Evaluation of the Role of Environmental Education in Manesht and Ghelarang Geotourism Destination, Iran

Abstract

The aim of this study is to investigate the land ethics of tourists regarding the geotourism resources in the Protected Area of Manesht and Ghelarang, Ilam Province, Iran. The theoretical framework of the research is based on environmental knowledge, environmental behavior, normative pressures, facilities, multiple incentive models, ability, opportunity and environmental ethics model. Approximate number of tourists visiting (local tourist) the protected area in the specified time range (spring 2017) was 3,000. Using the Cochran sampling formula, the sample size was determined to be 475 people and questionnaires, based on available sampling, were distributed among the tourists. The findings show that there is no significant relationship between tourists' age, the habitat, and environmental behaviors. In contrast, there is a positive relationship with gender and level of education. This study demonstrates that the lowest score in the assessment section of the variables analyzed was related to environmental knowledge and facilities. Hence, the low environmental knowledge of tourists needs to be improved through training so that they can gain an increased environmental awareness over time. Further, the second factor involves discussion of structural facilities that are rooted in national macroeconomic, and management policies which requires a comprehensive overview of Iran's tourism management.

Keywords: Environmental education; Geotourism; Protected areas; Sustainability; Iran.

1. Introduction

One of the most recent forms of tourism is geotourism. Over the past three decades, geotourism has attracted a great deal of international attention (Dowling & Newsome, 2010). Similar to tourism, geotourism promotes progress in the educational and cultural conditions of its host countries (Brandon, 1996). The concept of modern geotourism was first defined by Hose (2003) taking into account of geological and geomorphological characters of a destination (Hose, 2005, 2008, 2011). Raynard and Coratza consider geotourism as a set of activities, infrastructures, and services that contribute to the prosperity of Earth sciences through tourism (Raynard & Coratza, 2007). Over the past three decades, the theme of geotourism has been raised not only as a subject for basic and important research on the development of tourism in the destination regions, but also it has opened a new domain in the literature as a fundamental issue, with the aim of preserving, managing, and proper exploitation

of the natural landscape, in particular the geomorphological and geological heritage (Bertacchini, 1999; Cavallin et al., 1994; Holfmann, 1999).The geological and geomorphological heritage have been considered seriously since the 1990s, and there is a strong need for the proper use and utilization of geotourism resources for sustainable tourism development and for the prevention of the destruction and misuse of these resources (Erikstad, 2013; Gray, 2008; Prosser et al., 2006; Prosser et al., 2011; Ruban, 2010; Ruban, 2015; Wimbledon, 1996; Wimbledon, 1999).

One of the important issues that has attracted many researchers in the field of geotourism in recent years is the sustainability issue and how tourists view the way of exploitation and conservation of geotourism resources (Dowling, 2011). This is because in recent decades the vulnerability of geotourism areas, which include geological and geomorphological elements, is less considered than the cultural and biological heritage (Reynard & Coratza, 2007). The relationship between geomorphological and geological matters with tourism dates back to the early years when Leopold (1949), as one of the pioneers of geomorphology and geology, laid down the issue of land ethics as the groundwork for the ethics of tourism services. This relationship in recent years has been accepted by researchers in the new form of studying morphogenic systems in relation to geotourism ones (Arrowsmith & Inbakaran, 2002; Brandolini et al., 2006; Pralong, 2006; Serrano & Gonzalez-Trueba, 2005). The process of studying and conserving geomorphologic values (geomorphosites) is a landing point for investigating management purposes and the classification of areas. These areas represent the most valued and highly diverse selection of landforms in natural conditions, that is to say, protecting them as the Creation symbols is the center of all natural environment activities (Majnunian, 2001); and they embrace the most prominent examples of land diversity and geological heritages (Erikstad, 2013; Wang et al., 2014; Dong et al., Yu, 2014; Yeung & Ng, 2008). Because of their vulnerability, these areas can only survive if they are justified by decision makers and people. On the other hand, increasing the knowledge about the identification and introduction of geomorphologic and geological features associated with tourism and recreational activities can help in informing the tourism industry about natural and human phenomena, especially in the management and planning of the concerned areas (Ahmadi et al., 2014; Ahmadi et al., 2015).

