Site selection of the suitable zones for future expansion of Yasouj City

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Expanded Abstract

Introduction

Knowledge and evaluation of land suitability and potential for physical development of urban settlement is the initial steps for spatial and environment planning. Physical developments of urban settlements are linked to natural bed and geomorphologic features. Urban development in mountain areas has high sensitivity because of geomorphologic limitations and slope unsustainability. One of the major issues of metropolises is the rapid population growth and physical development. In urban development projects, in the past decades, towns and villages have mostly formed with no regard to the optimal landuse in different directions on the agricultural land, rich plains, mountain, river banks and beaches. Consequences of the development are the degradation of first class lands, good ranges, forests, and abnormal development of settlement. Therefore, zoning and finding the suitable locations is very important for future urban development to avoid horrible environmental, human, social and economic issues.

With different effects of various parameters on the physical development of each habitat, it is very important to identify the most important factors, because in an urban system the most important factors are the determinant parameters of its future development trend. Optimal site selection for physical expansion of urban settlements would not be possible except through a comprehensive evaluation of the effective factors on the basis of systemic view point and design of likely scenarios. In other words, study of the subject on the basis of systemic view and probable scenarios for physical development of city has more acceptable results than the one dimensional studies.

Physical expansion of urban population necessitates the need to provide suitable land for urban development and land suitability assessment. Therefore, this research is an attempt to investigate the effects of forms and natural processes in the physical development of Yasouj City based on knowledge data using Geographic Iinformation System (GIS). Data Knowledge

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include the use and application of numerical value of each parameter in site selection of physical development without the opinions and preferences of expert.

Study area

Urban settlement of Yasuj is the center and one of the major cities of Kohgiloye and Boyerahmad province. The city has had the high population growth in the recent decades and thus has considerable physical development. Yasuj city, with an area of 265 Km^2, is the center of Boyerahmad city and provincial capital of Kohgiloye and Boyerahmad. This city is located at the elevation of 1880 meters and coordinates 51° 41´ longitude and 30° 50´ latitude. From the perspective of climate, the region, with annual rainfall average of 858.1 mm, minimum and maximum of annual temperature average of 9.32 and 26.34°C, maximum and minimum of relative humidity of 32.33% and 50.49%, and wind speed of 4.95 Knot, has a moderate climate to semi-cold climate. Population of the City was 30000, 75000, 96000, and 110000 people, at the 1986, 1991, 2006 and 2011censuses, respectively.

Methodology

After assessment of the study area, according to the geology, geomorphology, hydrology, climate, human characteristics, 5 criteria and 15 sub-criteria were identified for scenarios of physical development in Yasuj urban settlement. Sub-criteria include: slope, aspect, elevation and lithology (geomorphology factor), density and distance from river (flooding factor), density and distance from settlements, landuse (human factor), temperature and precipitation (climate factor), and density and distance from fault (earthquake factor). Sub-criteria layers were produced in ArcGIS 10 software based on topography (1:50000) and Geology (1:100,000) maps and Digital Elevation Model (USGS DEM). Then, data knowledge method was used to explain the effects of natural forms and processes in the future of Yasouj city that each parameter has the specific numerical value. After calculating the class weights and designing the data knowledge models, raster layer of parameters are combined together based on the weight of the mentioned models in ArcGIS software. It was attempted to provide a zonation map of future development of Yasouj city based on data knowledge. Finally, the results of each scenario with the current map of Yasuj were carried out with valid accuracy.

Results and Discussion

According to the parameters properties, 84 classes were designed to achieve the target (Fig. 2). This components have the numeric values with specific different units. For example, units of elevation, temperature, and aspect are meter, ◦C, and rate, respectively. Therefore, the direct application of them in the model is incorrect and impossible. The normalizing methods were used to eliminate the parameter units, and impose the parameters influence based on their actual values. If the maximum and minimum of the class values are the most effective factors on the urban physical development, equations 1 and 2 are used, respectively. The obtained results of normaliziation and calculation of parameter weights are described in Tables 4 to 6.

In the data true value model, weight of sub-parameters is calculated via the sum of weight classes. Also, parameter weights are equal to the sum of sub-parameter weights. The obtained results are as Equations (3) to (7). The final model of data true value is designed as the sum of previous 5 equations, as presented in Equation (8).

Eventually, raster layers of the parameters were combined together in ArcGIS according to the aforementioned models, and zonation maps of Yasuj physical development. The result is as Figure 3 that show the land suitability of urban physical development in Yasuj City.

Conclusion

The results show the very suitable zone for that appropriate 41.72% (8.72 km^2) of the current settlement area where can expend to 77.45 km^2. Also, the suitable zone that cover 16.08% (3.36 km^2) of the current settlement of the study area can develop to 36.35 km^2 based on future

zonnation map of Yasouj City. Considering the above-mentioned cases, optimal physical development of Yasuj is to the flat sides, south, southwest, west and southeast of the study area.

This study try to present a method for prioritization of the parameters that don't have these disadvantages. Therefore, the research has examined the location of urban future development in Yasuj city using natural landforms and processes and data true value method by GIS technique. In the method, the parameters numeric value and normalization methods were used to quantify and rank the parameters. This minimize the possibility of expert interests interference. Therefore, the obtained results have the good validity and reliability and are acceptable.

Keywords: GIS, land suitability, natural form and processes, site selection, Yasouj.

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