Greenways as a Sustainable Urban Planning Strategy

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1. Introduction

Greenways are linear open spaces such as canals and scenic roads that are set along the riversides, hillsides or valleys, converted to a recreational use along the railways (Little, 1995).

As the last scientific sources about greenways in landscape planning are examined (President’s Commission on Americans Outdoors, 1987; Little, 1990; Flink and Searns, 1993; Smith and Hellmund, 1993) the definition of "designed and managed space networks that are compatible with the concepts of sustainable space use" comes out (Ahern, 1995).

In 1970s, when the decreasing of urban open spaces became clear throughout the country, the greenways planning activities directed to preserving gained importance. Those greenways which need less open space than conventional parks, make possible various recreational activities and form a system of being associated different open and green spaces are supported by authorities and the institutions directed to protecting environment (Arslan et. al., 2007).

The most clear statement on this subject came out by President’s Commission on Americans Outdoors in 1987. The commission sees the greenways as live networks like a giant circulation system. That provides people with access to open spaces close to where they live, and link together the rural and urban spaces in the American Greenways in the USA. Therefore, the commission suggested to generalize greenways which are a vision for the future as a system. It is possible to see more than 660 greenways examples implemented in the USA whose 80 % of its population live in cities (Bueno et. al., 1995).

Commission draws a parallel between the evolution model of greenways and motorways or railway system. According to this idea, the motorways and railways which are firstly formed in small parts, later the left parts of them are networked by planners, being...
combined in scale of national, state and regional. Similarly, greenways are of various widths and have a network system like main roads and railways junction systems. Just the main difference is the nature has already an existing system infrastructure corridor (Fabos, 1995).

The first serious attempt in Europe is made, in 1997, by establishing European Greenway Association (EGWA). This Association define the greenways as both protecting environmental values and the network of routes that are allocated for only the motorless vehicles (on horseback, bicycling or etc.) in order to increase the health of environmental life, considering integrated management approach (Fig. 1) (European Greenways Association, 2004).

![Figure 1. Salisbury Greenway Bicycle Way/ North Carolina](image)

Greenways are defined differently in both the concept and scope. Since these greenways focus on different aims, their scopes are different (Scudo, 2006). For example, the level of aims of protection, using mainly under protection, protection mainly under using and using (like recreation) affects the forming of greenways.

Two words should be examined to make clear the definition. The full word is “Greenway”. “Green” is defined as forests, riversides, natural spaces like wild life, “way” as a route or an axis. Two words together are depicted as greenway or an axis integrated with landscape (Watson et. al., 2003).
Greenways are a general term of showing linear consistency, linking open and green spaces and providing development into urban texture. There are bicycle passages, wild life routes, improved water sides or a river far from a city or pedestrian axes forested along a bay. Within the urban landscape, greenways brought together two functions. One of them is to form open spaces which are open to public and for recreational uses, and the second one is to ensure to protect and develop natural resources (Vikipedi Özgür Ansiklopedi, 2008).

Greenways are the passages that provide linking the spaces that have the specialty of high natural resource or are of cultural aspects. These greenways are based on both land and water (http://www.chaddsfordpa.net/resources.htm).

Greenways are the greened passages which follow the ways that are out of use or used by motorless vehicles (http://www.aevv-egwa.org/site/1Template1.asp?DocID=144&v1ID=&RevID=&namePage=&pageParent).

2. Developing process of greenways

Even if their scope is narrow, greenways whose first examples come out in the nineteenth century gave birth as an answer to the needs for the conditions of relevant period, the changing - corrupting process of landscapes in the last century and negative development of cities to the detriment of ecosystems. Changing of conditions, conceptions and tendencies lead to change of the concept and scope of greenways.

In the context of urban planning of nineteenth century, the development process of greenways classified into 3 categories. These are:

1. First Generation Greenways (the period between 1700 and 1960)
2. Second Generation Greenways (the period between 1960-1985)
3. Third Generation Greenways (the period after 1985)

2.1. First generation greenways the period (between 1700 and 1960)

First generation greenways are defined as “Green Way” and the first example of special and attractive corridors through the city (Searns, 1995). The axes that link in Europe city spaces and their surrounding are planted, boulevards and at the end of the nineteenth century, the parkways commonly used in the USA are the systems of first examples of these corridors (Ahern, 2004).

