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A Model for Urban Development Based on Natural Infrastructure Case Study: Ditches (Mādi) of Isfahan and its value added

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Abstract

An effective factor in reducing the problems of modern cities is to use, regenerate and enhance green infrastructure to tackle the increasing problems of cities. From the one hand, the green infrastructure significantly influences the surrounding environment. On the other hand, the increase of the value added to the lands in the areas covered by these green elements can enrich the environmental quality in addition to improving all aspects of life. This study aims at investigating the effect of Isfahan Madis, as green infrastructures of Isfahan city, on the increase of value added to the adjacent lands.

Moreover, the impact of Madis on improving the quality of life, as well as Madis patterns in promoting less developed regions are put into further scrutiny. Therefore, the influence of Madis on land prices, the role of Madis on the quality and promotion of residents' life and the living environment, as well as the use of Madis patterns in improving the quality of less developed regions can be stated as the research problems in this study. This study adopts a descriptive-explanatory research method. The results indicate that, despite the fact that wealthy people used to build their houses near Madis to benefit from the water and greenery in the past, the trend is reversed due to drought problems in recent years and providing privacy for the Madis. This has been an effective reason for the decline of the value added to the lands covered by Madis. Furthermore, studies show that improving the quality of Madis surrounding environment can induce the citizens to use these lands as green paths and memorable places for leisure times. Hence, using this green infrastructure to promote the less developed regions and reduce urban problems can be considered as a solution which is highly dependent on irrigation and water management and consequently the rights that are considered for Madis waters.

Keywords: *Madi, Green infrastructure, Value added, Life quality, Development pattern.*

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Introduction and statement of the problem

Isfahan city is famous for its natural and historical elements and structures, one of which is the Madi (Ghalenoyi, 2014: 1067). There exist some similar elements in Amsterdam and other historic cities of the Netherlands, known as the Gracht, which are used for splitting irrigational water, draining and disposing of excess water.

The term “Madi” in Isfahan dialect refers to a large and wide stream that is branched from Zayandehrood River to adjacent land for irrigational purposes, and do not exist in any other place” (Majedi & Ahmadi, 2008: 41). The review of the documents and historical maps of Isfahan indicates that the networks of Madis influenced the location of Isfahan city core, Isfahan development and growth, the location and construction of the Safavid government, the construction of the surrounding gardens and the city walls, and the configuration of neighborhoods (Namdarian, Behzadfar & Khani, 2016: 224). Based on the network of Madis, the Safavid government relocated the city center from the old square to a new square built at the Seljuk gardens and expanded the newly built neighborhoods with geometric and pre-contemplated designs along the North-South axes of Chaharbagh and East-West axes of Zayandehrood River (Ahari, 2001: 262). Zayandehrood River and its Madis have dominated Isfahan in a coherent and integrated network uniting the city elements and configuring a totality in the city (Ariana, 2013: 114). Madis are considered influential in development of gardens due to supplying water. They have also led to creation of associated occupations related to water mills and irrigation. They have also been effectively fundamental in transforming the Isfahan city from a hot and dry place to a garden city with narrow pathways in Seljuk period (Table 1); (Haghighatbin, Ansari & Pour Jafar, 2017: 24).

On the other hand, the early Safavid governors established their new capitals by connecting garden cities to the existing cities which were organized around a particular type of space such as a public garden,

a square or an organized street (Alami, 2008: 65).

In terms of water management system, they located the Madis in accordance with city regulations in order to be consumed and to be used in urban space creation as well as farms irrigation (Mahmoudian & Ghayyoomi Bidhendi, 2013: 141).

Therefore, the Madis, as the main reasons for creation of newly built neighborhoods lead to formation and configuration of palaces, mosques, caravansaries, bazars (markets), baths, and houses of many rich citizens along the Madis (Majedi & Ahmadi, 2008: 44). This process has been continuing since Safavid period; so that, before the present period, the traditional neighborhoods of this city were considered as the most expensive residential areas. Furthermore, it seems that the neighborhoods and garden streets along the Madis were greatly valuable. Therefore, the research problems evolve around the influence of Madis on the land price, the role of Madis on enhancing the quality and promoting the residents’ living environment, as well as the use of a Madi patterns to improve the quality of less developed regions. Also, the Madis can be considered as one of the effective factors in increasing the value of land in connecting districts and a reason for choosing the residence place from the citizens’ point of view.

