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The Selection of Suitable Sites for Tourist Settlement by GIS with Emphasis Ecotourism in Southern Part of Caspian Sea

¹A. Eslami and ²M. Roshani

¹College of Agriculture,

²Collage of Literature, Islamic Azad University, Rasht Branch, Rasht, Iran

Abstract: This study has been emphasized on ecotourism theory in Southern Caspian Sea, 25 watershed (shemrood), Guilan Province. Firstly, for ecotourism development, the study region divided to 3 zones: plain, forest and rangeland. Then using layers overlay determined decentralize and centralize sites, based on slope, aspect and without plant space by means of Arc GIS software. Finally, with considering of the all conditions, tourists decentralize and centralize settlement and access roads, 16 centralize sites located query in 3 regions.

Key words: Centralize sites, GIS, overly, watershed, Guilan Province

INTRODUCTION

Today, tourism is recognized as one of the world's huge industries and affected on economical, cultural, social and environmental sections of human life. Many researchers are believing tourism is an independence section and they are defining the principles of tourism based on an industrial structure. In the two last decades, ecotourism has been located in the center of attention for many experts, since people are traveling original and natural regions and enjoy from landscapes, wild animals, plants, etc., which these actions had insignificant impact on the environment and natural resources and play role in the protection and survival of various species of plants and natural sources. They will be introduced as good income source for natives, if it is apply appropriate advertisement and education. Ecotourism is an antithesis for a tourism who thinks as short-time profits.

Based on ecotourism definition as tourism kinds included wide range of activities related to natural resources e.g., visiting of national parks and protect areas, original natural area, watching of birds, walking tours in the natural environments, side climbing, mountain climbing, visiting of natural caves, study of plant flora or animal funa, conducting of field studies on wild life, ecologist considerations and similar activities.

Abdus Salam *et al.* (2000) conducted a research in the area of potentials identification and ecotourism measures at Mangrove sundarban in order to protect of forest's sources, plant life and animal life, using Geographic Information System (GIS) as a tool, satellite's imagery and Information Technology (IT). They tried

decrease the destructive effects in forest sources. Novotna (2007) presented an identification and evaluation method of the geographic potential for tourism in the Plzen Region. He suggested four steps; 1: Suitable variables to evaluate the tourism potential. 2: Chosen prerequisites in the form of processing layers. 3: Evaluation of geographic subject by Delphi. 4: General evaluation of potential using algebraic functions can present the output map for evaluating of ecotourism potentials. Bulut and Yilmaz (2008) were suggested 19 different alternative tourism forms after study of Kemaliye (Erzincan/Turkey) are, by considering of the natural, cultural and visual values of the area and their suitability. Andrew and Shaw (2007) using large amounts of spatial and non-spatial data associated with the diverse resources and activities in the park, indicated that it is logical choice under Geographic Information Systems (GIS) for store, manage, analyze and visualizing of the data. McAlpin (2008) believed the policy sciences provide a contextual basis for practical recommendations that will help participants build on the project's strengths and correct its weaknesses. Feng and Morrison (2003) applied GIS in tourism and hospital query in Brown County (India). Dondo *et al.* (2003) worked on the GIS application in Zimbabwe tourism planning. Due to instability in agriculture and also unstable weather conditions and fluctuation of farm productions in the international markets, government was focused on the tourism industry. Accordingly, different information sights relating to tourism facilities, national parks, ways, statistics and the like are prepared for the applicant. The purpose of this project was finding of suitable tourism places and future develops.

Andrea *et al.* (2009) using multi-temporal land sat imagery (1989-2005), described the rate and range of land cover changes throughout the Angkor basin. They show that there is a more area proportion of deforested (23.4%) against afforestation (revive) (4.9%) for the development of tourism. Fung and Marafa (2002) has announced Feng Shui woodlands as a cultural heritage by careful investigation and evaluated it is great potential for ecotourism in Hong Kong. They have suggested that Geographic Information System (GIS) can be have great potential for tourism development using Ikonos satellites images and both spectral and textural data. Also, Bukenya (2002) using Geographic Information System (GIS) and Multi Criterion Decision-Making (MCDM), frame work developed a special multi objective, ranking, prioritizing of Uganda's national parks. He divided national parks as 3 subgroups. So national parks in the Western region of the country are ranked higher than those in the other regions. For this purpose that the importance of subject, potentials and different abilities of ecotourism, Gilan 25 basin (Shemrood) have been known by use of Geographic Information System (GIS).

