

A Study on the effects of tourism stress on silvicultural parameters of forest areas of Mirza Kochak khan Park

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Abstract: Since the studied forest park is outside the city and time and money must be spent to reach it, Clawson method (economic – social method) was applied in this paper. So, 100 questionnaires were firstly distributed among tourists of this park. These factors were analyzed by using SPSS software and chi-square test. It is noteworthy that Cronbach's alpha test was applied to determine reliability and validity of the questionnaires. Then to study the effects of tourism stress on silvicultural parameters after dividing the region into maximum, medium, and minimum tourism stress, such factors as number per hectare, percentage of each tree species, reproduction as silvicultural parameters and carving on trees, branch – cutting, burning trees, etc. as damages of tourists were measured. Presence of tourists has a great effect on increase in the height of pruning, burning trees, removal of grass coverage, and increase in garbage, soil erosion, and reduction of wild animals, carving, and cutting branches of trees. Also the relation between income and desired recreations, relation between people awareness and forest knowledge, relation between education and previous visit to park have a significant difference with 95% probability.

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1. Introduction

Development of tourism activities depends frequently upon various natural, cultural, and historical attractions. One of the strategies that have recently been taken into account in most countries of the world is development of tourism particularly activities related to eco-tourism (Ghaderi, 2004). Tourism is an old phenomenon that has existed in the human societies from long ago (Kargar, 2007). However, modern tourism developed concurrent with development of industrial revolution in England and also development of personal vehicles from the mid 19th century afterwards (Davenpart, 2006). From 1945, tourism has had a rapid growth and now has the maximum growth in different economic sectors (Quattrone, 2002) (Deng, 20002) (Hamilton and et al, 2005). Having natural attractions, forests have a great potential for attracting tourists. Forest recreation is the best policy for managing forests to reduce degradation factors and sustainable protection (Karter, 2003; Rosa et al., 2005). One of the modern strategies considered in most countries of the world is development of tourism in tourism zones. In fact, tourism structure of a zone includes factors that may create more motivation for demanding tourism in that place (Law, 2002) and organizing tourism in a place starts with planning for understanding tourists' behavior in that place (Bansal et al., 2004). Tourism, as a social

phenomenon, is among main contemporary forces in providing places and cultures (Hultman and Hall, 2011). The "World Tourism Organization" defines tourism as a set of activities a person does in journey and in a place other than his living environment. This journey does not take more than one year and it is aimed at entertainment, recreation, rest, sport, and similar activities (Mehrabian, 2005). Today, tourism industry is the third great industry of the world after oil and automobile industries; and no doubt, it will be the most profitable business in the 21st century (Fennel, 2003). This industry that is among global phenomena that shows integration of economic, social, and cultural activities (Holjevac, 2003). It is often regarded as the greatest industry of the world and it is a means for achieving sustainable development which provides economic, environmental, social, and cultural opportunities for many local communities (Aref, 2011). Major capacities of tourism industry like developing different services, creating job opportunities, developing infrastructures, interaction of cultures, strengthening friendship among people, etc. as one of the business components called invisible export and as a sustainable economy have drawn a particular attention and may developing countries have taken its remarkable profits into account and have regarded it as a way to achieve development and cope with

complex economic constraints (Liu and Wall, 2006) (Kazemi, 2006) (Kharazmi, 2005) (Pourkazemi and Rezaei, 2006) and (Ghiami Rad et al., 2008). In the recent decades, importance of tourism at the international level has increased unprecedentedly in terms of both number of tourists and foreign exchange earnings (Sambrook, 2005). This important role of tourism has converted this industry into one of the most rapid economic sectors and its growth will continue in the future. In 2004, the rate of this industry growth has been 25% during 10 years and WTO has estimated that the number of international tourists will reach 1.6 billion persons up to 2010; that is, the average growth of annual tourists will be near 4.3 percent (Weaver, 2001). According to World Travel and Tourism Council Report, tourism industry has had directly and indirectly 10.3% of gross domestic product, 234.3 million jobs, and 8.7% of total employment in 2006 (Holden, 2008). With regard to the importance of subject, objectives of this paper are divided into two main and subordinate groups. Main objectives include control and modification of management plans, meeting recreational needs of tourists, reviewing sustainable protection of forest park. And subordinate objectives include spending leisure time, people familiarity with the nature, and developing natural resources culture.