Research aims

1. This research aims at adopting two objectives: Scrutinizing the role of Madis in the value added to the land
2. Scrutinizing the Madis patterns and their role in improving the quality of less developed regions;

Research background

Madis have had a strong effect on different aspects of life in Isfahan, so that an extensive number of research have studied their features and influences. Ahari (2001) has described “the role of Madis in formation of the city and spaces” specifically in a book entitled “Isfahan School of thought in Urbanism”. “Majedi and Ahmadi” (2008) have also studied “the role of Madis in formation of Isfahan

Table 1. The effect of Madis on the physical design of Isfahan city. Source: Majedi & ahmadi, 2008: 44.

axes	structure	characteristics
Chahar-bagh	Completely designed	- Urban geometric and linear spaces are created in the city - Green axes are created in the organic fabric of Isfahan city transforming the city into a "garden-city "as cited by many. These axes are shaped in a curved geometry and lead the city to its exits.
Other pathways such as alleys	Organic (curved)	- This irrigational system was articulated owing to the new urban design and the new Safavid neighborhoods in Isfahan

spatial structure". Also, Heidari (2010) emphasizes on the role of Madis in formation of most aspects of Isfahan city in an article entitled "Isfahan, the City of Madis". "Kalantari and Mohammadi" (2013) have focused on "formulating solutions for organizing and reviving old Madis in Isfahan city ". Moreover, "The role of Madis network in spatial organization evolution of Isfahan city, during Safavid era" can be found in an article by "Namdarian, Behzadfar & Khani" (2016). HosseiniAbri (2009) has described the water distribution and the contribution of each Madi from Zayandehrood River in his article entitled "The Relationship of the scroll attributed to Sheykh Bahayi and the traditional division of Zayandehrood water". "Mahmoudian & Ghayyoomi Bidhendi" (2013), have also discussed "water management system in Isfahan during Safavid era".

On the one hand, "Qalenoyi and Alikhani" (2014) have studied the "evaluation of Isfahan Madis as a green pathway" emphasizing on sustainable development; and on the other hand, "Ahmadi, Laghahi & Yazdkhasti" (2015) have scrutinized the "qualitative regeneration and enhancement of Madis urban edges in Isfahan using Lighting". Considering the role of environmental factors and their effect on land value, Joke Luttk (2000) has explored the role of water and natural environment as a prominent factor affecting the housing price increase in an article entitled "The influence of trees, water and open space values on housing price in the Netherlands".

In general, valuable studies have been conducted on the effect of Madis. However, the development of Madis patterns and the effective role of Madis in

improving the quality of different urban areas and the land price need to be discussed and evaluated according to the modern needs of Isfahan city, which are considered as the aims of this study.

Research questions and hypotheses

The main research questions are:

1. What is the effect of Madis on land prices in different parts of the city?
2. Has the value of the lands that are created by Madis affected the quality and enhanced the living environment for the residents?
3. Can the development of Madis pattern influence the quality of less developed regions effectively?

This research hypothesizes that Madis can be considered as significant factors in choosing the place for living according to citizens. It seems that the existence of Madis as a structural and natural element in the city can increase the value of adjacent lands. Consequently, the achieved value will probably affect the quality of life and induce vitality in the neighborhoods. Presuming that the two mentioned hypotheses are proved, this pattern can be acknowledged as an effective solution for city development and qualitative enhancement of urban environment.

Research Methodology

This research adopts a descriptive-explanatory research method based on quantitative measures and comparing field information. Firstly, the meaningful relationships between Madis, urban fabric, quality of living environment and the value added to the

lands were described and determined. In the next step, based on the explanatory method, the reason, the entity, the situation and the related aspects of Madis were explained. Eventually, the impact of Madis on the value added to the land was discussed according to field studies at the city scale. Therefore, the role of the Madis was elucidated by clarifying the meaningful relationship between the presence of natural and structural elements (as a green structure in Isfahan) and their effect on the quality of the living vironment and the value added to land.