MATERIALS AND METHODS

Sites of study: Shemrood 25 watershed is one of the catchment basin in Caspian sea, that is located in 47 km far from center of Gilan Province (Rasht), Eastern

longitude 49°50'9"to 49°50'12" and Northern latitude 36° 55'21" to 37° 09'21". The whole basin perimeter was 72.10 km that has allocated almost 18961.81 ha. The lowest height of the basin was 30 m and the highest height was 2100 m and middle height was 775 m (Fig. 1).

Method: Firstly, the entire basin divided into 3 separate parts that included plain zone, (height of 200 m far from sea level), forest zone (heights of 200-1500) and the height of more than 1500 m of the rangeland zone. Then it were prepared Triangular Irregular Network (TIN) map using 1:25000 topographic maps of contour 50 m. In order to map production, slope and aspect, the preparing TIN changed to Digital Elevation Model (DEM). For tourism settlement area fixing, it has been extract the without cover points as a separate layer. The data were collected between April 2008 till June 2009. The Query of settlement sites for tourist include 4 stages: 1. Determining of effective agents in Query; 2: Weighting of data layers; 3: Aggregation of layers and recognize suitable regions; 4: Conforming of results and Query of suitable region with land realities. For weighting of data layers, there is many methods,e.g., ranking, pair wise comparison, Fuzzy and Boolean. In this study it was used Boolean logic (zero and one) for Query of sites. For settlement Query it was utilized 3 slope layer without cover plant space and aspect by 3 region classification included plain, woodland and rangeland (Fig. 2). At the end decentralized and

