



## Ecological and environmental impact assessment of the location in residential townships on the environment

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### Abstract

Switching the location for urban development Such as residential townships should be so that Bring stability or sustainable development, That is cause to reduce of adverse ecological and environmental effects of the Hazardous Activities, Therefore, it is valuable approach the considering effective the criteria Using location of settlements, especially the effects on ecological and environmental. This study analyzes the ecological and environmental effects Positioning Settlements on the environment. Thus is paid to ecological and environmental impact assessment locate the town on an applied research by determination of environmental assessment indicators and using ahp method. The results showed that water pollution and noise pollution on the surrounding environment are highest and lowest effects respectively.

**Keywords:** location, Settlement, ecological effects, environmental, AHP

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## Introduction

At growing urbanization and as a result development of residential towns and Residential townships (Residential Complex) after the Industrial Revolution and the World Wars, has made the cities and their suburbs as gathering places and the most dense, and has cause the consumption of natural resources by the human population as well as the production and dissemination of pollution, as a result, have the highest share in environmental degradation (Potter and Thomas, 1986; Osborn and Whittick, 1976; Schaffer, 1970; Hardy, 1991).

In accordance with the emphasis of the World Commission on Environment and Development In the name of our common future "Brundtland Commission" in 1987, we practice today in sequence of future generations have serious effects for meet their needs, In other words, sustainable development is a development that are considered meet the needs of today without compromising the ability of future generations to meet their needs (Mahmoudi, 2005).

The need for sustainable development of the popular idea (Jabareen, 2004) that has created much debate in the field of urban form (Jabareen, 2006). The main idea of the sustainable development strategy to respond to questions relating to sustainable urban form that reduces energy consumption and reduce the level of air pollution, it offers (uk Department of the Environment [DoE] 1996; Breheny 1992a, 138). Yosef Rafeq Jabareen Has introduced four types of sustainable urban development such as: the neotraditional development, the urban containment, the compact city and eco-city (Jabareen, 2006). John Ellington in the book "Cannibals with Forks" which was released in 1998. Looking deeper meaning-and a new concept to sustain the principles of sustainability presents. These three fields with the titles of People (social), Planet (environment), and economic growth (the economy) is mentioned, as called sustainability tripod. Decisions balance these three fields will lead to achieving a sustainable solution (Eddie Krygyl and colleagues, 2014). So many factors on the formation and location of residential settlements (eg urban development) is effective due to the agents, to achieve sustainable development in "compact city" it is necessary.

Therefore, locating a land use in space must be in a manner that to achieve the stability or sustainable development, in this case, which leads to lower adverse environmental and ecological effects of risky activities, and to obtain the highest efficiency and performance of the intended land and Be more logical spatial activities (Mahmudi, 2005). In most cases sustainable development provides basis for discussions on the Compact City provides (Welbank et al, 1996). Because according to the systemic approach, residential town is an open system that systems affect the environment and its surroundings will be affected it. According to healthy city standard observing the regulations known as the environmental impact of EIS<sup>2</sup> any urban activity must be assessed in terms of the environment and protection of social welfare and protection of cultural heritage (Saeed nya, 2004). Environmental Impact Assessment (EIA) can be as a tool to identify and evaluate various options for the development of urban planners and city managers. So noticing to effective criteria on location specially the effects of environmental and ecological is valuable approach. From an environmental standpoint, urbanization that is a very complex set of landuse types are considered as one of the widest and deepest of human interference in the environment and at the same time Be no ill effects on the environment. In environmental impact assessment of IPA is consider Understanding the environmental impact of development or establishment urbanism. Thus, according to this research seeks to answer the above questions it is as follows:

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<sup>2</sup>Environmental Impact Assessment



1. What are the ecological and environmental indicators to assess the environmental effects of residential settlements?
2. What is the Ecological and environmental impacts on the environment Residential use?

