together with the absence of appropriate development plans and guidelines placed a challenging situation where development happens without control or guidance. This situation occurs beyond the geographical limits of the capital region, extending to many other Sudanese cities.

12-2 Administrative and procedural challenges

1. Lack of coordination among public authorities in Khartoum created a situation where cross sectorial plans/projects are hard to realise (such as this change project).
2. Planning for many of these authorities is seen as an income generation activity.
3. Due to the allocation of most of the government administrative activities/buildings along Khartoum CBD river front, the issue of security was one of the hindrance of proper riverside utilisation. Due to the same security reasons, the riverside of Khartoum CBD is hardly accessible during daytime, and almost inaccessible at evenings.

13. The Riverside development now (Five years after the proposed change project)Current situation and shortcomings

The fast uncontrolled development speed enriched by the power of the growing economy in the last three years has indeed placed many new realities to the change project. four years after this change project was proposed many structural, economic and physical changes occurs along the riverside. In many case some of the structure mentioned in this report i.e “types of water edge” are either completely or partially altered. The current situation though places more challenges to planners and citizens in terms of sustaining and managing the riverside, it provides more opportunities to learn from past mistakes and good practices.

Various physical changes has taken place since 2007 (see Fig.19), some of those changes are

- The erection of Tuti new bridge which realises a better income opportunities to Tuti-settlers at the expenses of the local identity of the traditional Island.
- Various large scale development projects are either planned or under implementation along the riverside, some of those examples are Al-sunnut development project which with plans to extend beyond the limits of Khartoum CBD waterfront.
- High influx of investment and development along the riverside.
- Environmental concerns over development along the riverside.



*Fig.19 Examples of the rapid changes occurred or planned to occur along khartoum riverside in the last four years
Al-sunnut project is seen at the top while Alnur city project at the bottom.*

14. Conclusion; Vitality and applicability of the change project

Having mentioned the above shortcomings and realities, especially with the new Khartoum Structure Plan 2008-2033 being approved, the question at this point is whether the solutions and visions drawn by change project developed in this report are still valid or not? Although its hard to provide an answer for this question with several new challenges and physical changes taking place in the river side, the change project general principles and vision can still be applied. In fact several principle developed in this change project were applied at larger scale in both the New Khartoum Structure plan 2008-2033 and Khartoum Water Front Study currently under development by Minstry of Planning and Public Utilities -Khartoum State.

To conclude, although we believe that the change project proposed by this report is valid and feasible, the need for a larger scale study for the riverside development is necessary to control the rapid development along the riverfront. The speed of change applied in Khartoum riverside requires strategic and creative solutions that can work beyond the limits of local level planning and poor institutional capacities