Ghaemi (1997) studied destructive factors threatening Golestan National Park. He found out that excessive accumulation of tourists in the recreation centers lead to waste increase, fire, removal of grass coverage in all resorts and both sides of the roads, unusual movement and escape of animals, lack of reproduction. Malekan Rad (1999) studied the effect of tourism stress on silvicultural parameters in Si Sangan Forest Park. He stated that tourist presence increases height of pruning, burning trees, removal of grass coverage and plants, and garbage. Barzekar (2002) studied recreational planning and management of productivity of Haraz Forest Park in Amol. He stated that excessive exploitation of a region may remove grass coverage and reproduction and harden the soil. So, excessive activities are not permitted. By preparing plant coverage map of the studied region, Juhasz (1996) proved the effects of human severe destruction on reduction of species diversity and showed that maximum diversity is only seen in the protected regions. He also showed 18 endangered species and their relation with special micro-climatic conditions in the studied region and noted the effect of changes in humidity and nitrogen on reduction of climate and so species extinction. Studying America National Park by using SWAT model, Nilsson (2004) provided a conceptual framework for systematic analysis of the studied region and so analyzed all strengths, weaknesses, opportunities and threats

existing in the Park. By using economic – social relations analysis for use of forests for recreation, Rusa and colleagues (2005) concluded that ecotourism activity must be accompanied by accurate knowledge of environmental capacities and economic – social matters. Jim and colleagues (2006) estimated recreational value of urban green space in Chongju of China through questionnaire and face to face interview with the visitors. The results revealed that inclination to visit increases by accessibility, appropriate plant coverage, and environment quality. Harrison (2007) described and evaluated tourism operation in villages near Grand Rivers in North Carbin. During this operation, emphasizing protection of resources and natural life of river and building construction from 2004 afterwards have led to high tourism attractions and increase in economic power of the region.

2. Materials and Methods

2.1 Location of the Studied Region

Haraz Forest Park is located at 16 km south of Amol City and near Haraz road. It has an area about 420 hectares and includes parcels 21, 22, 23 of series 5 and area 52 related to Haraz forests plan. It reaches parcel No. 24 from north, parcel No. 20 and Chakhani Valley from south, Haraz road and River from east, and series 6 of Haraz west forest plan from west. This Park includes three height classes namely, 300-400, 400-500, and more than 500 meters from sea level. The results of studying meteorological data of Karsang Station (lying at longitude $36^{\circ}17'$ east and latitude $52^{\circ}21'$ north and 220 meters above sea level) during recent thirty years showed that Haraz Forest Park lacks dry season. The average rainfall and temperature in this region equals 907 mm and 15°C , respectively.

2.2 Research Method

By library studies and visiting the region, the appropriate research method was selected. Since the Park is outside the city and time and money must be spent to reach it, Clawson method (economic – social method) was applied; and with regard to natural features and proper access, intermediate area form was used. The above mentioned method indeed elaborates real reaction of tourists to recreational facilities (Barzekar, 2005). Then the questionnaire was designed and distributed among 100 persons of those who have visited the Park. To determine reliability of questionnaires, internal consistency measurement method was applied. Internal consistency may be measured by Cronbach's alpha coefficient (Cronbach, 1951). This method is applied in most studies. Although the minimum acceptable value that indicates reliability is 0.7, 0.6 and even 0.55 are also acceptable

(Zeinali, 2011). To study the effects of tourism stress on silvicultural features, first the studied region was divided into three parts namely, maximum stress (8.67 hectares), medium stress (3.22 hectares), and minimum stress (2.42 hectares). So, the region that has such facilities as table, bench, road, bower, and many welfare facilities has maximum tourism stress; regions with relatively low density like walkways, open spaces have medium stress; and the regions with very low recreational activities due to lack of facilities have minimum stress. To measure such factors as number per hectare, percentage of each tree species, reproduction, average diameter of trees, percentage of

grass coverage, height of pruning as silvicultural parameters, and carving trees, cutting branches, burning trees, number of destroyed trees, intensity of soil erosion, wastes and garbage as tourist damages, a systematic random sampling method was used. So, in each region with regard to its specific conditions (for example in terms of grass coverage and reproduction), these factors were measured. Data was gathered and analyzed by SPSS and Excel. Sample plots have a diameter 11.26 m and an area 400 m². A 3x3 micro-plot has been applied at the center of each plot to determine grass and plant coverage.

