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MANAGEMENT PLANNING OF DEMANDING OUTDOOR RECREATIONAL ACTIVITIES IN SISANGAN FOREST PARK (IRAN)

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Abstract

Many ecotourism destinations unfortunately tend to become unsustainable and even self-destructive due to inappropriate environmental assessments. On the other hand, because of the increasing people's willingness to tourism and relaxation, it is necessary to select and introduce new regions for tourism. To do this, the application of relevant criteria can be a profitable method. The purpose of this study is to identify nature-based tourism activities and also site selection for them in Sisangan Forest Park emphasizing plant species diversity protection. A questionnaire method was used in order to recognize demanding activities. The sample size was calculated through Cochran formula. According to this, 140 questionnaires were distributed among tourists in Sisangan Forest Park. The results showed that clouds walking, horse riding, forest hot air ballooning, night walking for seeing wildlife and photography in forest had the highest demand. In this study, the principal sources to identify criteria and indicators of demanding activities were divided into two categories: expert's opinions and the review of other similar researches and literatures. Five main criteria including soil, slope, altitude, canopy coverage percentage and bottom coverage percentage were selected. Afterwards, with the help of Geographical Information System (GIS) abilities, suitable areas for demanding activities were determined. Finally, the maximum and minimum areas were allocated to clouds walking and photography in forest, respectively.

Key words: altitude, canopy, ecotourism, GIS, soil, slope, zoning

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1. Introduction

Today, tourism is becoming a major profitable activity in the world and also a powerful tool for effective economic development both in local and national scales (Klauco et al., 2015; Stubelj and Bohanec, 2010). The idea of ecotourism, a form of nature-based tourism, contributing both towards socio-economic and environmental benefits, burst into the scientific and later public consciousness in the 1990s (Wearing and Neil, 1999). One of the main challenges of ecotourism management is a sustainable development ecologically and achieving tourists' satisfaction and increasing the standard of local residents' life at the same time (Lim and Mcaleer, 2005). The natural beauty and high diversity of plants and animals in many forests all around the world changes such ecosystems to predominant regions for tourists. Hence, establishing and nurturing forest parks and natural recreational regions in order to attract tourists, boost the economy, provide leisure time, relax people and conserve natural resources is extremely required (Oladi, 2005). Natural forest parks are complicated ecosystems, so it is really vital to strike a balance between human activities and nature in order to accomplish conservation and tourism objectives at the same time. Also, it should not be neglected that natural forest parks have been always one of the most appealing destinations to tourists in national and regional scales (Barzehkar, 2005).

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For management of parks' assets to be effective and successful, it is vital to obtain information about visitors' characteristics as well as their opinions (Kolahi et al., 2013). Planning for sites in which there is no demand for recreation is futile. Thus, people's willingness to use an area for recreational aims is a critical factor that can turn an area into a recreational resource. If parks and recreational areas are established according to socio-economic rules and regulations, users' ideas will be one of the most significant factors that determine the recreation value of parks (Barzehkar, 2005).

To reach a wise use of forest parks, it is really necessary to maintain a balance that can guarantee the ecosystems supplies through a wide range of human activities from absolute conservation to effective intervention. To obtain this, the management planning of forest parks is worthwhile (Sadeghipouya and Rahimian, 2012). Zoning as a part of management planning indicates different land use and identifies the suitability level of different activities (Asadolahi, 2010). Spatial and geographical analyses are often multi variation and criteria. The evaluation of land suitability is a sophisticated process that requires the assessment of several environmental criteria at the same time (Strauss-Kahn and Vives, 2009).

Spatial Multi Criteria Evaluation (SMCE) is a multi-criteria decision making model with spatial data. This method is the spatial type of multi criteria decision making models and enable GIS to analyze data properly (Hatonen, 2009; Nouri et al., 2016). There are various methods for multi criteria evaluation among which the Weighted Linear Combination (WLC) method is one the most common methods for spatial multi criteria evaluation (Rahman et al., 2009). The northern forests of Iran have remarkable species richness and are globally important in terms of having endemic species (Sefidi et al., 2011). Sisangan forest park is one of the biggest and unique reserves of *Buxus hyrcana* in Iran and Middle East (Barzehkar, 2005). Forest outdoor recreation is the best policy towards forests management for decreasing destructive factors and sustainable conservation (Karter, 2003). If forests tourism is not planned according to their environmental ability and sensitivity, irreparable damages to plant and forest species are inevitable. Ecotourism planning offers socio-economic development to the region, so is a guideline on the progress of social and economic life of local residents that can result in better and more sustainable forest services. On the other hand, it is critical to choose appropriate techniques for the best decision because of the importance of decision making that can cause monumental errors with dire consequences (Parhizkar and Ghafari Gilandeh, 2006). In this study, the management planning was done in order to develop suitable activities fitted forest tourism emphasizing plant species diversity protection. There are different studies done in Sisangan forest park with the purpose of (eco)tourism including: The preservation and use values determination of Sisangan forest park, Nowshahr by using individual's willingness-to-pay (Amirnejad et al., 2006), a survey on ideas and recreational requirements of Sisangan forest park (Maygooni et al., 2009) and the introduction of tourism environmental management plan of Sisangan forest park with the help of Multi Criteria Decision Making methods (Sadeghipouya and Rahimian, 2012). We used the mentioned articles in order to design the questionnaire. Several researches have been done in the field of land management planning so far among which we can mention: environmental planning by the US Forest Service in forests with social problems (Stern et al., 2010), environmental planning based on public participation for tourism resources development in Florida (Yates et al., 2010), the usage of spatial multi criteria analysis to site selection for a local park in Italy (Zucca et al., 2008), nature-based tourism planning by means of multi criteria evaluation and GIS in Yan Chau Tong aquatic park in Hong Kong (Fung and Wong, 2007) and the selection of multi criteria activities for ecotourism planning in Igneada (OK, 2006). With the help of these articles, the criteria set were chosen.