Frederick Law Olmsted developed the idea of parkway system which leads to taking shape of current greenways (Kent and Elliott, 1995). The first parkway model started with the designs of Central Park of New York city by Olmsted and Vaux (http://www.umass.edu/greenway/Greenways/2GR-def.html).

In later period, Olmsted and Vaux who are affected by the wide boulevards of Paris and Brussels designed “Prospect Park (Macdonald, 2005). One of the important aspects of this park is its characteristic of rural landscape which is fully different from central park and the general structure of the city.
At the end of the nineteenth century and beginning of the twentieth century, first real greenways came from the system of the open spaces of the main city. This mostly is the network that is formed due to linking spatially linear spaces belong to public. The system is tied to the current topographical and hydrological models in the landscape. The Boston Park system is the most important one of these systems that Frederick Law Olmsted designed (Zube, 1995).

In 1887, The Boston Park System known as “Emerald Necklace” is the first greenway planned in the USA. Newton mentions this park system as parkway. This system that is 25 km length link the cities of Boston, Brooklyn to Cambridge city in Massachusetts State and Charles river to these spaces (Fabos, 2004). Olmsted also named this system as “strip park” known as parkway before (Little, 1995).

While, today, Boston Park system provide mostly recreation, transportation, water quality, flood control, nice view, wildlife, when it was first planned as a model, it was designed for linking the current conserved areas to the ecological greenways. This first design of Olmsted is adopted by various landscape architects (Ahern, 2004).

Charles Eliot, the pioneers of Landscape Architecture, suggested a comprehensive park system for Boston main city region. This corridor combined 6 wide green spaces connected to each other in the slums of main city into 3 big rivers (www.umass.edu/greenway). The suggestion of Eliot that sees rivers and their sides as the complementary of greenway system is important for the planning of greenways.

In nineteenth century, H.W.S. Cleveland, with Theodore Wirth, beside Eliot in the USA, planned greenways network for Minneapolis main city region. This parkway that provides both transportation and walking, picnic and natural hiking and is of 23-mile length is the parkway of Bronx River (Ryder, 1995).

After Bronx River parkway, parkways started to increase with this new trend and the architect Robert Moses who is affected by this trend implemented several parkways such as Hutcheson River Parkway, Taconic Parkway, Saw Mill River Parkway and Cross County Parkway, in Westchester and Bronx, and Henry Hudson Parkway in Manhattan (Arslan et.al., 2007).

The aim of Moses is to form a recreational network for New York people. Because of the transporting easiness of motorcars, as tendency for recreational spaces is getting increased. Moses especially observed that the spaces in Westchester and New Jersey have limited possibility for weekend activities. For this aim, Moses formed the Brooklyn-Queens greenways that link all the rural region which include east river, agricultural fields, sea sides, ponds, rivers and forest areas (Little, 1995).

As well as parkways concept, the green generation concept within the historic development of the greenway idea has an important place. The idea of parkways of Olmsted and Moses became the source to thought of surrounding and zoning the city, developing in the course of time. The first greenway that is The London Plan of Ebenezer Howard is defined as a
band limiting the borders of cities and a wide band of 5-mile or more in rural areas (Searns, 1995).

In this period, other landscape architects are Henry Wright and Charles Eliot II who work on greenways. A park design which is 40 mile length and is named as “40-mile circle” by Wright and Eliot II is held up by other greenway planners instead of a big park design in Portland, Oregon. Moreover, that Wright include several landscape elements from river greenways to forest spaces in integrated greenway network is supported by ASLA (American Society of Landscape Architecture) (Fabos, 2004).

Another plan in this period is the first open space plan which was designed by Charles Eliot II for Massachusetts state. The comprehensive plan in statewide was named “Bay Circuit Plans”. This comprehensive plan which is some 250 km length links several wetlands and drainage systems and surrounds Boston city (www.umass.edu/greenway).

