

Research Paper: Analysis the Environmental Indicators in Achieving Sustainable Development in the Villages Surrounding Chabahar City

Naser Abravesh¹, Maryam Karimian Bostani^{2*}, Gholamreza Miri²

1. PhD Student, Department of Geography and Urban Planning, Zahedan Branch, Islamic Azad University, Zahedan, Iran.

2. Assistant Professor, Department of Geography and Urban Planning, Zahedan Branch, Islamic Azad University, Zahedan, Iran.



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ABSTRACT

Purpose: The purpose of this research is to analyze the status of environmental indicators in achieving sustainable development in the villages surrounding Chabahar city.

Methods: In terms of purpose, the current research is in the category of applied research, and in terms of method, it is in the framework of descriptive-analytical method, it is a collection of library and field information, and the research tool is a questionnaire. The statistical population of the study includes all experts, professors, and university researchers related to the research topic in Chabahar; the sample size was selected based on a targeted sampling of 30 people. In order to analyze the data, SPSS software (t-test, regression, and Friedman tests) was used.

Results: The results of a sample T-Test to check the status of variables (environmental health, environmental resources and services, and energy) showed that all indicators are in a relatively favorable condition. Also, the results of the regression test to investigate the impact of environmental variables on rural sustainability showed that all environmental-biological variables (predictor variable) have a significant effect on achieving sustainable development (criterion variable). Finally, in order to prioritize environmental variables in terms of impact on sustainable rural development, Friedman's ranking test was used, and the results showed that the environmental health index with an average of (3.45) is in the first place.

Conclusion: The overall results showed that environmental indicators significantly impact sustainable rural development; therefore, the ground must be provided for the sustainable development of villages in presenting a rural development model that is compatible with the environment.

* Corresponding Author:

Maryam Karimian Bostani, PhD

Address: Department of Geography and Urban Planning, Zahedan Branch, Islamic Azad University, Zahedan, Iran.

Tel: +98 (915) 3415463

E-mail: m.karimyan@iauh.ac.ir

1. Introduction

Development is a comprehensive process of economic, social, cultural, and political activities whose goal is continuous improvement of the life of the entire population. Activity, freedom, appropriate participation, and fair distribution of benefits are considered as its basic elements (Attfield & Wilkins, 2012: 63). Sustainable development as a development model focuses on social, economic and environmental factors and emphasizes the path of positive transformation (Mensah, 2019: 5). Among the strategies to achieve sustainable development is the strict implementation of environmental policies and its correct management (Norouzi & Yadollahi, 2022: 33). However, the implementation of environmental policies and laws will not be possible without people's knowledge and awareness obtained through environmental education (Abdul-Halim et al., 2021: 1).

A look at the state of the environment in recent decades shows that human activities are the most effective and important causes of environmental changes, which, while creating useful and appropriate modifications, cause destruction (Farahmand et al., 2014: 109; Panahandeh et al., 2010: 88). Despite this, even though every member of the society (individually and collectively) interacts with their surrounding environment, for a long time, in the name of progress, humans have turned the interaction between themselves and nature into a conflict (Yamini & Jafarina, 2023: 74; Shahnooshi & Abdolahi, 2007: 17). This aggression has caused widespread environmental crises and risks. These risks have become so widespread that today. However, it has an insecure appearance and only appears as a natural threat; in practice, it has endangered the security of society and, as a result, national and international security. In such a way that sometimes it has brought more significant effects and consequences of wars (Lotfi et al., 2011: 121). Meanwhile, rural areas depend heavily on natural resources to provide their livelihood and needs. Therefore, the environmental sustainability of these areas is important in realizing the national development goals to deal with desertification and the risks caused by droughts, deal with soil erosion and destruction, preserve and maintain natural resources and sub-climates (Firouzabadi & Azimzadeh, 2013: 99). This is while the environmental problems of villages in developed countries are caused by the extensive and unbridled growth that has destroyed the environment, and in developing countries, it is caused by the increase in population and, as a result, exploitation of land and its resources beyond capacity (Raisi, 2007: 112).