The purpose of this paper is to solve a multi criteria decision problem for recognizing nature based activities in Sisangan Forest Park in Hyrcanian region by using Spatial Multi Criteria Evaluation method based on geographic criteria set and to discuss the usage of this method in planning of protected areas.

2. Material and methods

2.1. Study area

Sisangan forest park is one of the most unique Caspian coastal plain especially with the mix of *Buxus hyrcana* as an indicator species, located in southern parts of Caspian Sea in Nowshahr. This forest park is located between Rooyan and Nowshahr cities and it has an area of 591.65 ha located between latitudes of 36° 33´- 36° 30´´ 35´N and longitudes of 51° 47´- 51° 30´´ 49´E (Babazadeh Khameneh et al., 2016). The location of Sisangan Forest Park at Caspian region of Iran is provided by Babazadeh Khameneh et al. (2016).

Approximately 90% of the forest tree species consists of *Buxus hyrcana*. General slope is less than 5%. Altitude varies from -26 meter in costal parts to 125 meter in north slopes of Central Alborz Mountain Range (Roodi et al., 2012). The average annual rainfall is 1293.5 mm and average annual temperature is 16.13 °C. According to Aridity Index of Emberger, its climate is considered extremely humid with mild winter. Sisangan forest park has its own management plan that was firstly developed in 2003 and then revised in 2009. According to this plan, Sisangan forest park was divided into seven zones that this study was done in the intensive and extensive outdoor recreational zones with 178.5 ha in total (Sadati, 2009). The procedure for doing this research includes: recognition of demanding outdoor recreational activities from tourists' point of view, identification and selection of demanding outdoor recreational activities criteria, mapping the indicators,

standardization of maps, combination of criteria by means of overlaying, zoning of suitable recreational patches, and prioritization of zones.

2.2. Recognition of demanding outdoor recreational activities

In order to determine demanding nature-based activities, questionnaires were distributed among the tourists of the park to realize the level of their interest as well. The questionnaire consists of closed and open format questions that ask for visitors' favorite outdoor recreational activities and some other social issues. Considering the fact that this survey concentrates on Sisangan tourists' insights and opinions and their demands for activities, the statistical population includes the tourists of Sisangan forest park.

After designing the questionnaire, in pretest stage 30 questionnaires were given out in outdoor recreational zones and completed with the help of interview. The collected data were analyzed in SPSS ver. 17 software. The sample size was calculated through Cochran Equation (Cochran, 1977).

2.3. Identification and selection of demanding outdoor recreational activities criteria

In multi criteria evaluation to achieve the goals, certain criteria should be utilized. A criterion is considered a standard for judgment or a frame to evaluate how much suitable the decisions are (Hwang and Yoon, 1981). Hence, according to the criteria decisions are made. Any criteria become quantitative with the help of indicators. To determine different criteria, there is no pervasive and global technique and it differs from one case to the other. In other words, the criteria for evaluation are identified according to a special issue (Parhizkar and Ghafari Gilandeh, 2006). A set of evaluation criteria might be established through the research of previous similar studies and investigation of experts' opinions (Keeney and Raiffa, 1976; Pitz and Mckillip, 1984). The proper recognition of criteria to do nature-based activities results in a safer site selection and also is a preventative measure in terms of pollution and environmental destruction (Danehkar et al., 2012). In this survey, after collecting questionnaires and reaching the people's opinions about their favorite activities, in order to meet objective criteria to select suitable areas for each activity, we studied different resources for each nature-based tourism activity (Zucca et al., (2008), Farajzadehasl and Karimpanah (2007), Aminu (2007) and Tremblay (2006)).

2.4. Mapping the indicators

The usage of maps in zoning stage can make the application of criteria easier. So, after selection of demanding tourism activities criteria, considering the function of each criterion for demanding activities with different features and also similar reviews and experts' and environmentalists' opinions, indicators related to each criterion were defined in a way that were capable of mapping by GIS. Afterwards, at mapping stage, firstly, the basic map of this study was developed with the help of topographic map with a scale of 1:25000 (relating to National Cartographic Center of Iran). This map was used in order to develop digital elevation model, slope and aspect maps of the study area. Geologic map of this forest park that presents a detailed description of local geologic map units was obtained by Geological Survey of Iran.

2.5. Combination of criteria and zoning

Spatial Multi Criteria Evaluation (SMCE) is a process that combines and transforms geographical data (the input) into a decision (the output). This process consists of procedures that involve the utilization of geographical data, the decision maker's preferences and the manipulation of the data and preferences according to specified decision rules. The purpose of multi criteria analysis is the selection of the best alternative based on prioritizing them by the evaluation of some main criteria. There are numerous methods for multi criteria evaluation such as Weighted Linear Combination (Malczewski, 1999).

Weighted linear combination, or simple additive weighting, is based on the concept of a weighted average in which continuous criteria are standardized to a common numeric range, and then combined by means of a weighted average (Malczewski, 1999). The decision maker assigns the weights of relative importance directly to each attribute map layer. The total score for each alternative is obtained by multiplying the importance weight assigned to each attribute by the scaled value given for that attribute to the alternative and then summing the products over all attributes. The scores are calculated for all of the alternatives and that with the highest overall score is chosen (Eq. 1). The method can be executed using any GIS system with overlay capabilities, and allows the evaluation criterion map layers to be combined in order to determine the composite map layer which is output.

$$S = \sum W_i X_i \quad (1)$$

where S is suitability, W_i is weight of factor i, and X_i is the criterion score of factor i.

All GIS software systems provide the basic tools for evaluation of such a model.

