Original Article

Environmental Analysis of Villages on the Skirt of Farsan City based on the Urban and Rural Relationship

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Abstract

Purpose- The rural-urban integration refers to an optimal combination of natural, economic, social, and spatial factors. The scale of this integration depends on the extent to which urban and rural systems (economic, social, and environmental) influence, interconnect, complement, and share benefits. The main goal of this study is the environmental analysis of villages in the periphery of Farsan city based on the rural-urban relationship.

Design/methodology/approach- This is an applied study that uses a descriptive-analytical method. Data were collected using a questionnaire. The statistical population of the study consists of the four villages in Farsan county with a population of over one thousand people. Together, these four villages are home to about 4285 households (14972 people) from which a sample of n=375 was selected using Cochran's formula.

Finding- The results of the research based on the one-sample t-test indicate an environmental relationship between Farsan county and its nearby villages. The environmental indicators such as noise pollution and non-expansion of green space, the change of cultivation pattern, the intensified land abuse and brokerage, the reduced share of water in agriculture, and the limited environmental knowledge of villagers suggested adverse effects whereas other variables manifested the positive effects of the connection with Farsan on improving the environment of the nearby villages. The results of regression analysis showed that the environmental relationship of Farsan with its surrounding villages explained 17% of study indices (environmental health, land-use change, water and soil resources, knowledge and importance of environmental issues) and the remaining 83% was explained by other factors not addressed in this study.

Research limitations/implications- The main limitation of the study was the scant literature on the environmental effects of the urban-rural relationship.

Practical implications- Implementing a suitable cultivation model for agricultural products, expanding new irrigation systems, maintaining and reviving orchards, and raising awareness of environmental issues among villagers should be put on the agenda.

Originality/value- Investigating environmental effects of the urban-rural relationship as a way of ensuring sustainable rural settlement and environmental protection in the study area.

Keywords- Environmental relationship, City and village, Periphery villages, Farsan.

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1. Introduction

The urban area is a spacious residential populated with industries and a non-agricultural population and represents a complex and dynamic system, while the rural area is usually home to workers that are mainly engaged in agricultural production. Cities and villages as two interdependent systems are integrated and complementary (Ji et al., 2019). They create a complete system where the sustainable development of each can enhance the development of the other. For ages, the development of cities and villages in different countries and regions has been closely entwined with a range of economic, social, environmental, and cultural factors. As a result, complex relationships including economic, social, environmental, and cultural and location connections have been formed between urban and rural areas (Li et al., 2019).

The environment, as a place of residence that supplies the most basic human needs, is gaining more importance these days. However, throughout history, man has excessively exploited natural resources without planning, inducing massive pollution in soil and climate and destroying its bioavailability (Kamali Mohajer & Farahani, 2012). Most threats to human societies stem from environmental issues. These threats, although ostensibly constrained to natural threats, have compromised the security of societies and consequently the national security of the countries. In some cases, their effects and consequences are much greater and more dramatic than wars. (Lotfi et al., 2011).

A cursory look at the environment of villages around the world over the past two decades suggests that not only deleterious human effects on the environment have not diminished, but also acute and complex issues such as severe atmospheric pollution, biodiversity loss, ozone depletion, global warming, rising ocean water levels, drastic climate change, and a variety of other ramifications have emerged. In Iran, as in other countries, the development of urbanization and the gradual transformation of rural areas and agricultural communities into urban and industrial areas have altered the nature of human relations with the surrounding environment. These changes are chiefly due to a lack of control and monitoring of the environment (Rahmati, 2012).

In many villages across Iran, the environment faces severe threats such as desertification, deforestation, change of agricultural land use, declining aquifers, and landslides, to mention a few (Geravandi et al., 2012). In light of the fact that villages play a crucial role in the production and employment system of the country, and considering their geographical breadth and population (Anabestani et al., 2011), as well as a plethora of problems and environmental challenges in rural areas of Iran, the necessity and importance of conducting environmental-ecological assessments in rural areas cannot be overstated. The environmental issues, particularly environmental conservation, have received increasing attention in all parts of the country, especially in rural areas. Therefore, rural areas are of utmost importance due to their proximity to nature and their direct interactions with nature (Azmi & Motiei Langroudi, 2010). Villages formed on the skirt of cities are among the settlements that have witnessed the formation, and expansion of opportunities and threats that influence the quality of life and how the demands of its residents are fulfilled. Access to services in cities, and urban ecological threats along with the absorption of migrant population and its ramifications have given rise to complex conditions in these villages, which highlight the importance of studying environmental issues in these villages (Amanpour, 2019).

Farsan city with an area of about 5655 square kilometers has cold winters and temperate summers with soil that is well-suited for agriculture and horticulture. In light of the above-mentioned issues and given the importance of Farsan in the region and its impact on surrounding villages, it is highly important to explore environmental relationships. It is mainly because this small town, due to its dominant effect, has influenced or will affect the economic, social and environmental relationships

of the surrounding villages. Indeed, a variety of environmental changes in the surrounding villages depend on the association between the city and villages. Understanding this relationship provides more profound insights for environmental planning in the villages.

Therefore, the main goal of this paper is to conduct an environmental analysis of villages in the periphery of Farsan in terms of the rural-urban relationship. The secondary objectives of the research can be defined as follows: 1) Investigating the effects of the relationship of Farsan county with its surrounding villages in terms of environmental health index on the studied villages; 2) Investigating the effects of the association between Farsan and its surrounding villages in terms of land-use change index; 3) Exploring the effects of the relationship of Farsan county with its surrounding villages in terms of water and soil resources index; 4) Investigating the effects of the relationship between Farsan and its surrounding villages in terms of knowledge index and the importance of environmental issues.