A look at the situation of the rural environment in Iran in the past two decades shows that not only the destructive human effects on the environment have not decreased, but the growing process of tampering with environmental resources has created new challenges (Rahmati, 2012: 16). Attention to the environment has become important in all parts of the country, especially in rural areas, so that it can be protected as much as possible while using the environment properly. Therefore, rural areas are very important due to their closer proximity to nature, the direct effects they have on nature, and the effects they receive from nature. This doubles the necessity of research in the rural environment (Azmi & Matiei Langroudi, 2011: 105).

In the meantime, Chabahar in the south of Sistan and Baluchistan province has witnessed uneven and uncoordinated growth in recent years, which has had different effects on the surrounding villages so that the indicators of sustainable development based on the environment in the surrounding towns have changed. It has become fundamental. Among the environmental problems of the villages around Chabahar, we can mention migration, lack of access to services in the villages, unsustainable use of water resources, soil destruction and excessive use of chemicals in agriculture, reduction of biodiversity, etc. In recent years, Chabahar has received the attention of various international organizations and institutions, and this is the basis for attention in economic, social, and cultural dimensions, which these developments will affect the environmental conditions of this region. and if this development is not planned and based on documented research like the present research, it will create adverse environmental consequences for the city of Chabahar and surrounding rural areas in the future. Therefore, this research aims to analyze the status of environmental indicators in achieving sustainable development in the villages around Chabahar city.

2. Literature Review

Today, the importance of sustainable rural development and its place in the development of countries is clear to everyone, especially in developing countries where a large part of their population still lives in rural areas. Sustainable rural development plays a vital role in the economic, social, and environmental aspects of the whole society, Especially by contributing to the national gross product, food security and health of the society, provision of primary raw materials, and direct connection with natural resources and environment and its exploitation (Moridalsadat et al., 2017: 56).

The increase of environmental instabilities and efforts to reduce them can be considered two important characteristics of the 21st century in relation to the environment. Therefore, in recent decades, human attention has been drawn to the disaster of environmental destruction, and the preservation of the environment and its rational use has become a serious concern for many individuals and social groups (Norouzi et al., 2023: 160). On the one hand, this process encouraged countries to carry out environmental studies and planning. On the other hand, it led to the efforts of the world community to find a solution to preserve nature alongside and along with development, the biggest achievement of which was the “sustainable development” paradigm plan (Nouri & Nowrozi, 2016: 126).

The views about nature and the environment include two general views: the “Dominant Social Paradigm” and the “New Environmental Paradigm.” From the perspective of the dominant social paradigm that is rooted in the Industrial Revolution, humans are considered beings that do not need to follow the laws of nature. And they can exploit nature to the extent that their ability allows it (Badahang Galleh-Bacheh et al., 2021: 71). In this view, man is considered separate from nature, and he must dominate nature in any way. The dominant social concept is based on the belief that it is possible to solve human problems with technology, and in it, self-interest prevails over everything (Hernandez et al., 2000: 613). Along with the traditional approaches to the environment, a new way of thinking was introduced in the form of a new environmental paradigm. This paradigm emphasizes a more balanced relationship between humans and other species, as well as sustainability in the use of natural resources. This paradigm states that humans are a unique species, but a species is among different species and should be considered as one of them. Therefore, in the new environmental paradigm, man is a part of nature, and his life is also affected by the biophysical environment, which is formed by reacting to human action. Also, unlike the dominant social paradigm, the new environmental paradigm takes a critical look at political decisions and supports the active participation of citizens. Proponents of the new paradigm believe that the orientations resulting from this point of view lead to responsible behaviors towards the environment (Abbaszadeh., 2016: 63). The widespread use of the new environmental paradigm by researchers in different countries shows that this model is a suitable tool for measuring environmental attitudes and provides a framework for explaining environmental behavior (Ntanos et al., 2019: 17).