Protected areas (PAs) span the globe and almost all countries have set aside some part of their territory for the purpose of nature conservation (Kolahi et al., 2012). Dudley (2008) defines protected areas (PAs) as “a clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values”. PAs play a crucial role in maintaining biodiversity and natural systems and maintaining a sustainable world (Kolahi et al., 2013).

Considering the positive and negative effects of tourists on the environment, planning is needed to minimize the negative effects of tourism, so that the natural environments remain sustainable for future generations. Tourists are among the groups whose behavior affects the tourist destinations. In fact, the negative environmental behavior of tourists can lead to environmental degradation or destruction. Despite the importance of this issue, this area of research remains relatively unexplored in the tourism literature. Therefore, this study aims to investigate the environmental behavior of tourists in the protected areas of Manhest, Bangwal and Qararan. This research also sought to address the causes of environmental behaviors. Furthermore, this research aims to investigate the perception of tourists from geotourism resources in Manesht, Bankol, and Qalarang protected areas and the relationship between sustainable exploitation of geotouristic resources and the conservation of these resources. The findings of this study could be utilized in promoting the quantitative methods of assessing geomorphosites in Iran and elsewhere. The findings of this research could also provide new information for scholars and those who intend to research sustainable exploitation of geotouristic resources.

2. Literature review

Many scholars have conducted research in the area of geotourism in recent years and have expressed their views on new ideas and the introduction of new knowledge on the basic concepts of geotourism, the proper utilization of the resources of geotourism, and the conservation of this valuable human heritage (Badiali & Piacante, 2012; Cayla, 2014; Dowling, 2014b; Farsani et al., 2014; Gray, 2013; Gordon, 2012a ; Gordon, 2012b; Hose, 2000; Hose & Vasiljevic, 2012; Lazzari, 2013, Lazzari & Aloia, 2014; Ollier, 2012; Pralong, 2006).The introduction of arguments over conserving geotourism resources using assessment models is traced back to the 1990s, and some researchers have used these methods; recently, many other methods have been added to the list and tested (Brilha, 2015; Coratza & Regolini-Bissing, 2009; Coratza et al., 2010; Reynard & Coratza, 2013). Therefore, the sociology of tourists' behavior regarding the way to treat and exploit geotourism heritages has been investigated in various studies. These studies include tourists' way of utilizing geomorphosites and geoparks (Bollati et al., 2015; Lima, 2016; Kirchner, & Kubalíková, 2011; Kubalíková & Kirchner, 2015), the exploitation and evaluation of glacial geomorphosites (Bollati et al, 2015), and studying sustainable geotourism facilities using digital techniques in rural areas and tourist routes in the Manzagro area of Spain (Martinez-Grana et al., 2016), the negative impact of visitors on geotourism areas (Lima et al, 2016), management of geomorphosites in areas with the highest number of visitors (Coratza et al., 2008), the importance of mountainous geomorphosites for

environmental education of visitors (Reynard & Coratza, 2016), and identification and assessment of Karstic geomorphosites in Italy, Island of Gozo and Iran (Coratza et al., 2012; Waele et al., 2005; Ebrahimi et al., 2017).

