Corridor Plans: An Opportunity to Develop Low Carbon Open Spaces Network-The Case Study in Tehran, Iran

1. Introduction

We are on verge of an urbanized world. At the same time urban areas are the world's chief consumers of natural resources and generators of waste, consequently leading to multitude of environmental issues, including shortage of energy sources, increasing of the carbon emission to the air, global warming, climate change and its impacts on the urban environment, etc. [1]

If we do not seek for some ways to stop this trend, the extent of probable consequences might not be predictable. They might have the potential to be a serious threat to the life on the earth Besides we are responsible for preserving all the natural resources; we are responsible for keeping the air quality in an acceptable condition, we are responsible for preserving the qualities of the environment, and we are responsible for the next generations. Hence it is mandatory to put our cities in a right balance with the environment. We should conduct the development of our cities in a way in which they have the least effects on the environment [1], of course it is obvious that the kind of the development plan that we choose for a city is a very important stage in a planning process for the city since different kinds of urban development plans might have different impacts on the surrounding environment.

In one side, it does not seem logical to stop any urban development and on the other side, urban development, if does not conduct in a right way, can be the main cause of most environmental issues. So we should seek for some ways to control the harmful consequences of the urban development, we should devise new development plans that have the ability to meet the goal of controlling the harmful consequences of new urban developments as much as possible.

In this paper, among all the feasible harmful effects of the urban development on the environment we focus on the carbon emission to the air and diverse kinds of problems that large quantity of carbon in the air might have with itself, problems such as ozone depletion, global warming, climate change and all the terrible consequences that climate change is considered as the cause of them, like sea level rise, draught, etc. We tried to propose a pragmatic solution to reduce the carbon emission to the air.

Urban open and green spaces by providing the multi-functional spaces (recreational, aesthetical, infrastructural, social, cultural, and …), have the potential to be used as one of the most efficient tools to reduce the carbon emission to the air, and air pollution, simultaneously. Thus by using them as a fundamental element in development plans we can make an opportunity to conduct the growth of our cities in a low carbon and sustainable path. To make the most use of them we need to devise and propose specific development plans. In addition, "Urban green space management is essential to quality of life and sustainable urban development. (Green infrastructure can be defined as the network of multi-functional open spaces, parks, waterways, trees and woodlands needed to support a high quality of life in and around our towns and cities.)" [2]

In this paper we recommend "greenway corridor Plan" to create and develop a continuous low carbon open spaces network [3]. Corridor plans with considering their linear nature, have the ability to create a coherent network of urban open and green spaces.

For doing this paper, we choose Tehran, the capital city of Iran, as the case study. Tehran is one of the most polluted cities in the world. Tehran is a fast developing city, so growing demands of urban development in Tehran are inevitable, furthermore Tehran is getting warmer year by year as large quantity of carbon emission to the air is considered as one of

the most important factor of this phenomenon. In this situation, we have to conduct the future development of the city in a way in which we have the least possible carbon in the air. To reach this goal, we recommend corridor plan that has the ability to reduce the carbon emission.

2. Corridor plan

"A corridor is an area of land typically along a linear route containing land uses and transportation systems influenced by the existence of that route, but it can focus on any linear pattern, an open space, a water course, or a continuous linear pattern of similar land uses. Corridor plans often focus on the impact of a linear land use investment or linear land use policy. They often prepared to coordinate development with other public improvements or land use activities. Corridor plans also can serve as organizing elements for overall community planning, so they can affect directly on the quality of community planning of any city". [4]

2.1. Corridor planning

Corridor planning is the coordination of land use activity within a linear area.

Historically, corridor plans may have been limited to the engineering feasibility of constricting or widening a roadway within transportation corridor. Today, more communities are cognizant of the broad impact transportation corridors can have on quality of life. They include land use planning, access management, and aesthetic appeal in the corridor enhancement plan process.

The planning process includes many diverse community members, such as citizens, governmental officials, community organizations and other stakeholders, who work together to develop a vision for the corridor. Public participation in this process, as with all planning processes, is very important to the success of the plan. [4]

2.2. Successful corridor plan

Below are key elements that are typically included in a successful corridor plan:

Land Use _A comprehensive plan or land use plan provides a communitywide guide for land use development. At the corridor level, land use planning advances a step further by providing localized recommendations for individual parcels based on site-specific strengths and weaknesses. The land use element will help determine the quality and quantity of development that should occur based on existing and future infrastructure capacities.

