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Research Article

Management ecosystem by Assessment of plant covers changes (Case study: Taleghan Township)

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ABSTRACT

For an optimum use of natural resources in the sustainable development trend, there is a need to identify ecological resources in the shortest period of time and minimum possible cost. In this article, we aimed Management ecosystem by Assessment of plant covers changes at Taleghan Township in a twenty year period. Percentage of landscape and number of patch were among the metrics that were calculated. The patch surface showed that the greatest plant cover change belonged to agriculture class that was decreased from 15.72 percent in 1987 to 0.67 percent in 2007 and limiest land use/cover change belonged to range class that was decreased from 62.8 percent in 1987 to 46.55 percent in 2007. What was significant from an environmental point of view was that the amount of bare lands was increased more than two fold (from 20.22 percent in 1987 to 48.3 in 2007) which indicates unexpected vegetation cover degradation. In this regards the tsunami of money have impose and accelerated changes in land use; In addition many of dry farming lands have been abandoned and this cased to convert that into the poor grasslands and bare lands. Moreover, we suggest that land use planning will be implemented in the other area of Alburz so that each land use will be applied in the suitable place.

Key words : Plant cover, Taleghan Township, Changes detection, Management ecosystem.

INTRODUCTION

Explosive growth of population and urbanization, coupled with the excessive exploitation of natural resources and environmental reserves are the factors that affect ecosystem and Nutrition and healthy living resources for human groups threaten and in practice, power, influence, and cultural life of civilized societies in evolution has been influenced by the availability of natural resources (watt, 2004). In the trend of sustainable development optimum for use of natural resources needs to identify ecological resources in the shortest time and lowest cost (Ahmadi et al, 2003). The use of renewable resources should be so that it does not interfere in the balance because of factors such as environmental degradation, climate change and human interference disrupts this balance (Ahmadi, 2006). Value of ecological resources at risk, estimates the costs of protecting it, because one of the goals of ecological evaluation, identify resources to complete understanding, in order to reduce the risk of resource degradation (Amirnejad *et al*,. 2006). Considering the current level of human knowledge, remote sensing technology is one of the few ways to achieve a huge database on natural resources' changes without spending considerable cost. Remote sensing technology and geographic information systems are cheaper and faster than traditional methods for analysis and management of natural resources, which have an economic justification. Land use/cover changes by human activities, the main subject in local planning, is

one of the major applications of remote sensing to detect these changes. Satellite images provide the necessary information to process digital land use/cover maps; but these features are not sufficient for change detection. Serafeim and Christopou (2006) presented reliable results with a change in statistical methods for combining new techniques on remote sensing and stated that the remote sensing data to determine severity and rate of change (dependent variable) is not enough; also driving data (independent variable) may determine statistical relationship between these factors and changes. Landscape planning requires sufficient information about the ecosystems, due to the complexity and interdependence of ecosystems, although relationship between the ecosystems is important for us properly, from a functional point of view (Odum, 1971). Therefore the landscape ecology metrics can provide statistical relationship between external factors and ecosystems. On the other hand, for an optimum use of natural resources in the sustainable development trend, there is a need for identifying ecological resources in the shortest period of time and minimum possible cost. Bazyar *et al* (2013) for Study of most element of forest destruction by used the IRS-1C and LANDSAT image in the Kohkeloeye and Boveirahmad province indicated forest destruction was increased with increasing around populated villages and Near of this village. Askari *et al* (2013) for Modeling of Suitability Iranian Oak site for establish of coppice Regeneration in Zagros forest indicated Prevention of livestock grazing and irregular tree cutting in the degraded
forest stands can be suggested as a suitable approach for natural restoration and increasing plant diversity and regenerations. Taking into account that landscape planning contains a spatial concept, and provides acceptable results in land use/cover change studies, In this article, we aimed land use/cover change in Taleghan region with a landscape ecology approach in a twenty year period.

MATERIAL AND METHODS

This research was conducted in the Taleghan watershed located in the Alborz province, northern Iran (Figure 1). The area of watershed is about 124,000 ha, and as a sub basin of Sefidrod is drained into Caspian Sea.