2. Research Theoretical Literature

Urban-rural integration means that urban and rural spaces, urban and rural industries (including primary, secondary and tertiary industries) as well as urban and rural residents are holistically incorporated in the planning process. Urban-rural integration refers to an optimal combination of natural, economic, social and spatial factors of urban and rural. The degree of urban-rural integration depends on the extent to which urban and rural systems (economic, social, and environmental) influence, interconnect, complement, and share benefits (Fang, 2017). This approach suggests that when urban and rural population, technology, capital, resources and other factors are integrated, development between urban and rural areas in economic, social, cultural, environmental and spatial domains as well as balanced quality of life between urban and rural residents are coordinated (Shan & Ding, 2015; Chan et al., 2018). By optimizing the urban and rural spatial structure and establishing and

improving the relevant systems, the rational flow of resources between urban and rural areas can be established. This can ensure the comprehensive integration of urban social, economic and ecological environments, balanced development and quality of life between urban and rural residents. Thus, thanks to the harmony between urban and rural areas, urban and rural residents can access good living conditions, social welfare and quality of life with the broad development of productive forces. The flow of resources between urban and rural areas is a prerequisite for accomplishing urban-rural integration and rural revitalization (Yan et al., 2018).

The classical theories and models of urban-rural relationship, including the center place, growth pole, center-periphery, agropolitan and urban function in rural development, have all been formulated in their specific temporal and spatial context. The spatial development planning and policy-making system (urban and rural) in Iran have also been influenced by some of these models (especially the growth hub) at different eras. Classical approaches and models are often presented in top-down, centralized and non-participatory planning system. City-orientation, overemphasis on economic growth, reliance on expertise, failure to shore up the necessary infrastructure, and disregard for spatial and structural differences between regions in various societies and countries are among the reasons for the inefficacy of these traditional approaches and models. The history of development in Third World countries, at least in the rural sector, manifests that the attitude towards development and strategies adopted play a key role in the success or failure of development programs. Many experts believe that failure to improve rural society and realize rural development programs is rooted in the attitude towards rural development and adopted strategies (Zahedi et al., 2012). A review of rural development perspectives, methods and strategies over several decades illustrates that in most approaches, especially until the 1980s, the adoption of a partial and subjective approach as well as the

absence of a systematic and integrated approach to development and disregard for the role of people are the main reasons for the inefficacy of rural development strategies. As a result, many of these strategies have increased the urban-rural or agricultural-industrial dichotomy, putting rural development against urban development while mounting challenges such as environmental crises and socio-economic inequalities. This has prepared the ground for changing policy maker's approach from a "top to bottom" and "government-oriented" model to a "bottom-up" and "community-oriented" model (Oliaei, 2015).

In response to the drawbacks of classical theories and models, new approaches to spatial planning (urban-rural relations) including ecological approach, regional network approach, participatory approach, communication approach, interactive approach, strategic spatial approach, modern institutionalist approach, good governance and spatial justice have been introduced at different eras. Among these new theories, the ecological development approach closely deals with the environmental relationship of urban and rural areas. Ecological development is an approach that stresses the compatibility of social and economic goals with appropriate ecological management, along with the spirit of cooperation with the peaceful coexistence of humans and the nature, while fostering a type of qualitative growth, neither a zero growth nor negative growth (Ruknuddin Eftekhari et al., 2014). Ecological development seeks to enable human beings to optimize harmony with nature and achieve sustainable development through a full understanding of the interaction between the environment, economy, politics and socio-cultural factors based on ecological principles (Register, 2008).

According to the ecological development approach, the development of each region firsts calls for an assessment of ecological potentials. This process aims to cultivate a holistic development that is in harmony with nature by regulating the human relationship with it (Jokar & Masoudi, 2016). It can be argued that the ecological approach is one of the goals of sustainable development. In fact, sustainable development is recognized as a potential path to change the direction of development towards an inclusive model, which is intended to ensure a symbolic relationship between ecological -ecological, social and cultural, economic and physical- infrastructural systems for the present and future generations. This stems from the idea that these systems are interconnected and inseparable. Moreover, it is inferred from these interrelationships that sustainable development integrates not only economic dimensions but also environmental, social and physical-infrastructural dimensions at all levels (Dhahri & Omri, 2018). Accordingly, sustainable development seeks to align economic development with social and ecological development (Hall et al. 2010). New approaches, unlike classical approaches, share features such as a decentralized, bottom-up, human-centered approach, aiming to promote rural development alongside urban development. In general, some of the theories discussed (e.g., the growth pole) usually assume a one-way relationship between the city and villages that always benefits the former. Rural development is considered to be realized when urban development is materialized. In some theories, a reciprocal relationship has been proposed (regional network). Such theories are built on the harmonization of rural development with urban development at both regional and local scales. A single theoretical model in the field of urban-rural relationship can prevent myriad problems (Alizadeh et al., 2013).

Table 1. A review of the literature on the environmental relationship between urban and rural areas

Author	Results
Nourian (2020)	Urban development has given rise to myriad of environmental, physical and social problems for managers and citizens in the region. Environmental pollution, including water, air and noise, is one of the major pollutions caused by the physical sprawl of this region.
Hosseini et al. (2015)	The main effects of the Mehr housing project on the environment are water pollution, vegetation changes, soil pollution, air pollution and noise pollution, respectively.
Afrakhteh et al. (2015)	Spatial trends, especially the flow of capital and people (population), which have laid the ground for rural-rural interactions in the study area, have also contributed to physical-spatial evolution (land-use system, housing, etc.) in the area. However, these developments in villages, far from positive, have provoked adverse developments as well (e.g. changing the use of agricultural and gardens, expanding the urban housing model).
Hesam et al. (2014)	The major effects of urban sprawl on the study village were land-use change, demolition of agricultural land, reduction of drinking water, proximity to cemeteries, landfill problems and the escalation of noise pollution
Hatami Nejad et al. (2012)	With population growth and the increasing trend of rural-urban migration in different periods, and consequently the spatial-physical development of the cities, the area under the control of the city has expanded parallel to the urban sprawl. This has exerted a devastating effect on many high-quality agricultural and horticultural lands, inducing environmental pollution, both inside and around the city.
Navabakhsh and Safi (2009)	In recent decades, Malayer has undergone extensive changes due to the modified relationship of the city and surrounding villages as well as widespread rural-urban migration. The growth of urbanization and consequently the physical expansion of the city have obliterated agricultural lands, and natural and biological resources in the vicinity of the city, giving rise to diverse types of pollution and environmental problems.
Ghazi et al. (2009)	Urban sewage and waste as well as their effects on natural life during urbanization cause negative environmental effects, which are rooted in the disregard for the appropriate spatial patterns of urban uses during their construction.
Sadr Mousavi and Ghorbani (2006)	With the population growth and the expansion of urban-industrial centers, these restricted spaces have been stretched to limit and their environment is threatened.
Wenjing Wang et al. (2020)	Urbanization has debilitated ecosystem services due to the transformation of natural lands to impenetrable surfaces. Urban services and ecosystems showcase a negative spatial correlation. Urbanization has also diminished natural habitat, water resources, soil conservation, and carbon sequestration
Benítez et al. (2012)	The expansion of Zalapa has ruined natural resources and agricultural land, which, in addition to deteriorating living conditions within the city limits, also poses a threat to the city's stability.