Finally, the maps of capable areas for each activity were made. The applied maps were maps of identified criteria that were combined with maps of identified ecological groups of this forest park (Babazadeh Khameneh et al., 2016).

3. Results and discussion

3.1. Tourists' demanding recreational activities

Among demanding activities that visitors to Sisangan forest park were interested in, clouds walking, horse riding, forest hot air ballooning, night walking for seeing wildlife, photography in forest had the highest demand (Table 1).

Table 1. Visitors' distribution based on their favorite activities

Activities	*Frequency*	*Percentage*	*Priority*
clouds walking	58	41.4	1
horse riding	57	40.7	2
forest hot air ballooning	54	38.6	3
night walking for seeing wildlife	52	37.1	4
photography in forest	52	37.1	5
bicycling	50	35.7	6
forest walking	48	34.3	7
camping	33	23.6	8
hunting	33	23.6	9
bird watching	29	20.7	10
tree walking	16	11.4	11
butterfly watching	11	7.9	12

Table 2. Indicators related to selected recreational criteria

Bottom coverage (%)	*Canopy coverage (%)*	*Altitude (meter)*	*Slope (%)*	*Soil*	*Activities*
less than 50 with low density	more than 40with low density	no limitation	less than 15	not swampy and stony	clouds walking
no limitation	no limitation	less than 1500	less than 15	no limitation	horse riding
no limitation	no limitation	preferably the steppes	less than 15	no limitation	forest hot air ballooning
less than 50	40-80	less than 1500	less than 10	not swampy and stony	night walking for seeing wildlife
no limitation	40-80	no limitation	less than 10	no limitation	photography in forest