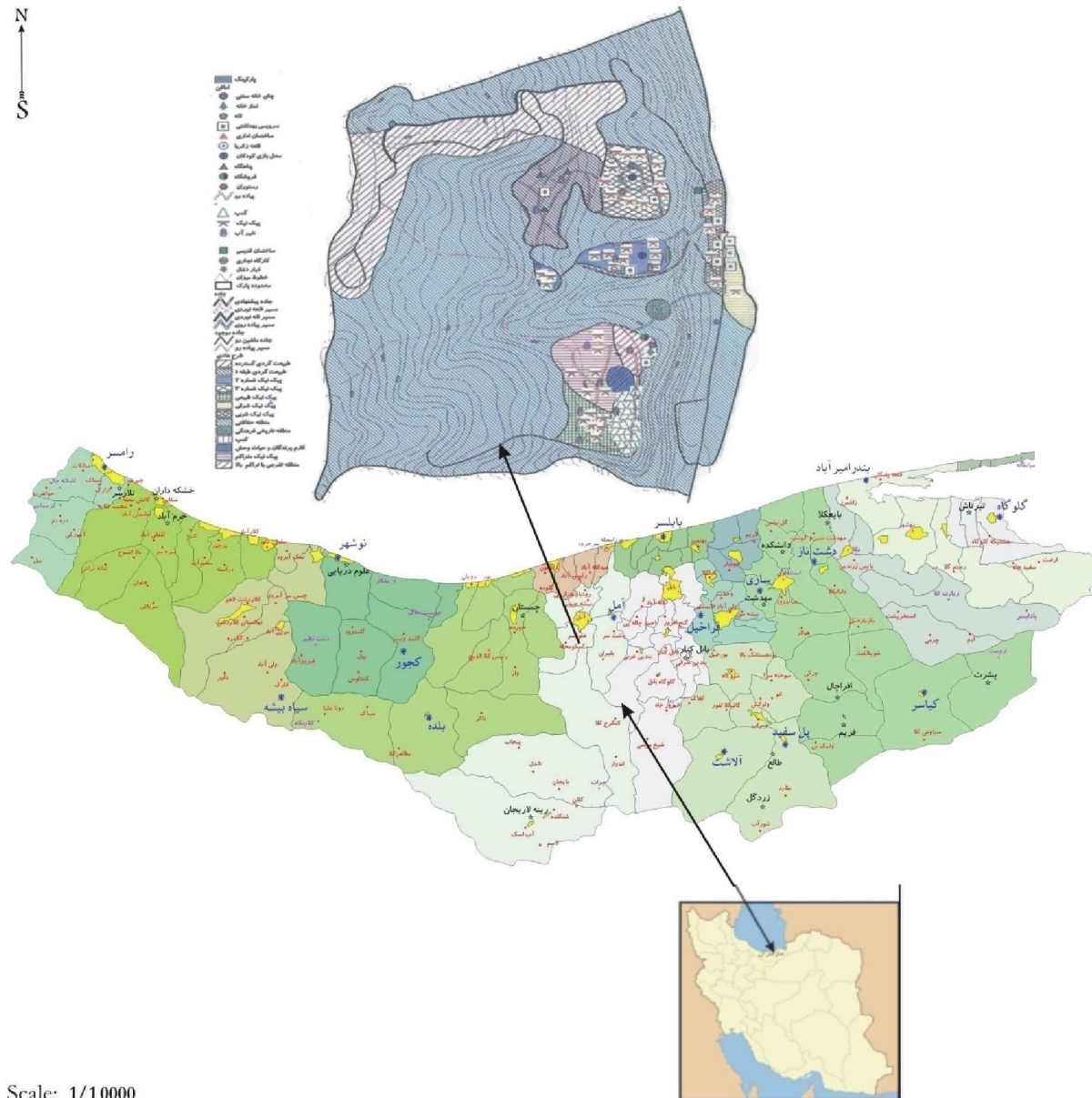


Figure 1- location of Haraz Forest Park

In this paper, people awareness has been specified indirectly; that is, each awareness parameter has been scored and several classes were considered. As regards education index, zero was regarded for illiterates, 10 for diploma and lower, 20 for associate degree to B.sc, and 30 for M.sc and higher. Also score 2 was considered for each hour of watching TV and score 4 for each hour of studying books and newspapers. Then total scores were classified into 10-20 as very low awareness, 20-25 as low awareness, 25-30 as medium awareness, more than 30 as high awareness.

The income rate of tourists was classified into four groups: less than 2.000.000 rials, between 2.000.000 – 5.000.000 rials, 5.000.000 – 10.000.000 rials, and more than 10.000.000. Tourists were asked to name a few forest species. Therefore, those who named more than 2 forest tree species were classified into high awareness group; those who named one or two tree species, into medium awareness group; and those who named no species or named a species that does not exist in North of Iran were considered as among low awareness group. Having scored and classified them, data was analyzed by using SPSS

software. To test data, chi-square statistical test was applied (in all test, confidence level was calculated 95%).

3. Findings

In this paper, 100 tourists were inquired by using questionnaire. Furthermore, to determine reliability of the questionnaire, Cronbach's alpha coefficient method was used emphasizing internal consistency. Cronbach's alpha coefficient for the questionnaire of this paper equals 0.72 while the standard alpha is 0.80. More than 95 percent of tourists were male and 2 percent had more than 80 years. 65% resided in Tehran and the rest resided in adjacent cities and other provinces. More than 50% of them had associate degree and higher. More than 85% have visited Park for several times. Regardless of education, less than 60% have medium awareness of forest, 75% are interested to use park attractions without vehicle. As regards desired recreation, 70% have selected forest park. More than 70% of tourists agree with paying entrance fee and 60% have regarded long distance of Park from city as the most important factor to use it (table 1).