The most important development in this period is the coupling national parks and comprehensive recreational areas and parkways and so there will be continuity between the spaces that are protected and used for recreational aim (http://www.nps.gov/aboutus/history.htm). A highlighter example of this is Blue Ridge Parkway along the Appalachian mountain (Fabos, 2004).

2.2. Second generation greenways (the period after 1960-1985)

First generation greenways that are parkways included in the open and green space system that links urban and rural spaces are firstly converted into the urban corridors after the second half of twentieth century.

Throughout the 1960s and 1970s, the subjects that support contemporary greenways development process in terms of environmental aspects are divided into two parts. One of them is the increasing of bicycle passages and second is the works of landscape architects in academic area.

Because the harms that motorcars coming out from 1900s do increased towards the second half of twentieth century so the demand for bicycle passage and pedestrian pathways that are motorless traffic routes. The implementation of the bicycle passage and pedestrian pathways that are a part of greenways is practiced several times in the USA and Europe. Throughout the period of 1960s-1970s, bicycle passage and pedestrian pathways named as city pathways supported the environmental conscience because they had had the goals of preserving cultural landscapes, controlling the city development and recreation (Little, 1995).

In this process that environmental conscience was increased, several landscape planning and design works that are linked to greenways would be a basis for the studies and were realized. Phil Lewis determined 220 natural and cultural resources in Wisconsin by “the method of mapping” that he found. Since these resources are especially along the river or drainage spaces, Lewis (1964) named these spaces as “environmental corridors”. Lewis’s mapping, analyzing and evaluating the resources provided a basis for the suggestion plan of
“Wisconsin Heritage Pathway”. “The term of environmental corridor” that was created by Lewis to protect river corridors or the spaces environmentally sensitive is used in first greenway/green space system planning in statewide. In this planning process, to protect the spaces that are environmentally sensitive, and river corridors are targeted (Fabos, 2004).

The end of 1960s is the beginning for the term of “Greenway”. In this period, William H. Whyte used the term of “Greenway” for the first time in his book entitled “The Last Landscape” that he wrote to get rid of motorcar (Bueno et. al., 1995). The first implemented greenway project of Whyte is “Platte River Greenway” in Denver in the mid of 1970s. This corridor, 10 mile length, comprises parks, spaces having natural characteristics, canals and harbour region. There is also a stroll and bicycle route, 2.5 m width (Searns, 1995).

2.3. Third generation greenways (the period after 1985)

These greenways targeted to satisfy aesthetical and recreational needs for city dwellers with the beatified axes and corridors in addition to motorless vehicles routes. Thus, both negative effects of urbanization are reduced and alternative corridors that supply influential visual forms and greens for screening the fumes and noises of motorcars are created. This situation contributes to the spiritual healing of urban people (Searns, 1995).

This generation corridors have more comprehensive duties apart from all these characteristics of them. Third generation greenways, beyond meet people need, take on a lot of goals such as preserving habitat, reducing flood harms, increasing water quality, protecting historical sites, education, which are integrated with space and resource management concepts (Mugavin, 2004).

3. Greenways types

Greenways that are a part of a wide network to protect the elements which shows physical continuity in landscape are formed around railways, canals, roads that are along the hillsides and valleys, watersides and rivers.

Main concept is to keep the corridor "green" with the natural vegetation and to connect the interesting points along the river and similar systems to a “way” or line. Greenways are formed directly and indirectly for people benefits and uses. For example, a greenway can provide recreational walks, observing wild life, recognition and evaluation of the environment, river fishing and riverside protecting (Glossary of Bicycle Terms, 2008).

Greenways are divided into 6 groups according to the projections of scientists and planners who work for different goals;

Urban riverside greenways: they are the greenways that are formed by riversides in urban areas. Sometimes, the destroyed riversides which are affected by urban activities can be ameliorated by redevelopment programs. These spaces are thought as a part of greenways (Little, 1995). Beside this definition, not only riversides but the other sources that are linked to water are included greenways (Fig. 2). As a result, the greenways are formed along the
water resources such as, flood beds, river corridors and wetlands. The aim of creating these greenways is to protect resources, ameliorate and manage (Ahern, 1995).

