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# THE IMPACT OF ORGANIZING THE ACCESS ROUTE ON VEGETATION AND NATURAL ECOSYSTEMS SOIL

Sahin Ansarian[1], Amir Hossain Firozan[1], Mahsa Hakimi Abed[2], Houshang zangeneh[3] and Seyed Armin Hashemi [1]
[1]Department of Forestry, Lahijan Branch, Islamic Azad University, Lahijan ,Iran
[2]Department of Environment, Lahijan Branch, Islamic Azad University, Lahijan ,Iran
[3]Forestry Section, Natural Resource Organization of Kermanshah ,Iran
Email: firouzanamir@yahoo.com

**ABSTRACT**

In this research, Tafeh Kochkineh is monitored and evaluated which is one of the Kermanshah north Promenade with 31 hectares area that constructed by Grassroots Preservation and restoration of mountain environments Organization (Parow population) with financial support of small donations facilities Office of United Nations Global Environment, by using remote sensing technology, ground control (30 number of samples in 1000 square meters in area), Relative density testing of Access way soil (The Green Mile). Biometric tests results shows that the studied area have been in better condition compared to previous years in terms of vegetation, the vegetation was increased in this area and this had been done due to create access project in this place. Results of field and laboratory testing of soil shows that the soil of this area is classified in AASHTO and grouped in A-7 and considered as the worst type of soil after organic soils to construct a way. But on another hand it is the most appropriate soil for the renewing the Soil and vegetation the blocked routes. So that17% of the soil density reduced within about eight years and vegetation will be deployed to cover in this area soon.

**Keywords:** access way, wide outing, soil density, Kermanshah.

## INTRODUCTION

One of the important parts of tourism activities in the world is based on enjoying nature which is called ecotourism today. Ecotourism which is the short term of Ecological-Tourism is named as Jahan Gardi Zist Mohiti (Tabiat Gardi) in Persian literature, which means that, the environment or nature that is not only a tourist, but other people also live in it (Rezvani, 2000). Ecotourism is that type of tourism which is related to nature, the main motivation in this kind of tourism is utilizing natural attractions of an area, including cultural physical and indigenous characteristics and the tourist leave the place after compromising the importers without damage it. Thus, while enjoying the culture of historical records and natural samples and respect and preserve the ecosystem, it create economic opportunities and income for local people and provide a more serious maintain and support of attractiveness with new funding.

In fact ecotourism is an antithesis to a tourism that is thinking of short term benefits (ecotourism Organization, 2001). Promote the local tourism development, while continuing to exploit the potential of nature and use of water and soil for the nature, causes to enhanced locals to these facilities and they provided to the benefit of this industry and the developments caused by it. Although the tourism doesn't attract investment like most of the other markets of tourism, but lead to environmental protection by increased participation of indigenous people (Khosravi Fard, 2002). Hence the need to take care of the environment, a cultural policy, has demanded to use the most appropriate training methods. Also, for the visitors to enjoy, the protection of natural attractions is a necessity. Search for such a balance is something that should identify the concept and philosophy of visiting the natural and environmental attractions and ecotourism. Today, Tourism is one of in the world's most successful industries and there is a broad approach to ecotourism. Ecotourism has been considered as a profitable and nondestructive activity and has been welcomed in developing countries especially in the past two decades. (Phenol, 1999). Tourists cannot make use of the many attractions of nature due to lack of ecotourism proper planning, lack of information, lack of planning, lack of the comprehensive and coherent management, and in another hand the imbalance in population density and natural resources caused to exploitation of ecological potential of some areas (Manouchehri, 2006; fauz Solaiman, 2005).

However, there is not any attention made to planning way issues in the most Promenades and mostly the ways are constructed by considering the natural topography of area, standardization and outing principles. Prospects and ecotourism are not respected in the design of this route. If these principles were observed, in addition to wide exploitation of outing ecological potential, the other ecological factors will be protected, including soil, vegetation and prevent fires and on the other hand, outing issues have a considerable effect on the natural resources plan income with a sustainable development view.

Various studies have been made at the fields of outing routes, vegetation conditions and soil density such as Banerjee and colleagues (2005) that by using maps of vegetation and outing places with soil fertility, density in the west Napour route of Bengal's West core were identified road maps.

Lawrence and colleagues (2005) in the study of "Vegetation protection of Gabon forests in Central Africa" concluded that develop the outing is the best government

policy to plan in these forests for decreasing the destruction ingredient of their sustainable conservation.