Research background shows that urban sprawl has a deleterious and threatening effect on the environment. However, few researches have directly explored the effects of the environmental relationship between urban and rural areas. The present study seeks to shed light on this relationship.

3. Research Methodology
3.1 Geographical Scope of the Research
Farsan city with an area of about 5655 square kilometers makes up 3% of the total area of Chaharmahal and Bakhtiari province. According to the latest statistics in 2016, this city has a population of 93941 people (24765 households), of whom 62,000 people (16,166 households) live in cities and 19,378 in rural areas (Statistical Center of Iran, 2016). Farsan city has cold winters and temperate summers with fertile soil for agriculture and horticulture. The city is rich in water resources with several springs around the city. This city lacks forest lands and protected areas with a small rangeland in an area under 37,000 hectares, which accounts for 3.3 percent of the province's rangelands (Chaharmahal and Bakhtiari Management and Planning Organization, 2019)
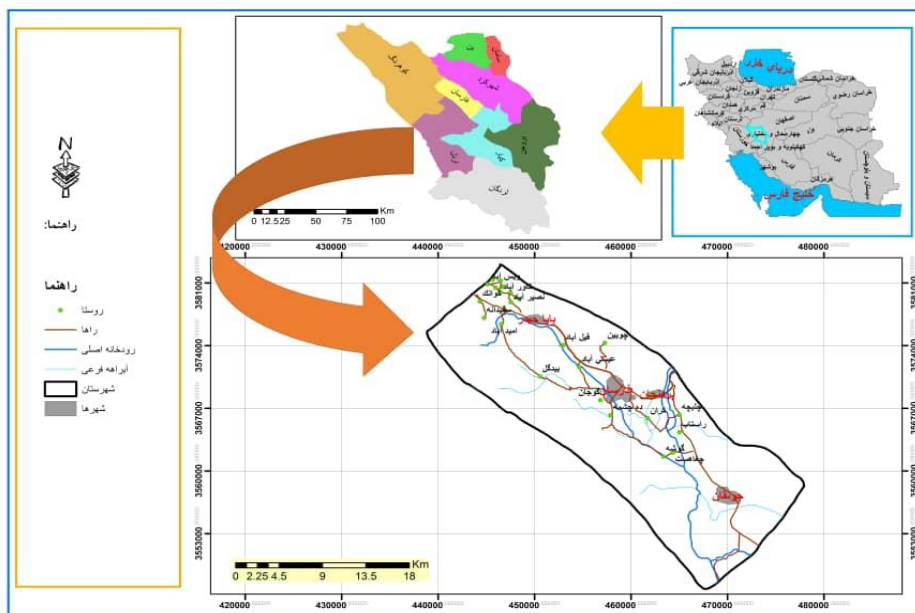
Figure 1. Location of villages around Farsan city
(Source: Chaharmahal and Bakhtiari Management and Planning Organization, 2019)

3.2. Methodology

This is an applied study that uses a descriptive method. Data collection was conducted using document analysis and library method along with data derived from field studies (questionnaire). The statistical population of this study, based on the two criteria of distance from the city and population, included four villages in Farsan city with a population of over a thousand people that were 1 to 7 km away from the city. Together, these four villages were home to over 4285 households (14972 people), of whom a sample of 375 households was selected using Cochran's formula. The sample size in each village was selected based on the population ratio of each village to the total sample. For this purpose, the simple random sampling method was used and the questionnaire was completed by the heads of

households. After data collection, analysis was carried out by SPSS software.

The research hypotheses are as follows: 1) The relationship between Farsan and its surrounding villages seems to have exerted positive effects on the studied villages in terms of environmental health index. 2) It seems that the relationship between Farsan city and its surrounding villages has exerted desirable effects on the studied villages in terms of land-use change index. 3) It seems that the relationship between Farsan city and its surrounding villages has exerted favorable effects on the studied villages in terms of water and soil resources index. 4) It seems that the relationship between Farsan city and its surrounding villages has exerted desirable effects on the studied villages in terms of knowledge index and the importance of the environmental issue.

Table 2. Sample size in the studied villages

	Village	Household	Population	Distance from Farsan city	Number of questionnaires
1	Deh Cheshmeh	1229	4510	2 km	106
2	Isaabad	462	1757	5 km	46
3	Filbad	1401	4656	6 km	119
4	Karan	1193	4049	5 km	104
–	Total	4285	14972		375

In order to analyze the ecology of the villages surrounding Farsan city, considering the relationship between the city and the village, descriptive research was conducted. Therefore, environmental effects were measured in the form of 4 indices of rural environmental health, land-use change, water and soil resources and knowledge and importance of environmental issues based on 35 indices. Before the regional inquiry, the validity of the instrument was confirmed by experts in the field. Moreover, all items were scored based on a Likert scale.