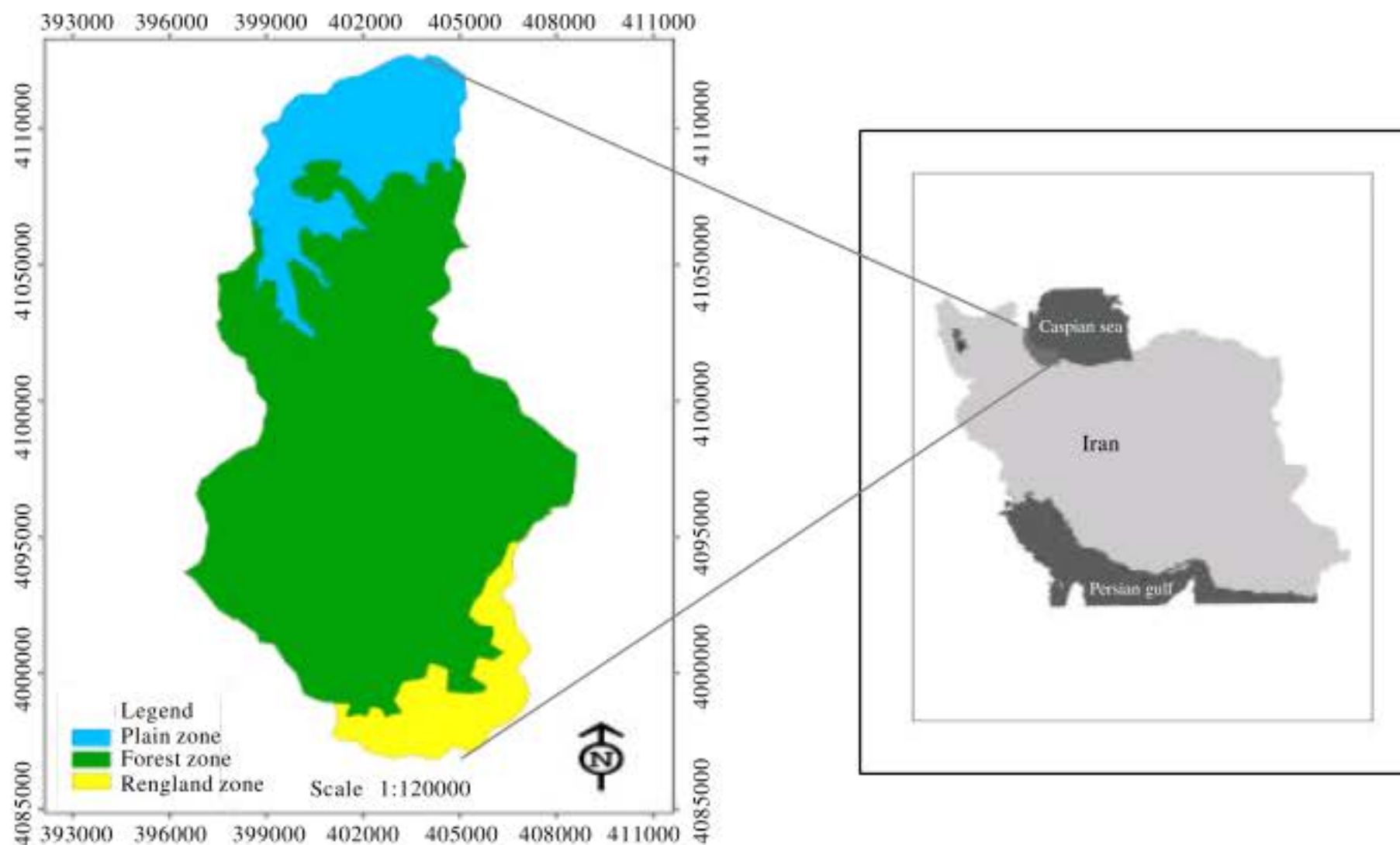


Fig. 1: Location of study area

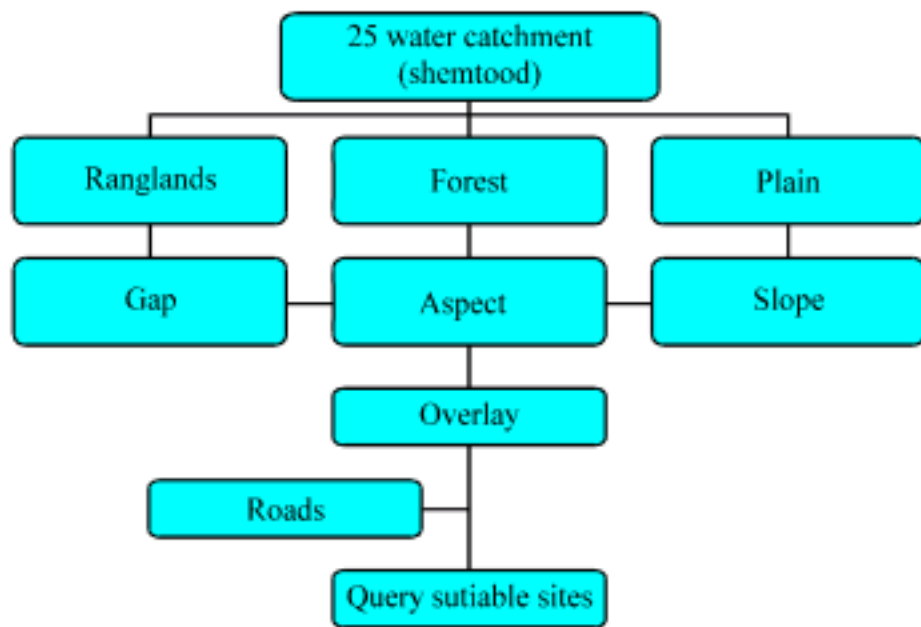


Fig. 2: Flow chart of the study stages

centralized settlement suitable places was extracted for tourist with the overlay of layers in Arc GIS software and weighting in layers by Boolean Logic.