Access Management _Effective access management policies improve the function of the roadway, enhance safety for motorist and pedestrians, and establish an image of a consistent master planned corridor.

Aesthetic Standards _Standards should be established for public infrastructure in the corridor. These aesthetic components, such as landscape features, lighting, pedestrian amenities, topography, and signage, can be influenced through adopted corridor development standards in the community's zoning ordinance.

2.3. The possible reasons to prepare a corridor plan

- To establish a vision for the future
- To respond to a legal mandate
- To coordinate improvement actions

- To provide guidance to land owners and developers
- To respond to local transportation improvements [4]

2.4. Approaches to the plan

There are three different approaches to corridor plans, which are often used together:

- The framework approach
- The strategic approach
- The project approach [4]

In this paper, we also used of the three approaches together to propose of preparing the greenway corridor plan in the city of Tehran.

2.5. Corridor plan components

Regardless to the time frame and the initial purpose, most corridor plans include the following actions:

- Conduct an inventory of conditions: In preparing a corridor plan, a planner must first understand the pattern of existing and anticipated land use, transportation, land ownership, area demographics, and market conditions. This is best done by collecting, tabulating, and mapping a range of data explaining conditions within the corridor.
- Provide a vision of the future: Plans are designs to achieve agreed-on ends or purposes. Thus it is important that the plan provide an image of what it intends to achieve.
- Establish a development policy: In order to achieve the vision, the plan must provide the tools necessary to coordinate private development or redevelopment activity with the policy initiative underlying the plan.
- Coordinate public investment: Because corridor planning often is driven by public investment initiatives _the need to build a road, locate a transit alignment, or secure open space_ strategies for public investment are frequently a key component of the plan and guide the program of implementation activities.
- Identify implementation activities: In this stage, all the activities which are necessary to implement a corridor plan should be identified. [4]

3. Case study

Tehran with 621 square kilometer area is an inhabited area for near to 7.5 million people [5]. Tehran as the capital of Iran has been developed without any comprehensive plan, strategies and policies in last two decades. This huge lack in addition to increasing trend in building construction within a framework of “density selling program” caused serious and dramatic problems for Tehran in national, regional and local levels. These problems can be summarized in different categories such as population and services, activities and employment, water and sewage, pollution and environment, natural disasters, traffic and uncontrolled urbanization. Mentioned problems in combination with each other, makes Tehran as one of the most polluted cities in the World in terms of environmental issues. Tehran`s environmental problems include contaminators, ecosystems destruction, high rate of waste generation, air and water pollution and the risk of climate changing which

highlighted sustainable development (and low carbon development) as an essential approach for Tehran`s municipality.

Beside mentioned problems, Tehran has variety of natural resources such as mountains (in north and east), five river-valleys in north-south direction, natural water resources and etc. Among listed resources, five river-valleys with their specific spatial characteristics have potential to solve some parts of Tehran`s environmental problems (Figure.3.1). The case study of this paper called Darake river-valley is located in the west part of Tehran.

