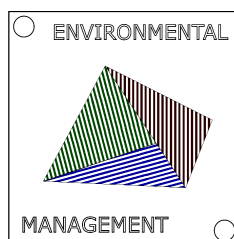





## STRATEGIES TO PROMOTE PERFORMANCE OF THE SPATIAL ENVIRONMENTS OF CITIES THROUGH ECOLOGICAL CORRIDORS CONCEPT

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### ABSTRACT

*The research clarifies the concept of its spatial environment and its natural and built components and the relationship of these components to each other and the extent of their mutual influence, and explains the importance of the existence of environmental standards that would enhance and enumerate the spatial environments of river axes and deduce through them the basic aspects of raising the performance of spatial environments of river axes, then the research moves to defining the concept of ecological corridor of rivers and their development, and shows the strategies for preserving this environment and the guidelines that fall within it, to arrive at the end of the theoretical part to determine the spatial dimensions that contribute to raising the performance of spatial environments for ecological times .*

*The research is based on enhancing the subject of the natural component of its ecological corridors. The research is also based on the nature of the environment along its axis to conclude at the end of defining effective strategies to address the problems of the spatial river environment based on the spatial dimensions of the river area, and thus arriving at a number of results that would raise the performance of the spatial environment of the ecological corridor and its impact on the city .*

**KEYWORDS:** River axes, Ecological corridor ,Spatial environments.

### Introduction

Green spaces in cities are considered the green lung and breathing space for their residents, due to their direct connection with residential areas, and because of their impact on improving air quality and reducing pollution resulting from human practices within the spatial environment with its natural and

built components, especially after industries entered heavily into these environments and became the most important sources of pollution. Therefore, the local authorities in each city were striving to increase the areas of green areas and intensify the plant elements within them in line with the requirements of the city.

With the rapid growth of cities, these green areas within them began to erode, and often turned into small green islands in the heart of concrete forests. Corridors and their continuity and the protection of biodiversity, to maintain their function in connecting green areas surrounding cities with each other, and strive to restore nature in the city. The spatial environments of the ecological corridors have suffered from major problems, including urban sprawl, misuse of land and problems in their ownership, which led to a high percentage of pollution within them to dangerous levels that negatively affected river courses, water quality, quantity and flow rate, in addition to the inability to make use of them in many cases. Due to the high percentage of pollutants within them, and this pollution has also become one of the most important distortions of the visual aesthetic landscape of these rivers, in addition to the lack of attention to the urban facades surrounding the ecological corridors of the rivers, their heights and their covering, thus increasing the distortion in the landscape, especially the river interface. All this calls for the study of the ecological corridors of rivers within their spatial environments to achieve the best use of the benefits of these corridors, and the optimal use of the surrounding lands, to seek the spatial environment towards achieving sustainable development with its different economic, social and environmental principles, and to improve the quality of life for the inhabitants of these environments.

### Research objective

The research aims to find a formula through which to raise the performance of the spatial environment of the River based on the following:

- 1- Determining the environmental treatments of the river to restore its environment with its plant and water elements in a way that achieves the preservation of the vital biological diversity within it.
- 2- Enhance the overall visual aesthetic landscape of the spatial river environment.
- 3- Determining the best use of the land that would enhance the performance of the natural and built spatial environment of the river axis.
- 4- Treating land ownerships to achieve the continuity of green networks within the spatial river environment by addressing the fragmentation that occurs.