## Literature review

Some research in the field of urban residential location and the factors influencing this positioning is done that the following is a brief explanation:

Vincenza Chiarazzo and et al (2014) investigate the effect of environmental conditions on site selection and development of the city and access facilities. The results showed that the relationship there is an assumed, and a classification from the climate variation between different areas has offered. Rezai et al. (2014) study influencing factors in the location of industrial estates. Results showed that the human factors lead to human factors and there are local factors more weight than natural factors. Nasrallah et al (2012) Determined criteria for locating industrial town by using sustainable criteria. Results showed that social and economic criteria is the most influential factors. Zarabad and et al (2013), Determined criteria for locating industrial town by using sustainable criteria. Environmental criteria and infrastructure are the most important role in locating residential town. Kobe Boussauw and et al (2011) develops a model based on a set of spatial proximity characteristics a model that estimates for every neighbourhood in Flanders and proposed model could contribute to the practice of sustainable spatial planning. Marc D. Weiner and et al (2013) explore the effects of the gender gap and differences in residential location on environmental risk tolerance and analyze data from the US general population and from households living with 50 miles of a US nuclear facility. they conclude that modeling environmental risk tolerance both gender and place of residence should be considered potentially meaningful explanatory variables. John H. Lowry and et al (2014) compares eighteen metrics of urban form for 542 neighborhoods in salt lake county, Utah. They findings suggest the effectiveness of smart growth policies in Salt Lake County have had limited effect. Changhyo Yi and et al (2014) examines the factors of residential location choice by considering the characteristics of the Korean housing market. the results of this study are significant in understanding the characteristics of residential location choices of Korea and the countries in the transition as well. Petter neass (2013) studies relationships between urban land use and travel have shown correlations between daily-life travel behavior and the location of the dwelling. Amnon Frenkel and et al (2013) investigates the residential location choice of knowledge-workers at the intra-metropolitan level. David Boyce and et al (1999) present reformulation of the residential location submodel of the Integrated Model of Residential and Employment Location. Joseph Prashker (2008) investigates various factors influencing individual's choice of residence location and the role of commute trip on that decision. The results are consistent with existing research literature with new emphasis on the effect of income. Marshall Lindsey and et al (2011) explore the relationship between residential location on household patterns of vehicle miles of travel, and by extension, energy consumption and greenhouse gas emissions. Various scenario show that with increases in privately vehicle fuel efficiency, the overall reduction in fuel use creates a more uniform spatial profile of energy/greenhouse gas emission across the region. Bagherzadeh et al (2013) to explain the process of creating residential



complexes and urban planning and design of residential standards with regard to the standards and principles of sustainable urban development and to have concluded that low density and open green spaces and residential environment provides more desirable. Aryn Zadh B. et al (2013) study, locating new cities in 3 decades by adapting known methods and techniques used in the past and compare the deals so that the main axis is determined to be ready to recognize areas of new Town location, location selection methods, criteria, and weighting the criteria to determine the final score of each option and come to the conclusion that the location of new towns there is a simplistic view

According to the above several studies have been conducted in selected residential areas and factors based upon different theories and methods which cause increase the knowledge in this field. But studies have considered only partially effective in positioning your criteria and effective factors in order to achieve sustainable development and reduce or completely ignored the importance of other factors. Therefore, by considering the importance of sustainable urban development, Address the environmental and ecological effects on the location of residential townships and land uses is warrant consideration issue in this research.

### Method

The present study, considering that one of the principles of sustainable development is the environment and the effects of construction and urban development on the environment, analysis particularly ecological and environmental impact of locating settlements on the environment. Thus by choosing residential town of South Pars Gas owned by of South Pars Assaluyeh in Bushehr of Iran and relying on an applied research by documenting in process step by step, evaluates the ecological and environmental effects of Location by determining and recognizing environmental assessment indicators by using AHP method. The method of scoring is the use of experts that have expertise in the theory and practice locating and using multi-criteria analysis.