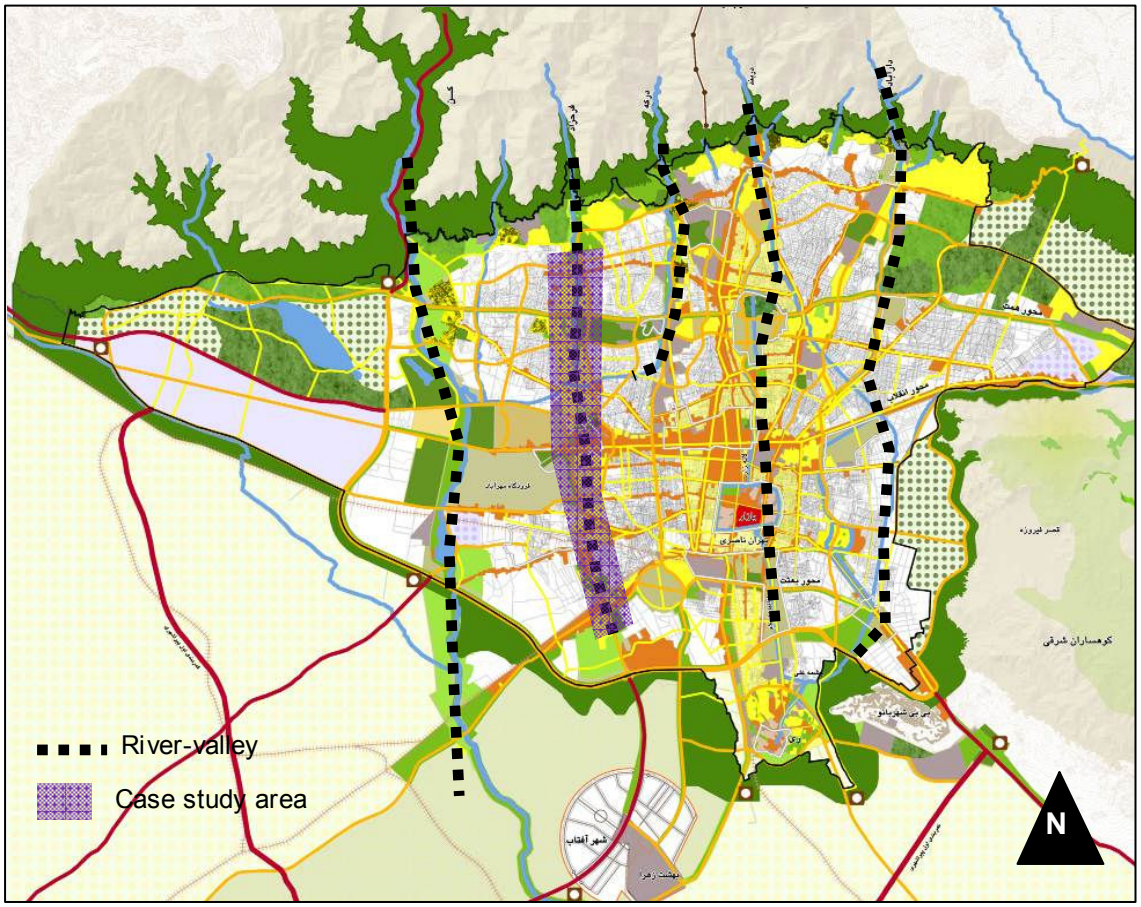

Figure.3.1. Five river-valleys of Tehran and the case study area

3.1. Present situation

The case study area is about 316 ha which shapes like a corridor in north-south direction. Green & open space, residential, hotel and services (hospital) contribute the main land uses in present situation. Figure.3.2. illustrates high share of green and open spaces among other land uses which indicates the potential of the site for creating an open space network. In addition, lack of residential services, informal settlements, environmental contamination in water resources (river), sonic pollution, destruction of green spaces in southern part, lack of utilized open spaces, undefended spaces, uncontrolled development around river, lack of swage network, lack of public transportation system, improper accessibility to river and open spaces by foot or car, disjointed spaces along river currently remark as main problems of the study area.

On the other hand, high quality of soil, high share of green and open spaces, NGO`s, locating some bus line around the site, concentration of master plan on this river valley as

one of the structural developments lines for Tehran, different local plans for the area focusing on integrated open space management approach, moderate slope from north to south regard as opportunities of the site for generating a corridor plan in order to create an open space network.

As a result, it could be concluded that environmental issues in this area in very important, however, other problems in other aspects must be solved in order to have a suitable open spaces network. Moreover, using all opportunities and strengths of the area should be integrated in preparing corridor plan for this area. Therefore, a holistic approach in generating strategies is necessary and essential. Considering all mentioned implication increase the feasibility of the proposed strategies for corridor plan. Simultaneously, it could result in introducing the values and benefits of creating open spaces network to have a sustainable city.