An overview of previous research shows that factors such as environmental concerns, environmental attitudes, environmental knowledge, environmental awareness and education, environmental values of individuals as well as demographic characteristics affectthe behavior of tourists (Mensah & Dei, 2013; Puhakka, 2010; Salehi et al, 2012). In other words, the results of the research show that the environmental behaviors of tourists are influenced by various factors. In addition, a review of studies has shown that scientific studies are very limited in understanding the environmental behaviors of tourists, especially in relation to geotouristic destinations. Up until the 1990s, research on determining the factors affecting the environmental behavior of tourists was focused solely in individual studies, and the attention of all approaches was focused on environmental orientation and interest as a prerequisite for behavior (Corraliza & Buerenguer, 2000). Gradually and over time, the range of theories expanded and covered various other factors (Dunlap & Michelson, 2002). In order to explain the research question in this study, from the various views of environmental sociology and the explorations and studies of the land ethics of tourists, the Multiple Model of Olander and Thøgersen (1995) and the Fietkau and Kessel Environmental Behavior Model (1981) have been selected to explain the environmental behaviors of tourists. The experts of these models believe that when studying the impact of consumer behavior on the environment, their motivation, ability, and facilities should be considered as well. In a multiple model, motivational factors include: the beliefs that affect an individual's attitude, social norms and attitudes that in turn define the consumer's intention to act in a particular way, and the beliefs about an activity, which often change in accordance with experience. In addition to motivation, individual abilities, i.e. knowledge and habits, are effective in researching intentions. People are learning every day or have habits that make them function in a completely automated way (Pietikäinen, 2007). This multiple model shows that the operator requires knowledge (about the science of nature) to change people's behavior and to be able to use this to protect the environment and geotourism resources. Motivation may be weak to act in a particular way when one does not know what acts affect the environment, and how, therefore, one needs to learn new ways of acting and the environmental-orientation methods (Kollmuss & Agyeman, 2002).The Fietkau and Kessel (1981) environmental behavior model uses a sociological framework to explain environmental behaviors. The basic variables in the environmental behavior model are: a) Attitudes and Values: Attitudes and values can enable or disable people to carry out environmental behaviors, b) Behavioral Incentives: These are mainly internal factors that can support or reinforce the appropriate environmental behaviors toward geotourism resources, c) Normative pressure on the proper environmental behavior toward geotourism resources: A person

must receive a positive reinforcement to continue a particular environmental behavior. This can be internal (satisfaction of doing good things), or external (social, such as not throwing garbage out and financial, like getting money for returned bottles, and d) Knowledge: Knowledge acts as a modifier of attitudes and values (Kollmuss & Agyeman, 2002).

Each of stated models only deals with a part of the subject. By extracting the main elements of the above models, a new model was designed and tested. Therefore, the current research utilizes all the elements of the above models (Environmental behaviors, Environmental knowledge, Environmental value, Facilities and Normative pressure), and by bringing these variables together, creates a new model. Finally, the aim of the new model is to determine the role of environmental variables in the sustainability of geotourism destinations and to investigate the factors that are effective in strengthening environmental behaviors.

3. Area of study

The area of study, with an area of about 30,000 hectares, was located between the protected districts of Ilam, Ivan, and Sirvan with longitudes of 46 18 19 and 30 37 46 east, and latitudes of 33 36 40 and 45, 37 30 north. The area was protected and controlled from 1984 to 1996 for 13 years as a non-hunting area. Therefore, since 1996, in addition to changing the boundaries, and in order to restore the wildlife and vegetation cover, the Supreme Council of Environmental Protection approved the Bill No. 157 in 1996 and the area has been upgraded to a Protected Area and listed among the top four areas of the organization since then (Fig. 1). The general vegetation includes chestnut trees and the mountainous parts are covered by wheat fields and shrubbery. The altitude of this area ranges from 1400–2700m. The precipitation of the study area ranges between 800–1050 mm and mean annual temperature is 6–14oC (Ahmadi et al., 2018). The study area has high potential in the field of geotourism. The presence of geological and geomorphological attractions has made the area a major geostratious destination for tourist. In the study area more Attractions are glacial sites in manesht and Qalarang Mountain, karst phenomena including caves and karstic springs, doline, straits and erosion landforms in the north of the area, unique geomorphologic and geological phenomena such as Shoshkan in the north of the area. The existence of mountains, along with sufficient precipitation and snow storage in winter, with an average temperature of -7^{o}C in the month of January, offers a basis for winter sports (Ahmadi et al, 2018). Therefore, this region has significant potential for geotourism activity (Ahmadi et al., 2015).

Figure 1. General position of Manesht and Ghelarang Protected Area regarding the political provincial and national borders.