### Case study

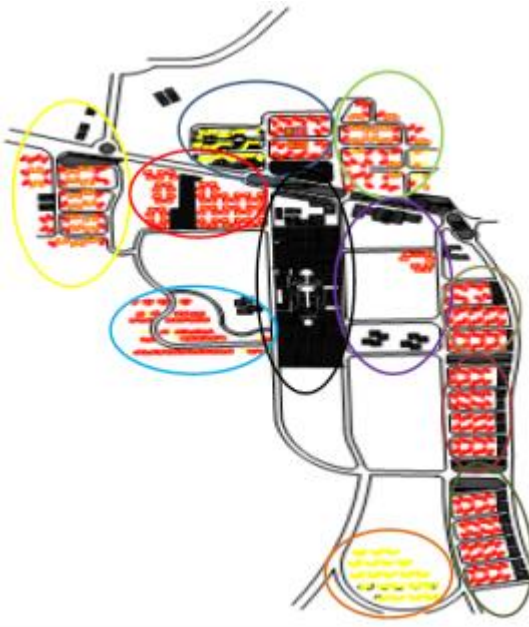
Jam city located in Bushehr Province and limited to the North and East to the section Asyr in city Mohr of Fars province, of South to the city of Kangan and the West Counties to Dshtyv Dair. The city is connected from one side to the city Firuz Abad in Fars province on the other hand connected via 4-lane highway jam - Assaluyeh Assaluyeh in Iran's energy economic hub. Jam is mountainous areas and good weather of Bushehr province. Existence of varied and numerous economic activities in the region, Jam has turned into a city of immigrants allowed. Resulting is the entry of different cultures in the area and have a temperate temperate climate. Settlements 2500 unit South Pars gas field located in developed areas of the city jam and located 60 kilometers Pars Special Economic Energy Zone in Bushehr, Iran, as one of the biggest projects of settlements which has 16 thousand and 372 hectares area, and built in 2003 and has the capacity to accommodate about 10 thousand people. pictures below and Table 1 shows the information on Jam City and Settlements South Pars gas field and its land uses.



In order from left to right: 1. Position Bushehr province in Iran (website, 2015) 2. The position of city jam in Bushehr Province (website, 2015)



In order from left to right (1) aerial photos city jam (website, 2015) 2. Aerial photo South Pars settlements (website, 2015)



In order from left to right: 1-dispersion of map of land uses in settlements According to the color representing each user. Map No. 2-Range any district in settlements (authors, 2015)



**Table 1 land uses in any region of settlements of South Pars (authors, 2015)**

Region	User in each Region
Region1	Residential-Kindergarten-Specific market Region-Emergency-Fire Stations( Near Region)
Region2	Residential-Lemon and Olive Garden
Region3	Residential-Special park of Region-Sports Hall for Region-Office
Region4	Residential-Special Office of settlements
Region5	Residential-Girls Highschool-School Girls-School boys-Sports Hall of settlements
Region6	Residential-Green space
Region7	Residential-Green space
Region8	Residential-Green space
Region9	Residential-Music school
Region10	Residential
Neighborhood Center	Green space-Stores-Markets-Library - Clinic

## The necessary assess the environmental impact of urban development in order to achieve sustainable development

Sustainable urban development is a multi-dimensional content, including environmental aspects, economic, social and political (Huanget al, 2009; Olewier, 2006). An urban project temporalcan be indicative of urban sustainability that create balance in life And Reduce the lack of social balance and social gap And improve the quality of life in general (Enyedi, 2002). International Council of Environmental Initiatives (ISEI) Emphasizes that sustainable development is development that basic services of environmental, social, and economic offers by no threat to the environment, construction and social systems that depend these services on them (Hussain et al, 2014). Thus, pay attention to effects of urban development in the form of settlement construction on the natural environment is essential, in addition to two social welfare and economic prosperity in order to achieve sustainable development. Also the United Nations Environment Programme has defined sustainable development as improve the quality of life within the capability range of the capacity of ecosystems (Berton et al, 1996). The purpose of the assessment of sustainability is that optimal share of Plan activities ensure in sustainable development (Pope et al, 2004, 596). in this case Sustainability assessment in urban areas is a major challenge for environmental management and public documents (Martinez et al, 2005).