Table 3. Results of evaluation of the reliability of the questionnaire indices

Source: Authors' studies based on research by Navabakhsh and Safi (2009), Hesam et al. (2014), Hosseini et al. (2015), Ghazi et al. (2009), Afrakhteh et al. (2015), Hataminejad et al. (2012), Sadr Mousavi and Ghorbani (2006), Nourian (2020)

Variable	Index	Description	Cronbach alpha
Environmental	The health of the rural environment	Improvement of waste and sewage collection system, improvement of municipal waste disposal, enhancement of rural biological quality, reduction of noise pollution, reduction of surface water pollution (river), development of sewage disposal, improvement of pathway hygiene and accessibility, improvement of canals and waterways, and expansion of green space	0.95
	Land-use change	Illegal constructions (villas, second houses, etc.), the destruction of gardens and agricultural lands, the demolition of natural resources due to the impact of the city, the devastation of landscapes, the change of cultivation pattern due to the impact of the city, incompatibility of land uses caused by the impact of the city, increased land abuse or brokerage, fragmentation of lands due to the inflow of people from cities, destruction of lands due to the expansion of industrial workshops	0.85
	Water and soil resources	Access to agricultural water, development of new irrigation methods, quantity and quality of drinking water, reduced soil fertility due to the impact of the city, decreased wetlands in rural areas, lessening of soil erosion, especially agriculture, expansion of land ownership change (maintaining the land ownership), decreased share of water in the agricultural sector, change of agricultural lands to construction sites	0.75
	Knowledge and importance of environmental issues	Accessibility and awareness of environmental data, the importance of environment for villagers, the training of environmental issues, incorporation of environmental regulations in village executive decisions, improvement of environmental knowledge of land-use change, improvement of environmental knowledge for the establishment of urban industrial workshops in rural areas, the emphasis of Islamic councils on environmental issues, improved knowledge of villagers about various environmental health diseases	- 0.74

4. Research Findings

4.1. Description of the statistical sample (respondents)

A descriptive study of the sex variable shows that 86.6% of participants are men and 13.4% are women, which suggests a balanced distribution for this variable. According to the statistics, the age range of participants was between 20 and 61 years with an average age of participants. As for the level of education variable, most participants had a diploma (46.6%) and illiterate people or individuals with primary, secondary and high school education had the lowest frequency. Moreover, 40% of participants had a bachelor's degree or higher. Regarding occupation, most participants were employed in agriculture sector (40%)

4.2. Analysis of the normal distribution of data

Special tests known as goodness-of-fit are used to evaluate the statistical distribution of indices. The most common test used to check the normality of data is the Kolmogorov–Smirnov test. To check the normality of data, the null hypothesis about

the normal distribution of data was tested at an error level of 5%. The analysis of data in table 4 shows that in all cases, the significance level (Sig) is greater than 0.05 and therefore the normality of the data is confirmed. According to the results, considering the normal distribution of data, parametric tests can be used to analyze data and draw conclusions.

Table 4. Evaluation of data normality

Index	Rural Environmental Health	Land-use change	Water and soil resources	Knowledge and importance of environmental issues
Kolmogorov-Smirnov	4.906	5.545	4.098	3.416
Asymp.sig(2-tailed)	0.123	0.131	0.186	0.122

4.3. Assessment of rural environmental health index based on the rural-urban relationship

The study of rural environmental health index based on a rural-urban relationship using the sample t-test shows that all nine variables were at a significance level of less than 0.05. Accordingly, it can be argued that Farsan city has had a positive effect on rural environmental health in terms of the above variables. To measure the desirability of this index, the difference between the mean and t-test can also be used. The analysis of the mean difference of variables shows that variables of noise pollution reduction with a mean difference of -0.689, and green space expansion with a mean difference of -0.097 exhibit the adverse effect of Farsan city relationship on surrounding villages in the above areas. However, the analysis of other variables at a significance level of less than 0.05 as well as the positive value of t-statistics show the positive effect of Farsan city on improving the environmental health in the surrounding villages. In other words, there is a balanced and desirable between Farsan city and surrounding villages.

Table 5. Assessment of rural environmental health index in terms of urban-rural relations using the sample t-test

Items	Test coefficient = 3						Mean
	T	df	Level of significance	Mean difference	CI=95%		
					Lower limit	Upper limit	
Improving the garbage collection system	62.648	379	0.000	1.805	1.75	1.86	4.81
Improving urban waste disposal	23.197	379	0.000	0.955	0.87	1.04	3.96
Improving the biological quality of the village	86.582	379	0.000	1.061	1.04	1.08	4.06
Reducing noise pollution	-29.009	379	0.000	-0.689	-0.74	-0.64	2.31
Reducing surface water pollution (river)	82.483	379	0.000	1.850	1.81	1.89	4.85
Improving sewage disposal	41.863	379	0.000	0.895	0.85	0.94	3.89
Improving the hygiene in pathways and accessibilities	54.5	379	0.000	0.877	0.85	0.92	3.89
Improving water channels and streams	82.595	379	0.000	0.947	0.92	0.97	3.95
Expanding green space	-2.806	379	0.005	-0.97	-0.17	-0.03	2.9
Total	115.732	379	0.000	1.02	1	1.04	4.02

4.4. Assessment of land-use change index based on the rural-urban relationship

The study of land-use change index based on a rural-urban relationship using the sample t-test shows that all nine variables were at the significance level of less than 0.05. Accordingly, it can be posited that Farsan city has influenced land-use change in terms of the mentioned

variables. To assess the desirability effect of this index, the difference between the mean and t-test can be used. The analysis of the mean difference between variables suggests that the variables of the destruction of gardens and lands (mean difference: -0.882), demolition of natural resources induced by the impact of the city (-0.761), incompatibility of land use caused by the impact of the city (0.955), destruction of rural landscapes (-0.228), change of cultivation pattern due to the impact of the city (-0.929), and intensified land abuse and brokerage (-1.303-)

demonstrate the adverse effect of Farsan city on the surrounding villages. It should be noted that the connection with Farsan city has fueled the change of crop cultivation and land use, leading to the destruction of natural resources, lands and gardens in the studied villages. However, the analysis of other variables suggests that the urban-rural relationship has not put an adverse effect on the studied villages. In other words, there has been a fairly positive relationship between Farsan city and its surrounding villages concerning this variable.