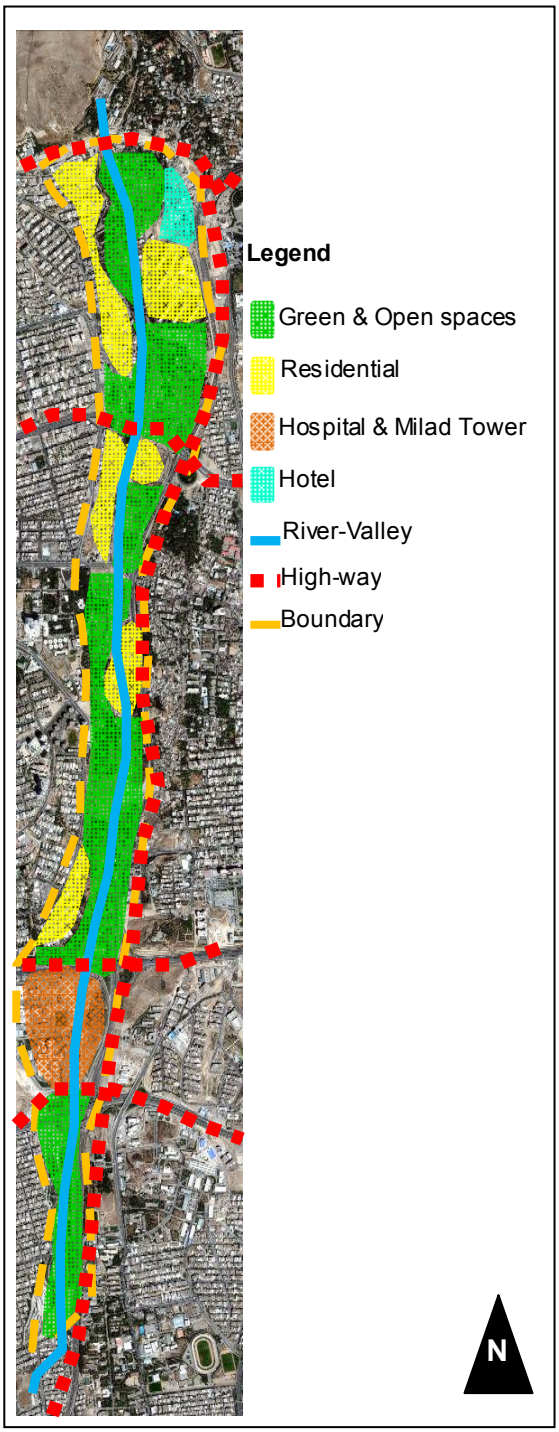

Figure.3.2. Spatial organization of corridor in present situation

3.2. Master plan

Considering the main challenges of Tehran as a metropolitan city, the current master plan described a vision for Tehran as a city which is:

- Green and livable with variety of open and public spaces
- Sustainable and cohesive with a proper structure for residents, activities and recreation

So, both two statements indicate the necessary and the focus of master plan on creating open spaces network in order to reach sustainability in city level. Moreover, the master plan proposed many strategies and policies in different contexts to achieve this vision. Below, the related strategies and policies about the case study area as a river-valley summarized (Table.3.1):

Listed master plan proposed strategies and policies emphasize on creating open and green spaces network in the case study area as one of the river-valley of Tehran. In addition to textual recommendation, master plan proposed a specific green zone (G31-specific green zone for river-valleys) in zoning map of Tehran. Open and green spaces in combination of recreational and multi-functional spaces form the main character of this zone.

In conclusion, reviewing all master plan`s documents reveals that the case study area has the opportunity to integrate open and green spaces in a network of multi-functional areas. Additionally, sustainability as a main objective of master plan should be achieved by developing river-valleys.

Table.3.1. proposal strategies and policies in master plan of Tehran regarding the study area

Strategies	Policies
Conservation of Environment	• Maintaining sustainability of the protected area, ecosystems, cultivate lands, gardens • Developing green spaces
Development of green and open spaces, recreational and touristic areas	• Developing green spaces to support minimum per capita of 10 square meter • Revitalizing river-valleys as the green north-south axes
Improvement of spatial structure	• Restructuring river-valleys as the developing axes • Reusing undeveloped and open lands within the city

3.3. Proposal corridor plan

As described in methodology part, a holistic approach used to generate a corridor plan for this area in order to create an open and green space network. The whole process is based on strategic planning process. At first step, the site`s problems and opportunities classified in four contexts. Then, a strategic approach has been determined for each context. Combination of all four contexts contributes the proposed vision for the case study area (Figure.3.4).