Table 1- frequency percentage of tourists' response to the questions

| | | | | | |
|---|---------------------------|----------------------------|--------------------|----------------------------|--|
| Gender of respondents | Male | Female | | | |
| | 95% | 5% | | | |
| Age of respondents | 15-25 | 25-50 | 50-75 | Above 75 | |
| | 20% | 65% | 13% | 2% | |
| Residence of respondents | Tehran | Amol | Isfahan | Other cities | |
| | 65% | 20% | 6% | 9% | |
| Job of respondents | Free | Employee | Without job | | |
| | 55% | 45% | 1% | | |
| Education of respondents | Diploma and lower | Associate degree and B.Sc. | M.Sc. and higher | | |
| | 46% | 50% | 4% | | |
| Income of respondents | Less than 2 million rials | 2-5 million rials | 5-10 million rials | More than 10 million rials | |
| | 4% | 48% | 42% | 6% | |
| Number of Park visit | One time | Several times | | | |
| | 13% | 87% | | | |
| Awareness | Very low | Low | Medium | High | |
| | 0 | 30% | 59% | 11% | |
| Method of visiting Park | With family | With friends | Single | | |
| | 85% | 13% | 2% | | |
| Lovers of different parks | Forest parks | Urban parks | Both | | |
| | 60% | 15% | 25% | | |
| Cooperation of tourists with Park officials | Cooperation | Lack of cooperation | | | |
| | 85% | 15% | | | |
| Using Park in different seasons | Spring | Summer | Spring and Summer | | |
| | 6% | 74% | 20% | | |
| Forest awareness | High | Medium | Low | | |
| | 17% | 63% | 20% | | |
| Use of facilities for overnight stay | Bower | Tent | Residential unit | | |
| | 45% | 40% | 15% | | |
| Tourists interest in Park facilities | Natural | Artificial | Both | | |
| | 74% | 9% | 17% | | |
| Method of using Park attractions | Walking | Automobile | Both | | |
| | 75% | 5% | 20% | | |