Table 6. Assessment of land-use change index according to urban-rural relations based on sample t-test

Items	Test coefficient - 3						Mean
					CI=95%		
	t	Df	Level of significance	Mean difference	Lower limit	Upper limit	
Illegal constructions (villas, second houses, etc.)	28.764	379	0.000	0.811	0.76	0.87	2.81
Destruction of gardens and agricultural lands	-53.117	379	0.000	-0.882	-0.85	-0.91	3.88
Demolition of natural resources due to the influence of the city	-21.441	379	0.000	-0.761	-0.83	-0.69	2.24
Destruction of landscapes	-8.272	379	0.000	-0.282	-0.21	-0.35	3.28
Change of cultivation pattern due to the impact of the city	-70.392	379	0.000	-0.929	-0.90	0-0.95	3.93
Incompatibility of land uses due to the impact of the city	-89.960	379	0.000	-0.955	-0.98	-0.93	2.04
Intensified land abuse and brokerage	-55.202	379	0.000	-1.303	-1.26	01.35	4.30
Land fragmentation due to the inflow of urban residents	73.118	379	0.000	1.708	1.75	1.66	1.29
Land degradation due to the impact of industrial workshops	72.515	379	0.000	1.703	1.75	1.66	1.30
Total	-9.258	379	0.000	-0.102	-0.12	-0.08	2.90

4.5. *Measurement of water and soil resources index according to the rural-urban relationship*

The study of water and soil resources index according to the rural-urban relationship using the sample t-test shows that all nine variables were at the significance level of less than 0.05. Accordingly, it can be argued that Farsan city has wielded influence on the quantity and quality of water and soil resources in terms of the above-mentioned variables. To evaluate the desirability effect of this index, the difference between mean

and t-test can be used. The analysis of the mean difference between variables reveals that Farsan city has diminished the share of water in the agricultural sector with a mean difference of -0.203. However, the analysis of other variables shows that the association of Farsan city with its surrounding villages in terms of balanced water and soil resources has produced positive effects. In other words, there has been a positive and balanced relationship between Farsan city and its surrounding villages in this index.

Table 7. Measurement of water and soil resources index based on urban-rural relations using the sample t-test

Items	Test coefficient = 3						Mean
					CI=95%		
	t	Df	Level of significance	Mean difference	Lower limit	Upper limit	
Access to agricultural water	58.718	379	0.000	1.508	1.46	1.56	4.51
Development of new irrigation methods	66.496	379	0.000	0.921	0.89	0.95	3.92
Quantity and quality of drinking water	52.389	379	0.000	1.058	1.02	1.10	4.06
Degraded soil fertility due to urban impact	15.701	379	0.000	0.495	0.43	0.56	3.49
Reduction of water resources in the rural areas	26.997	379	0.000	0.658	0.61	0.71	3.66
Lower speed of soil erosion, especially in agriculture	32.128	379	0.000	0.611	0.56	0.66	3.61
Stability of land ownership	119.478	379	0.000	1.029	1.01	1.05	4.03
Reduced share of water in agriculture	-4.276	379	0.000	-0.203	-0.30	-0.11	2.80
Change of agricultural lands to construction areas	35.272	379	0.000	0.771	0.73	0.81	3.77
Total	67.663	379	0.000	0.758	0.74	0.78	3.76

4.6. Assessing the knowledge index and the importance of environmental issues based on the rural-urban relationship

The analysis of knowledge and the importance of environmental issues index based on a rural-urban relationship using the sample t-test shows that all eight variables studied are at a significance level of less than 0.05. Hence, it can be argued that the relationship between Farsan city and the surrounding villages has had a favorable effect on the knowledge and importance of environmental issues in terms of the above variables. To determine the desirability of this index, the mean difference and t-test can also be used. The analysis of the mean difference between variables shows that the relationship of Farsan city with its surrounding villages in terms of environmental education with a mean difference of -0.921 has not been significant. However, the analysis of

other variables, considering the value of positive t-statistic, demonstrated the favorable effect of Farsan city relationship on raising the level of awareness and knowledge of environmental issues in the surrounding villages. In other words, there has been a desirable and balanced relationship between Farsan city and its surrounding villages concerning this index.

Table 8. Assessing the knowledge index and the importance of environmental issues based on a rural-urban relationship using the sample t-test

Items	Test coefficient – 3							Mean
					CI=95%			
	T	df	Level of significance	Mean difference	Lower limit	Upper limit		
Access to and awareness of environmental issues	35.321	379	0.000	10.063	10.00	1.12		4.06
The importance of the environment for the villagers	49.446	379	0.000	0.866	0.83	0.90		3.87
Teaching environmental issues	-28.965	379	0.000	-0.921	-0.86	-0.98		2.08
Considering environmental regulations in village executive decisions	44.519	379	0.000	0.839	0.80	0.88		3.84
Improving environmental knowledge related to land-use change	85.452	379	0.000	1.789	1.75	1.83		4.79
Improving environmental knowledge related to the establishment of urban industrial workshops in rural areas	56.280	379	0.000	1.247	1.20	1.29		4.25
The emphasis of Dehyars and Islamic councils on environmental issues	55.977	379	0.000	1.258	1.21	1.30		4.26
Improving the knowledge of villagers about various environmental health diseases	109.802	379	0.000	1.874	1.84	1.91		4.87
Total	101.405	379	0.000	1.002	0.98	1.02		4.00

4.7. Assessing the relationship and the impact of environmental indices on the rural-urban relationship

The analysis of variance (ANOVA) in the regression model shows that the alpha error (Sig) in the ANOVA of the regression model (0.000) is less than the acceptable error (0.05); therefore, there is a relationship between different indices (rural environmental health, land-use change, quantity and quality of water and soil resources and knowledge and importance of environmental issues) at 99% CI. That is, each of these indices influences the environmental status of the villages along with other factors and indicators

Table 9. Significance test of regression model for the importance of environmental indices in urban-rural relationship

Model	Sum f Squares	df	Mean Square	F	Sig.
Regressing	398.174	4	99.544	231.063	0.000
Residual	161.552	375	431		
Total	559.726	379	***		

The results of regression analysis (Table 10) suggest the strength of indices (environmental health, land-use change, water and soil resources, knowledge and importance of environmental issues) in the environmental relationship of Farsan city and its surrounding villages explains 17% of the environmental issues and the remaining 83% are dependent on other factors overlooked in this study.