In the field of the present research, there have been studies inside and outside the country, some of which will be mentioned below: Mohammadi Dehcheshme (2024), in research on environmental empowerment strategies in human settlements (study of Delfan city, province Lorestan), has paid. The results showed that among the selected indicators, managers and decision-makers and extraterrestrial plans and programs would have the least effect in the process of environmental empowerment of residents in the study area. Habibi & Salehi (2023), in research on villagers and environmental behaviors in the villages of west Gilan, the results of the research indicate the weak state of environmental socialization in rural areas and the existence of serious challenges and obstacles in this field. In general, the results of the present research indicate the lack of development of environmental education and training in the villages and, finally, the lack of environmental cognitive development among the villagers. Ansariardali et al. (2020) explained the rural environmental sustainability development model of Chaharmahal and Bakhtiari province in their research. The results showed that the structures related to the dimensions of rural environmental sustainable development in the second-order factor analysis model, “Natural resources and ecosystem management dimension,” “Energy management dimension,” “Biodiversity management dimension,” “Integrated pest management dimension,” “Water management dimension” and “soil management dimension” have the largest role in the factor structure, respectively. The most reliable factors of the second type over the first factor are “natural resources and ecosystem management dimension.” Bassani & Ferreira (2017), also in the study of the viability of energy access in rural areas of Brazil, found that the use of renewable resources in rural areas has been successful. Still, the main challenge is expanding in the Amazon region. They propose complete energy access for the rural population by exploring different sources such as small-scale water, biomass through proprietary form, and exploitation of wind and solar energy. Sutcliffe et al. (2016), in research on “the role of environmental sustainability assessment to achieve sustainable development,” the results show that environmental sustainability assessment includes evaluating the direct effects of the project on the environment with regard to alternatives and efforts to Reduce harmful environmental impact. A set of assessment tools increasingly influences sustainability assessment. These tools can be used in the form of sustainable development evaluation frameworks. Evaluation frameworks are effective and useful in choosing appropriate and efficient tools and ease of use. On the one hand, evaluation frameworks are used

to examine different aspects of policymaking in order to control sustainable changes. On the other hand, they are used to guide the implementation of a comprehensive and integrated evaluation. Ayres (2010), in an article on “Determining environmental indicators in achieving sustainable development,” has concluded that different approaches have been created to select sustainable development indicators. These concepts are influenced by the frameworks in which indicators are organized. Conceptual frameworks for sustainable development indicators provide accuracy and clarity of measurement, achieve the expected goals of evaluation, and define and select the required type of indicator. Therefore, choosing the conceptual framework for selecting indicators is a fundamental step in evaluating environmental sustainability. Tukker (2000) has researched “environmental impact assessment in the development of the surrounding environment.” The results show that environmental impact assessment is a method that aims to ensure decisions that may have a significant impact on the environment. In fact, environmental impact assessment is the measurement of different aspects of the environment in relation to the way decisions and policies are made, and based on this, environmental conditions affect the development of the surrounding environment.

The analysis of previous studies indicates that several studies have been carried out separately in the field of environmental indicators and sustainable development, but less attention has been paid to the analysis of the status of environmental indicators in achieving sustainable rural development. Researchers have been placed, and this research has specifically investigated this issue.

3. Methodology

In terms of purpose, the current research is included in applied research, and terms of method, it is in the framework of descriptive-analytical method. The method of collecting data and information is done in two ways: a) library and documentary method: this method has been used in order to obtain the general basics of the research, including definitions and key concepts and the background of the study. b) Field method: This method includes the preparation and compilation of questionnaires, the preparation of specialized checklists, and special observations. The current research questionnaire has 53 questions in two sections (sustainable rural development and environment), each with 16 and 37 questions, respectively (Table 1). The validity of the questionnaire was confirmed using the face method, and the reliability of the questionnaire was confirmed using Cronbach's alpha of 0.82. The statistical population of the study in-

cludes all experts, professors, and university researchers related to the research topic in Chabahar City, and the sample size was selected based on a targeted sampling of 30 people. In order to analyze the data, SPSS software (t-test, regression, and Friedman tests) was used.