The role of Madis in the structure and quality of Isfahan city

According to historical evidence, running or stagnant water in the physical structure of Isfahan garden city were predominant elements in the design, urban spatial organization, and the structure and quality of urban landscape. The organic order of water in a large scale (the whole garden city) was provided by the river and its branches (Madis) (Haghighatbin, Ansari & Bemanian, 2013: 9). During Safavid period, the most important urban planning activities were implemented in Isfahan which led to formation of the main urban structure to date. The construction of Naghsh-e Jahn scaure, the Safavid palaces, bridges, large historic buildings, Madis, square and streets such as Chaharbagh were accomplished during this period (Shokooyi & Movahedoohi, 2002: 105). Nevertheless, Zayandehrood River is also a significant factor in Isfahan developments and spatial organization. The infrastructural Madis networks can also be regarded as the most effective components of this River (Fig. 1). The extent of Madis passing through the dense urban fabric of Isfahan should be highlighted at least in two related and important aspects. Firstly, the Madis act as breathing spaces in the city leading a favorable blow of air into the city fabric. This performance of Madis is of the utmost importance in the present era with air pollution crisis. Secondly, considering the desirable space and environment created by Madis, it is very important and valuable for organizing people

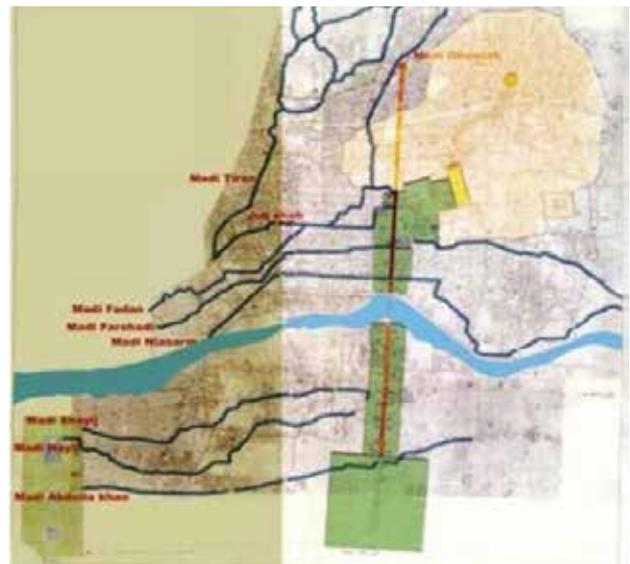


Fig. 1. Map of Isfahan Madis and Gardens during Safavid Period. Source: Haghighatbin, Ansari & Pour Jafar, 2017: 23.

movement, especially pedestrians (Kalantari & Mohammadi, 2013: 16). The presence of this natural element creates a sense of tranquility for residents in the neighborhood and can transform these places into attractive pedestrian pathways by strengthening and deploying appropriate functions and applying proper and coherent pavements and edges (Azani & Hatamifar, 2015: 13). Therefore, the qualities that are generated due to presence of Madi spaces can be attributed as provoking a sense of affiliation, legibility, preserving and strengthening the identity of spaces adjacent to water, safety, accessibility, environment, presence, function and activities, economic status and physical quality of existing buildings (Taji, 2016: 24).

Madis and their role on land and real estate prices

In order to determine whether the Madis have any effect on the value of the surrounding lands, it is necessary to investigate all the factors affecting the value of the land and housing in the first step. Subsequently, the role of Madis will be further scrutinized.

Factors affecting the value added to the land and real estate

Since the lands is of vital importance in terms of

value and social effects, it is significantly considered in generating comfort, safety, prosperity, and high living quality (Mehrabi, Mohammadi, Saravi, Jafari & Ghorbani, 2013: 308). On the one hand, rapid development and changes in socio-economic structures and physical environment throughout time lead to emergence of new forces that transform the city structure and land and housing prices. Therefore, land price is a highly influential factor in determining the land use or the functional transformation (Khakpour & Samadi, 2014: 22).