RESULTS AND DISCUSSION

It is considerate 3 zones including plain, forest, rangeland for locating of appropriate tourist settlements which these zones had various potential for tourists attraction, Factors such as slope, slope direction and areas without plants as a gap space (in order to avoid of the damages into natural sources in the region), were considered by analysis of separated layers for each zone. According to Boolean logic, the slope layer divided to unsuitable (0-20%) and suitable limits (% >20), as well as the effect of slope direction in 2 unsuitable and suitable categories (S, SW, SE, E, Flat directions) for centered camps Quarry. Regions which had not plants were considered as suitable plane and other lands were considered as unsuitable in due to plant. With overlay of above layers in the 3 regions of suitable settlements it was determined for tourist as potential regions. Also, the camps less than 0.1 ha were removed since they had not suitable facilities for tourists.

Plain regions potentials: The height in the lower part of studied basin was less than 200 m from sea level, which includes 3016 ha of the South coast of Caspian Sea. Twenty two suitable camps have been assigned for tourist settlement based on the slope, slope direction and gap space by overlay of the layers. The camps of group one with 0.1-0.5 area have most frequency (7 sites), but the camps of 1-2 ha had the least frequencies in the plain area. Scattering of site camps (Fig. 3) shows that they are more than in the East plain area and also small area's camps have similar scattering of site.

Forest regions potentials: Forest zone is located between mean plain and rangeland and its height is 200-1500 m that is included in this basin study of plane equivalent to 14280 ha. These forests have various species and special in Hircanian species that included old forests in the world i.e., *Pterocarya fraxinifolia*, *Fagus orientalis*, *Alnus glutinosa*, *Froxinus excelsior*, *Gleditschia caspica*, *Parrotia persica*, *Diospyros lotus*, *Carpinus betulus* and *Crataegus aronia*. Density forest, co density forest and sparse covers ordinary, 12648, 2807 and 1036 ha. The most criterion in forest zone for camp choose is the gap space because of preventing demolition of natural sources that 15 Quarry camps included by layer overlay with the most area 0.1-0.5 ha and it is suitable distribute in forest land plane (Fig. 4).

Rangeland regions potentials: Rangeland zone is upper part of the studied basin with the altitude of sea 1500-2020 equal to 1642 ha of the studied basin. There are rangeland species with medical uses such as *Officinal's Borage*, *Echium amoenum*, *Arctium lappa*, *Urtica dioica*, *Viola odorta*, *Thymus kotschyanus*, *Descurainia sophia* L., *Astragalus* which are attractive for tourism and they have wide range of varieties, especially in spring and summer. In this zone layers overlay, 13 Query camp recognized with the most frequency of 2-10 ha. On the whole accumulation of settlement camps take place, mostly at the end of the basin regions and that altitude of 1750-1950 m (Fig. 5).

The main goal of this study was determining of central and decentralized camps of tourism since camp's position is importance from the view of availability, placement and view aspect of natural resources. For this reason, connecting road also has resulted in camps quarry one of the 3 zone, plain, forest and rangeland. During this plants layer of connecting road was added for determining centralized and decentralized camps. Then road Buffer was used as 100 m on both sides (Fig. 6).

On the basis of accessibility, query camps was considered for tourist settlement plain zone 9 number, forest 4 and rangeland 3 site ordinary with area almost 11.11, 5.11 and 35.24 ha. The camps outside of Buffer are as transitory and decentralized camps for tourist settlement at 13 sites (plain), 9 sites (forest), 10 sites (rangeland), with area to the extent of 110, 12 and 23 ha.

