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Analysis of indicators to achieve a sustainable city of Dezful with emphasis on reducing greenhouse gases

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Introduction

Urban development is always faced with noise, water pollution, air pollution, environmental degradation, health problems, and traffic congestion which have adverse effects on the health of living organisms and ecosystems and the cities make uninhabitable. To overcome these challenges, cities must follow a path of sustainability. Sustainable urban development refers to the balance between the various social and environmental dimensions of the city and their simultaneous development (Arab Ameri, Arghan & Kamyabi: 2020, 4). Cities make up three-quarters of the world's greenhouse gas emissions and two-thirds of the world's energy consumption. The city's footprint of producing greenhouse gases such as carbon and nitrogen is unavoidable.

In the past, Iranian architecture and urban planning were the fame of the world. The windmills of Yazd, Shadavans of Dezful, and other cities represent each city is harmonic with that region's climate. Unfortunately, traditional society to a modern society transition based on imitation caused it to lose its place. This issue, In addition to ecological issues and global warming, leads to more energy use, increased costs, and the undiscovered art of urban planning. The new responsibility of all of us in the face of this backwardness is to plan for the revival of these values and set up a new empire of sustainable Iranian urban planning and its introduction to the world.

Khuzestan province, in addition to very hot and humid weather in summer, in recent years, it has faced environmental crises such as dust, excessive concentrations of pollutants, unhealthy water, and acid rain which has caused a variety of respiratory diseases and poisoning.

Dezful has a long history of environmental compatibility and by taking advantage of the inherent potential for the use of sustainable energy due to ecological conditions, Proximity to Dez River, cold river water flow, city height also soil fertility, extensive agriculture, Dez and Karkheh hydroelectric dam, non-industrial and ability to offer strategies for equilibrium emissions such as Carbon dioxide in the urban area and nitrogen oxide in the agricultural area.

Ignorance of this issue leads to odd weather patterns, natural disasters are increasing, dust, and acid rain, depletion of natural resources, and damage to animals and ecosystems.

We spout this issue in Dezful because of existing parameters that lead us to urban sustainability. With a little infrastructure and reflection, a sustainable city can be established in Khuzestan, which has not had significant urban development due to climatic conditions and has the highest number of emigrants. In this article, we focus on the stabilization of Dezful and limit the two main gases, carbon and nitrogen. The main

research question is whether it is possible to make indicators of reaching sustainability Dezful?

Purposes of research:

- Determining the most important indicators for reaching a sustainable city in Dezful
- Determining the rate of reaching less greenhouse gas emissions in Dezful by following traditional architectural patterns
- Determining the efficiency of underground spaces to reach sustainability in Dezful

Research questions:

- What is the most important indicator to reach the sustainable city of Dezful?
- Observing the traditional architectural patterns of Dezful, what effect does it have on the amount of greenhouse gas emissions in Dezful?
- Does the replacement of underground spaces in Dezful have an effect on the stability of Dezful city?

Research Hypotheses

- ✓ It seems that the natural resources and morphology of Dezful is the most important indicator for reaching a sustainable city of Dezful.
- ✓ It seems that the traditional architectural patterns of Dezful have a great effect on greenhouse gas emissions.
- ✓ It seems that the replacement of underground spaces has a great impact on reaching sustainability in Dezful.

Methodology

The research is for applied purposes and its nature is descriptive-analytical. The study method is experimental and the data collection method is from libraries, field, and internet sources. The statistical population of this study was all residents of Dezful (N = 264709 people) and selected the members with a simple random sample. The statistical sample was 383 people using Cochran's formula with 5% error and 95% confidence level. We Used software like PHOTOSHOP, EXCEL, AUTOCAD, GIS, SPSS, and WORD to preparing maps, photos, analysis of findings, and final design. The study area is Dezful city in Khuzestan province, which examines the indicators for achieving a sustainable city by analyzing the current situation, we presented plans and suggestions for reducing greenhouse gas emissions and a healthier lifestyle. For analysis, we used AHP hierarchical analysis method in Super Decisions software with an incompatibility rate of less than 0.08 and used AUTOCAD software for the last designs. IN infield research, the method is designing questionnaires, interviews, field observations, and perceptions.

$$n = \frac{\frac{(0.5)(0.5)(1.96)^2}{(0.5)^2}}{1 + \frac{1}{264709}\left(\frac{(0.5)(0.5)(1.96)^2}{(0.05)^2} - 1\right)} = 383.60329417779013$$

$n \cong 384.$

Results and Discussion

We choose this case because there are many opportunities in Dezful, such as the 30-meter city altitude from the very cold river water and the historical context of Dezful that used this concession, fertile lands and agriculture which use groundwater for irrigation, and threats such as dust and hot weather. With little infrastructure and change, can become a sustainable city in southwestern Iran where urban development is very poor and this issue causes citizens to migrate to cool areas with healthier air.

The main question and purpose of the research, which is to find the most important indicator of achieving a sustainable city of Dezful, Use the AHP method in the Super Decision software, and enter the qualitative values. The last results show that afforestation or tree planting in Dezful is the best option to make sustainability. By managing green space and supporting forestry, we can achieve a large percentage of balancing with green space and trees in the foothills of Dezful, which have more potential. The second option was underground agriculture in abandoned spaces. Due to the fact that Dezful has many abandoned underground spaces, we can use it for underground agriculture, and keep the soil and forests, which are the largest carbon natural sinks. The least amount belongs to the construction and change of underground spaces due to the high cost. Construction of tunnels for the passage of underground vehicles and the change of use of old underground urban spaces into residences, shopping malls, underground libraries, research laboratories, and in strategic cases their use as shelters and underground hospitals are among the issues we addressed.

Conclusion

The results of the questionnaire show: 84% agreed with turning the surface streets into large green spaces with cycling and walking, 68% agreed with basement fruit and vegetable market center with natural cooling, 66 % Agree with upgrading Kats and turning Them into a residence to attract tourists, 58% agree with constructing an underground pedestrian crossing under the main streets for the safety of school children and the elderly, 51% agreed to underground agriculture in their underground space They are interested.

Suggestions: Filling the empty groundwater aquifers of Dezful Gardens Villa with carbon dioxide from the city center. This also prevents the risk of landslides. Schedule night shifts for the hot and sultry three months of summer in Dezful, from 10 pm to 8 am so that clients can come at the right time. Specific climatic conditions need more specific working conditions. It is possible that people, who have sleep problems at night, find this situation useful and migrate to Khuzestan. Use of hydrogen buses, trams, and electric or battery-powered transportation systems (PRT) for public transportation and prohibit the entry of gas and gasoline vehicles into the area. Install plastic recycling bins in the markets. Using electricity generated from the Dez Dam and solar panels during the day can fuel public electric vehicles, light tunnels, and ventilate them. Direct the cold water of the river in atmospheres and safe canals along the main streets and extensive tree planting around the streams help to create ideal conditions.

Keyword: Sustainable development, urban, environmental, structural hazards.

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