### Research data

- 1- *Spatial environments and the impact of their components on urban ecology*: The research in this chapter presents a historical overview of the emergence of cities on rivers, the concept of the spatial environment and its divisions, and their relationship to the promotion and improvement of human, natural and ecological public life. Activities have developed in ancient civilizations, especially in areas of waterways. By analyzing, we find that these civilizations relied on rivers in the areas of agriculture, transportation, entertainment, and others. Based on the stages of development of land uses on the banks of rivers, especially in European cities, it is noted that the beginning of the industrial revolution was the first factor in the deterioration of the ecosystems of cities, as cities began to grow on the two river banks without taking into account the erosion of the elements of the natural environment, and did not take into account the damages resulting from this urban sprawl that leads to the erosion and demise of the ecological reality, so standards were necessary to restore the reality as it was to restore the environment to the cities. With the onset of the Industrial Revolution, the growth of the city appeared on the second bank of the river, and thus the space of nature within the cities began to shrink as a result of urban sprawl, and it became urgent for the emergence of movements and currents to defend nature within its environment and its relationship with the built spaces, so the concept of the spatial environment with its natural and built components appeared, and

considering that Cities have become composed of two parts separated by a river, new concepts and methods of treatment have emerged to preserve biodiversity and protect it from erosion, including the concept of ecological corridors.(Renalds et al., 2010)

- 2- *Enhancing the natural component in the spatial environments of cities*:More than 4 billion people around the world live in urban areas today,and by 2050, this number will be over 6 billion people. As humanity moves into the urban world of the future, connecting people to nature and embracing the decisions that will create a new era of natural cities, through which people, infrastructure and wildlife interact dynamically as part of a single ecosystem, positively supporting the system as a whole.These cities will be more resilient to environmental extremes such as droughts, storms, and heat waves. The citizens of these cities will reap the benefits that nature provides for free.There is very little in a dense urban environment what might be called a 'natural ecology.'Humanity has managed, often fundamentally changed and adapted, nature and natural processes .In the past, this management was often beneficial in the short term, especially in environments containing rivers and waterways (Jackson et al., 2013).

Biodiversity has intrinsic value and humans have a responsibility to conserve biodiversity, and the obligation for future generations to conserve nature.Natural ecosystems are known to provide ecosystem services in the form of resources such as food, fuel and timber Air and water purification,detoxification and waste decomposition, Climate regulation Renew soil fertility and crop pollination, these operations are estimated to be worth trillions of dollars annually (Nature in the city thriving biodiversity and healthy ecosystems, 2017).

- 3- *Environmental criteria for assessing the ecological reality of rivers*:The expression should be a guiding picture describing the dynamic and ecologically healthy river that can exist in a particular location .This picture may be influenced by irreversible changes in watersheds and geomorphology, by permanent infrastructure in floodplains, or by non-native species that cannot be removed (Palmer et al., 2005).The term ecological is used in a very general sense to include the biological, hydrological, and geomorphological aspects of natural systems .Thus, an ecologically dynamic state is one in which organisms vary in abundance and composition over time and space, as in appropriate reference systems, and channel shape and composition change in response to a change in the natural flow path in the area.

It is essential that practitioners realize that there cannot be a globally applicable restoration end point given regional differences in geology, climate, vegetation, land use applications and species distribution .There are many ways to create a guiding picture for reform efforts, and these approaches are not mutually exclusive and often complementary.(Rheinhardt et al., 1999).

- First, historical information, such as aerial photographs, maps, ground photography, and ground and biological survey records can be used to determine preconditions.
- Second, relatively underutilized or already restored reference sites can be used to help define restoration goals.
- Third, an analytical or process-based approach that uses empirical models can be used to guide project design.
- Fourth, flow classification systems have been used as a basis for developing indicative images for the improvement and enhancement of ecological realities in North America and Europe(Kondolf, 1995).So,the paper summarizes guidelines that can be used to assess the Five Criteria for Ecologically Successful River Restoration. The list is not exhaustive, and the effort, cost, and complexity of the assessment process should be proportional to the ecological risk, project cost, and societal concern .Simple and inexpensive methods should be used whenever possible .The indicators for each standard show the possible assessment tools for it( Bond& Lake 2003).