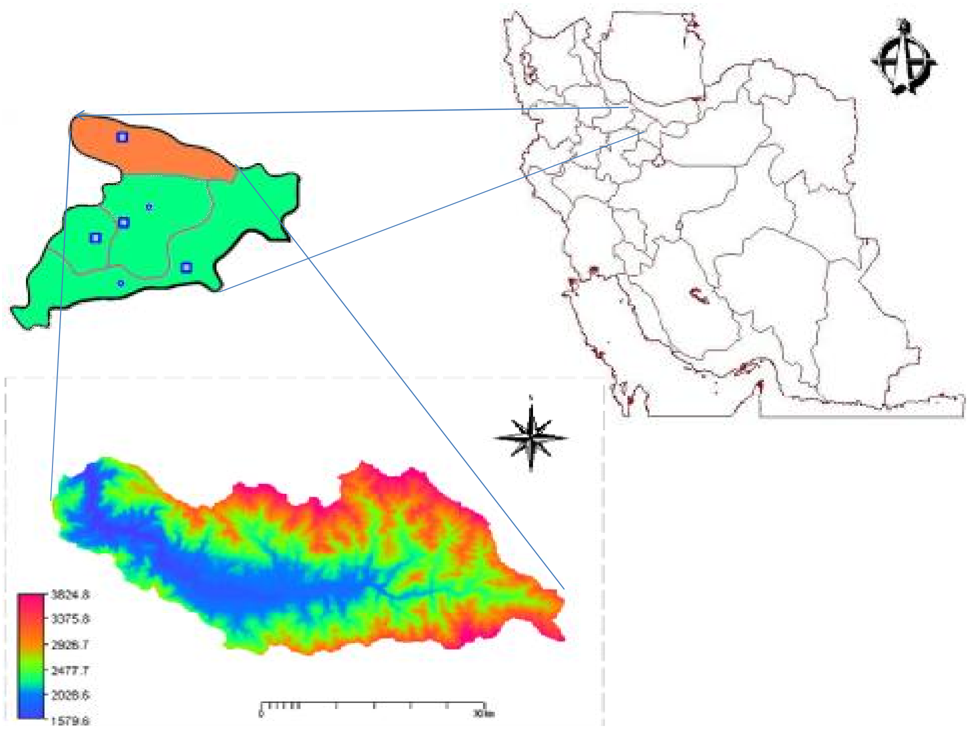

Figure 2: Position of Taleghan area in Iran and its digital elevation model

Coefficient of area variation is 37% for Taleghan and Vertical gradient of rainfall in this region is based on calculations per 1000 m elevation difference is about 180 mm (Vafakhah, 2008). Table 1 indicated Range of temperature changes based on altitude (Project Center of Excellence Watersheds, 2010). In this based the average rainfall approximately is 690 mm and the mean annual temperature is 06/3 ° C.

Table 1: Range of temperature changes based on altitude

Altitude (meter)	The annual average temperature (ºc)
1500	21
2000	8.8
2500	5.6
3000	2.4
3500	-0.8