**Figure 2.** Scioto River Greenway

**Recreational greenways:** They are the spaces that have characteristics of routes and pathways of various type and go along a very long line (Little, 1995). Beside the natural corridors, canals and railway routes can be examples of that kind of spaces. These ways are formed along the routes and pathways passing through recreational spaces generally linked water and landscape resources which are of high visual value (Fabos, 1995). The recreational focuses in these pathways not only can be both urban and rural but local, regional, national and international (Fig. 3).

**Figure 3.** Willamette River Greenway, Oregon
Natural corridors that are of Ecological importance: they are the corridors which are formed by the spaces generally along the rivers, and sometimes valley sides (Little, 1995). These kind of spaces make possible protecting wild life, migrating of species, sustaining biological diversity and natural hiking (Fabos, 1995). Ahern (1995), define ecological corridors as “ones that are linked to biodiversity” (Fig. 4).

Greenways that have visual and historical value: they are the greenways that are attract tourists, provide benefits of economical, educational and visual and supply permanent-seasonal accommodation (Fabos, 1995). They generally are the routes along the road or motorways and the routes rarely along watersides. These routes make possible seeing by getting out of vehicles and pedestrian activities in specific points (Little, 1995). Another important characteristic of these greenways is that they link cultural and historic resources (Ahern, 1995).

Figure 4. Oconee River Greenway, Athens, Georgia.
The greenways that aim controlling of urban development: these greenways are formed to separate urban and rural areas and control enlargement (Ahern, 1995).

Comprehensive greenways systems and networks: they are formed by linking different kinds of open areas to greenways in urban and regional scale (Little, 1995).

4. The functions and benefits of greenways

Greenways have a lot of functions such as protecting water sources, reducing pollution, increasing river side habitat and biodiversity, reducing flood harms, providing recreational opportunity, supplying environmental education, alleviating noise, enhancing micro-climatical effects of both cooling and decreasing pollution and reducing riverside erosion (Bischoff, 1995).

It is possible to divide the functions of greenways into two groups as rural and urban. Within the developing urban landscape, greenways have to functions: one of them is to create open spaces for people’s easy reach (public access) and recreational uses and second to provide protecting and developing natural resources which are still present nowadays. In this context, the greenways that tie in with many various linear open spaces in cities and so provide developing into the textures of cities can be a bicycle passage wildlife routes, urban riverside corridor etc. These urban corridors take on some various duties such as answering to the increasing of people interest for their outside recreation, protecting the areas of habitat and wildlife, balancing between the air pollution and excessive heat changes and controlling urban development (Watson et. al., 2003).

One of the key functions of greenways is a special way that integrates the uses suitable for each other and separates the unsuitable ones from each other.

Greenways provide many benefits that increase quality of public life with using spaces for multiple goals. The recreational, ecological, environmental, cultural, aesthetical, educational and economical benefits are obtained from developing and protecting greenways.

4.1. Environmental benefits

The ecological characteristics of greenways make possible sustain the life of plants and animals, and cause bio-diversity to increase and be protected (Ndubisi et.al., 1995).

Several scientists believe that disintegrating of habitat is the most threatening factor to biologic diversity among the factors such as global warming, extracting metals, grazing, urban development. Disintegrating stems from the changes that human beings make. The structures like roads, canals or the activities such as agricultural development and deforesting prevent the species from their free movement. Ecologists advocate that beside the reducing obstacles, landscape greenways should be created to solve the problems. These linear connections combined habitat parts to make link species, populations and ecological processes (Bueno et. al., 1995).
Greenways take on important duties that are of urban ecological systems. They are important to protect present natural areas hence urban ecological system for future urban development.

### 4.2. Educational benefits

Greenways create practical opportunities for training users about natural landscape and cultural/historic areas, and create awareness ([http://www.stlucieco.gov/greenways/greenways.why.htm](http://www.stlucieco.gov/greenways/greenways.why.htm)).