| | | | | | |
|---|------------------------|---------------------|---------------|--------------------|-------|
| Importance of different matters for tourists | Security | Facilities | Both | | |
| | 25% | 10% | 65% | | |
| Tourists' evaluation of Park facilities | Sufficient | Insufficient | | | |
| | 65% | 35% | | | |
| Desired recreation of tourists | Going to Forest park | Going to urban park | Climbing | Watching movie | Sport |
| | 70% | 40% | 42% | 35% | 45% |
| Reasons of choosing this Park | Adjacency to trip path | More attractions | Both | Others | |
| | 45% | 15% | 30% | 10% | |
| Tourists' interest in different parts of Park | Very busy areas | Medium | Quiet areas | No difference | |
| | 24% | 57% | 13% | 6% | |
| How to park the vehicle | In sight | In parking lot | No difference | | |
| | 75% | 20% | 5% | | |
| Tourists' opinion about night visit | Inclination | Lack of inclination | | | |
| | 82% | 18% | | | |
| Wearing uniforms by Park personnel | High | Medium | Low | | |
| | 85% | 10% | 5% | | |
| Tourists' evaluation of Park personnel behavior | Good | Medium | Weak | | |
| | 24% | 66% | 10% | | |
| Type of vehicle used by tourists | Personal | Public | State | | |
| | 91% | 7% | 2% | | |
| Entrance fee | Agree | Disagree | | | |
| | 70% | 30% | | | |
| Obstacles to visit Park | Long distance | High costs | Short time | | |
| | 60% | 27% | 13% | | |
| Time for visiting Park | Less than 2 hours | 2-4 hours | 4-10 hours | More than 10 hours | |
| | 21% | 67% | 10% | 2% | |

In this paper, the relation between questions raised in the questionnaire was assessed by chi-square test. Summary of this research is presented in table 2. It must be noted that there is a significant

difference between income and desired recreation, awareness and knowledge of forest, education and Park visit.

Table 2- comparison of the relation between parameters by chi-square test with 95% confidence

| Row No. | Question | X ² | Sig. | Result |
|---------|---|----------------|--------|--|
| 1 | Is there a significant difference between education and knowledge of forest? | 3.109 | 0.54 | There is no significant difference between education and knowledge of forest. |
| 2 | Is there a significant difference between awareness and desired recreation? | 24.569 | 0.323 | There is no significant difference between awareness and desired recreation. |
| 3 | Is there a significant difference between income and desired recreation? | 49.544 | 0.032 | There is a significant difference between income and desired recreation. |
| 4 | Is there a significant difference between job and desired recreation? | 13.839 | 0.242 | There is no significant difference between job and desired recreation. |
| 5 | Is there a significant difference between awareness and demanded facilities? | 1.08 | 0.897 | There is no significant difference between awareness and demanded facilities. |
| 6 | Is there a significant difference between education and desired recreation? | 23.269 | 0.385 | There is no significant difference between education and desired recreation. |
| 7 | Is there a significant difference between job and favorable season for visiting Park? | 3.191 | 0.270 | There is no significant difference between job and favorable season for visiting Park. |
| 8 | Is there a significant difference between income and previous visit to Park? | 3.918 | 0.270 | There is no significant difference between income and previous visit to Park. |
| 9 | Is there a significant difference between age and desired recreation? | 26.546 | 0.779 | There is no significant difference between age and desired recreation. |
| 10 | Is there a significant difference between awareness and knowledge of forest? | 21.786 | 0.0001 | There is a high significant difference between awareness and knowledge of forest. |
| 11 | Is there a significant difference between age and type of journey? | 5.098 | 0.531 | There is no significant difference between age and type of journey. |
| 12 | Is there a significant difference between awareness and previous visit to Park? | 1.375 | 0.503 | There is no significant difference between awareness and previous visit to Park. |

| | | | | |
|----|--|-------|-------|---|
| 13 | Is there a significant difference between awareness and different parts of Park in terms of tourist density? | 4.739 | 0.578 | There is no significant difference between awareness and different parts of Park in terms of tourist density. |
| 14 | Is there a significant difference between education and previous visit to Park? | 9.329 | 0.009 | There is a high significant difference between education and previous visit to Park. |
| 15 | Is there a significant difference between awareness and journey vehicle? | 3.685 | 0.450 | There is no significant difference between awareness and journey vehicle. |