4. Material and methods

4.1. Data collection and analysis

The present study was carried out using a survey method. For the theoretical framework, a questionnaire (Researcher-made questionnaire) was developed and distributed among the tourists who visited Manesht and Bangkol and stayed more than four days in the studied area in the spring of 2017(table 1 to 3). In order to explain the research question in this study, from the various views of environmental sociology and the explorations and studies of the land ethics of tourists, the Multiple Model of Olander and Thøgersen (1995) and the Fietkau and Kessel Environmental Behavior Model (1981) have been selected to explain the environmental behaviors of tourists. The target population of the study was the local tourists visiting the Protected Area of Manesht and Bangkol. For selecting the samples, a representative sample of tourists was used. According to the available information, the approximate number of tourists visiting the Protected Area of Manesht and Bangkol in the specified time range (spring 2017) was 3,000. Using the Cochran sampling formula, the sample size was determined to be 475 people. According to the prediction of non-return of some questionnaires, 532 questionnaires were distributed randomly among tourists. After reviewing the questionnaire and excluding the incomplete ones, 456 questionnaires that were without errors were selected as the criteria for the study and the analysis. The collected data were analyzed by SPSS software using a deductive method. In this research, we have tried to design and test a new model by extracting the main elements of the above models. In this way, the following compilation model was developed and tested as the framework of the research (Fig. 2). Preliminary information and data were collected by both desk research and field studies. In order to evaluate the ecological capability of the Protected Area (Fig. 3) and hazard map (Fig. 4), maps of topography, land cover, slope, land use, and hydrology were used. A topographic map of the study area at the scale of 1:50,000 was used to extract some geomorphological features, including faults, ridges, and elevation points. The slope map was extracted from the Digital Elevation Model (DEM) to specify areas with a slope higher than 20%, which are suitable for rock climbing, hiking in steep terrain, mountaineering, and hillside climbing (Fig. 5). The map of fragile habitats was obtained from the Administration of Environmental Protection in Ilam Province.

Figure 2: Flowchart and designed research model

4.2. Sampling

In this study, the Cochran equation was used to determine the sample size (Cochrane & Orcutt, 1949).

$$n = \frac{\frac{z^2 pq}{d^2}}{1 + \frac{1}{N}\left(\frac{Z^2 pq}{d^2} - 1\right)} \qquad (1)$$

Where:

n is the sample size,

Z^2 is the abscissa of the normal curve that cuts off an area α at the tails; (1 – α) equals the desired confidence level, e.g., 95%);

N is the population size,

T = or z = standard error percentage of acceptable confidence correlation

q = ratio of population without definite attribute.

(I-p) = q ratio of population without specific attribute

d = the degree of confidence or optimal probable accuracy

The value for Z is found in statistical tables which contain the area under the normal curve. e.g Z = 1.96 for 95 % level of confidence. In this equation, using a confidence level of 95 percent, the error rate of 5% and variance of 25% the sample size based Cochran equation was identified.

The following equation was used to simplify the sample size:

$$n = \frac{N}{1 + N(e)^2} \qquad (2)$$

Where:

n is the sample size,

N is the population size,

e is the level of precision.

The following equation was used to corrected formulae:

4.3. Definitions and variable measurement methods

4.3.1. Environmental behaviors

Environmental behaviors are a set of actions of society members toward the environment, which includes a wide range of emotions, tendencies, and specific behavioral readiness to the environment. Individuals of each society have a different approach to the environment according to specific social and cultural conditions. These approaches and behaviors may be completely negative and against the environment or vice versa, quite positive and in line with positive environmental perceptions. To assess and measure environmental behavior in relation to geotourism resources, the 9-point scale of (Stern, 2000) has been used (Table 1). Here, the answers were based on the Likert scale and coded from 4 (always) to 1 (never). A high score on the environmental behavior scale indicates environmentally oriented behavior in relation to geotourism resources.