With regard to main goal of research which it is emphasize on gap space of plant for site selection, there are 16 sites for tourist settlement. The settlement query had been to decrease human destructive effects on natural sources as settlement camps with taking into consideration the gap space layer. As the characteristics exclusive of this study, it has been used this layer for

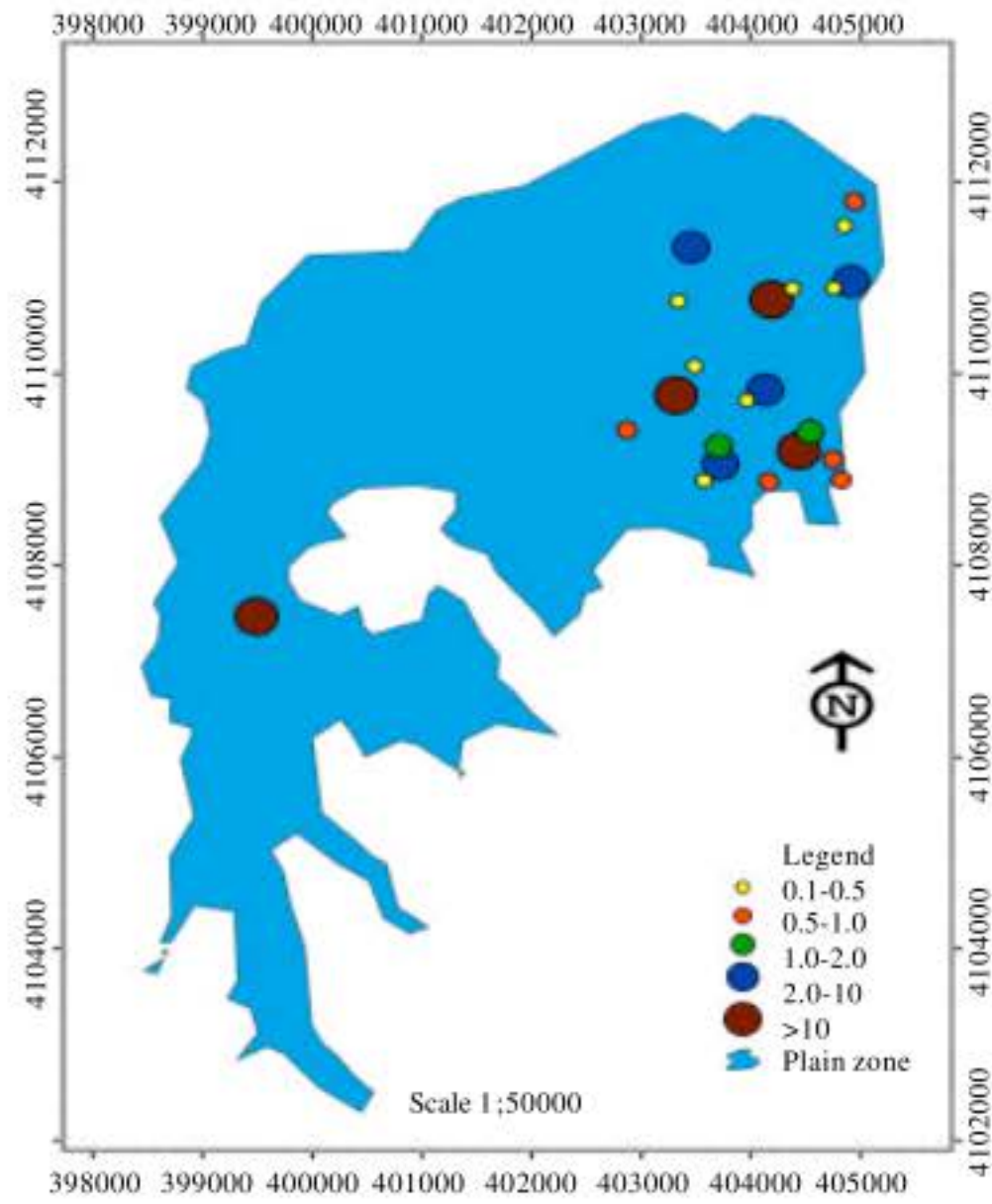


Fig. 3: Classification of sites in plain zone

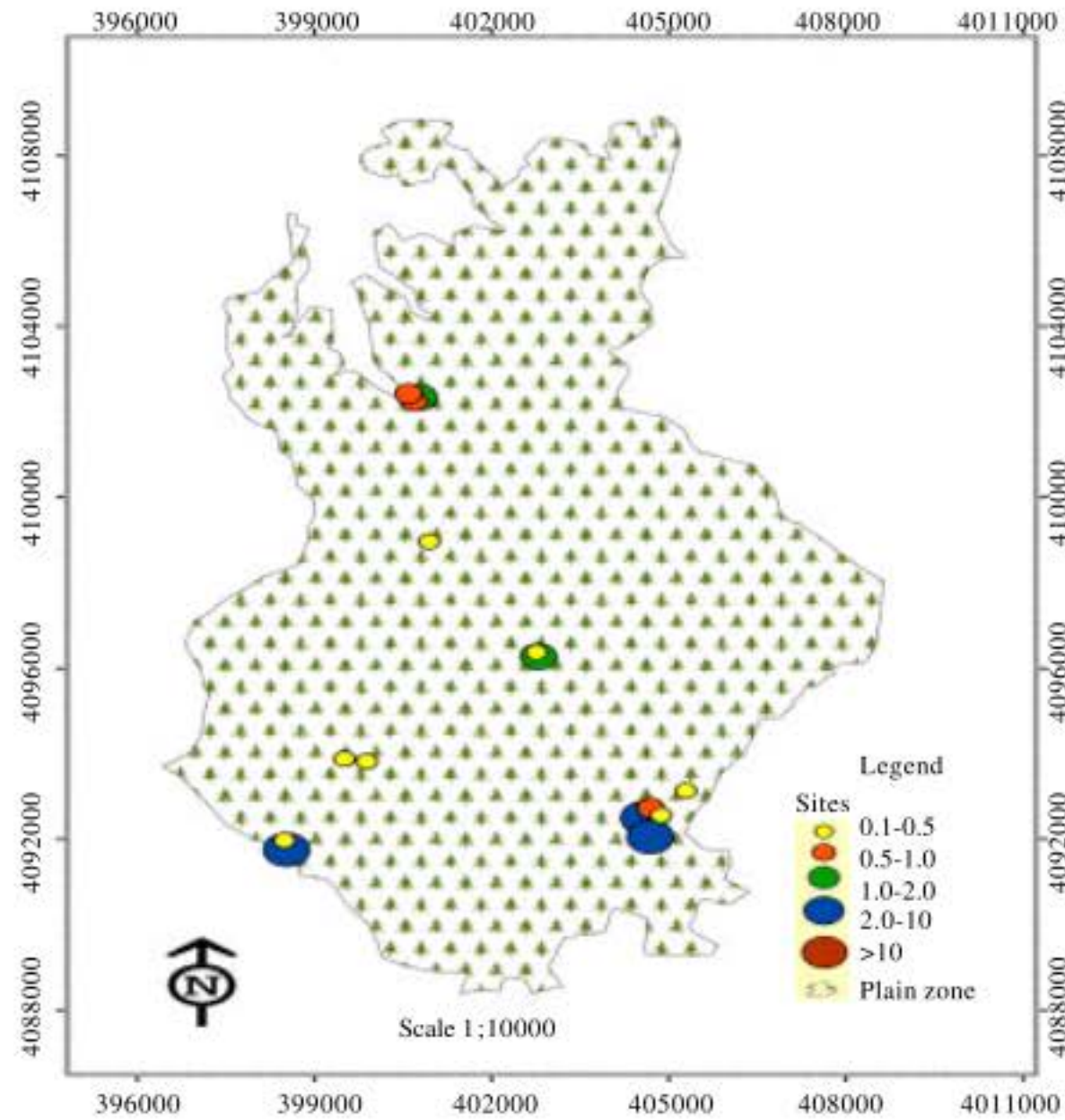


Fig. 4: Classification of sites in forest zone

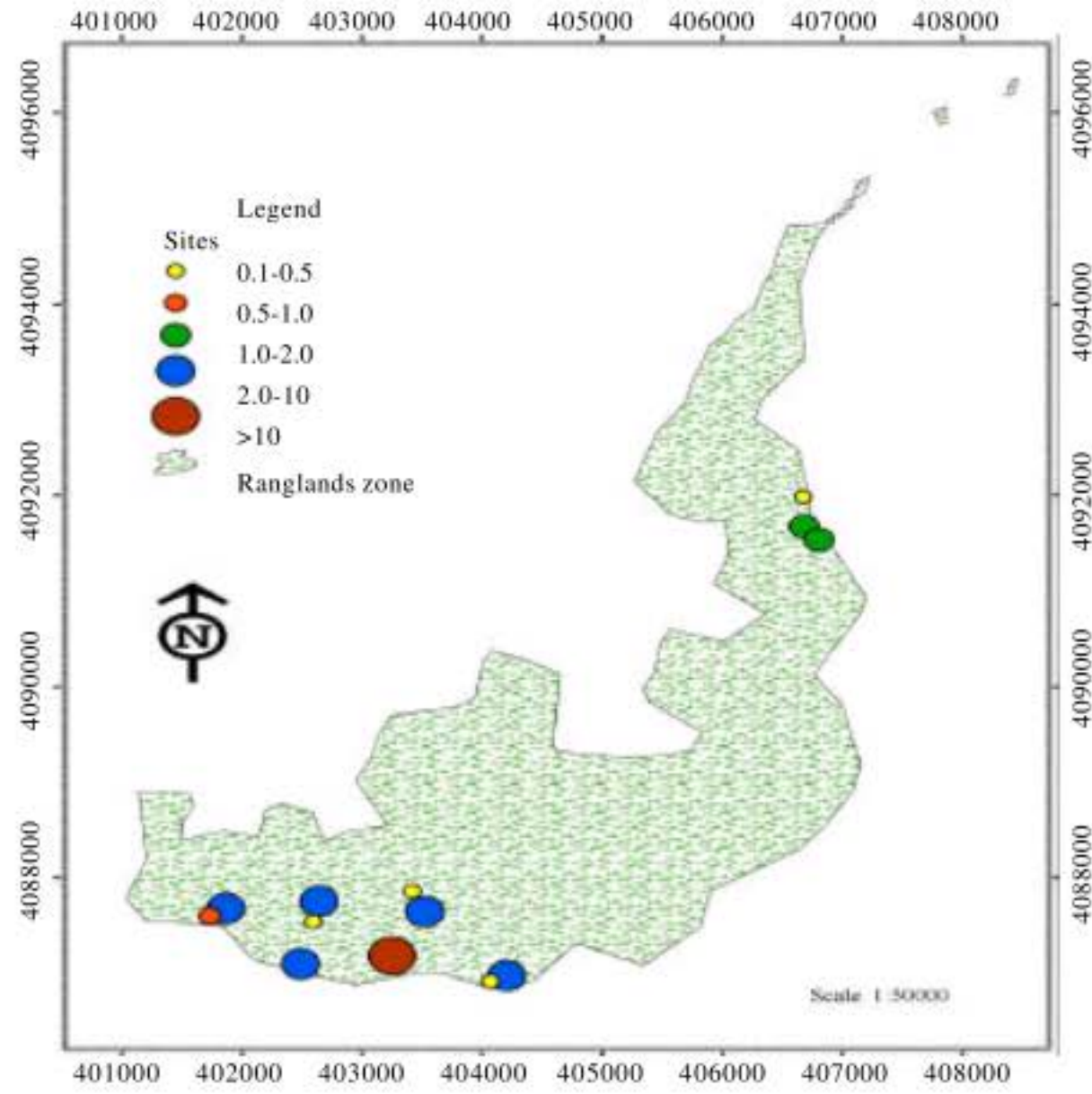