## Environmental and ecological indexes impact on land use location

In order to create balance and harmony between the activity and the environment, tools and various methods have been developed and used with the emergence of the harmful effects of human activities. Environmental Impact Assessment (EPI) is one of the best ways that by identifying the environment and understaning its importance assess the effects of various sectors and activities a project on the environmental components (Rodgarmy et al, 2007). Hence Do Environmental impact assessment of America National Environmental Policy Act (NEPA) formally began in the world (Jafari, 2008).In fact, Environmental assessment studies of development effects, examines the positive and negative effects of activities that can affect



directly or indirectly in the short term or long term, the natural environment and human local to global scale as reversible or irreversible. (Rodgarmy et al, 2007).

Conference "Environment and Development" was held in June 1992 by United Nations in Rio Dvzhanyr (Brazil). In principle 17 the final statement of the conference is stipulated Necessity of environmental impact assessment of projects that may have significant negative effects on the environment. Since the aim of today's development, is sustainable development ,therefore, evaluate the effects of development is one acceptable methods to achieve stable development, and can be used as a planning tool available to planners, and can be used as a planning tool available to planners, Managers and decision maker; until According it able Identify the potential environmental effects that appears as a result of the implementation of development projects and Select a logical choice to eliminate or reduce them (Mahmudi, 2005).

in fact Environmental impact assessment , is Measuring different aspects of the environment be related to the decisions and policies (Tukker, 2000,440) and includes assessing the direct impact of the project on the environment with regard to efforts and alternatives to reduce the harmful effects of environmental (Sutecliffe et al, 2009). Analysis of urban literature and urban planning Regarding Sustainable development and environmental sustainability Shows that a city or urban development the only time has a principles of sustainable that its structure is in full interacting with strategies and obstacles, Climate and soil pollution as well as noise pollution and plant appropriate cover (Hussaini et al, 2014). Figure 7 shows criteria for environmental assessment

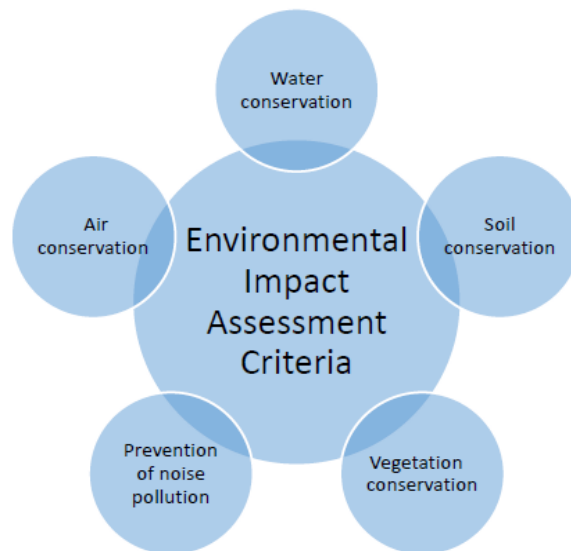


Figure7. The criteria for ecological and environmental impact assessment- Source: authors

### AHP method

AHP is one of the most popular multi-criteria decision-making techniques that first was Devised in the 1980s by Thomas Al.saty (Ghodsi Poor, 1381: 18). Basis of This method of decision-making is hidden in paired comparisons. Decisions by providing a decision tree That Reflects factors are compared and evaluated, begins and then will be done a series of paired



comparisons. This weight of each of factor in comparison to evaluated competing alternatives in decision shows. Eventually logic of analytic hierarchy process In a manner matrix of pairwise comparison makes combined which decision is optimal.

### Ecological and environmental impact assessment by using sustainable development indexes of AHP method

In the first phase (phase tree hierarchy) must be specified criteria and sub-criteria to achieve environmental sustainability that effective in ecological and environmental impact assessment of land settlements location. And it is arranged in the form of a decision tree for hierarchy, according to Chart 1:

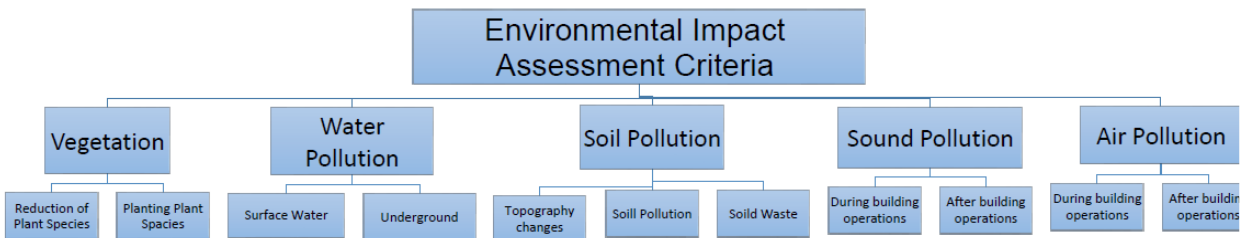


Chart1. The criteria and sub- criteria of Environmental sustainable development- Source: authors

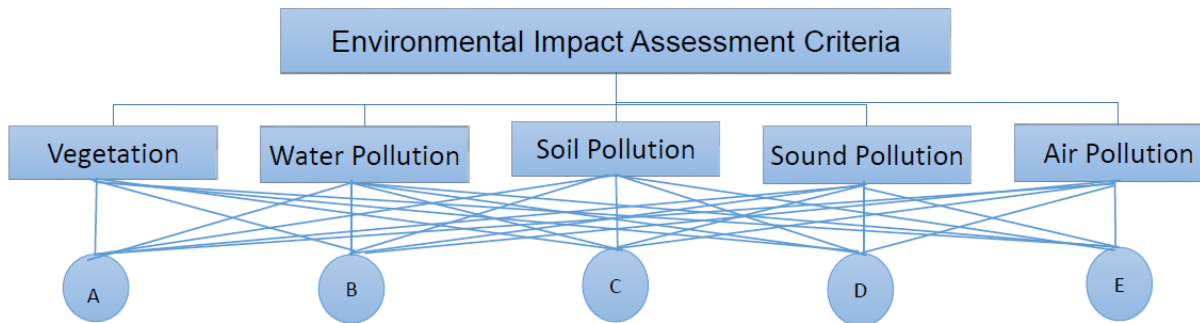


Chart 2- The tree hierarchy criteria and sub- criteria of Environmental sustainable development- Source: authors

#### Phase 2- pairwise comparisons:

Compared to in AHP elements of each level to their respective element at a higher level as a couple and are calculated their weights. This is called weight relative weight .Then by combination of the weight, is determined the final weight of each option, in accordance with Table 2 and 3.

Table 2 – paired comparison matrix of environmental indicators





	A(Plant)	B(Water)	C(Soil)	D(Sound)	E(Air)
A	1	$\frac{1}{3}$	3	8	5
B	3	1	5	9	7
C	$\frac{1}{3}$	$\frac{1}{5}$	1	3	5
D	$\frac{1}{8}$	$\frac{1}{9}$	$\frac{1}{3}$	1	$\frac{1}{5}$
E	$\frac{1}{5}$	$\frac{1}{7}$	$\frac{1}{5}$	5	1

Source: authors

Table 3 - normalized matrix paired comparison

	A(Plant)	B(Water)	C(Soil)	D(Sound)	E(Air)
A	0/22	0/19	0/31	0/3	0/27
B	0/64	0/56	0/54	0/35	0/4
C	0/31	0/11	0/1	0/12	0/27
D	0/03	0/06	0/03	0/04	0/01
E	0/04	0/08	0/02	0/19	0/05

Source: authors

According to the results of the analysis was done on the basis of AHP, Water pollution has the greatest impact on the environment And then changes in vegetation, soil contamination, air pollution And Eventually noise pollution have minimal impact on the environment, That is mentioned in Table 4.