On the other hand, urban development occurs during a certain period, and this evolutionary development depends on three systems in spatial dimensions: first, extended urban systems such as the network of roads, commercial centers, etc.; second, the ecological and physical system (expandable) i.e. waters, forests, agricultural land, etc.; and third, the urban planned system included in comprehensive and detailed urban plans, and etc. (Majedi, Zebardast & Mojarrabi Kermani, 2012: 139). A number of factors affecting land prices and urban housing are presented in (Table 2). Another factor that effectively influences the land and housing prices is the viewpoint that varies in accordance with the environment (Luttik, 2000: 161). A deep scrutiny in the impact of all effective factors reveals that environmental and landscape factors are less considered. In scientific definitions, urban landscape is referred to a quality which is developed through the dialogue between the addressees and the city physic, and the physical components that generate quality are all present in the city (Mansouri & Atashinabar, 2014: 12). Therefore, Madis can be considered as one of these components which cause freshness, beauty and prosperity in terms of city landscape and image (Kalantari & Mohammadi, 2013: 26). Madis lead the water into urban fabrics, i.e. alleys and courtyards, creating green spaces in the city and houses, and thus creating a favorable urban landscape and vitality in the streets. The conduction of water into the courtyards and the creation of water axis and water ponds creates a micro-climate

in the courtyard and in the urban fabrics (Sheybani & Esmaeeldokht, 2015: 19). All the aforementioned factors result in the fact the Madis as significant natural elements fundamentally affect the increase of the value added to the land.

Moreover, since the environmental resources are not exchanged in the market and the market cannot comprehend their true value, indirect methods are used to rate these resources. For instance, despite the fact that citizens do not directly pay for clean air, they prefer to live in areas where the climate is more desirable, which is reflected in the demand for greenery and the housing [and real state] prices (Ghasemi, 2014: 4). Having discussed the effect of Madis on land prices, it can be concluded that environmental factors, urban landscape, and the quality of living place are of vital importance to the increase of housing and land price in the city. Proximity to water, garden, mountainous and highlands, accessibility to main roads, proximity to the city center and etc. add a special value to the urban areas. Isfahan city is no exception either. In addition to being located near Soffeh Mountains and University of Isfahan which have highly affected the land price, the southern regions of the city also benefit from other natural features that are Zayandehrood River and its built components known as the Madis. Investigating the role of these natural features on the land price of this region seems stimulating.

The relation between Madis and the value of adjacent lands

Firstly, it is worth noting that the average price of a square meter of land varies in different regions of Isfahan due to some features. Region 6 and 5 of that are located in southern Isfahan have the highest housing prices respectively. After that, region 3 has the highest prices since it is located in the historical fabric of Isfahan city near the grand bazar and commercial centers (Akbari & Tavasoli, 2008: 55, 56). The regional price provided by Isfahan Municipality also shows that region one, three, five and six have the highest regional prices (Table 3).

The research subject may imply that the areas covered

Table 2. Factors affecting land and housing prices. Source: Fannie t al., 2008: 15 & 16.

Environmental and natural factors	Such as adjacency, geographical location and the land altitude
Physical factors	Such as accessibility to urban facilities and services, the distance from the city center, the function (residential, commercial, industrial ...), the quality of the building, the extent, accessibility to the surrounding area, the surrounding functions, the location to the city boundaries
Economic factors	Such as the level of economic activity, the role of city in the region and the role of region in the country, the cost of building materials, the manpower wage rate, economic and political shocks such as economic sanctions or bankruptcy, wars and conflicts, inflation, bank loans, Investment and accumulation of capital
Social factors	Such as social preferences and priorities (for instance the concentration of certain types of people in a certain part of the city), social contamination (the existence or absence of crimes and misconducts in neighborhoods), the high social status, immigration (settlement of immigrant form villages in the peripheral or inappropriate residential areas), the willingness of young families to live in independent units, lack of control and lack of a specific social policy in the field of urban housing

Table 3. Average regional price in 15 regions of Isfahan. Source: authors.

Region	Regional price (Rials)	Region	Regional price (Rials)	Region	Regional price (Rials)
1	246,542	6	268,350	11	63,336
2	74,723	7	88,382	12	46,787
3	215,918	8	83,699	13	114,941
4	152,029	9	98,917	14	58,704
5	236,596	10	75,926	15	41,133

by Madis have a higher value, due to some reasons such as proximity to water, freshness and greenery. Therefore, an extensive field survey was carried out at the city scale through collecting information from real estate consultants. Having searched thoroughly, it was discovered that although the Madis have affected the quality of the environment, the price of the lands adjacent to Madis vary in accordance with the Madi condition. In most parts of the city that were adjacent to Madis, the land prices were lower; however, the value added to some neighborhoods such as Bisheh-Habib (Fig. 2) are still considerable due to being located the middle of the Zayandehrood River and a part Niasarm Madi.