Standard	Evaluation guidelines
<b>Current analysis of the Dynamic state of the site</b>	The indicative picture should take into account not only the mean state or some constant values of the major system variables (hydrology, chemistry, geomorphology, physical habitat state and biology) but should also consider a combination of these variables and the probability that they will not be constant.
<b>Improving ecosystems</b>	Appropriate indicators of ecological integrity or ecosystem health should be selected based on relevant system characteristics and types of stressors causing disruptive ecological conditions. The expected rate of improvement will vary with the degree of degeneration, the degree to which the restoration reduces major stress factors, and the sensitivity of the indicators chosen to changes in stress levels. The change may be related to a reference site or away from a degraded state.
<b>Increase flexibility</b>	The system must require minimal ongoing intervention and have the capacity to recover from natural disturbances such as floods and fires, and recover from other human encroachments.
<b>Permanent damage removal</b>	Pre-monitoring of selected ecosystem indicators projects should demonstrate that the effects of the restoration intervention do not cause irreversible damage to the ecological characteristics of the system.
<b>Environmental assessment completed</b>	The ecological objectives of the environmental project should be clearly defined, with evidence that information or data after restoration have been collected on ecosystem variables of interest. The level of evaluation may vary from simple comparisons to rigorous statistically designed analyzes so results should be analyzed and published.

Table 1. Shows the five evaluation criteria and guidelines

- 4- *The ecological corridor*: It is a kind of environmental landscape with the formation sector integrated with the environmental, social and cultural environment and other tasks that it seeks to integrate. The ecological corridor was originally proposed to connect the isolated habitats of wild animals through the creation of migration corridors, so as to achieve the purpose of protecting wildlife (Jongman, & Troumbis, 1995). The International Union for Conservation of Nature (IUCN) issued in 1980 the concept of an ecological corridor to global conservation. Since then, the ecological corridor has begun to change from a single function of natural habitat conservation to a multifunctional direction. In recent years, the connotation of the ecological corridor has been greatly expanded, and the building direction has changed from an ecological function to an integrated functions of landscape aesthetics, recreation, and historical and cultural protection (Jordán, 2000).
- 5- *Environmental and Spatial Aspects of Ecological Corridors*: It is generally accepted that nature conservation strategies based on locating specific sites rather than on all territories have not been successful, at least in terms of biodiversity conservation, and since habitats within landscapes are interconnected, within designated areas they are affected in many ways by human activities in the surrounding lands. Often the defined area strategy is not sufficient in itself to preserve biodiversity and improve within the specific areas because ecological processes and external influences identified and / or promoting wider through the interdependence of habitats are not taken into account for the management of the region, and the effects have led this on. The areas defined due to human activities in their surroundings lead to the need for a spatial strategy in nature conservation (Li & Hao, 2014).
- 6- *Spatial strategies for environmental conservation of ecological corridors*: Biological transformation is a scale-dependent phenomenon. Transformation occurs at many spatial scales as defined by ecology. Accordingly, the design of the ecological network will be

successful if it continues with biological transmission and communication between landscapes at all levels where fragmentation and isolation are identified. and barriers to movement and flows. In this context ,ecological corridors should be defined in two administrative phases - national and national, As it should be three lanes on the design of meaningful levels of ecology: above the level of a regional or national level regional and local level, should be (or above the regional national corridors that:(a) It mainly provides migration routes for species at the national level, either in a seasonal perspective or in consideration of long-term forced movements related to global changes.

(b) Allow geographic expansion in the vicinity. Local corridors should support biotic and abiotic spatial processes and flows and movements that define at the landscape level(Jongman, & Troumbis, 1995). *In terms of the planning process, the following steps describe a systematic set of stages in relation to the Habitat Orientation Directives*