$$(R2= 0.17, R =0.34).$$

Table 10. Variations in the dependent variable (urban-rural environmental relationship) explained by the indices

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.343	0.17	0.070	0.456

Based on the results of table 11, the rural environmental health index (0.204) predicts 20% of variations in the dependent variable, land use change index (0.464) predicts 46%, water and soil resources index (0.537) predicts 53%, and knowledge and importance of environmental

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issues predicts 32% of environmental relationships in the urban-rural relationship. The variables of water and soil resources (0.537) and rural environmental health (0.204) have the highest and lowest impact on the urban-rural environmental relationship, respectively

Table 11. The impact coefficients of the regression model of independent variables (environmental health, land-use change, soil and water resources, knowledge and importance of environmental issues) in urban-rural relationship

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig
	B	Std. Error	Beta		
(Constant)	4.322	1.069		11.402	0.000
Rural environmental health	0.231	0.317	0.204	2.382	0.000
Land use change	0.211	0.371	0.464	3.359	0.000
Water and soil resources	0.200	0.415	0.537	8.504	0.000
Knowledge and importance of environmental issues	0.201	0.339	0.322	2.877	0.000

4.8. Evaluating the significance of the difference between villages in terms of the environmental dimension of urban-rural relationship (ANOVA and Duncan test)
To determine the significance of difference in the environmental relationship between the studied villages, the ANOVA test was used. Thus, this test (Fisher) was conducted for all studied villages

to evaluate whether the villages are significantly different from Farsan city in terms of the environmental relationship. As shown in the ANOVA table (Table 12), the alpha error (Sig) (0.000) of ANOVA is less than the acceptable error rate (0.05); hence, it can be argued that villages are significantly different in terms of environmental relationship with Farsan city.

Table 12. The significance of the difference between villages in terms of the environmental dimension of the urban-rural relationship (ANOVA test)

Index	Variance	Sum of squares	df	Mean squares	F	Sig
Rural environmental health	Intergroup	8.236	3	2.745	345.345	0.000
	Intragroup	2.955	376	0.008		
	Total	11.191	379	***		
Land-use change	Intergroup	14.156	3	4.719	515.034	0.000
	Intragroup	3.445	376	0.009		
	Total	17.600	379	***		
Water and soil resources	Intergroup	15.516	3	5.172	765.836	0.000
	Intragroup	2.539	376	0.007		
	Total	18.055	379	***		
Environmental knowledge and importance	Intergroup	9.954	3	3.318	303.787	0.000
	Intragroup	4.107	376	0.011		
	Total	14.061	379	***		

After corroborating the significant difference between the test groups (villages) in terms of environmental relationship with Farsan city, the question that arises is to which village(s) this difference could be attributed. In this regard, the Duncan test was used to compare the means between villages. The analysis of the average environmental relationship at all villages was greater than 3; therefore, it can be argued that the environmental effects of Farsan city on the studied villages are desirable but not equal. In terms of environmental health index, Deh Cheshmeh (mean: 4.01), Karan (mean: 4.09) and Filabad (mean: 4.12) have the highest average and Isaabad village with an average of 3.63 has the lowest average in terms of environmental health. As for the land use index, the villages of Filabad (mean: 3.93), Deh Cheshmeh (3.89) and Karan

(3.28) have undergone the highest land-use changes while Isaabad village with an average of 3.03 has the least land use changes. Moreover, concerning the water and soil resources index, the villages of Karan (3.71), Filabad (3.65), and Issaabad (3.42) had the lowest and Deh Cheshmeh with a mean of 4.04 had the highest quantity and quality of water and soil resources among the villages studied.

With regard to the knowledge and the importance of environmental issues, Deh Cheshmeh (4.18) and Karan (4.55) have the highest and Filabad (3.91) and Isaabad (3.67) have the lowest mean. According to the results, it can be concluded that among the surrounding villages, there is a difference in terms of environmental relationship with Farsan city.

Table 13. Measurement of the differences between villages in terms of the environmental dimension of the urban-rural relationship (Duncan test)

Significance level of 0.05					
Water and Soil Resources			**Rural Environmental Health**		
Mean	**Sample size**	**Village**	**Mean**	**Sample size**	**Village**
4.04	114	Deh Cheshmeh	4.01	114	Deh Cheshmeh
3.71	103	Karan	4.09	103	Karan
3.65	119	Filabad	4.12	119	Filabad
3.42	44	Isaabad	3.63	44	Isaabad
Knowledge and importance of environmental issues			**Land use change index**		
Mean	**Sample size**	**Village**	**Mean**	**Sample size**	**Village**
4.18	114	Deh Cheshmeh	3.89	114	Deh Cheshmeh
4.05	103	Karan	3.28	103	Karan
3.91	119	Filabad	3.93	119	Filabad
3.67	44	Isaabad	2.83	44	Isaabad

5. Discussion and conclusion

Urban-rural relations, as the backbone of human society development, have always been among fundamental issues. One of the main links between urban and rural areas is their social, economic and environmental relationship. In this study, the indices of the environmental relationship between Farsan city and its surrounding villages were identified and examined using the sample t-test. The results of this test show that all four indices (rural environmental health, land-use change, quantity and quality of water and soil resources

and knowledge and importance of environmental issues) are at a significant level of less than 0.05. Based on this level of significance, it can be argued that Farsan city has had a desirable effect on the environment of the surrounding villages in terms of the aforementioned indices.

The results of the present study are aligned with Nourian's (2020) research on the effect of the city on noise pollution. Moreover, the results about the destruction of gardens and lands, devastation of natural resources due to urban intrusion, incompatibility of land use due to the city impact,

destruction of rural landscapes, change of cultivation pattern caused by the impact of the city (the tendency of villagers to plant trees instead of wheat, barley and alfalfa), intensified land abuse and brokerage, which depict the deleterious effect of Farsan city on the surrounding villages, agree with those reported by Nawabakhsh and Safi (2009), Hatami Nejad et al. (2012) and Benítez et al. (2012). The findings of these researchers about the role of expanded urbanization and consequently the urban sprawl in the destruction of agricultural lands in the margin of the city, the devastation of natural and biological resources and various types of pollutions, especially environmental problems, which have sparked negative developments (such as changing land use of agricultural and horticultural lands, expanding the pattern of urban housing) are in agreement with the present study. Regarding water quantity reduction, land-use changes and noise pollution, the findings are in line with those of Hesam et al. (2014).