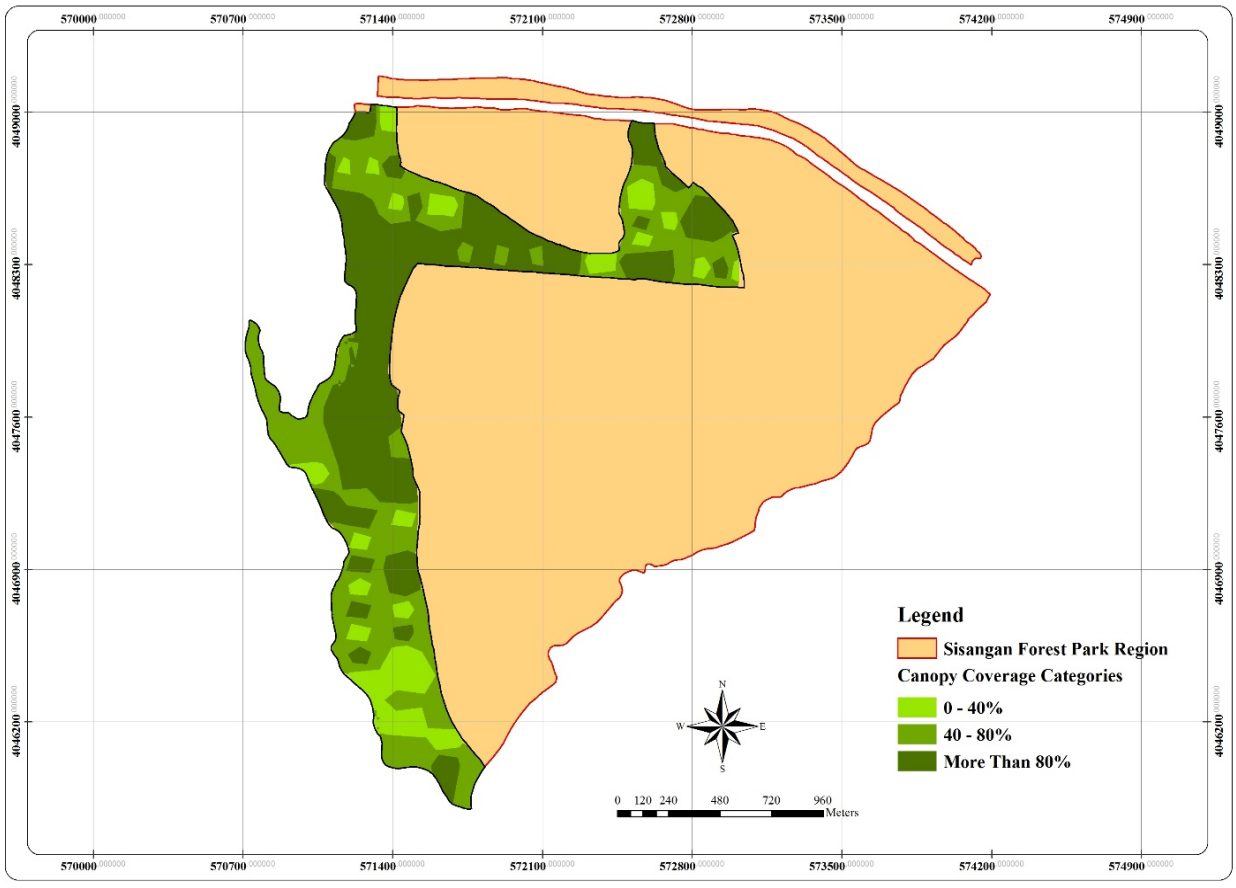

Fig. 1. Canopy coverage categories in outdoor recreational zones of Sisangan

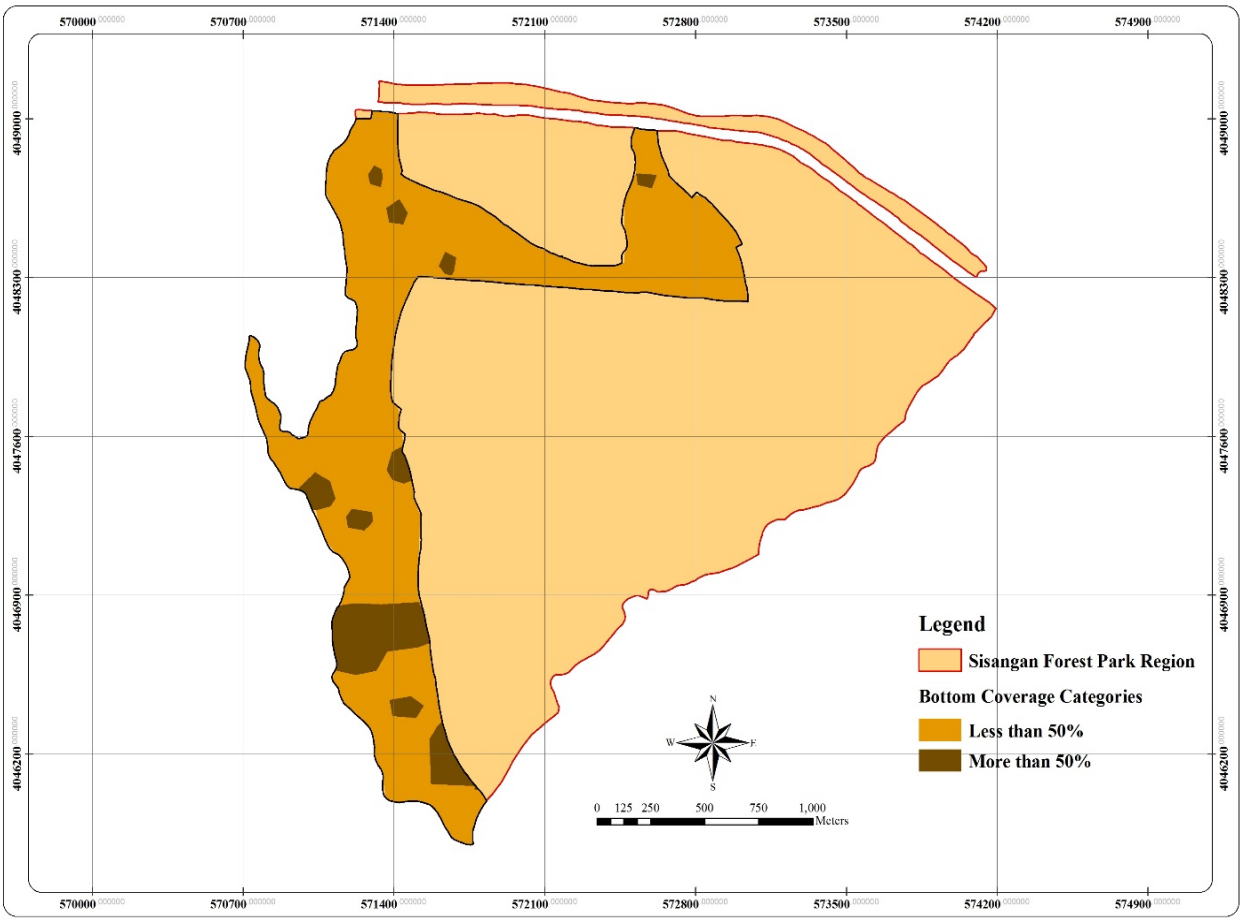

Fig. 2. Bottom coverage categories in outdoor recreational zones of Sisangan

3.2. Criteria for demanding outdoor recreational activities

Since there are various ecosystems and natural environments in which planning of different outdoor recreational activities is feasible, application of activity-based approach is important in management planning.

In tourism planning considering outdoor recreational activities, after recognition of demanding activities or activities that are suitable for the ecosystem of the study area, firstly painstaking research on required criteria and indicators should be conducted. Afterwards, for zoning and planning of each activity, environmental evaluation according to the identified criteria should be done (Danehkar and Mahmoudi, 2013)

In this study, the main way of identifying criteria was experts' opinions and also the identity of each activity was the other factor that was considered. For this reason, the first five activities that had the highest demand were studied and their necessities and obligations for applying them were recognized. Finally, five main criteria including soil, slope, altitude, canopy coverage percentage and bottom coverage percentage were selected. Table 2 indicates the criteria and indicators for each activity.

3.3. The maps of zoning

Considering the criteria of selected activities, there were no limitations relating to soil, slope and altitude in outdoor recreational zones (intensive and extensive) of Sisangan forest park according to the ecological features of the forest park. Therefore, decisions about activities were taken just according to the maps of canopy coverage percentage and bottom coverage percentage. For this reason, three categories of canopy coverage including: category 1. canopy coverage less than 40%, category 2. canopy coverage between 40% and 80%, category 3. canopy coverage more than 80% (Fig. 1), and also 2 categories of bottom coverage including: category 1. bottom coverage less than 50% and category 2. bottom coverage more than 50% (Fig. 2) were mapped. Taking everything into consideration, the instructions of mapping the activities are mentioned below.

3.3.1. The map of clouds walking

This zone is compounded of categories 2 and 3 of canopy coverage and category 1 of bottom coverage minus ecological groups of II and IV (Fig. 3). This zone is 63.29 ha from extensive outdoor recreational zone and 17.39 ha from intensive outdoor recreational zone.

3.3.2. The map of horse riding

There is no limitation for this zone except ecological groups of II and IV due to their endangered plant species (Fig. 4). This zone is 75.09 ha from extensive outdoor recreational zone and 19.76 ha from intensive outdoor recreational zone.

3.3.3. The map of forest hot air ballooning

There is no limitation for this except ecological groups of II and IV due to their endangered plant species (Fig. 5). This zone is 75.09 ha from extensive outdoor recreational zone and 19.76 ha from intensive outdoor recreational zone.

3.3.4. The map of night walking for seeing wildlife

This zone is compounded of category 2 of canopy coverage and category 1 of bottom coverage minus ecological groups of II and IV (Fig. 6). This zone is 30.27 ha from extensive outdoor recreational zone and 6.13 ha from intensive outdoor recreational zone.