Chabahar is located in the extreme southeast of Iran, next to the warm waters of Oman, at 60 degrees and 37 minutes east longitude and 25 degrees and 17 minutes north latitude. It is limited to the cities of Iranshahr and Nikshahr from the north, the Oman Sea from the south, Pakistan from the east, and Kerman and Hormozgan provinces from the west. Chabahar has three districts, five villages, and two cities. In this research, three villages around Chabahar city (Ramin, Kamb, and Kam Parmin) have been investigated.

4. Findings

First, by using the mean and standard deviation of each variable, we investigated the responsiveness of each variable (Table 2). Based on the results, it can be seen that the sustainable rural development dimension variable has the highest average, and the environmental resources and services variable has the lowest average, which indicates that the rural sustainable development dimension has the most attention and the ecological resources and services dimension has the lowest. Has received attention in this regard.

In this section, the desirability of the research variables has been investigated using a sample t-test.

In Table 3, the desirability of the environmental health variable has been investigated using a sample t-test. According to Table 2, the value of t obtained from the examination of the test is equal to 16.542. Also, the average value is 3.32, and it is confirmed at the confidence level of 95% (sig = 0.006). Therefore, the environmental health index is in a favorable condition.

In Table 4, the variable desirability of environmental resources and services has been examined using a sample t-test. According to Table 4, the t-value obtained from the test is equal to 12/213, and the average value is 3.08. This is higher than the average and is confirmed at the confidence level of 95% (sig=0.03). Therefore, the index of environmental resources and services is in a favorable condition, although it is not very impressive.

Table 1. Dimensions, indicators, and items examined in the research

Variable	Dimensions	Object
Environmental	Environment Resources & Services	Contaminated lands caused by waste materials
		The amount of waste produced
		Satisfaction with drinking water quality
		Human and industrial waste discharge into open and surface waters
		Prevention of water pollution
		The concentration of pollutants in the air
		The amount of pollution caused by the movement of vehicles
		Air quality level
		The amount of air inversion
		The amount of pollution caused by industrial workshops and factories
		Outdoor quality
		Quality of green space
		Quality of vegetation
		Quantity and distribution of green spaces
		Landscapes with natural value
		Credits spent on protecting valuable landscapes
	Destruction of landscapes (change of use)	
	Tourism capability	
	population density	
	Adherence to the care of the residential environment	
	Land use changes	
	Credits spent on beach cleanups	
	Management of coastal areas	
	Environmental Health	The quality of natural beauty
		Resistance of houses and buildings against earthquakes
		Flood prevention programs
		Quality of buildings and architecture
		Quality of buildings and architecture
		The quality of the landscape
		The quality of garbage collection
	Wastewater collection quality	
	Energy	The amount of peace and lack of noise pollution
The amount of carrier energy consumption (electricity)		
The amount of carrier energy consumption (water)		
The consumption of carrier energy (gas)		
The amount of carrier energy consumption (gasoline fuel)		
The cost of carrier energy consumption		

Table 1. Dimensions, indicators, and items examined in the research

Variable	Dimensions	Object
Sustainable Development	Sustainable Rural Development	Development and improvement of the educational environment
		Development and improvement of leisure and entertainment space
		Development and improvement of healthcare and medicine
		Development and improvement of personal and social security
		Development and improvement of spatial connection and belonging
		Development and improvement of partnership and solidarity
		Development and improvement of access to consumer goods
		Development and improvement of access to employment and income
		Development and improvement of access to housing for all classes
		Development and improvement of infrastructure facilities and services
		Development and improvement of transportation
		Development of clean air and improvement of air pollution
		Development and improvement of the visual quality of the space
		Development and improvement of the quality of green space
		Continuity of space
Control of physical development		