Measured Parameters in three maximum, medium, and minimum stress areas:

Measured trees and saplings

In this paper, 83 percent of the measured tree species in maximum stress area is maple, 9.7 percent is *Pterocarya fraxinifolia*, and the rest is alder. The average diameters at breast height (DBH) of these trees are 0.3, 0.21, and 0.27 meters, respectively. In medium stress areas, 41.8 percent of trees are planer trees, 32.2 percent is parrotia, 9.20 percent is

hornbeam, 3.7 percent is oak, and the rest is hawthorn. The average diameters at breast height of these trees are 0.26, 0.24, 0.31, 0.67, and 0.14 meters, respectively. In minimum stress areas, 41.2 percent of the measured trees are hornbeam, 39.7 percent is planer trees, 12.9 percent is parrotia, 4.3 percent is oak, and the rest is hawthorn. The average diameters at breast height of these trees are 0.32, 0.42, 0.25, 0.65, and 0.15, respectively (figure 2 and 3).

Percentage

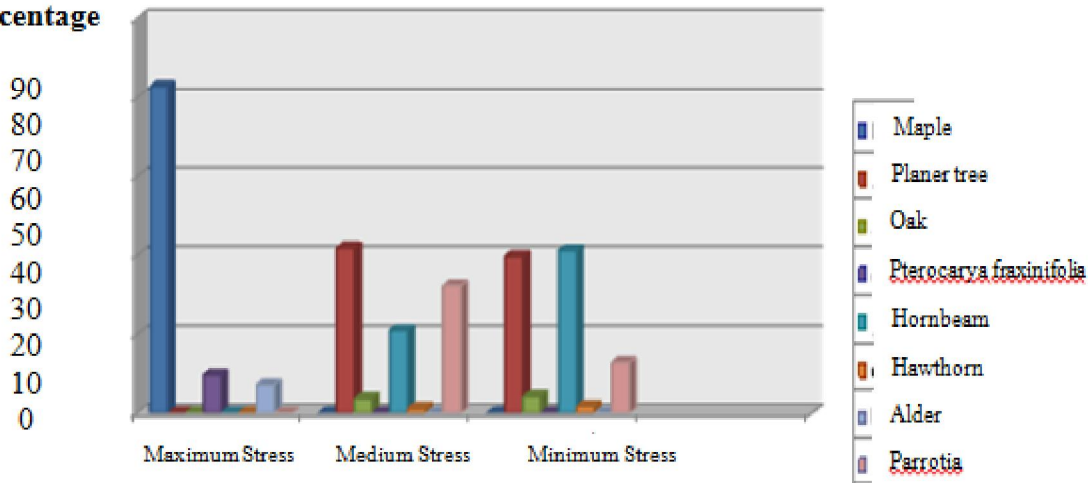


Figure 2- frequency percentage of tree species in three maximum, medium, and minimum stress areas