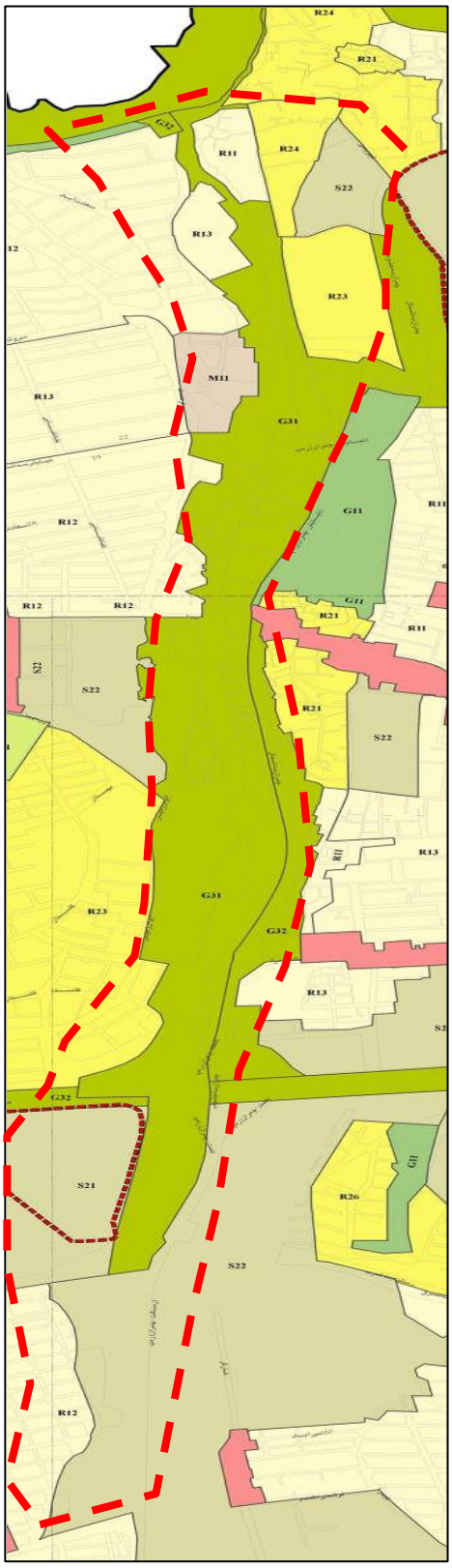

Figure.3.3. Master plan`s proposed zoning for the study area

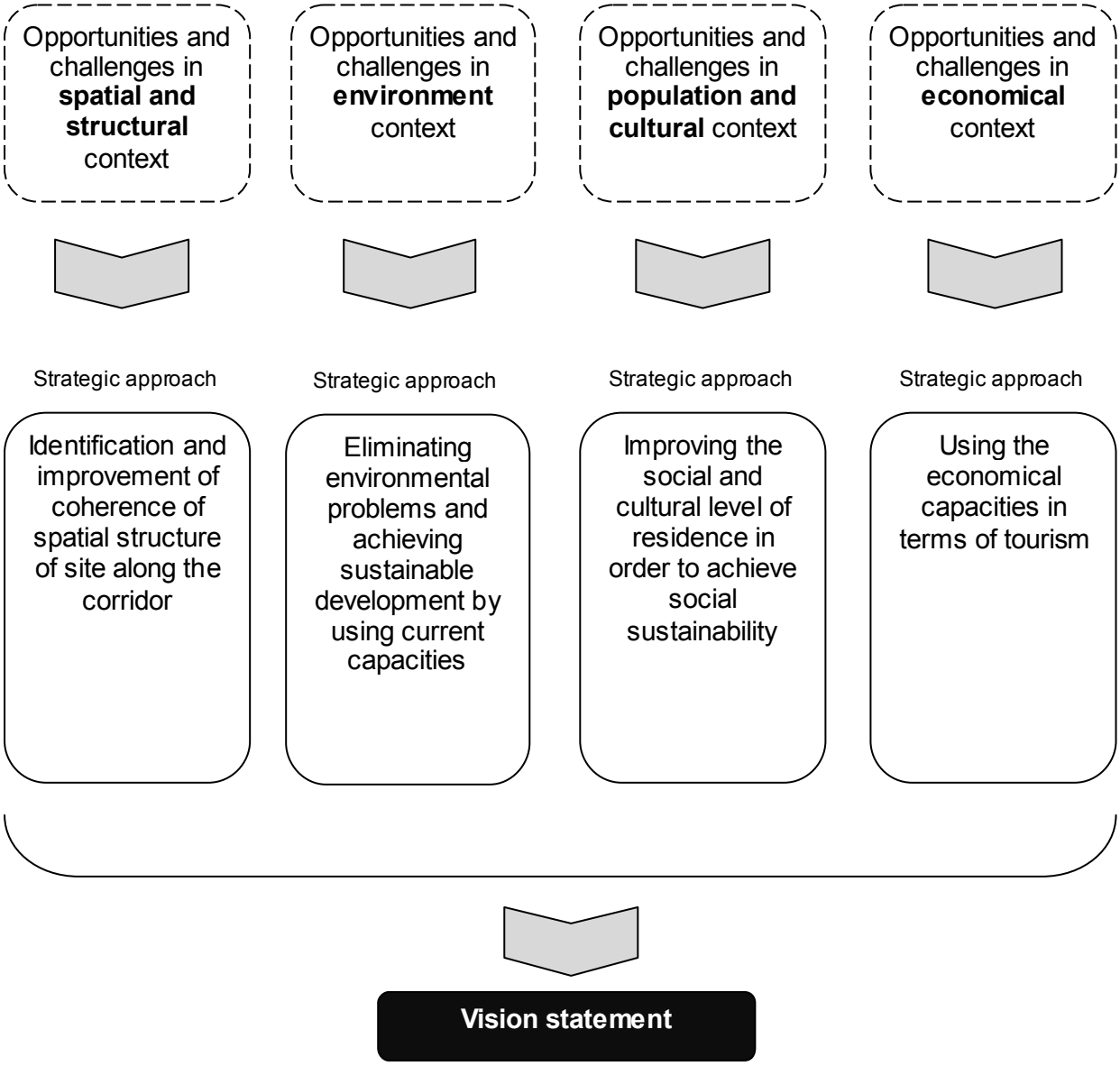

Figure.3.4.The process of proposing the vision of the case study area

Therefore, the vision of study area in 2030 is:

"Darakeh river-valley in 2030 contributes as a development axe of Tehran. This corridor is cohesive open space and green network which result in increasing sustainability of the Tehran. Moreover, supplying the services at city scale, this area competes with other river-valleys of Tehran in the development process".

The final step is to specify aims (objectives), strategies, policies and implications for achieving the organized vision. Consequently, mentioned issues are generated for the study area in four contexts: Environment, spatial structure, population and culture as well as economy. The aims (objectives), strategies, policies and implications are summarized in following table (Table.3.2):

Table.3.2. Aims, strategies, policies and implications of corridor plan

Context	Aims	Strategies	Policies	Implications
Environment	Sustainable development and adaptable with nature	• Maintaining and improving the quality of river-valley • Eliminating the contaminant activities in the area • Decreasing the risk of natural disasters	• Preserving and developing green and open spaces • Revitalizing the margin of river-valley • Preparing environmental regulation for the area • Using physical, managerial and social methods to decrease the risk of natural disasters	• Creating sewage network for the area • Redeveloping the river-valley • Renovating the physical part of river-valley • Redeveloping the undefended open spaces • Exiting the contaminant land use • Locating open and green spaces with low density to creating disaster management station