Reference: Research results, 2022

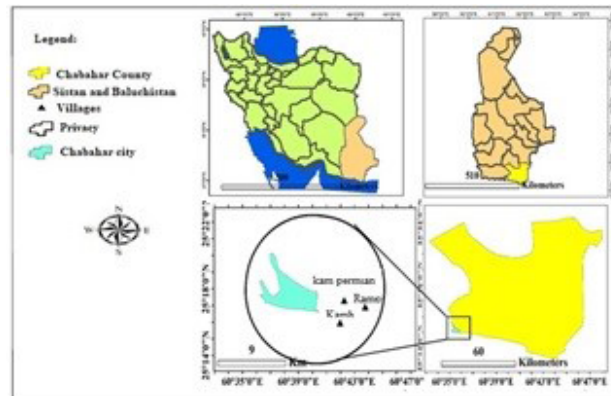


Figure 1. Study area. Reference: Authors, 2023



Table 2. Mean and Deviation of research variables

Factors	Mean	Deviation from the norm
Sustainable rural development	3.31	0.686
Energy	3.08	0.925
Environmental resources and services	2.98	0.975
Environmental Health	3.24	0.689

Reference: Research results, 2022



Table 3. The results of a sample t-tech test to check the desirability of the environmental health variable

Variable	Test value = 3						
	t value	df	Sig.	Mean	Difference from the mean	At 95% confidence level	
						lower Bound	upper Bound
Environmental Health	16.542	39	0.006	3.32	1.1122	1.0965	1.7452

Reference: Research results, 2022



Table 4. The results of a sample T-Tech test to investigate the variable desirability of environmental resources and services

Variable	Test value = 3						
	t value	df	Sig.	Mean	Difference from the mean	At 95% confidence level	
						lower Bound	upper Bound
Environmental resources and services	9.213	39	0.03	3.08	1.123	1.1236	1.7452

Reference: Research results, 2022



In Table 5, the desirability of the energy variable has been investigated using a sample t-test. According to Table 5, the t-value obtained from the examination of the test is equal to 17/625. Also, the average value is 3.11, which is slightly higher than the average of 3, and it is confirmed at the confidence level of 95% (sig = 0.02). Therefore, the energy is also in good condition, but it is not very impressive.

In the following, a regression test was used to investigate the impact of environmental variables on rural sustainability.

Table 6 shows the impact of rural environment resources and services on rural sustainability. Based on this, to determine the effect of resources and services of the rural environment on rural sustainability as a predictor variable and rural sustainability as a criterion variable, they were analyzed in the regression equation. According to the results (p<0.05, F=165.465), the obtained R2 is equal to 0.498, which shows that with a one-unit change in the independent variable, a 0.498 change in the dependent variable is created. Therefore, the resources and services of the rural environment have had an impact on rural sustainability.

Table 7 shows the impact of energy on rural sustainability. Based on this, to determine the effect of energy as a predictor variable and the dimension of rural sustainability as a criterion variable, they were analyzed in the regression equation. According to the results (p<0.05, F=79.973), the obtained R2 is equal to 0.324, which shows that with one unit change in the independent variable, there is a 0.324 change in the dependent variable. Therefore, energy has had an impact on rural stability, although considering the low level of significance, it can be said that the effects of energy have not been significant.

Table 8 shows the impact of environmental health on rural sustainability. Based on this, to determine the effect of the health of the rural environment as a predictor variable and the dimension of rural sustainability as a criterion variable, they were analyzed in the regression equation. According to the results (p<0.05, F=34.652), the obtained R2 is equal to 0.383, which shows that with one unit change in the independent variable, there is a 0.383 change in the dependent variable. Therefore, the health of the rural environment has had a proportional effect on rural sustainability.

Table 5. The results of a sample T-Tech test to check the utility of the energy variable

Variable	Test value = 3						
	t value	df	Sig.	Mean	Difference from the mean	At 95% confidence level	
						lower Bound	upper Bound
Energy	17.625	39	0.02	3.11	1.2362	1.1452	1.6325

Reference: Research results, 2022



Table 6. The results of the one-way analysis of variance regression analysis of the impact of resources and services of the rural environment on rural sustainability

Model	Correlation coefficient	Coefficient of Determination	Adjusted	Error	
1	0.705	0.498	0.495	1.357	
Level of sig.	β	F	df	Sum of squares	Source
0.000b	0.705	165.465	1	304.588	Regression
			38	307.412	Residual
			39	612.000	Total