3.3.5. The map of photography in forest

This zone is built on category 2 of canopy coverage without ecological groups of II and IV (Fig. 7). This zone is 32.32 ha from extensive outdoor recreational zone and 6.42 ha from intensive outdoor recreational zone.

3.3.6. The final map of indicators related to selected recreational criteria

After preparing the maps of selected activities, the final map was compounded of those five maps by means of overlaying. This map shows the whole site of demanding activities (Fig. 8). As the map shows, the maximum and minimum areas are allocated to clouds walking and photography in forest respectively.

4. Conclusions

Zoning approach with the purpose of multiple applications not only provides high quality conservation for specific regions but also encourages other rational applications (Asadolahi, 2010). To reach this special goal, almost always evaluation of several criteria is needed that this process is called spatial multi criteria evaluation (Carver, 1991). The results of this study vividly reflect the effectiveness of this approach in forest parks management.

The research findings indicate that site selection based on different recreational activities is possible and with the help of that, land suitability for various kinds of tourism and ecotourism is recognized. Doing such researches is a new approach that by studying each activity, the suitable situation for its development is identified and at the end, the zones with maximum sustainability and minimum danger are introduced. As a matter of fact, this way makes tourism management closer to sustainability strategy. According to the final map of demanding activities, 94.76 ha out of 178.5 ha (the total area of intensive and extensive outdoor recreational zones) is allocated to the demanding outdoor recreational activities that this area is approximately equal to 53% of the whole area of the outdoor recreational zones. Considering Sisangan forest park one of the biggest reserves of *Buxus hyrcana* in Iran, it is recommended that the rest 47% of outdoor recreational zones which is not suitable for development of demanding activities in terms of low sustainability of plant diversity turn to the conservation zone.

Overall, it is really important to be mentioned that forest parks are dynamic ecosystems that are influenced by human activities and natural changes so the management of such ecosystems should be flexible and changeable. To be more precise, zoning should change after a while and also the management of forest ecosystems should be adaptive.

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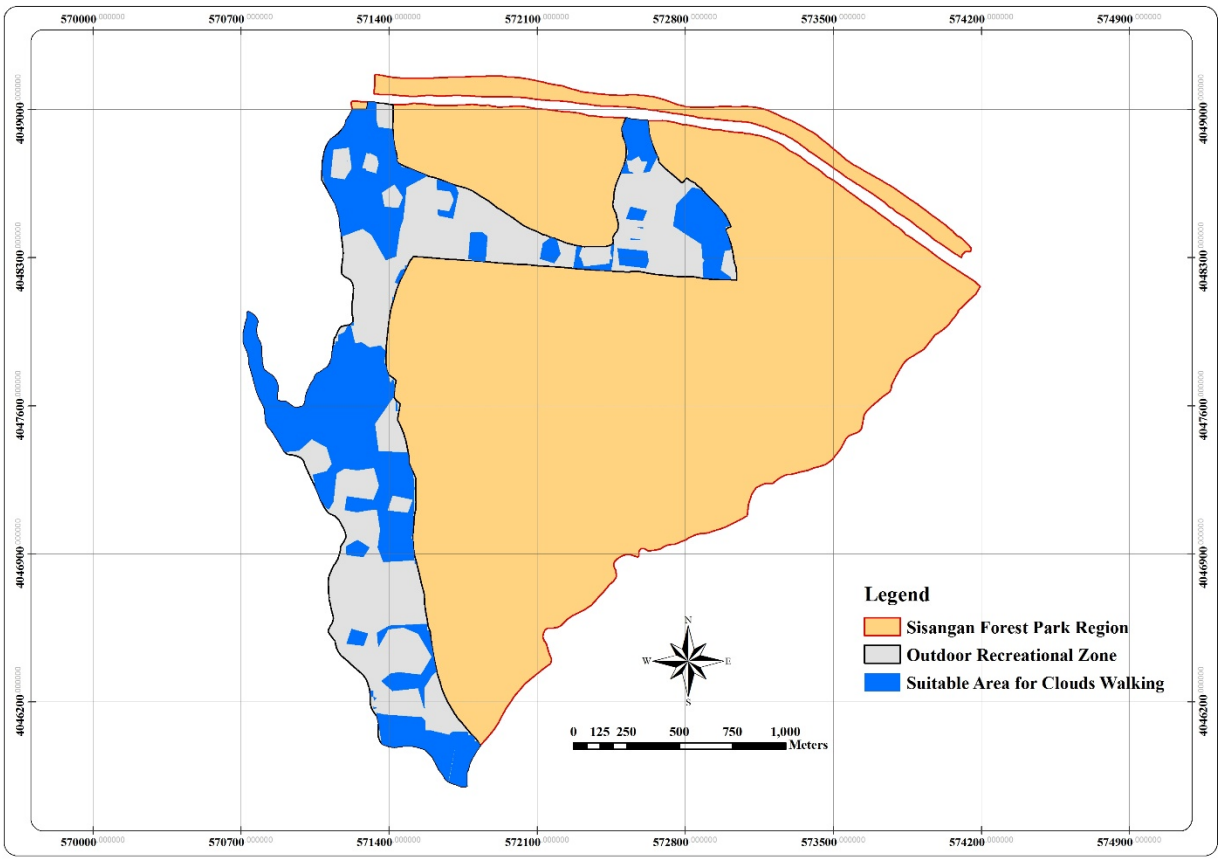