Centimeter

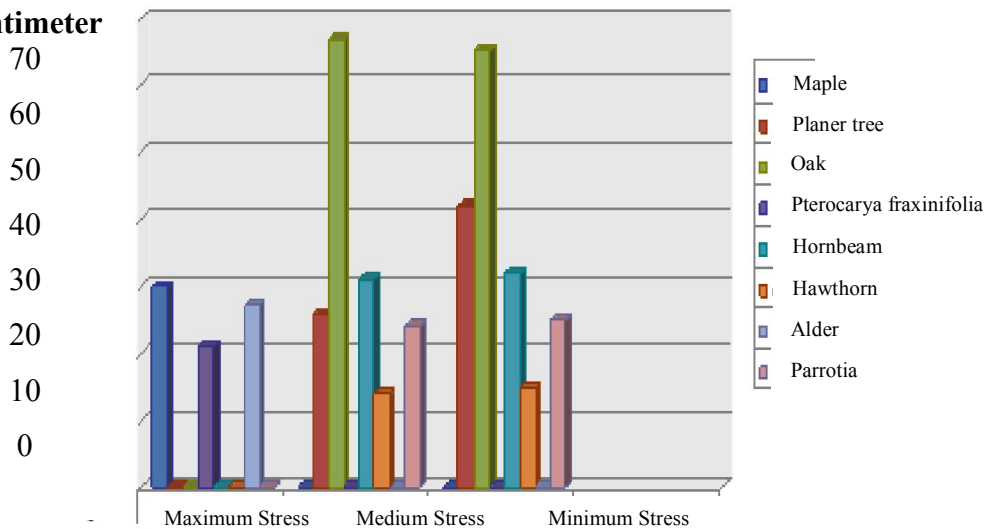


Figure 3- average diameter at breast height of tree species in three maximum, medium, and minimum stress areas

In this paper, maximum and medium stress areas lack grass coverage and saplings; but in minimum stress area, there is 42 percent grass coverage and also planer, oak, maple, hornbeam saplings with respective frequency percentage 64.1, 6.3, 3.8, and 25.6 were observed (table 3 and 4). In maximum stress area, height of pruning more than 3 meters is 70 percent and less than 3 meters is 30

percent. In medium stress area, height of pruning more than 3 meters is 56 percent and less than 3 meters is 44 percent. And in minimum stress area, height of pruning more than 3 meters is 42 percent and less than 3 meters is 58 percent. As the statistical results showed, height of pruning was decreased by reduction of tourism stress. Maximum branch cutting was 2.4 percent in maximum stress area (table 3).

Table 3- percentage of measured parameters

| Parameter \ Region | Carving | Burning tree | Cutting branches | Crown coverage | Grass coverage | Cutting sapling | Soil erosion | | Height of pruning | |
|--------------------|---------|--------------|------------------|----------------|----------------|-----------------|--------------|---------|-------------------|--------------|
| | | | | | | | High | Surface | More than 3m | Less than 3m |
| Maximum stress | 16% | 0.9% | 4.2% | 90% | - | - | 33% | 30% | 70% | 30% |
| Medium stress | 8% | 1.1% | 2.1% | 68% | - | - | 20% | 20% | 56% | 44% |
| Minimum stress | 2% | 0.1% | 1.3% | 74% | 42% | 0.012% | - | - | 42% | 58% |

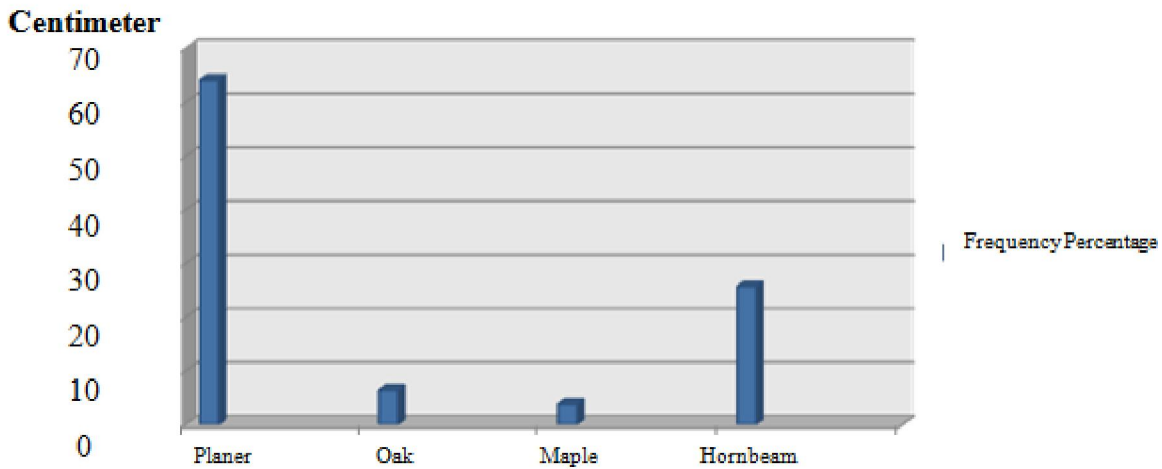


Figure 4- frequency percentage of saplings in minimum stress area

Conclusions

Most tourists have regarded it necessary to differentiate between Park officials and other people and have stated that they agree with paying entrance fee. This indicates that tourists demand more facilities besides security and peace by paying entrance fee and differentiation of Park officials from others.

