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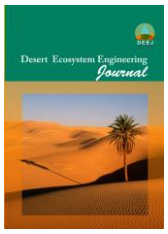

Application of Landsat satellite images and artificial neural network algorithm in study of land use changes in Ilam dam basin

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Extended Abstract

Introduction: Population growth has increased the pressure on natural environment, and unsustainable exploitation and the land use changes have damaged ecosystems. Consequently, the need for food and water has led humans to devote more land to cultivate and use it under his control. Indeed, remote sensing satellites are the most common source of data for identifying, quantifying and mapping for patterns of land use change. Therefore, detecting land use changes using remote sensing data in the GIS environment can provide a good understanding of how land use changes are made, and present appropriate solutions in management. In the meantime, Landsat satellite imagery has the potential to detect land-use changes, land cover and modeling due to the proper location resolution and long-term archiving of images. There are several methods for discovering variations that in the meantime, the past classification comparison method is highly common. This method was first used by Gordon (1980).

Materials and methods: So far, many studies have been conducted on land use monitoring using different data, methods and algorithms. The aim of this study is a discover the land use change trend during the two periods before and after the dam construction. So, in this study, in order to identify the dam construction effects in changing the dam basin, Ilam dam which is one of the largest dams in Ilam province, has been investigated. First by using Landsat satellite imagery and Artificial Neural Network classification algorithm, the land use map of the basin was prepared in the years of 1989, 2000, and 2017. Satellite data can play an effective role in providing land cover mapping, because of its specific features including wide coverage, repeatability, multi-spectrum, diversity and land cover, and continuous upgrading. Landsat satellite imagery has the high potential to identify land cover, land-use changes and modeling due to the strong archive and high temporal resolution. In this study, for providing land use change for different years have used of TM sensor images on 14/5/1989 and 28/5/2000, as well as OLI sensor on the 11/5/2017. In order to discover land use changes due to the

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construction of the dam, using the past classification comparison method, land use changes were determined during two periods. 7 species land use including lake, forest, pasture, dry land farming, garden, residential and barren lands were used for classification by surveying the study area. Gathering data about the changes required the use of techniques and tools that can scan large areas at a cost effective and short-term. Change detection is one of the major applications of remote sensing. Accordingly, various digital methods have been developed for change detecting in land covers. The main factors for the successful implementation of change detecting are selecting the appropriate dates for image acquisition and the use of accurate detection methods. In the changes detection to eliminate the effects of external sources such as the angle of the sun and the seasonal and geological differences, the spectral reflection of the data should be similar. The data used should be at a similar time interval (in terms of season and month), and on the other hand, be in the appropriate seasons. Because of the difference in weather conditions in two different times, the difference between the calibrations of the sensors, the humidity and exposure conditions can affect the numbers and the digital image of two different times. For this purpose, the images used in this study were selected in late of May and early of June. As Mather (2005) states, atmospheric corrections in remote sensing surveys is necessary; especially in cases where the goal is to determine variations in different periods. Because the effects of the atmosphere reduce the contrast between objects and reduce the contrast of the image, and it actually causes the problem of extraction of information. For this reason, COST method was used to reduce atmospheric effects.

Result: The results of this study showed that the forests have decreased by about 10354.79 ha during a 28-year period; In other words, during this period, about 49% of the forest area in the studied area was lost, which represents an annual degradation of about 369.82 hectares, equivalent to a degradation rate of about 1.75%.

Discussion and Conclusion: The results showed that the accuracy of land use maps of different years is more than 85%, which indicates the reliability of these maps. Also, according to the results during the two mentioned periods, as well as the general period of 28 years, the area of forest land and barren lands has decreased and the level of lake use, rangeland, residential, dry farming and garden has increased. The results of this study are consistent with Rahmani et al. (2013), Arokhi and Niazi (2013) and Saghafian et al. (2007). According to the FAO statistics for the years 1990 to 2000, the annual degradation level of forest land has been estimated at 0.2% per annum worldwide. The most important reason for decreasing the area of forests in the studied area is the development of the phenomenon of oak decline. This phenomenon, which has strongly affected the forests of the west of the country during the last decade, is considered one of the most important environmental problems in the country and has destroyed thousands of hectares of western forests in the country. One of the provinces that is heavily exposed is Ilam province (Karami et al., 2018).

Keywords: Dam, change detection, land use, artificial neural network, Ilam.