Fig. 3. The suitable area for clouds walking at Sisangan Forest Park

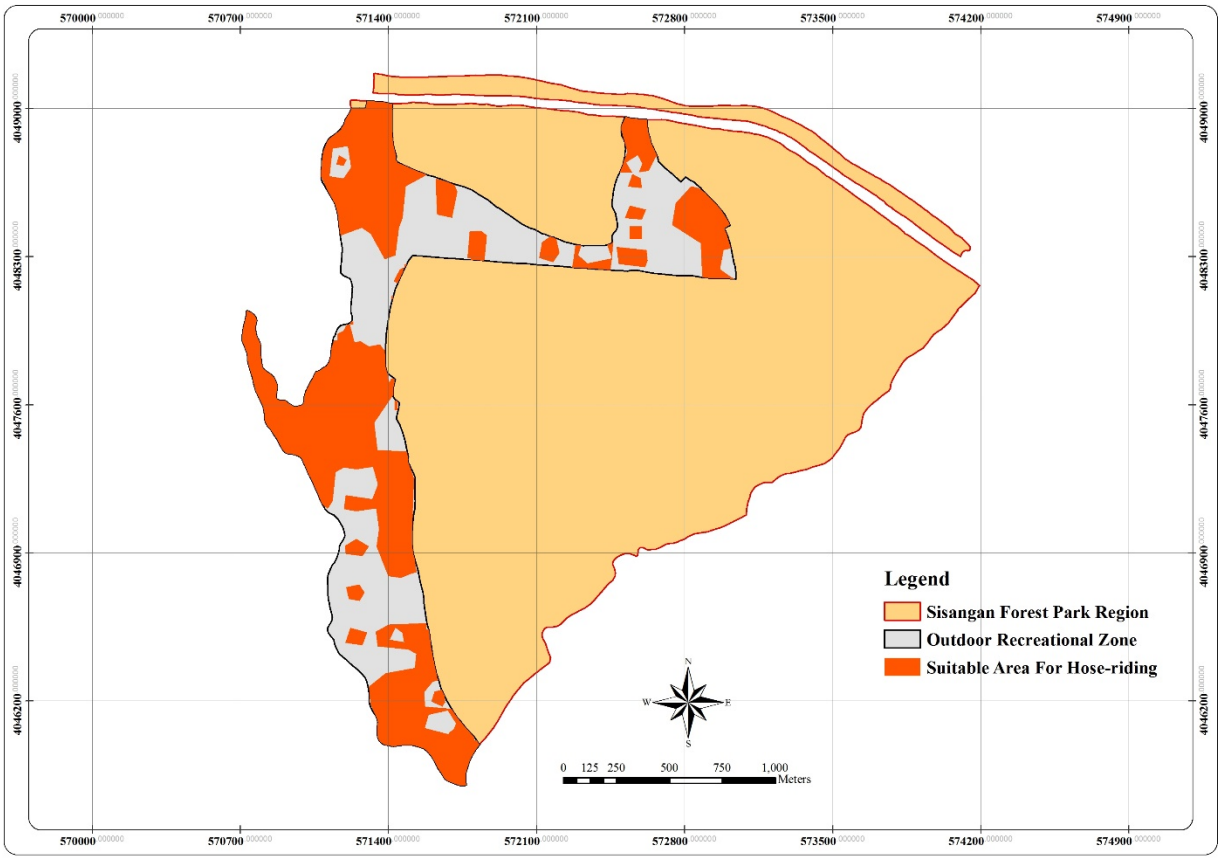

Fig. 4. The suitable area for horse riding at Sisangan Forest Park

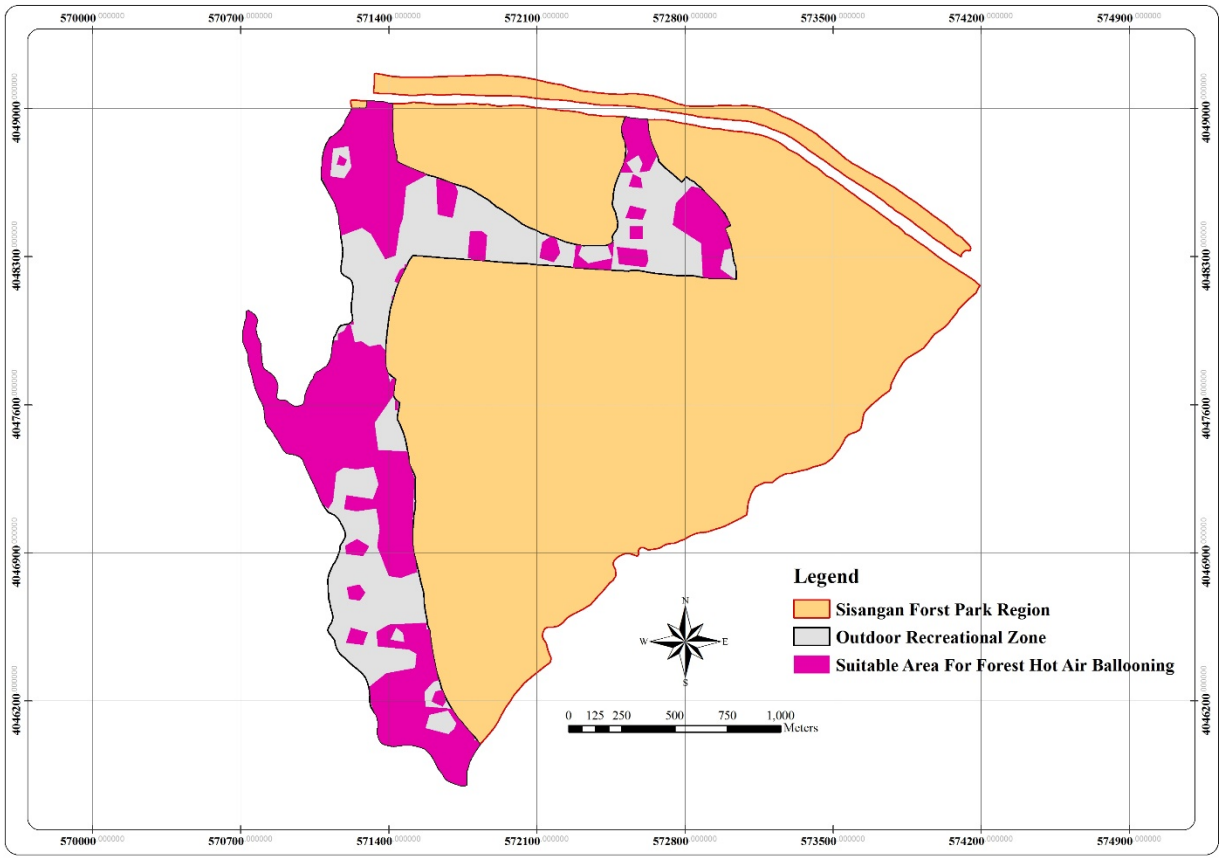