Spatial structure	Cohesive open and green space network	• Preparing a safe accessibility for the site • Utilizing the river-valley to supply city scale services • Revitalizing existing informal settlements	• Creating streets hierarchy • Preparing foot and bicycle access along the corridor • Developing infrastructure in the area • Developing public transportation systems • Preparing renovation plan for informal settlements Rejoining the area as a cohesive axe	• Developing bus route • Developing bicycle and foot way from north to south of corridor • Developing streets network • Designing two entrances in north and south • Developing open spaces like sport lands with multi-functional activities • Executing foot bridges along river-valley to increase accessibility of both side of river-valley • Decreasing building density in the area • Decreasing car access to the river-valley side • Increasing the rate of open spaces in different land uses
population and culture	Social sustainability	• Increasing social interaction among users • Increasing public participation • Increasing safety in the site • Using social capacities of the users	• Developing public spaces • Improving quantity and quality of cultural centers • Preparing encouraging facilities for participation • Involving NGO`s in development process	• Locating 24 hours activities along river-valley • Increasing the users awareness by educational brochures • Updating information of the users about the development process •
Economy	Economy sustainability based on eco-tourism	• Using natural potential for eco-tourism • Preparing job opportunities for the residence • Developing economic infrastructures	• Creating recreational point along river • Developing recreational facilities in the corridor • Motivating private investors for investing on recreational infrastructure	• Locating commercial center in the area • Locating garden-restaurants along river-valley • Preparing encouraging facilities in taxes to reduce construction fee by municipality