The relations between income and desired recreations, between awareness and knowledge of forest, between education and previous visit to Park are significant with 95% confidence. Also there is no significant difference among awareness and desired recreations, tourists interest in Park facilities, number of visitors, tourists interest in selecting and using different parts of Park, type of vehicle for using Park

attractions, and also among job and desired recreations, selecting favorable season for going to Park, and among age and desired recreations, method of traveling, and between income and number of visitors.

According to statistics obtained from different regions, below results are presented:

In maximum stress area, the most frequency percentage relates to maple and the least frequency percentage relates to alder; while in medium stress area, the most frequency percentage relates to planer trees and the least frequency percentage relates to hawthorn and in minimum stress area, the most frequency percentage relates to hornbeam and the least frequency percentage relates to hawthorn. This indicates inequality of species transmittal in these two

regions and the impact of tourists on the species. Height of pruning in maximum stress area is more than that of medium stress area and minimum stress area which shows tourists presence and interference. Also in maximum stress area, there are great losses including carving, nailing, and signs on the trees while these effects are reduced in other areas which show the impact of tourism stress reduction in these areas. Moreover, in this area, the most average diameter relates to maple and the least one relates to *Pterocarya fraxinifolia*; while in other two areas, the most average diameter relates to oak and the least one relates to hawthorn. This indicates that species are young in maximum stress area. In minimum stress area, burning trees is observed rarely. But in medium stress area, burning trees is observed more than maximum stress area which is due to existence of oven and barbecue in maximum stress area and lack of barbecue in medium stress area. Also cutting branches in maximum stress area is more than medium stress area, and in medium stress area, it is more than minimum stress area which depicts the effect of tourists' presence in these areas. The percentage of crown coverage in medium stress area equals 68% which is less than maximum stress area which is due to intense presence of tourists and their activities. But in minimum stress area, there is no soil erosion due to grass coverage; while in other two areas, soil erosion is so much due to lack of grass coverage and saplings, even roots of trees are quite bare and protruding from the ground in some regions.

In maximum and medium stress areas, there is no reproduction due to high soil erosion and so there is no sapling; while in minimum stress area, planer, oak, hornbeam, and maple saplings are observed which shows that very few number of saplings have been cut and so less presence of tourists in this area. The rate and type garbage differs in different areas with regard to the presence of tourists and type of their activities. Garbage in maximum stress area is more than medium and minimum stress areas. Since garbage, particularly nonrenewable waste such as plastics, will not only reduce forest beauty, rather it will also have irreparable effects on the environment. So it must be taken into account seriously. And also despite wild life is among main factors of maintaining ecosystem and balance in the forest life, no sign of wild life is observed unfortunately due to excessive exploitation in this region. But in other areas, these signs have been observed. Furthermore Mirza Kuchak Khan Forest Park is regarded as among the first forest parks in Iran that welcomes a great number of tourists every year due to its adjacency to the main road. Although this Park has been assigned to private sector, little attention has been paid to this Park unfortunately.

To maintain welfare and convenience of tourists, toilets must be reconstructed and welfare

facilities such as recreational facilities, sport facilities, and sufficient light in nights must be provided by receiving sufficient budget and accurate planning.

To prevent firing, it is suggested to inspect the Park at dusk every year to extinguish fire and recommend the passengers to extinguish the fire after removing the need, to take garbage of recreational areas and other areas of the Park first to the temporary depot and then outside the Park at most every two days.

In maximum stress area, to recover grass coverage, crown coverage must be reduced and reached to 50 to 60 percent. Since all grass coverage of this area has been removed, its recovery is difficult; so, the surface must be scratched and proper grass seeds must be planted.

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