In this study we used Landsat (TM sensor) satellite images (1987) and IRS (LIS-III sensor) satellite image (2007). Satellite sensor data may have had a variety of geometric and radiometric errors. To control data quality and awareness of atmospheric, geometric and radiometric errors, these data were processed, the displayed bands on the screen of the ENVI 4.2 software which has a high potential zoom, were compared with different combinations of band colors, and thus no errors were found. The satellite image geometric accuracy was checked using the peel waterways and roads layers that were digitized and extracted from the 1/25000 topographic map. Buffers were applied three times the size of the study area using the PCI Geomatica V8.1 software and by implementing the subset function for all the bands. In this study, optimum index factor (OIF) was used to select the best band combination in the ILWIS Academic 3 software and After reviewing different combinations of bands, the combination of band 753 from Landsat satellite (TM sensor) and 432 from the IRS satellite (LIS-III sensor) were selected as appropriate. Finally, after determining the training samples using aerial photography mosaics, the study area was classified based on the supervised classification and using maximum likelihood algorithm in ENVI 4.2 software. We used ecological features to enhance the accuracy of the map classification (Paine & Kiser, 2004). After the classification, control and approval of the significant errors, the maps was converted to vector format by the ENVI 4.2 and ArcGIS 9.2 then converted to shape file format and a unique code was assigned to each land use/cover layer. Land use/cover areas (hectare) were calculated for the 1987 and 2007 years using XTools functions in ArcGIS 9.2. Then the attributes of these layers were processed in Fragstats software and metrics in class level were calculated. Percentage of landscape, number of patch, landscape shape index, largest patch index and Euclidean nearest-neighbor distance were among the metrics that were calculated. The concepts of these metrics are as follow (Fragstats 3.3 guidelines): Percentage of Landscape (PLAND) is equal to the sum of the areas (m^2) of all patches of the corresponding patch type, divided by the total landscape area (m^2), multiplied by 100 (equation 1); Total landscape area (A) includes any existing internal background. It ranges between $0 < PLAND \leq 100$. PLAND approaches 0 when the corresponding patch type (class) becomes increasingly rare in the landscape. PLAND equals 100 when the entire landscape consists of a single patch type; that is, when the entire image is comprised of a single patch. Percentage of landscape quantifies the proportional abundance of each patch type in the landscape. For aware from connective path network, hydrologic network and structural quality (land use) survived all of over area at tow day period in the outman 2010 (Figure 2).

Figure 2: Visits to this area (outman, 2010)

Taleghan area due to differences in altitude and topographical diversity, 510 plant species, including 30 species of medicinal, 22 types of grassland and Different communities and Shrubs such as juniper, beech, oak, mastic, oak, hawthorn and... (Nikcar, 2011). Figure 3 indicated Agricultural land of Taleghan area.

Figure 3: Agricultural land of area Taleghan

RESULTS AND DISCUSSION

Table 2 shows the Percentage of plant covers the year 1987 and 2007 year.

Table 2: Percentage of plant covers in year 1987 and 2007 year

Covers type	1987 year	2007 year
Garden	1.26	3.54
Agriculture	15.72	0.67
Grassland	62.8	46.55
Bare lands	20.22	48.3
Lake	-	0.94

Among the strengths of the region are natural corridors, especially trees besides the river and gardens that provide a fertile field for the conservation of biodiversity. Among the threat of the region is increasing the volume of waste and plant cover changes due to increased tourism around Dam Taleghan (Figure 4). Albeit lack of education, tourism culture and the lack of Legislators sanitation of native (Figure 5) can also add to the competent.

Figure 4: Dam Taleghan

Figure 5: Trash along the river and the regional health planning

The Percentage of Landscape metrics showed that the garden area was increased by 2.28 percent, while agricultural land was decreased by 15.5 percent. Grasslands increased 16.25 percent and bare lands to 28.08 percent (Fig. 6). From the ecological concept, due to the increasing surface area of the bare lands and decreased grasslands, it can be concluded that vegetation cover was destroyed. But agriculture land decreased intensely; it can be caused by the existence of the Taleghan reservoir and more can be caused by the release of the dry plains which these lands were converted to pastures over time with weak density.