Greenways are like an open air class. They especially provide information about the importance of the natural environment with the children schooled (Searns, 1995).

### 4.3. Economical benefits

The economical benefits of greenways are the increasing land prices, growing tourism and increasing business and trade opportunities (Bueno et. al., 1995).

Greenways have positive effects on values of lands that are in neighboring areas. The outside recreational demands of people and increasing social interaction such as biking, walking, fishing or sightseeing cause the value of lands near to these greenways to increase (Rutgers Department of Landscape Architecture and Morris Land Conservancy, 2002).

Greenways create opportunities for economical growth, providing bicycle renting along the axis, new business areas and establishments such as shops, restaurants and health clubs.

### 4.4. Aesthetics benefits

Aesthetical quality and public perception can be increased by greenways. Greenways seems to be such a mechanism that provides a means of preserving open space while at the same time creating a “green infrastructure” to link people and places (Fabos, 1995). These greenways also create opportunities for planners and designers to form new norms in urban planning and design.

### 4.5. Recreational benefits

The greenways that are designed for recreational goals include organized sport areas, bicycle passages, walking routes, hacking courts and group activities.

These greenways as alternative transportation corridors link origins and destinations for people to go they want along the landscapes that provide sightseeing with pedestrians and cyclists (Conine et. al., 2004).

Greenways, beside developing opportunities based on natural resources in linear ways along the rural and urban landscapes, reach a dynamic recreational use, coupling the free areas that have recreational potential in urban areas on to each other. Hence a setting is
prepared for both recreational diversity, user satisfaction and using potential, and providing city sustainability (Aydemir, 2004).

4.6. Social benefits

The life quality of communities is increasing due to the natural, visual value and similar characteristics of greenways. According to the research of Lee (1999), several greenways in Oakland, Chicago affect local people because of their visual characteristics. Neighboring and friendship relations of the people who use greenway is increased and so greenways became focusing points in which various activities are made (Shafer et. al., 2000).

5. Criteria that determine greenways

Five key words show the basic characteristics of corridors in the scope of "relating to planned, designed and ecological, cultural, aesthetical and sustainable space use concepts, and space networks which are managed for multipurpose, comprising linear elements" of greenways (Frischenbruder and Pellegrino, 2006).

According to this definition:

1. The areal shape of greenways is first **linear**. This characteristic of corridors provide the recreational activities like bicycle use and it provides ecological contribution by transporting material, species and nutrients in terms of wild life and cause landscape planning to have supremacy and opportunities. This characteristic is the point that the greenways differ from other landscape planning concepts.

2. The greenways that are an integrated system try to make association based on linking advantages beyond the spatial scales. **Link** is another key that defines greenways, contacting the different levels of scales and wholeness of bigger landscape.

3. **The structure of multiple functions** of greenways is required to be provided functional and spatial coherence of certain uses. Because of this characteristic, especially determining process of aims is important for planning of greenways. Determining and realizing targets can be hard for greenways that carry ecological, cultural, social and aesthetical aims. For example, because both aims contradict with each other and spatial and functional differences are required for a greenway protect both recreation and wild life, one of the special management or uses should be eliminated for their togetherness. The decisions that are the aims of greenways should reflect the social and cultural values and suggestions as well as environmental protection.

4. Greenway policy take on a complementary duty between nature protecting and economical development, beside linking to **sustainable development** concept. These greenways are an effort not only protecting nature but also balancing between resource use that make possible other landscape uses of people and protecting.

5. Greenways supply different **spatial policies** based on the advantage of integrated linear systems. These greenways also can be thought as complementary for comprehensive landscape and physical planning (Viles and Rosier, 2001).
6. Greenway planning

Although the actuality of greenway concept is getting increased more and more, there are some uncertainties about how these greenways are planned. Some of the greenways are planned because they have potential for their roles in biological diversity and controlling and directing the city development, and the others because they have recreational benefits. Determining the aim is especially important for planning and designing of greenways.