Fig. 5: Classification of sites in rangeland zone

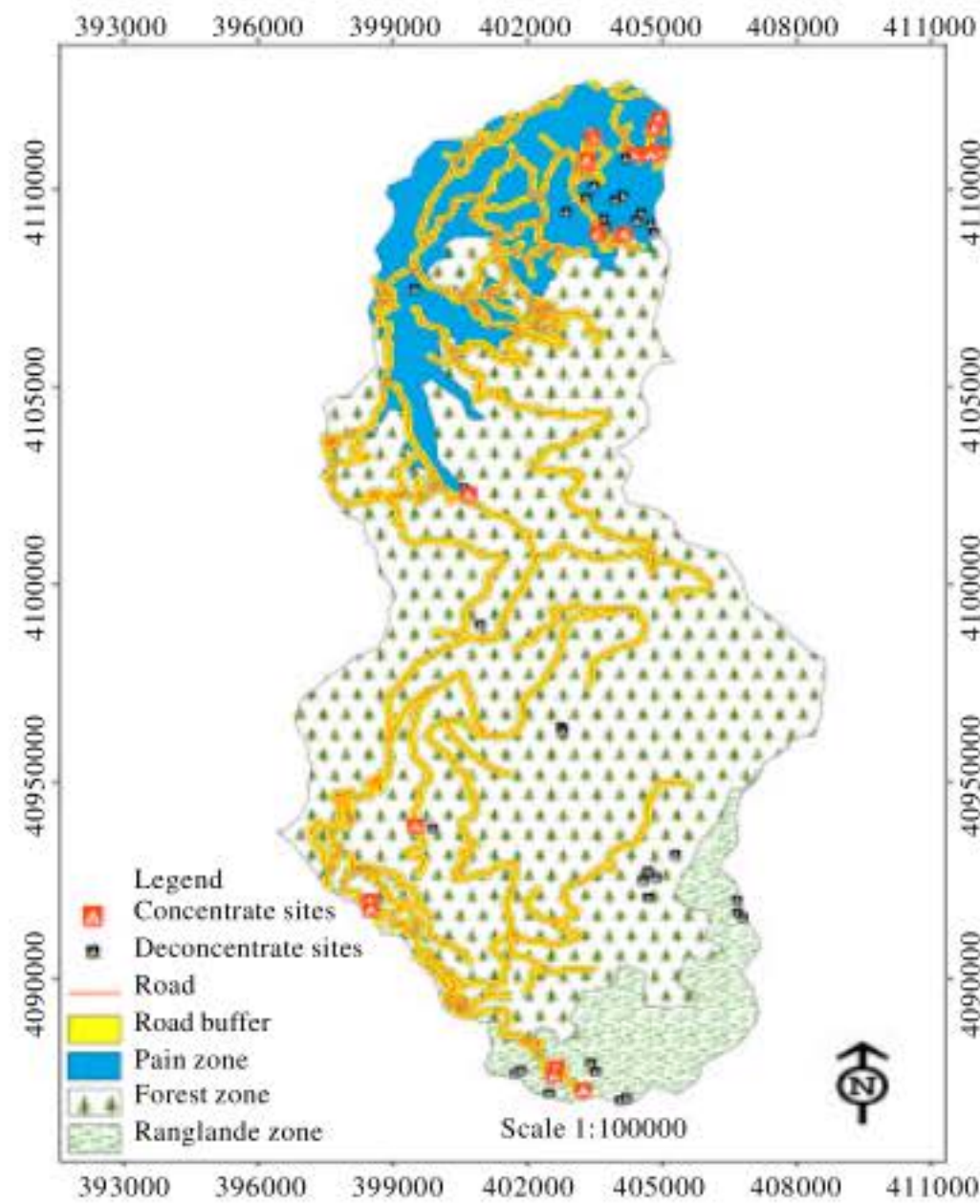


Fig. 6: Final model for selection sites in three zones

selection of site with emphasis on tourism sustainable development. Also, present finding was support with the other results such as Abdus Salam *et al.* (2000) and Andrea *et al.* (2009). Finally it must be pointed the these kind studies and determinations, curability of and introducing of suitable areas can be use in tourism industry along with natural sources protection for the native regions in respect of economic aspect.

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