Dependent variable: rural sustainability

Foresight: resources and services of the rural environment

Reference: Research results, 2022



Table 7. Results of one-way analysis of variance analysis of energy regression analysis on rural sustainability

Model	Correlation coefficient	Coefficient of Determination	Adjusted	Error		
1	0.569	0.324	0.320	1.574		
level of significance	β	F	Mean square	df	Sum of squares	Source
0.04b	0.569	79.973	198.173	1	198.173	Regression
			10.9	38	413.827	Residual
				39	612.000	Total

Dependent variable: rural sustainability

Prediction: Energy

Reference: Research results, 2022



Table 8. One-way analysis of variance test results of environmental health regression analysis on rural sustainability

Model	Correlation coefficient	Coefficient of Determination	Adjusted	Error		
1	0.415	0.383	0.167	1.794		
level of significance	β	F	Mean square	df	Sum of squares	Source
0.000b	0.415	34.652	111.495	1	111.495	Regression
			14.14	38	537.333	Residual
				39	648.828	Total

Dependent variable: rural sustainability

Prediction: health of the rural environment

Reference: Research results, 2022



Finally, Friedman’s rank test was used to prioritize environmental variables in terms of impact on sustainable rural development (Table 9). The results showed that the environmental health index with an average of (3.45) is in the first place, and the indicators of resources and services of the environment and energy are in the second and third places.

5. Discussion

With the change of development paradigm from classic to modern, sustainable development and environmental issues have become the main pillars of development. Today, attention to the environment has become important in all parts of the country, especially rural environments; the environment is one of the sensitive and vulnerable aspects of the villages in case of neglecting the serious consequences of environmental destruction and exploitation, It will be impossible to achieve sustainable development without taking into account the natural environment, which has limited capacity; Therefore, it is necessary to pay attention to the rural environment in

the planning process of sustainable rural development for the rural management system. In a situation where the irrational actions of humans have caused the destruction of the environment and the reduction of production, an appropriate procedure and program should be used in order to protect nature and sustainable development, especially in the countryside.

The results of a sample T-Tech test to check the status of variables (environmental health, environmental resources and services, and energy) showed that all indicators are in a relatively favorable condition. Also, the results of the regression test to investigate the effect of environmental variables on rural sustainability showed that all environmental variables (predictor variable) have a significant impact on achieving sustainable development (criterion variable). Finally, to prioritize the environmental variables in terms of effects on sustainable rural development, Friedman’s ranking test was used, and the results showed that the environmental health index with an average of (3.45) ranks first.

Table 9. Ranking of environmental variables in terms of impact on sustainable rural development

Rank	factors	mean	Mean rating
1	environmental health	3.45	3.05
2	Environmental resources and services	3.38	2.87
3	energy	3.32	2.85

Reference: Research results, 2022



Environmental conditions are very important in achieving a sustainable village, among which the health and hygiene of the environment, which includes the important indicators of the beauty and quality of roads, buildings, architecture, garbage collection, sewage disposal, etc., are of great importance. It seems that these cases are in better conditions in the villages around Chabahar than in other cases. On the other hand, the resources and services of the environment, which include the amount of pollution, the quality of drinking water, leisure spaces, the management of coastal areas, the credits spent to improve the environment, etc., are in poor condition compared to other cases. that in the evaluations and allocation of credits and for sustainable rural development in the field of environment in the villages around Chabahar, special attention should be paid to these matters. The results of the present research are in line with the results of Habibi and Salehi (2023), Ansari Erdali et al. (2019), Basani and Ferreira (2017), and Satlif et al. (2016).

Based on the obtained results, the following suggestions are presented:

Creating and promoting the environmental culture and getting familiar with one's duties in the field of rural environment among the residents of the villages by holding cultural programs and advertisements.

supporting and encouraging investments for the development of new technologies compatible with the environment;

Providing facilities (financial and support) for environmental protection measures in villages;

Participation of rural residents and their use in management levels and environmental decisions with the cooperation of villagers and the village council.

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Conflict of Interest

The authors declared no conflicts of interest.

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