Fig. 5. The suitable area for forest hot air ballooning at Sisangan Forest Park

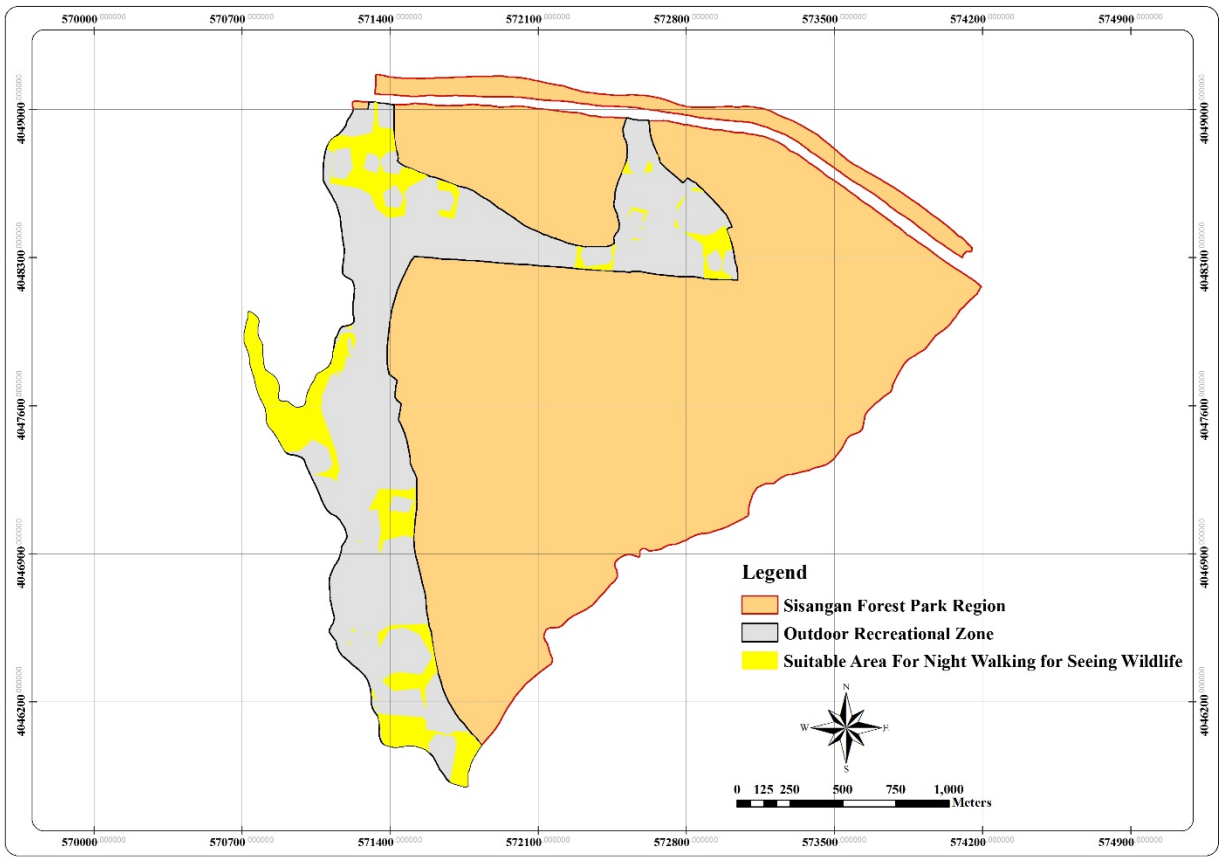

Fig. 6. The suitable area for night walking for seeing wildlife at Sisangan Forest Park