As identified in Chart 1 effective criteria in ecological and environmental impact assessment have the following criteria that in this study, AHP method is exactly the same as the main criteria for the evaluation, it is also made to the following criteria. And the results of following assessment criteria showed that the highest and lowest levels of water pollution related to groundwater and surface water. About the following criteria related to vegetation highest and lowest, respectively, related to the reduction of available plant species and planting non-native species. The results of the evaluation criteria of the highest and lowest levels of soil contamination related to waste and pollution of soil and topography changes that are the result of construction. About the following criteria for maximum and minimum air pollution related to the construction stage (the results of human habitation) and stages of construction. About the following assessment criteria related to sound criteria results showed that the highest and lowest levels of contamination related to the construction stage (the results of human habitation) and is in the stages of construction, that results are summarized in Table 4 is shown. And the evaluation of all environmental factors is shown in Table 5.



**Table4. The results of the ecological and environmental impact assessment**

Environmental Impact Assessment CRITERIA	Weight Criteria	Criteria Arrangement
Plant(A)	0/258	2
Water(B)	0/498	1
Soil(C)	0/134	3
Sound(D)	0/034	5
Air(E)	0/076	4

Source: authors

**Table5. The final results of the final evaluation criteria and sub-criteria ecological and environmental effects of residential settlements**

Environmental Impact Assessment Criteria	Criteria Arrangement	Weight Criteria	Secondary Criteria	Criteria Arrangement	Weight Criteria
Plant(A)	2	0/258	Reduction Plant Species	1	0/8
			Planting Plant Species	2	0/2
Water(B)	1	0/498	Surface Water	2	0/17
			Underground Water	1	0/8
Soil©	3	0/134	Topography Changes	3	0/1
			Soild Pollution	2	0/29
			Soild Waste	1	0/55
Sound(D)	5	0/034	During Building Operation	2	0/32
			After Building Opertion	1	0/67
Air(E)	4	0/76	During Building Operation	2	0/25
			After Building Opertion	1	0/75

Source: authors

## Conclusion

Facing Research in following the strategy to achieve sustainable urban development, considers effective strategy ecological and environmental impact assessment based on the the three principles of of sustainable development to achieve this. So selection settlement of South Pars in Iran's of Bushehr province city jam city , and Evaluation of distribution of land uses in settlement, in order to evaluate the environmental and ecological effects on the environment of residential of settlements, acted on it by identifying evaluation criteria and using AHP model. The results showed that among the mentioned criteria, water pollution



greatest impact on the environment and subsequent changes in vegetation, soil contamination, air pollution and the noise is minimal impact on the environment.

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سومین کنفرانس بین المللی  
پژوهش‌های نوین در

عمران، معماری و شهرسازی

برلین - آلمان ۱۹ تیرماه ۱۳۹۵

ارزیابی اثرات زیست محیطی و اکولوژیکی شهرک های مسکونی بر محیط زیست (نمونه مورد مطالعه شهرک پارس جنوبی  
عسلویه)

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مکان گزینی جهت توسعه های شهری نظیر شهرک های مسکونی باید به گونه ای باشد که پایداری یا توسعه پایدار را محقق سازد ، به این صورت که با کاهش آثار نامناسب زیست محیطی و اکولوژیکی ناشی از فعالیت های مخاطره آمیز منجر شود و بالاترین بازده و کارایی از اراضی مورد نظر کسب شود ، لذا توجه به معیارهای موثر بر مکانیابی کاربری شهرک بخصوص اثرات اکولوژیکی و زیست محیطی رویکردی واجد ارزش می باشد. از این رو پژوهش پیش رو برآنست تا اثرات اکولوژیکی و زیست محیطی مکان یابی شهرک را بر محیط زیست مورد تجزیه و تحلیل قرار دهد در نتیجه با انتخاب شهرک مسکونی پارس جنوبی متعلق به شرکت گاز پارس جنوبی عسلویه واقع در استان بوشهر ایران در یک پژوهش کاربردی با مشخص نمودن شاخص های ارزیابی زیست محیطی با استفاده از روش AHP به ارزیابی اثرات اکولوژیکی و زیست محیطی مکان یابی شهرک پرداخته شده است. نتایج پژوهش نشان داد که آلودگی آب و آلودگی صوتی به ترتیب بیشترین و کمترین تأثیر را بر روی محیط زیست اطراف دارند.

کلمات کلیدی: مکان یابی، شهرک ، اثرات زیست محیطی، محیط زیست، AHP