Jin Ying Deng *et al*. (2003) studied the effects of kick the vegetation in the Zanjyajy national forest park in China. He reviewed the types of density along the different paths and concluded that the paths which had more outing aspect and tourists willing to use those ways more than the others, have more density and their vegetation are more trampled. He stated that damages to trees around these routes are more than the other routes. The study considered temporary fence installation, sales management, environmental education, increasing the desire to using other routes as suitable solution to overcome this problem.

Asghar Sepahvand (2004) to review the competence of various options in order to complete the road network capabilities of Patam sector in a multi-purpose forestry.

Bejerk *et al*. (2006) study the relation of vegetation density in urban parks with public recreational visitors. Outing priorities to residents and visitors with respect to the density of vegetation in urban parks and such issues were evaluated in order to determine the capabilities and environmental impact. Results showed that the dense vegetation parks are having more capability to attract visitors.

This study results the monitoring of Tafeh Kochkineh, one of the norths outing area of Kermanshah. Green Route project of Tafeh Kochkineh was started in 1379 in administrative steps. this project is Grassroots Preservation and restoration of mountain environments Organization (Parow population). This project is supported by small donations facilities Office of United Nations Global Environment (SGP), and the internal supporters are Islamic council of Nukan, Taqbostan youth volunteers, local residents of Bagh Abrisham and Taqbostan district, County, Department of Natural Resources, Environmental Protection Agency, State Parks Organization of Kermanshah, Kermanshah city police and the government.

The main stages of the project are including: dibble, municipal garbage collection, deleting subdirectories, the main route selection, sign installation, tree work, irrigation (Two years), stilling both sides of the route, dry selection of waterways, build stairs, improving waterways with check dam, embankment the bare root of trees and shrubs. All the steps had been done by consultation with Department of Natural Resources and Watershed experts as a technical team and working group meetings and field visits. At the end of the project, over the years some activity would be done once or twice including repair the stile, the drainage and garbage collection by the Association. The important reasons to select the location (Tafeh Kochkineh) for the project were: harsh destroy of location, large number of tourists, shallow soil, steep, drought and fire.

## MATERIALS AND METHODS

### Area of study

The study area is Tafeh Kochkineh which is one of the outing and mountain routes of Taqbostan in Kermanshah. Recreational area is located in the southern slopes of Mount Taqebostan with 283 hectares space. The organized path is located between the 38 "7, , 47 Up to 47 , 8 ', 1" East longitude and 34 , 23 ', 50 "Up to 34 , 24 ', 6" North longitude. An area that the initial phase of outing covers included 31 Hectares from the entrance to the seasonal waterfalls walls. there are shrubs of Bokhorak (*Amygdalus scoparia*), bitter almond (*Amygdalus lycioides*), wild cherry (*Prunus mucranata*), eglantine (*Rosa Canina*), khinjuk (*Pistacia Khinjuk*).

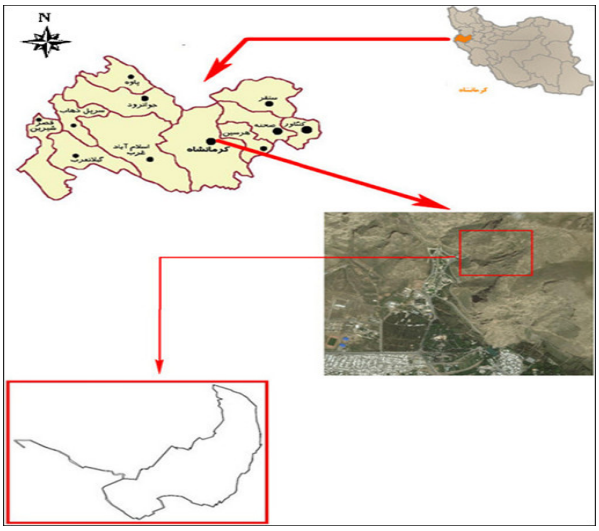


**Figure-1.** Location of study area (Tafeh Kochkineh Green route).

Soil type according to Unified Soil Classification is silt by the symbol of GM. In geomorphology view, the two sculptures in the northeast and southwest of the province haven't the same morphology. While in other regions, the area physiographic had beneficent from tectonic in wrinkle type, Therefore, its morphology is in the shape of parallel syncline and anticlines with North West. City of Kermanshah has a cold semi-arid climate by 1/47 degree distance with Greenwich and 32/34 degrees distance from the equator, it has plain-Mountainous physiographic and steppe vegetation-Pasture and trees are scattered in mountains.