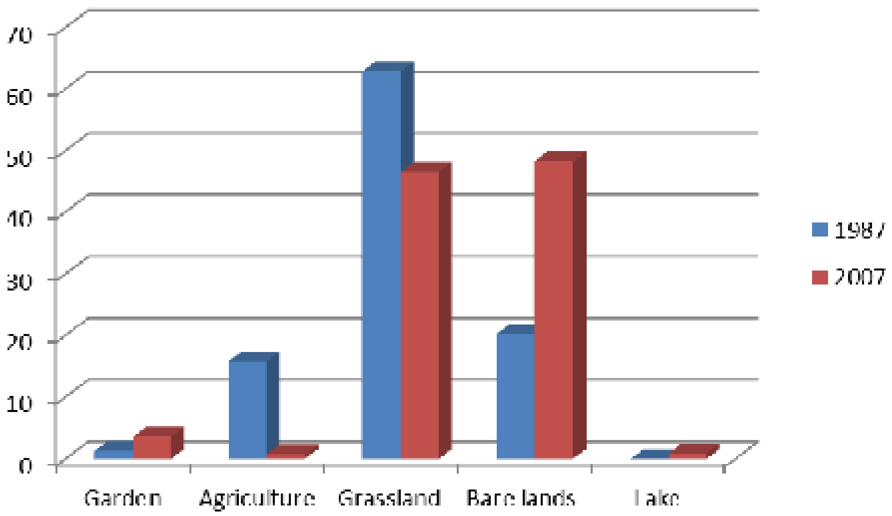

Figure 6: Percentage of plant covers in year 1987 and 2007 year

The land use surface showed that the greatest plant cover change belonged to agriculture class that was decreased from 15.72 percent in 1987 to 0.67 percent in 2007 and limiest plant cover change belonged to range class that was decreased from 62.8 percent in 1987 to 46.55 percent in 2007. What was significant from an environmental point of view was that the amount of bare lands was increased more than two fold (from 20.22 percent in 1987 to 48.3 in 2007) which indicates unexpected vegetation cover degradation. Existing documents shows that Taleghan region had the maximum land use/cover change during the year 2000 and afterwards, when the Taleghan reservoir dam was built. results of This study Conformity With Findings of Wang *et al* (2008), Theobald (2010), Uzun & Gültekin (2011), Bazyar *et al* (2013) and Askari *et al* (2013). Was presented sustainable tourism development as the best strategy for SO strategy, imposed regulations of Soil and water pollution by the health centers as the best strategy for ST strategy, avoid of Land use changes as the best strategy for WO strategy and finally Range Management Plan to reduce surface runoff and reduce soil erosion as the best strategy for WT strategy. However, the proposed According to diagram of sustainability measure (IUCN approach) Utility and desirability of life indicators of ecosystem be measured Based on ecological features and areas of indigenous knowledge that is rooted in public participation and base Status of stability the presented solutions as more realistic utility the natural balance of the ecosystem does not Disturbs and lead to sustainable development and Notable in Taleghan township. Review of previous studies and the study of authors showed which growth of population is the most important factor for the vegetation change and environmental funds; because optimal solutions will be necessary to avoid complications (Table 3).

Table 3: Optimum strategy for reduce effect of plant covers changes

Plant cover type	Probable cause	The main threat	Optimum strategy
garden	Shortages of selling fruit local market and rising prices of transport	Converted to agriculture	creation firms of Facilitate for selling fruit in the area
Agriculture	Lacking advantage economy and purchased land to capitalist	Converted to Bear land and sale of land	Support of the local market and avoid land use change of agriculture and gardens
grassland	Reduce forage production from agricultural	Overgrazing animals	Control of domestic animals and possible forage plants produce
Lake of dam	Do trashing along the river and increase tourism and erosion upstream land	Environment pollutions	Applied the laws of health, education of tourism and reduce drainage dam
No cover (Bear land)	Uncontrolled land use change	Expansion of construction land	Run of Rangelands projects

Principle of ecology in easily can be into the design and planning, so this approach to solving environmental-social Difficulties in future development planning is decisive between of program. Therefore for analysis structure of landscape can be identified disorder and disturbance factors and somewhat predicted altering force of future; in this study agricultural land because of human intervention in nature is known as disorder patch which value lower in 2007 year than 1987 year. Building of the Taleghan dam in order to achieve the objectives of national economic development in 2000 year have more effect than 1200 hectares of the fertile land went under the water, and become Taleghan tourism regional and increased construction of residual in area gradually. In this regards the tsunami of money have impose and accelerated changes in land use. In addition many of dry farming lands have been abandoned and this cased to convert that into the poor grasslands and bare lands.

CONCLUSION

Management ecosystems have been supported by ecology and landscape ecology sciences. According to results extreme changes was for class of agricultural which reduced 23.5 fold and minimum changes was for class of grassland which reduced 1.4 fold in period time 1987-2007. Moreover, at the moment according to the new political subdivisions Taleghan was transformed to a township from a rural area, and consequently new business and authority centers will be needed we suggest that land use planning would be implemented in a finer scale so that each land use will be applied in the suitable place with its maximum potential.

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