Various factors influence the decrease of value added to the lands adjacent to Madis. Drying of Zayandehrood (Fig. 3) and consequently the drying of the Madis (Fig. 4), which have declined the freshness and beauty in these areas, and caused the growth of insects and reptiles, are important factors in the reduction of

value added to the land. The Madis and city creeks always had a legal right to profit from the river. However, in the recent years these vital veins have not benefited from water since Zayandehrood River is filled with water only in some months of the year. From the cultural aspects, the drying of Madis has influenced the quality of life as well, so that, the local people refused to live in some areas of Isfahan such as Shahpasand after the drying of Madis. They sold their properties to immigrants due to ignorance of Isfahan Municipality. This place now accommodates a huge number of people with different ethnic backgrounds as well as Afghan immigrants. Moreover, the prohibition of high-rise construction to preserve the privacy of the Madis have exacerbated the situation. According to the urban planning and construction regulations of Isfahan city, the basis for determining the height of the new constructions adjacent to the Madis is the width of the traffic road adjacent to the Madi and the intermediate line

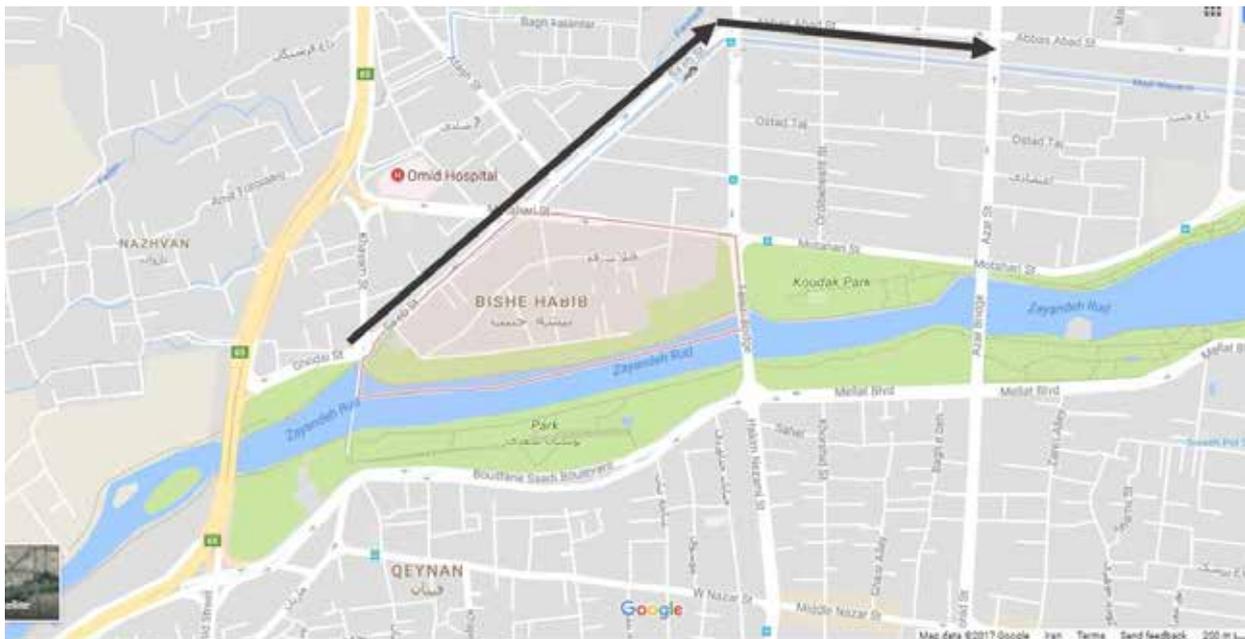


Fig. 2. Bisheh-Habib neighborhood. Source: Google map.