### Data and software used

Statistical Yearbook of Kermanshah (2007) was used for weather data (rainfall and temperature) and Hydrology (Water flow, etc.). Regional Aerial Images of 1957 by the scale of 1:20000 was used to interpret the data and the output of 1:3000 was prepared. Excel and SPSS software were used for data analysis, calculations and charting. Information of regional soil was obtained by sampling, field and laboratory work. Necessary equipment for field operations and field measurements which has been used in this study are include: Manual GPS device (Model GARMIN 60CSx) Altimeter, clinometers

(CENTO) Compass, meter, Rope, inventory forms, Camera, Questionnaire and other supplies and personal requirements.

## METHOD

It was necessary to inform about changes of the top area vegetation to compare the past and present data by considering the evaluating characteristics of the study that its objective is monitoring and awareness of the status of vegetation through observing the transformation that occurred over time.

Therefore, thirty plots was taken in the field, the intensity vector of statistics in this case is equal to ten percent. Then the plot centers on the aerial photograph were determined and the percent canopy cover in Year 1957 was estimated. To compare the data Biometric tests has been exhausted. By considering that one of the default parameter in the test is, having normal or near normal distribution in the community or examined communities, the test for normal distribution will be discussed (Zubairi, 2002) before discussing various tests to comparison samples. Thus the kolmogroff-smirnof test was used because the numbers of plots are less than 40. Homology or heteroscedasticity of variances was evaluated by determining the normality and independency of data and finally the formula of t test with relevant degrees of freedom in 95% level was used to compare data.

### Method of study for relative density of soil

a) **Field density method AASHTO T191 or the standard to determine the specific gravity of soil in the field of cone method.** The purpose of this experiment is, to obtain the specific gravity of soil in normal criteria with a layer of crushed by calibrated gravel. In the beginning there should be a specific gravity of sand, which was obtained by relative size of sand to water within container because the special weight of water is equal to one. To determine the specific weight of soil in place we act as follow: the place surface desired to sampling should be quite smooth. After cleaning the litter layer of the upper soil surface, the density cylinders were put on the floor and mark the opening border. Then dig the pit in depth of 15cm cautiously so as not damage the pit walls. Materials were not discarded and kept for weighing and subsequent operations. Then placed the cylindrical density on the hole that has a certain amount of calibration sand, so that the cylinder valve is located exactly on the center of the hole. The tap was open to fill the pit with sand. When the flow of sand into the hole would stop, close the valve. By measuring the remained sand in cylinder determines the amount of removed sand and by the density of materials out of the hole can be achieved soil special weight.

b) **The laboratory density method AASHTO T180D.** This method considered as a standard method to determine the laboratory density by the Department of Transportation. The foundation of this method is based on the percent of moisture content and dry density (G m) in the place to the optimum moisture percent and maximum percent of dry density (G m). The relative density and relative density percent of the tested sample obtained by the proportion of place density to the laboratory density.

## RESULTS

The calculation of percentage cover in different years using a fixed plot that the percentage covers over the time is as follows:

**Table-1.** Calculations of percentage cover during different years.

| Plots | 2011 Year | 1967 Year | Plots | 2011 Year | 1967 Year |
|---|---|---|---|---|---|
| Plot 1 | 1.84% | 0.70% | Plot 16 | 0.40% | 4.00% |
| Plot 2 | 1.51% | 2.00% | Plot 17 | 0.60% | 0.40% |
| Plot 3 | 8.30% | 4.00% | Plot 18 | 2.60% | 2.50% |
| Plot 4 | 5.74% | 4.00% | Plot 19 | 6.28% | 1.00% |
| Plot 5 | 4.56% | 0.40% | Plot 20 | 4.36% | 1.10% |
| Plot 6 | 1.10% | 1.20% | Plot 21 | 4.80% | 0.20% |
| Plot 7 | 1.38% | 4.00% | Plot 22 | 7.55% | 2.20% |
| Plot 8 | 1.73% | 1.00% | Plot 23 | 4.50% | 1.50% |
| Plot 9 | 0.93% | 0.60% | Plot 24 | 2.34% | 2.50% |
| Plot 10 | 2.03% | 3.00% | Plot 25 | 3.90% | 1.60% |
| Plot 11 | 2.01% | 4.40% | Plot 26 | 2.81% | 0.30% |
| Plot 12 | 2.10% | 0.20% | Plot 27 | 3.61% | 0.20% |
| Plot 13 | 2.31% | 1.00% | Plot 28 | 5.74% | 1.50% |

| | | | | | |
|---|---|---|---|---|---|
| Plot 14 | 1.05% | 0.90% | Plot 29 | 6.90% | 0.50% |
| Plot 15 | 5.42% | 1.50% | Plot 30 | 0.66% | 3.00% |