The ANOVA of regression model shows that the alpha error (Sig=0.000) is less than the acceptable error (0.05) and therefore different indices (rural environmental health, land-use change, quantity and quality of water and soil resources and knowledge and importance of environmental issues) are significantly related at 99% CI. That is, each of these indices has a key role in the environmental status of the studied villages along with other factors and indicators. Duncan's test also revealed a mean difference between the studied villages in terms of the four indices.

The results of regression analysis show that the strength of indices (environmental health, land-use change, water and soil resources, knowledge and importance of environmental issues) in the environmental relationship of Farsan city with its surrounding villages can explain 17% of variations while the remaining 83% are explained by other factors not examined in this study. ($R2= 017$, $R=0.34$)

The rural environmental health index (0.204) predicts 20% of changes in the dependent variable, land-use change (0.464) predicts 46%, water and soil resources (0.537) predicts 53%, and finally knowledge and importance about environmental issues predicts 32% of variations in the environmental relationship of urban and rural areas. The variables of water and soil resources (0.537) and rural environmental health (0.204) have the highest and lowest impact on the urban-rural environmental relationship, respectively.

The following suggestions are presented to preserve the rural environment:

- Adopting the appropriate cultivation pattern of agricultural products in the villages by Jihad Keshavarzi to control price fluctuations and ensure food security;
- Promoting greenhouse cultivation and development of new irrigation systems in the studied villages to increase the share of water in the agricultural sector;
- Preservation, maintenance and revival of gardens and wooded lands, prevention of garden fragmentation, issuance of permits for cutting down trees at the construction site, roads, canals and water transmission pipes, power transmission lines, water, telephone lines, etc. in an attempt to expand green space in the studied villages;
- Fostering the sense of responsibility in protecting the environment at the villages and promoting the spirit of participation among the local people at the studied villages;
- Government cooperation to implement policies that prevent land exploitation and changes of agricultural land use;
- Educating and informing villagers about environmental protection. This awareness could be developed by environmental education in the form of seminars, conferences and gatherings. Also, access to environmental information resources such as public and mass media can play a pivotal role in raising the level of environmental information and knowledge of individuals in society (Khosravani et al., 2013).

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بررسی و تحلیل زیست‌محیطی روستاهای پیرامون شهر فارسان با توجه به رابطه شهر و روستا

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چکیده مبسوط

۱. مقدمه

روستاهای پیرامون شهری در زمره سکونتگاه‌هـایی قـرار دارنـد کـه صحنه شکل‌گیری، رشد و تدام فرصت‌ها و تهدیـدهایی هسـتند کـه کیفیت زیست و نحوه تأمین نیازهای ساکنان را تحت تأثیر قرار مـی‌دهد. از یک سو دسترسی به خدمات موجـود در شـهرها و از سـوی دیگر تهدیدهای بوم شـناختی شـهری و جـذب جمعیـت مهـاجر و عوارض ناشی از آن، شرایط پیچیده‌ای را در این روستاها بـه وجـود آورده که باعث اهمیت بالای بررسی زیست‌محیطـی ایـن روستاها می‌شود. با توجه به موارد ذکر شده و اهمیت شهر فارسان در منطقه و تحت تاثیر بودن روستاهای پیرامونی آن از این شهر، بررسی روابط زیست‌محیطی اهمیت پیدا می‌کند؛ چرا کـه ایـن شـهر کوچـک بـا حکمروایی و تسلط خود، روابط اقتصادی، اجتماعی و زیست‌محیطی روستاهای پیرامون را تحت تاثیر قرار داده است یـا خواهـد داد. در حقیقت تغییر و تحولات زیست‌محیطی زیادی از روستاهای پیرامون، وابسته به روابط بین شهر و روستا است که بـا شـناخت جـامع ایـن رابطه، زمینه بهتری برای برنامه‌ریزی زیست‌محیطی روستاها فـراهم می‌شود. بنابراین هدف کلی تحقیق، بررسی و تحلیل زیست‌محیطـی روستاهای پیرامون شهر فارسان با توجه به رابطه شهر و روستا می‌باشد.

۲. مبانی نظری تحقیق

نظریات کلاسیک روابط شهر و روستا شامل: مکـان مرکـزی، قطـب رشد، مرکز-پیرامون، آگروپلیتن و کارکرد شهری در توسعه روستایی هر کدام در بستر زمانی و مکانی‌های خود شـکل گرفتـه‌انـد. نظـام برنامه‌ریزی و سیاستگذاری توسعه فضایی(شهر و روستا) در ایران نیز در مقاطع زمانی مختلف تحت تاثیر برخی از ایـن رویکردهـا (بـویژه قطـب رشد) قـرار گرفتـه اسـت. رویکردهـای کلاسـیک، غالبـاً در

چهارچوب نظام برنامه‌ریزی از بالا به پایین، متمرکز و غیرمشـارکتی مطرح شده‌اند. در پاسخ به ناکامی‌های ناشـی از نظریـات کلاسیک، رهیافت‌های جدید برنامه‌ریزی فضایی(روابط شـهر و روستا) شـامل رویکرد اکولـوژیکی، رویکـرد شـبکه منطقـه‌ای، رویکـرد مشـارکتی، رویکرد ارتباطی، رویکرد تعاملی، رویکرد راهبردی فضـایی، رویکـرد نهادگرایی جدید و حکمروایـی خـوب و عـدالت فضـایی در مقـاطع زمانی مختلف مطرح گردیدند.