Fig. 3. Drying of Zayandehrud River. Source: authors.

between the approved edge and the Madi edge. Furthermore, in blocks that are adjacent to the Madis from the north, it is necessary not to build or cantilever any part of the building including the roof, the balconies and the basement within 2 meters from the Madi edge line. This space will be used as the open space contributing to the 40% of open space determined for every building block (Naghsh-e Jahan Pars Consulting Engineers, 2011: 69). Therefore, property owners are not allowed to increase density or build high-rise constructions due to privacy reasons for the Madis that have reduced

the value added to the lands and properties.

Narrow pathways and traffic congestion problems related to parking spots have made these regions less attractive and have caused traffic problems. Similarly, in some neighborhoods where the Madis are located in the middle of the alley, no protection or privacy is considered, leading to accidents and dangers for pedestrians (Table 4). For instance, Charkhab neighborhood used to be a two-way street which has turned into a one-way street due to the increase in green space width, and has led to traffic congestion and accidents since the street has become narrower.

These three factors have significantly affected the citizens' tendency to buy a property near the Madis and have led to the reduction of the value added to land. Meanwhile, some other factors contribute to this issue that are explained as follows:

1. Construction is prohibited in the area considered in the revision plan in association with rivers, Madis, springs, aqueducts and streams.
2. Access to personal vehicles is prevented in those part of the streams, Madis and springs that are allocated to pedestrian access in the revision plan. These spaces should be secured for safe pedestrian movement if another entrance is provided for the building blocks.

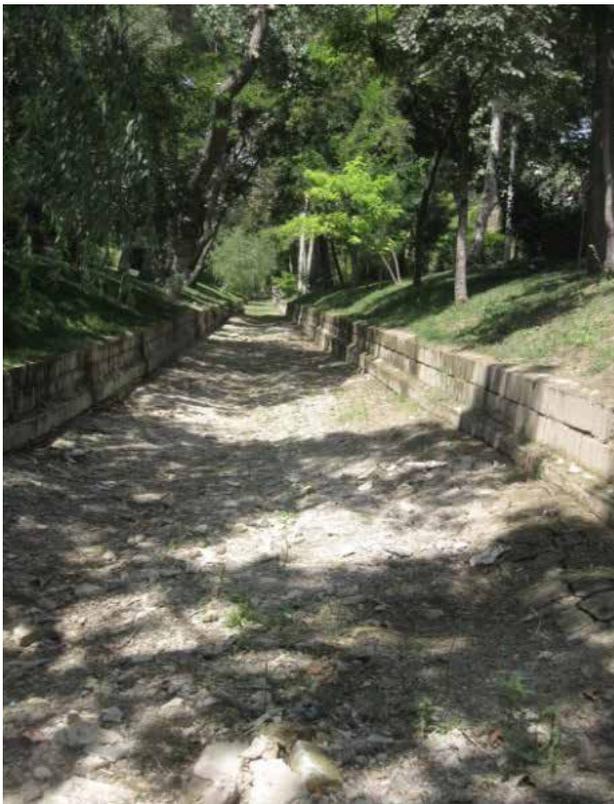


Fig. 4. The dry Niasarm Madi that was considered as one of the main Madis in Isfahan city. Source: authors.

Table 4. Main factors in reduction of value added to Madis adjacencies. Source: authors.

Dried Zayandehrood River and dried Madis	- Reduction of freshness and beauty in covered areas
	- Increase in number of insects and crawling animals
Forbiddance of high density and high-rise building	- Preserving Madis privacy
Narrow pathways	- Issues and problems related to the parking spots
	- Traffic within areas
	- Lack of protection and privacy for Madis

this strategy will induce the citizens living adjacent to these axes (or indigenous ecosystems of a particular city), to provide a long lasting physical environment around these axes if high environmental and health quality is provided. This will allow these axes to act as a part of main city structure. Eventually, the main city structure will be preserved and the city will be less prone to environmental deterioration (Kashani Hamedani, 2013: 13). Therefore, the Madis pattern can be considered as a proper pattern that can be adapted to the environmental, cultural, economic, social and ... conditions of Isfahan city.

It can be used to develop the less developed regions in this city. Creating green infrastructures would be very useful for areas where Madis exist with poor environmental and living quality. However, water resource management and optimal use of water will help to reduce water scarcity in existing Madis and develop them in the future.