**Table-2.** Comparison test between the sampled averages in different years.

| Accepted | t student | Degrees of freedom | t Statistics | Comparison |
|---|---|---|---|---|
| H **A** | 2.009 | 47.931 | 4.784 | 13 46 & 13 90 |

$(H_{\cdot}:\overline{X}_{\cdot} = \overline{X}_{\cdot})$

$(H_A:X_{\cdot} \neq X_{\cdot})$

According to the table, it can be seen that the difference between the average of 1957 and 2011 significant is 95% percent and it is not random. In this conclusion the probability of error is about 5% .

**Soil mechanics**

Based on experiments of stone materials and, stone and soil aggregation, the technical laboratory and soil mechanic, the mental level of the LL = 52% and plastic limit PL = 21% for the study area. The tests on 31490 gr soil shows that the coefficient of the soil is less than twenty. Therefore, according to AASHTO method in soil classification, the soil studied in the area is grouped in A-7.

**Table-3.** Soil classification table through AASHTO method.

| **General classification** | **Granular materials 35 percent or less which passed from No. 200 sieve** | | | **35 percent silt and clay soils which passed from No. 200 sieve** | | | |
|---|---|---|---|---|---|---|---|
| **Grouping** | **A-1** | **A-3** | **A-2** | **A-4** | **A-5** | **A-6** | **A-7** |
| Aggregation | | | | | | | |
| Percentage of pass from: | | | | | | | |
| No. 10 sieve | | | | | | | |
| No. 40 sieve | Maximum 50 | Maximum 50 | | | | | |
| No. 200 sieve | Maximum 25 | Maximum 10 | Maximum 35 | At least 36 | At least 36 | At least 36 | At least 36 |
| Flow degree | | | | Up to 40 | At least 41 | Up to 40 | At least 41 |
| Plasticity coefficient | Maximum 6 | NP | | Up to 10 | Up to 10 | At least 11 | At least 11 |
| Group Coefficient | 0 | 0 | Maximum 4 | Up to 8 | Up to 12 | Up to 16 | Up to 20 |
| The value of the way bed | Excellent to Good | | | Moderate to bad | | | |

Putting the Group A-3 before A-2 is due to finding groups in terms of soil (From left to right) and isn't the reason to prevails of A - 3 over A-2. A-7 soils: These soils often have a very high versatility level and in addition it may have elastic and spring properties. This kind of soil is change in its volume against moisture and its group coefficient changed between one and 20. Whatever the psychological and plasticity index is higher in these soils and the sand grains and sand are low in them, the group coefficient will increased. (Lotfi, 1996). 44% of the sample would pass through sieve 200. This group of soil is one of the fine-grained and the plasticity of the soil that is the worst soil to route after organic soils. But on the other hand, due to the large volume of soil required for the pavement it is the best type of soil in view of reversible surface of blocking paths to the field with vegetation and shrubs.

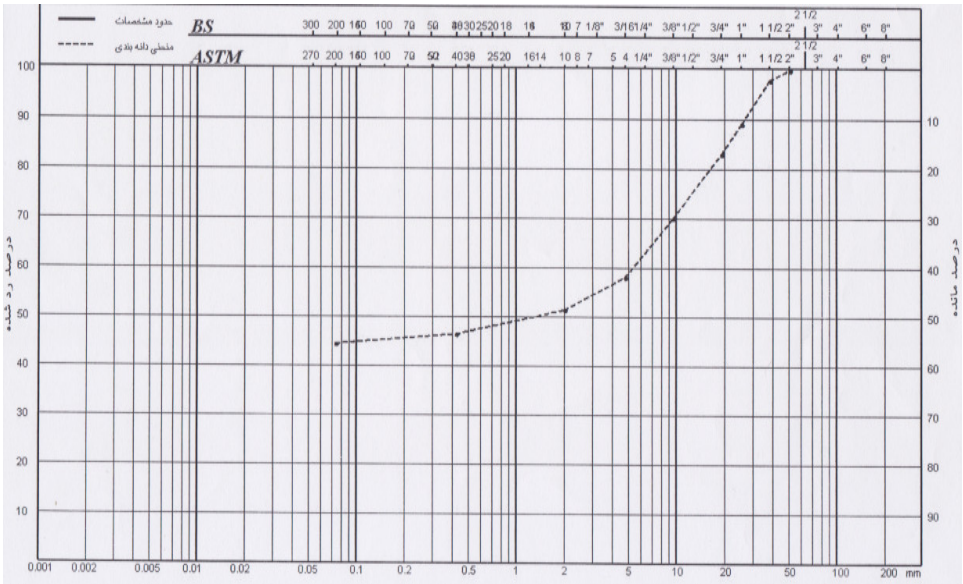


**Figure-2.** Diagram of soil aggregation.

The relative density of the soil that has been obtained in experimental density method AASHTO T18 0 D as follows:

**Table-4.** Soil density of study area.

| Sample No. | Location sampling | Local density | | Laboratory density | | The relative soil density % |
|---|---|---|---|---|---|---|
| | | Soil moisture percent | Dry density (Gr/cm3 ) | Percent of optimum moisture | Maximum of dry density of soil (Gr/cm3 ) | |
| 1 | The current path | 2 | 1.78 | 8.8 | 2.09 | 85 |
| 2 | The current path | 1.3 | 1.74 | 8.8 | 2.09 | 83 |
| 3 | The current path | 1.9 | 1.79 | 8.8 | 2.09 | 86 |
| 4 | The current path | 1.4 | 1.84 | 8.8 | 2.09 | 88 |
| 5 | Blocked route | 3.5 | 1.5 | 8.8 | 2.09 | 72 |
| 6 | Blocked route | 2.2 | 1.39 | 8.8 | 2.09 | 67 |
| 7 | Blocked route | 2.9 | 1.41 | 8.8 | 2.09 | 67 |
| 8 | Field with consolidated cover herbal | 3.5 | | 8.8 | 2.09 | <50% |
| 9 | Field with consolidated cover herbal | 4.4 | | 8.8 | 2.09 | <50% |
| 10 | Field with consolidated cover herbal | 4 | | 8.8 | 2.09 | <50% |

Average relative densities of blocked routes are 5/68 Percent, at a minimum: 47% and maximum 72%.

## DISCUSSIONS

According to the experimental results, the predominant soil type is A-7 that is worst soil for road routes after organic soil (A-8). This is because of organic material and very fine-grained soil. So irreparable damage to soil, vegetation and constructed roads will be happened due to lack of vegetation and compact the soil.

According to the experimental results there is about 17% decrease in density of blocked routes. (During about eight years) that by considering the density

reduction, it can be expected to return to normal density over the coming years and vegetation located in areas which are blocked. Even in some areas, it is perpendicular to the dominant. This helps to reduce erosion of field and track. Also due to break the route, reduce the high slopes of the length routes which is also effective in reducing erosion. Also the most of the route has been placed in shadow edge and the wall. By considering the broad and multi-branched of shrubs exception of the figure which has Heaven crown, increasing vegetation cover reduced the erosion and water flow.

According to survey results, about percent of vegetation cover, revealed that vegetation of the area is also a little and has a negative range during the course of the past. This trend was reversed after the implementation of the project and field cover has saved from destruction, also it multiplies in a few times. Based on statistical achievements it have been found that the rate of change in recent decades is meaningful than in the past and there is only the probability of 5% for these changes to be accidently. Thus we can conclude that the project is implemented in the study area could have a great impact on improving the condition of area vegetation.

So organization of access route in this area could improve access for tourists to walk and also improve the soil conditions and vegetation. Select the main route and remove sub routes and parallel ways to the main path led to decrease the total amount of soil density of the area and provided the field to vegetation. So that with increasing population, awareness, welfare and the desire to more outing, this project could achieve its main objectives. Because of poor soil and soil types to implement such projects, it can be concluded that the next phases of the project in this area, and other similar areas are possible and it can be implemented.

**Suggestions**

a) As the vegetation factors and soil density have been studied with respect to the route, and positive effects of these factors in organizing the mountain routes has been proven, further research is recommended on the effects of factors like the animal and plant variation over time or optimizing routes viewpoint, with surveys of recreational users.
b) Preparation of implementation plan for organizing other recreational routes Kermanshah. Encourage the environmental activists of private sector to investment in extensive promenade and climbing.
c) Introduced this project to people through presence of media culture and reminding people to be diligent in maintaining it.
d) Collecting seeds of native shrubs to artificial planting and development of these shrubs, especially around the paths. Therefore, collect seeds at the right time and used them in appropriate time.
e) Near the blocked routes and places which can be shortcut by tourists, construct the more complete stile.
f) Try to use half-long vegetation to block the paths to protect the enjoyment of the landscape image of green fields and avoiding the turn out of tourists from the main route.

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