از بین نظریات جدید ذکر شده، رویکرد توسعه اکولوژیـک بیشـترین ارتباط با رابطه زیست‌محیطی شهر و روستا دارد. توسـعه اکولوژیـک رهیافتی به توسـعه اسـت کـه هماهنگی و سـازگاری اهداف اجتماعی و اقتصادی را با مدیریت مناسب اکولوژیکی مورد توجه قرار مـی‌دهـد، روحیه تشریک مساعی با همزیستی مسالمت‌آمیز انسان و زمین؛ نوع دیگری از رشد کیفی، نه رشد صفر و نه رشد منفی.

۳. روش تحقیق

روش تحقیق از نظر ماهیت توصیفی و از نظر هدف کـاربردی اسـت. برای گـردآوری داده‌هـای لازم، از دو روش اسـنادی-کتابخانـه‌ای و میدانی(پرسش‌نامه) استفاده شده است. جامعه آماری این پژوهش با توجه به دو معیار فاصله از شهر و جمعیت آن‌ها، چهار روستای شهر فارسان که بالای هزار نفر جمعیت دارند و فاصله آن‌ها تا شهر بـین ۱تا۷ کیلومتر می‌باشد، انتخاب شده‌اند. جمعیت این چهار روستا بـه تعداد ۴۲۸۵ خانوار(۱۴۹۷۲ نفر) هستند که از طریق فرمول کوکران حجم نمونه برابر با ۳۷۵ سریرست خانوار تعیین شد . انتخاب حجـم نمونه در هر روستا، با توجه به نسبت جمعیت هر روستا به کل نمونه تعیین گردید. روش نمونه‌گیری بـه صـورت تصـادفی سـاده بـوده و پرسشنامه میان سرپرستان خانوار تکمیل گردید.

*. نویسندۀ مسئول:

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۴. یافته‌های تحقیق

در این پژوهش شاخص‌های رابطه زیست‌محیطی بین شهر فارسان و روستاهای پیرامون با استفاده از آزمون تی‌تک نمونه‌ای شناسایی و مورد بررسی قرار گرفتند. این نوع آزمون نشان می‌دهد که هر چهار شاخص مورد بررسی (بهداشت محیط روستا، تغییر کاربری اراضی، کمیت و کیفیت منابع آب و خاک و دانش و اهمیت مسائل زیست‌محیطی) در سطح معناداری کمتر از ۰.۰۵ قرار دارند. با توجه به این سطح معناداری می‌توان گفت که شهر فارسان تا حدودی اثر مطلوبی از نظر شاخص‌های ذکر شده بر محیط‌زیست روستاهای پیرامون داشته است. تحلیل واریانس مدل رگرسیونی نشان می‌دهد میزان خطای آلفای (Sig) تحلیل واریانس مدل رگرسیونی کمتر از میزان خطای قابل قبول (۰.۰۵) و برابر با ۰.۰۰۰ می‌باشد و لذا بین شاخص‌های مورد بررسی در سطح اطمینان بالای ۹۹ درصد رابطه معنادار وجود دارد و در حقیقت هر کدام از این شاخص‌ها می‌توانند در وضعیت زیست‌محیطی روستاهای مورد مطالعه دارای اهمیت باشند و در عوامل و شاخص‌های دیگر نیز تاثیرگذار باشند. با استفاده از آزمون دانکن نیز این نتیجه گرفته شد که میانگین بین روستاهای مورد مطالعه از نظر شاخص‌های چهارگانه ذکر شده، تفاوت وجود دارد. نتایج تحلیل رگرسیون نیز نشان می‌دهد میزان قدرت شاخص‌های موثر (بهداشت محیط، تغییر کاربری اراضی، منابع آب و خاک، دانش و اهمیت مسائل زیست‌محیطی) در رابطه زیست‌محیطی شهر فارسان و روستاهای پیرامون توانستند ۱۷ درصد تاثیرگذار باشند و ۸۳ درصد به عوامل دیگری که در این تحقیق مورد بررسی قرار نگرفت، وابسته هستند. ($R=۰/۳۴$ $R^2=۰/۱۷$).

۵. بحث و نتیجه‌گیری

بر اساس نتایج بدست آمده شهر فارسان تا حدودی اثر مطلوبی از نظر شاخص‌های ذکر شده بر محیط‌زیست روستاهای پیرامون داشته

است. نتایج تحقیق حاضر با تحقیق نوریان(۱۳۹۹) در زمینه اثر شهر بر آلودگی صوتی همخوانی دارد. در زمینه اینکه متغیرهای تخریب باغ‌ها و اراضی، تخریب منابع طبیعی بواسطه نفوذ شهر، عدم سازگاری کاربری‌ها به واسطه نفوذ شهر، از بین رفتن مناظر و چشم‌انداز روستایی، تغییر الگوی کشت به واسطه نفوذ شهر(گرایش روستاییان به کاشت درخت کبود بجای محصول گندم، جو و یونجه)، افزایش سوء استفاده و دلالی زمین، نشان از اثر منفی شهر فارسان بر روستاهای پیرامون دارد، با تحقیقات نوابخش و صفی (۱۳۸۸)، حاتمی‌نژاد و همکاران (۱۳۹۱)، افراخته و همکاران (۱۳۹۴) گریسلدا بنیتز و همکاران (۲۰۱۲) همخوانی دارد. چرا که نتایج این محققان نیز در زمینه اینکه افزایش روند شهرنشینی و به تبع آن رشد و گسترش ابعاد فیزیکی شهر، باعث از بین رفتن اراضی زراعی پیرامون شهر، تخریب منابع طبیعی و زیستی و بروز انواع و اقسام آلودگی‌ها و در حقیقت پیدایش معضلات زیست‌محیطی و تحولات منفی را (نظیر تغییر کاربری اراضی زراعی و باغی، گسترش الگوی مسکن شهری) را برای پیرامون در پی داشته است، یکسان می‌باشد. در زمینه کاهش کمیت آب، تغییرات کاربری اراضی و آلودگی صوتی نیز با تحقیق حسام و همکاران (۱۳۹۳) نیز همخوانی دارد.

کلید واژه‌ها: رابطه زیست‌محیطی، شهر و روستا، روستاهای پیراشهری، فارسان.