- Determining the goal of preserving sites with environmental treatments:Environmental treatments aim to preserve the biological and biological diversity of ecological corridors, and address the problem of fragmentation by exploiting the open spaces to increase and intensify the original plant elements to achieve their mission in preserving habitat sites, thus preserving all animal and plant species within their habitat and treating the flow by providing sound water management capable of On maintaining the type and quantity of water with the precinct of the river that achieves the continuity of the corridors and their non-fragmentation.
- Fragmentation: residue and size:The various habitat types and species included in the Habitat Directive have a geographic distribution that is, by definition, highly fragmented as a result of naturally occurring or extensive modification of landscapes to their extent.
- Land Ownership and Use:The implementation of conservation planning, in particular the design of an ecological network (ecological corridors and links between natural areas and buffer zones) lies in the ability of state authorities to control and enforce land use over public and private lands, and presupposes the status of land ownership in an area.
- Multiple jurisdictions:Multiple jurisdictions participate in the design and implementation of conservation policy.
- Responsibility for nature conservation is regulated differently in different states, some countries have regulations at the national level even in the Nature Conservation Act on ecological networks, ecological corridors and buffer zones, other countries have a well-developed planning system and some do not, moreover, political power Acceptance as a policy area varies greatly across Europe.
- Inadequate implementation of conservation laws:Practically all European countries have already adopted the protection of nature and set a specific policy in many laws, conventions and international agreements. However, claims to strengthen the implementation of this legal framework are emerging everywhere. To ensure the effectiveness of these criteria by studying ecological corridors and enhancing their impact on their spatial environment (Jongman& Troumbis, 1995).

Table 2. The spatial dimensions to be followed to protect the ecological corridors and enhance their spatial effects within urban environments based on aspects of raising the performance of spatial environments - prepared by the researcher.

Increase spatial performance			
Spatial dimensions	Pillars of a performance improvement strategy		
	Attention to space and the environment	Attention to society and culture	Attention to the economy and infrastructure
Environmental treatments	Reduce pollution. Promote biodiversity	Enhance spatial memory.	Promote the concept of environmental economics.
Visual aesthetic scene	Achieving ease of access.	Achieving visual comfort	Use of modern technologies. Reinforcement of urban facades of the river
land use	Reducing urban sprawl Locating natural hazards	Enhancing tourism and entertainment activities within the hub.	The best investment for the land and its location.
land holdings	Processing of the fragmentation of the axis.	Create a cultural hub along the river.	Activate <u>sectoral partnership</u> natural resource management

## Conclusions

### 1- At the level of environmental treatments:

- Redistributing and intensifying the natural plant elements along the stream in a way that achieves protection, preservation and limitation of urban sprawl.
- Using the original plant elements and agricultural plants that were previously available along the axis and enhancing them according to the nature of the use of the land.
- Determining the area of the pedestrian and bicycle paths and defining the elements of urban furniture to identify with the nature of the river.
- Organizing eco-recreation areas that encourage conservation and interest in natural elements.
- Achieving a real management of natural scenes through the concept of preserving the natural environments, their plant and aquatic elements and their biodiversity.

### 2- On the aesthetic level:

- Reviving and preserving the heritage architectural buildings along the river, and linking their green areas with the nature of the river.
- Reshaping the urban facades in line with the nature of the river.
- Unifying the cladding of the buildings according to their function in line with the aesthetic aspect of the river axis.
- Focusing on the necessity of the continuity of the green network and the environmental hubs and their connection, in order to achieve a green and sustainable visual scene.
- Identification of a new building arrangement that achieves consistent heights on the river axis and in harmony with the surrounding nature.

### 3- At the level of land use and property:

- Maintain a unified ownership of the riverbed and its precincts to take advantage of it as one element in enhancing the city's environment.
- Not to allow encroachments on the sanctuary of the river for any type of land use except the natural ones, such as the establishment of ecological parks.
- Use of land within the urban area in a way that achieves an urban environmental cultural axis that enhances population interaction.
- Determining the laws regulating the use of agricultural areas in the event of fragmentation of ownership, and not allowing other occupations to occur on their area.
- Making some modifications to the properties, transferring them, or changing the ownership of some lands and changing their organizational character to use them for vital environmental purposes in the region to preserve diversity and not allow urban encroachments.
- Paying attention to the environmental awareness-raising aspect of the city's residents and creating a sense of ownership and spatial space to contribute to the preservation of the corridor.

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