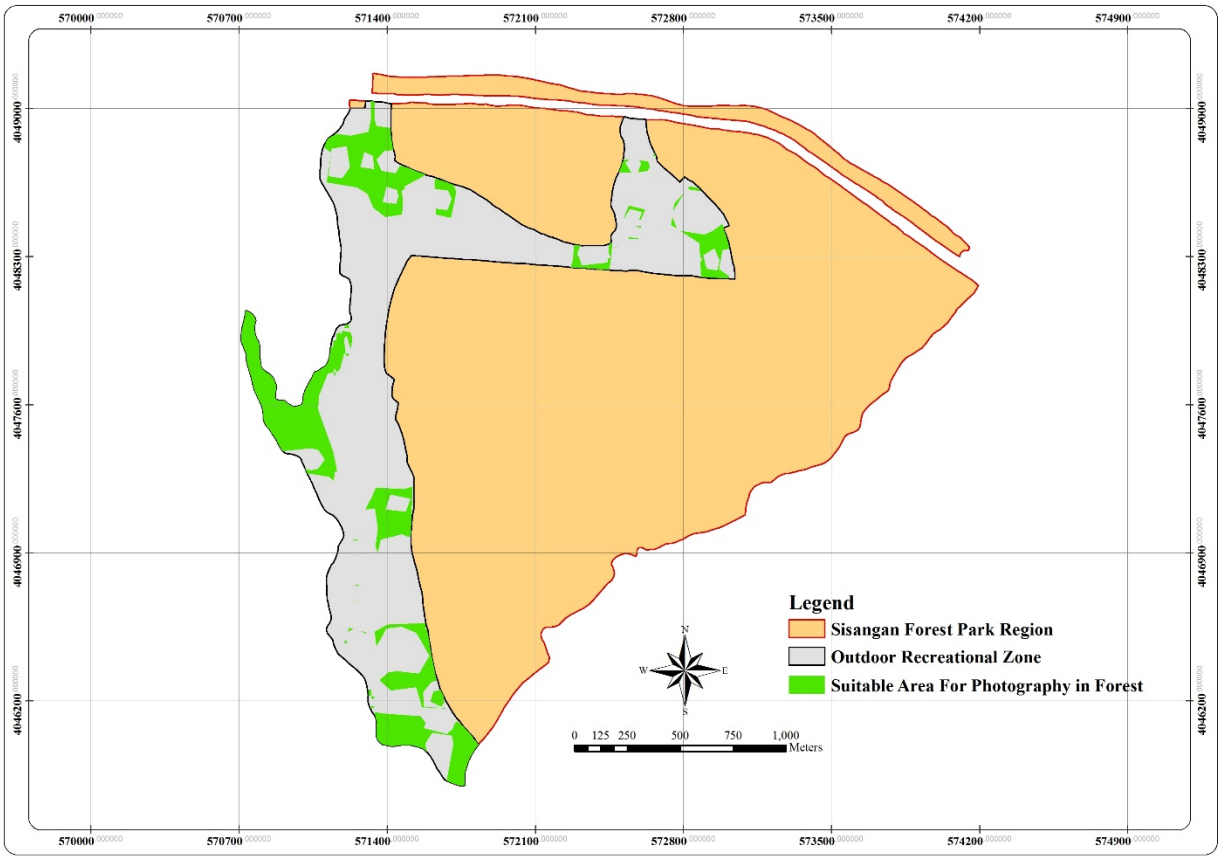

Fig. 7. The suitable area for photography in forest at Sisangan Forest Park

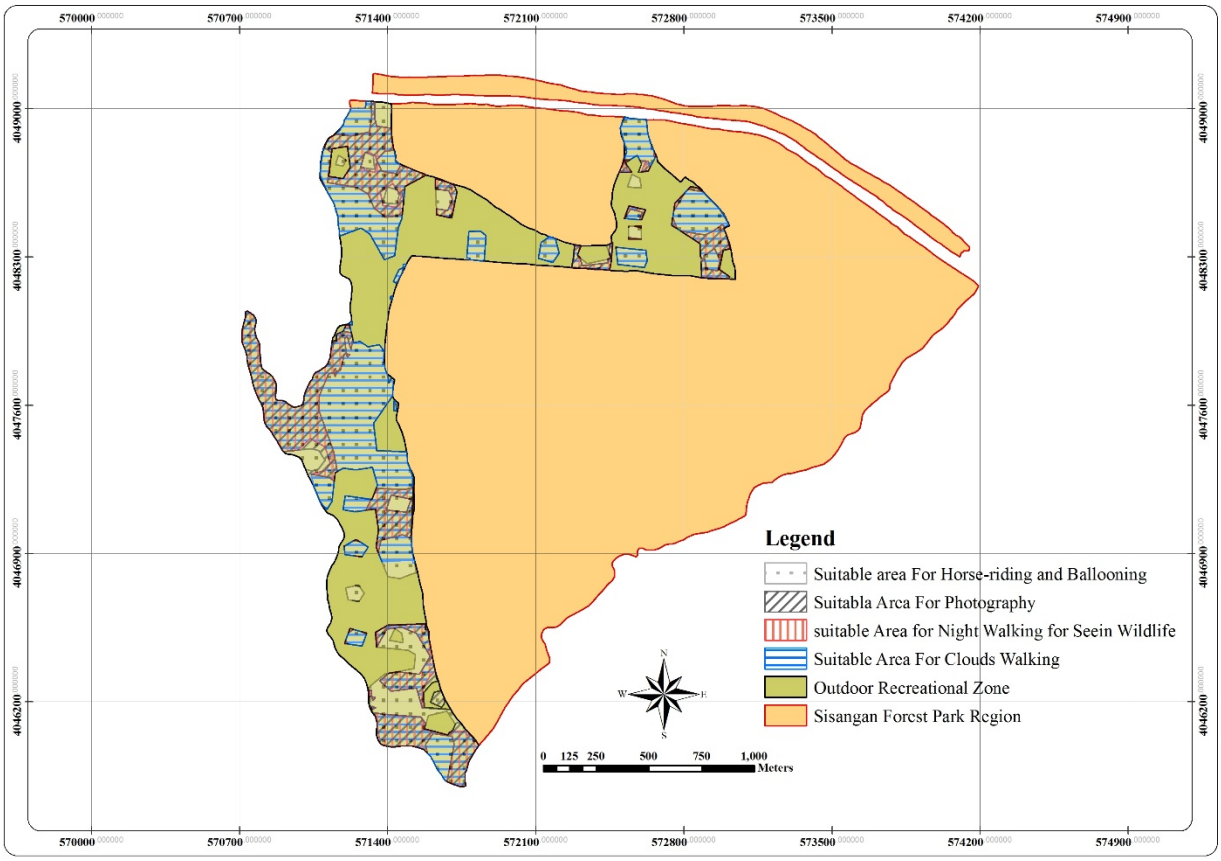

Fig. 8. The final map of indicators related to selected outdoor recreational criteria at Sisangan Forest Park

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