Based on the remarked aims, strategies, policies and implications two strategic corridor plans proposed initially: the first was based on minimum interference, the other based on maximum interference. At the end, by combination of two alternatives, the final corridor plan generated to specify the location of implications. This plan integrates the implications which need to be located on land in order to create a sustainable open and green spaces network (Figure.3.5, 3.6, 3.7).

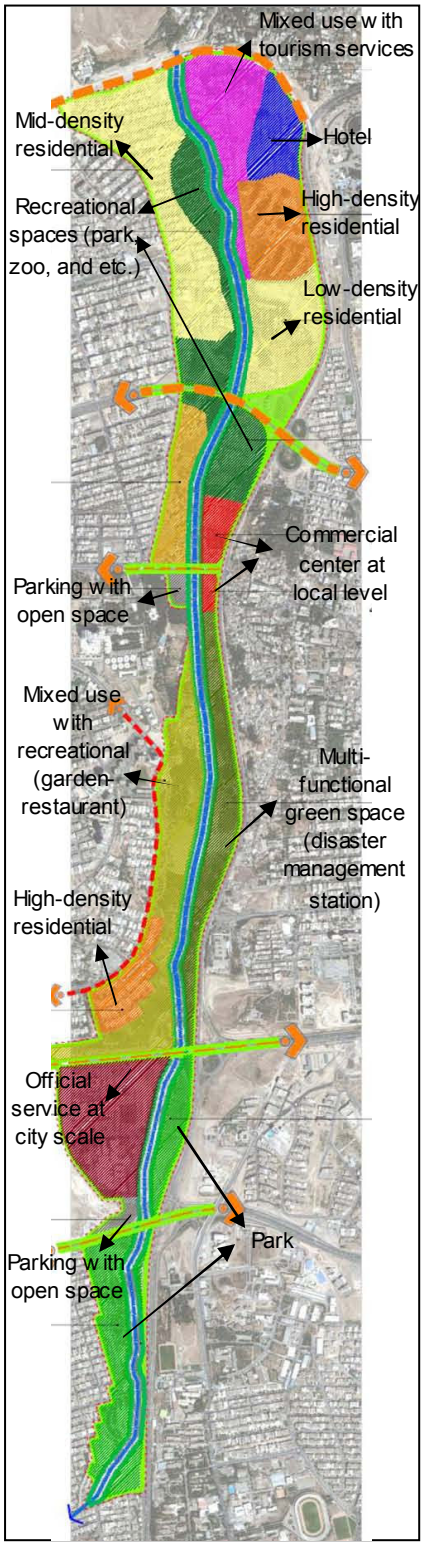

Figure.3.5. Alternative with maximum interference

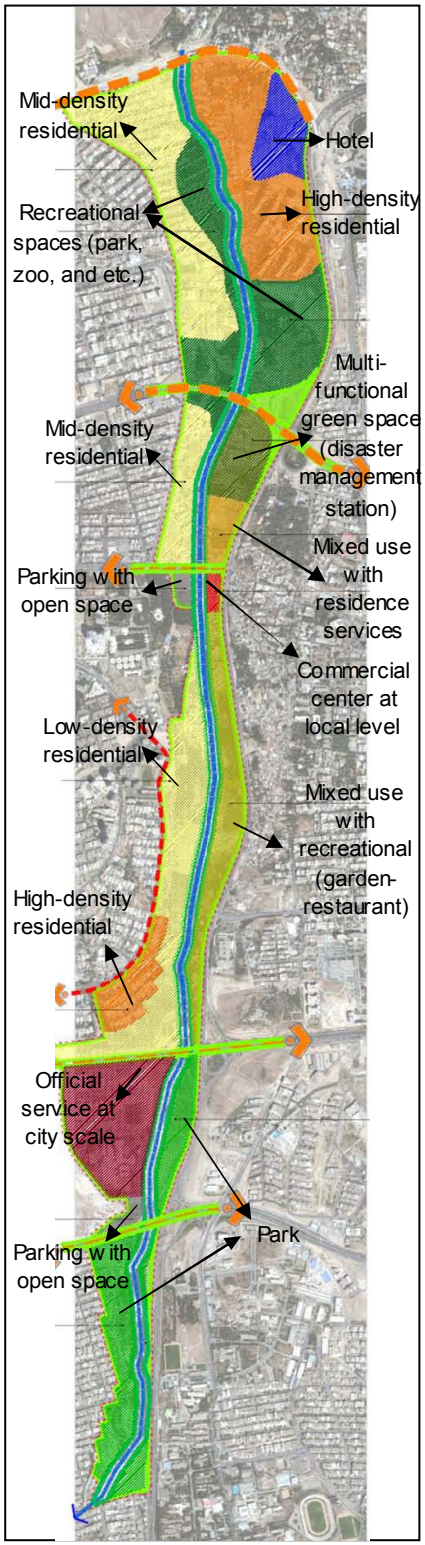

Figure.3.6. Alternative with minimum interference

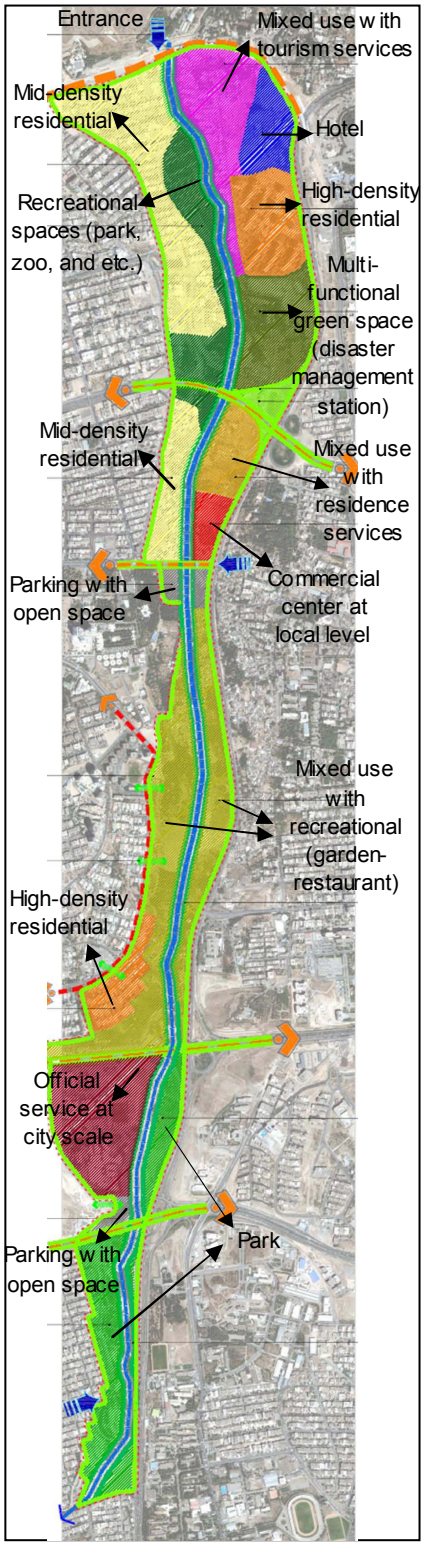

Figure.3.7. Final alternative (corridor plan)

4. Conclusion

Consider to literature reviewed in introduction part, the benefits of creating open and green spaces as a network is obvious. Moreover, the corridor plan proposed for the case study area indicated that how a green space network could be gain through a corridor plan. As a result, this research shows the benefits of corridor plan as a kind of urban plan in shaping green and open space network. Therefore, proposed strategies in this corridor plan are based on case study characteristics and could be useful in same cases as an experience.

5. References

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