

## Analysis of the Feedback of Natural Environment in the Development of Galehdar City

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### Expanded Abstract

#### Introduction

Location of any human settlement is influenced by environmental factors, especially morphology and topography of the ground on which the settlement is formed. This makes it necessary to consider the morphology in site selection of urban land application. Identifying the status quo and problems of the city and prediction of its future changes involves recognition of these factors, forces and their mechanism of action. Different centers of the city during various periods and dynamics of physical expansion of Galehdar and the spatial arrangement of the neighborhoods (sprawled expansion) and fabric expansion of the city indicate that temporary urban rivers have a direct effect on the configuration, development and spatial structure of Galehdar. Reciprocal function of the two subsystems including physical basin and human subsystem of the urban area in the past have gone parallel with balance in subsystems and dynamism of hydro geomorphology of the city and its control. However, currently with rapid expansion of urban space with physical geomorphology and hydrology (climate), the system moves toward imbalance.

#### Methodology

The aim of this present research is to investigate the physical environment of temporary urban rivers (hydro geomorphology) and its processes and their impact on fabric-physical development of Galehdar city. In order to improve the spatial and fabric structure of the city and use of a descriptive-analytical method based on documents-library resources and several field observations, this research investigates the effects on the sustainable development of the city to eliminate obstacles on the way of its development.

#### Results and Discussion

Morphology of Galehdar represents the fabric of the city and the reasons of its configuration, fabric development, continuity and changes in the development trend and planning for the future of the city. In a systemic intra-city investigation, since the city centers are formed in various periods, a different picture of the city is painted in its development, structure and fabric.

The historic monument of "Tomb Padu" represents the history and the initial development of Galehdar city (settlement). The early and historic center (the offset point of the settlement/village) is located within the present area of Galehdar city (during Achaemenid to

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Sasanian periods). Given the present depth and direct linear path of Horu River, it seems that overflow of the river or an earthquake might have caused desolation, displacement and transformation of the early center and formation of the second center (old texture) symmetrically on the west part of Horu River (rebuilding of the city in the Jews neighborhood).

Formation of human settlement in Galhedar had slow growth in the stage of connection to the Jews center (second center/old texture) and the third center during Molla Fereydun Khan (middle texture). The new center (Safavid era) was completed after the second center.

Several centers have been formed separately and symmetrically from east to west in different eras and the old center is left desolate. Temporary rivers have been effective in site-selection of various centers of the city as well as in physical-spatial distribution and status of centers and their fabric formation. Thus, the location and spatial structure of the city reflects its environmental conditions. Therefore, topographic (location) and geographic conditions (status) as well as fabric changes of the city (the present and future conditions of the city) and physical fabric changes in the city during Islamic Republic era have caused a semi-sprawled and grid-plan pattern in the structure of Galhedar City.

Following the environmental conditions (geomorphology), the texture of Galhedar City and its houses are compact in the old section (second and third centers); on the other hand, the new texture is formed based on particular order and geometrical texture of the dominant environmental conditions. In addition to compact and irregular morphology contrast in the old section and disintegrated regular morphology in the newly-built sections of the city, this trend can be seen in the spatial dispersion of the structure and appearance. The most important factor affecting the morphology is its location infrastructure and site. In fact, natural elements have been effective in the structure, texture and formation (development trend) of the city.

In terms of urban spatial growth, the morphology (plan) of Galhedar city has followed continuity and sequence. Accordingly, the spatial structure of the city has been based on environmentalism and the historical background of the city has affected the spatial system, disparity of urban areas and the inner system of the city. Therefore, the structure of Galhedar is affected by its physical location and its disintegrated fabric and texture is formed by temporary rivers.

## Conclusion

The particular location of Galhedar city and its morphology (site and urban texture) shows that its location next to a river and in a plain has caused the spatial structure of the city to be based on a "purposeful order in the structure and fabric of the city in connection to the natural environment" and in contrast a "complex irregularity in the fabric and structure of the city texture".

Analysis of the variables of physical environment, artificial environment and their effects on the structure, type, morphology, and the shape of the city (unity of the natural environment and the city) indicated that morphology of the city is based on the natural environment of 3 linear rivers and the form of communicative network inside the city. This is in its old and early sections consistent with the structure of natural environment of the city and its surrounding i.e., similar to the ancillary network and its connection with the main river in watershed.

The results have also explained the reciprocal relationship between human-made environment (physical environment and the structure of the city) and the natural environment (rivers of the city) as well as the correlation between the two in terms of time and space in the location of the city.

Overflow periods of Ghale and Horu rivers and their discharge have a relationship with settlement expansion in Galhedar city (the hydrologic effects between construction and urban development). The hydrology of the region is effective on the formation of center sites, their deterioration and spatial dispersion. In fact, city centers and consequent urban development of the city indicate the role of hydrology in historical civilizations of the region.

**Keywords:** Galhedar City, hydro geomorphology, physical development, rivers of city, sustainable urban development.

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