One of the aims of greenway planning is environmental protecting. The greenways along the river or creek sides have effective duties such as reducing the pollution stemmed from urban and agricultural irrigation, preventing soil erosion and protecting water quality (Arendt, 2004).

Planning process targets at establishing a continuous network system that support basic ecological functions, protect important natural and cultural resources and keeping sustainability of landscape. In this respect, greenway planning head for an integrated landscape planning that try to create linear networks in a sustainable frame work (Sijmons, 1990; Kerkstra and Vrijlandt, 1990; Van Buuren, 1991; Ahern, 1995).

Greenway planning began at local scale and go on at regional scale to create greenway systems (Conine et. al., 2004). Planning process take into account the networks that are taken place in a wider landscape wholeness, and linear areas. Planning also includes an approach that provides a lot of benefits because it pays attention to areal and spatial association. In this context, greenway planning process try to provide sustainable landscapes against disintegrating, space decreasing, urban development and uncontrollable change of area use (Ahern, 1995).

7. Implementation examples of greenways

7.1. The Capital Area Greenway, Raleigh, North Carolina

The Capital Area Greenway, the first comprehensive local greenway system, is not an implementation plan that is prepared by a professional planning team or specialists. This implementation is developed as a graduate project of a student in North Carolina University. The aim of the project is to protect the natural structure of Raleigh settlement. This student suggested a greenway network through all the districts of the city instead of forming only a riverside park in his project. Today, the plan implemented protects ecosystems like wetland, suggesting recreation opportunities such as race track, bicycle passage. The Capital Area greenway is a model to 35 local scale greenways in North Carolina (Fig. 5) (Little, 1995).

7.2. Lambro River Valley Greenway, Italy

Lambro river and its environment are locally chosen as an exemplary space in order to form a greenway planning approach in regional scale, in Italy. It is targeted to protect the present
natural resources, historical spaces and to create recreational spaces along the Lambro river in north of Milan by this greenway. This corridor, including the dwellings that are along the river, is a basic element formed for the motorless vehicles that couple a lot of sources in the space on to the city (Toccolini et.al., 2006).

Figure 5. The Capital Area Greenway, Raleigh, North Carolina (Little 1995).

7.3. Calgary, Fish Creek Greenway, Canada

Fish Creek river corridor which passes through Calgary city is evaluated in the scope of greenway application in 1966 and so, in 1972, it is sequestrated by local authorities to protect these greenways and to provide possibility of recreational use of them. Calgary urban greenway is approximately of 1200 hectares with a part within the urban area of Bow River with Fish Creek River Valley. Moreover, the total length of greenway is 13 km and its wide 0.8 km. Greenway forest spaces comprise pastures, river and river flood and historical spaces. Therefore, ecological characteristics are primarily taken into account in forming the corridor. Certain development centers are chosen and connections are provided between these centers in plan. Some connections are designed as bicycle and walking way. Fish Creek protect urban greenway, natural and cultural landscape values and is one of the
successful implementations of greenway that meet public recreational needs (Taylor et. al., 1995).

7.4. New England Vision Plan

In this plan, to form an integrated network of greenways that combine the greenway networks of 6 states, Connecticut, Massachusetts, Maine, New Hampshire, Rhode Island and Vermont in New England region, ABD is targeted. The basic of the aim is to make sustain natural landscapes which have mountains, hills and rivers from North to South between states. When the plan that its implementation has not yet finished is completed, a greenway connections that are 57,000 km length between the wild life, recreational, historic and cultural areas mostly along river zones are provided (Fabos, 2004).

7.5. The Brooklyn - Queens Greenway, Coney Island

The aim of Brooklyn–Queens greenway planning is that ecological, cultural, recreational sources can be easily reachable and make possible various uses of it for city people (Fig. 6). Especially, wide open spaces are present for those who prefer a lot of soccer and baseball, tennis courts that are more than 100, uses that make possible various water activities along the greenway that have much rich potential in terms of recreational uses, two golf areas, two ice skate courts, funfair and passive recreations (Little, 1995).

![Figure 6. The Brooklyn - Queens Greenway](image_url)
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