Effective factors on promoting the influence of Madis

The research findings indicate that transforming Madis into linear parks as proposed by the Municipality of

3. Pedestrians are prioritized to move in pathways around the Madis and streams and the vehicles are prohibited with confined accessibility in areas allowed in the revision plan.

4. High-speed routes in the vicinity of the Madis are prohibited, except for the specified areas allowed in the revision plan.

5. Marginal services (with a surface area of 1000 meters or more) should be built at least 5 meters behind the Madi edge in accordance with urban planning regulations (privacy, shading, etc.). The remained space should be programmed for the entrance space, green space and tree planting.

6. Construction of regional and local commercial units and services on the margins of the Madis should not intrude the privacy of Madis (Naghsh-e Jahan Pars Consulting Engineers, 2011: 103 & 104).

The role of Madis on the quality and living environment

In general, each region is affected by macro-climatic features including latitude, distances and proximity to the sea, altitudes, etc., as well as micro-climatic features such as day and night, vegetation, built environments, topography, adjacency to water, etc. (Fig. 5). Madis are the most important factors that affect the micro-climate of Isfahan (Shahbazi, Riasat & Moradi, 2012: 2), and the quality of the surrounding areas. Zayandehrood River and the Madis respectively provide life and moisture to the city (Paragali, 2012: 18). Madis, as the key elements that add meaning to Isfahan city, have made this city a unique place to which the residents are deeply affiliated. This system is not observed in any cities of the country where a river flows. Having been located near greenways, Madis can play a vital role in improving the quality of urban spaces. They can be considered as the first examples of greenery and green network that provide transportation, communication, and conservation ecological services. In the past, citizens used to benefit from these areas as they walked, sit, stood, talked, heard and observed the spaces. Now,

the conditions and quality of the environment and the Madis space have had a central influence on the activities and the presence of citizens in urban spaces, so that the municipality of Isfahan has been commissioned to build and create suitable furniture, green space, and various lighting in line with the Iranian-Islamic architecture to maintain, enhance and improve the quality of life in areas covered by Madis. Therefore, Madis as active urban edges have contributed to the formation and improvement of the quality of the surrounding neighborhoods. For many years, they have led to vitality and legibility of urban spaces, creating a sense of place and memory for the citizens (Ahmadi, Laghaii & Yazdkhasti, 2015: 153). The role of Madis in enhancing the quality of less developed regions. The Madis can exhibit a proper pattern for enhancing the quality of less developed regions in Isfahan. Regarding the dependence of environmental conditions on the Madis and the impact of Madis in the structure formation, the accessibility and development process of Isfahan, Madis pattern can be proposed to be used as a green network that provide applied facilities such as transportation, communication and protection services and comply with ecological policies simultaneously (Ghalenoyi & Alikhani, 2014: 1068). To fulfil this aim, the visions, ideals and goals of creating a greenway can be determined on the basis of the status quo in every region (city), in order to present a strategic plan for every region with related details. The greenway functions cover a wide range of benefits and outcomes in social, economic, cultural, agricultural, urban, biodiversity and leisure aspects. In this regard, the characteristics of indigenous and environmentally friendly plants and their use will play a decisive role in creating and enhancing the indigenous and environmental identity of each city (Masnavi & Fathi, 2011: 87)

Creating a space around the environmental elements integrated into urban areas, such as Madis axis, provides a lively environment with high quality indicators that preserve the indigenous environmental features in the form built environment. In addition,

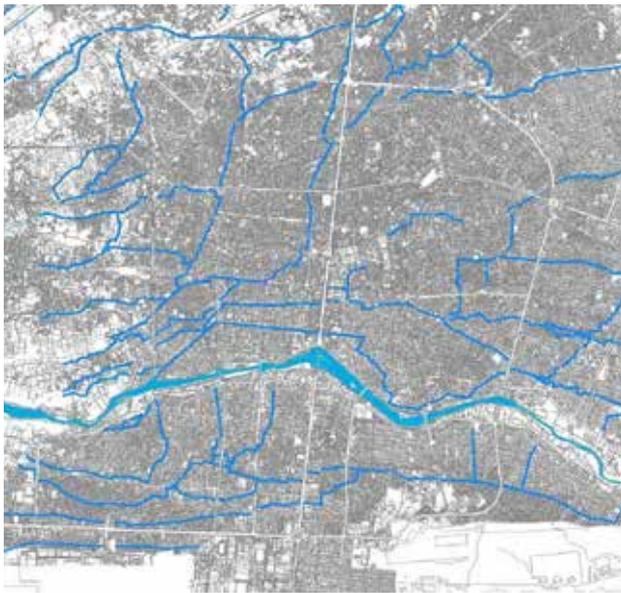


Fig. 5. General distribution of Madis in Isfahan city. Source: Kashani Hamedani, 2013: 11.

Isfahan could significantly contribute to enhancing the environmental quality and, to some extent, the rise in land prices in these areas. Although the rise in land prices cannot be regarded as beneficiary at this point of time, it may lead to enhancement of local quality, the tendency for living in these areas and the desire to protect the privacy of Madis periodically. Moreover, providing safety in areas adjacent to Madis will also affect the land prices, since the citizen are willing to go hiking in these places. Therefore, the solutions that lead to qualitative upgrading, a rise in land and property price, as well as citizens' satisfaction with Madis spaces can be summarized as follows:

1. Empowering and encouraging local inhabitants to live adjacent to Madis to protect the existing fabric.
2. Using the original capacities of Madis to attract tourists.
3. Giving the ownership of abandoned or downgraded properties to the municipality and transforming them into cultural-recreational centers and etc.
4. Protecting and preserving Madis during drought to prevent the growth of insects and animals.
5. Developing a specific strategy for irrigating the surrounding green space during drought.
6. Providing safety for covered areas in order to extend the green space for the use of citizens

7. Using the Madis pattern for less developed regions.

Conclusion

In recent decades, urban concerns have led the citizens to aim at improving their quality of life. Preservation and upgrading of green infrastructures have been highly considered in many cities of the world. For instance, in Seoul, South Korea, the highway which was built on the Cheonggyecheon River was destroyed and a green infrastructure was added to Seoul metropolitan areas as a consequent of the river revival -in order to increase the quality of citizenship. In similar examples in Tehran, the revival of river valleys such as Farahzad and Darake were also being highly accentuated. The Madis have transformed Isfahan city into a beautiful garden city affecting all quantitative and qualitative aspects of life. However, these vital veins of the city have ceased to function in recent years as a result of current droughts. On the one hand, the presence of insects and reptiles in addition to increase of environmental pollutions caused by the droughts, and the narrow pathways, has made the people less eager to live near the Madis. On the other hand, the prohibition of high-rise construction in order to preserve the privacy of Madis have exacerbated the situation. Therefore, it is of vital importance to focus on Madis as historical infrastructures and as an ecological features of Isfahan city. In many countries, the housing price in the historic areas of the city is considerably higher than other parts of the city. Similarly, areas that benefit from good weather conditions or the regions that are close to a green infrastructures are no exception. However, a reverse trend is observed in Isfahan city since green historical urban infrastructures are not highly desired. Hence, the assumption that proximity to the Madis increases the value added to the land becomes doubtful. Nevertheless, the importance of Madis has been revealed to all, and its revival has been vitally accentuated in order to enhance the quality of life, so that the Madis be used as an indigenous urban pattern for the development of less developed regions. The

results of this research reveal that some other factors also contribute to the success of this pattern, whose absence can lead to a “counterproductive” effect in Madis. For instance, lack of water, absence of proper water management and disrespecting the rights that are considered for Madis waters will have a negative effect on the Madis.

Having discussed the issues related to Madis, it can be concluded that increasing the value added to the land, improving the quality of life in areas adjacent to Madis, and finally using the Madis pattern to improve the quality of less developed regions can be beneficial in solving urban problems of Isfahan city, provided that this process is completed by a powerful resource management, sustainability of water flow, and in compliance with future developments near the Madis and the possibility of high-rise construction in the adjacent fabrics.

Development patterns on the basis of natural elements will add value when natural sustainability is guaranteed and supportive factors in urban management are provided. Natural elements cannot be merely sufficient in providing the conditions for development or value creation. The results of the studies indicate that if other requirements are not met, the development pattern can turn into a deteriorative or an anti-development pattern.

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