Table 1: Environmental behavior clauses (Stern, 2000)

4.3.2. Environmental knowledge related to geotourism resources

Environmental knowledge related to geotourism resources includes information that people have about the environment, the ecology of the planet, and the impact of human actions on the environment and the ecosystem (Arcury, 1990). According to this definition, knowledge of the behavior of tourists can be presented as follows: individual information about the behavior of tourism, its effects on the environment and humans. In terms of practical definition, in this research, an 8-item scale made by the researcher has been used to assess and measure environmental knowledge related to geotourism resources (Table 2). The answers are designed and coded based on the Likert scale with *Yes*, coded 2, and *No* coded 1. Obtaining high scores on this scale means there is a high level of environmental knowledge associated with geotourism resources.

Table 2: Environmental knowledge items

4.*3.3. Environmental attitude*

The environmental attitude is also a collection of pleasant or unpleasant feelings about the features of the physical environment or its related issues. In terms of practical definition and for measuring the general attitude toward geotourism sources, the 15-item scale of (Danolp et al., 2000) has been used.Responses are categorized according

to the Likert scale from completely agree with code 5 to completely disagree with code 1. A high score in the environmental attitude scale related to geotourism resources indicates a favorable orientation. The terms of this scale are listed in Table 3.

Table 3: Items related to environmental attitudes (Salehi & Ghaemi Asl, 2013)

4.3.4. Environmental value

The environmental value associated with geotourism resources includes the individual's fundamental orientations toward geotourism resources and his or her ideology about the natural world. To assess and measure the environmental value, a 5-item scale was used. The answers were categorized according to the Likert scale from completely agree with code 5 to completely disagree with code 1. Earning a high score on this scale means a high environmental value associated with geotourism resources. The items of this scale are: Everything, whether human beings, animals, plants or rocks have the right to exist; nature must be protected even for its inanimate features; we are responsible to future generations in terms of the conservation of geotourism resources; geotourism resources are valuable by nature and must be protected; and finally, the nature zone and these resources should be preserved and valued.

***4**.3.5. Facilities*

The infrastructures and opportunities that individuals need for proper behavior with regard to geotourism resources, in relation to tourism behavior, include: accessibility to appropriate rules, danger zone maps, identification of highly vulnerable areas, infrastructures, guides, appropriate facilities, etc. To assess and measure opportunities, the 5-point scale developed by (Salehi et al, 2012) was used. Responses are categorized according to the Likert scale ranging from *completely agree* with code 5 to *completely disagree* with code 1. Obtaining high scores on this scale indicates the existence of the necessary opportunities and infrastructure for tourism behavior. The items of this scale are as follows: There are enough garbage cans in the tourist resorts; they give us garbage bags when we arrive at the resorts; there are guide boards about the identification and conservation of geomorphological and geological (geotourism) resources; to prevent incorrect exploitation there are guides in charge of providing advice and information to people; and finally, the necessary facilities to prevent environmental degradation and loss of geotourism resources are available.

4.3.6. Normative pressure

There are different types of social norms, one of which is a personal norm that is related to the concept of self and is experienced as a moral commitment. This sense of commitment is very serious about vulnerable phenomena. Personal norms refer to statements about how one should behave with regard to geotourism resources; in general, they are about how a person believes that he/she must behave with regard to geotourism and environmental resources in relation to others. To assess and measure personal norms, a researcher-made 5-point scale has been used. Obtaining high scores on this scale shows the intensity of the social norm. The items of the scale include: I keep the environment of the area clean because I consider it my second home; I do not leave waste in the Protected Area, because I believe by doing so, I'll hurt myself; family members expect me to recycle my domestic waste; neighbors expect me to put garbage in the garbage bins of the Protected Area and; finally, I never leave garbage in the environment because I think others are watching me.

4.4. Validity and reliability

In this research, to ensure the reliability of the instrument, first the initial validity of the questions was analyzed according to the experts' view point in the field of research. Also, to ensure the reliability of the results, the Cronbach's Alpha method was used. Accordingly, the calculated alpha coefficients for the research variables are as follows: environmental behavior 92%, environmental knowledge 72%, environmental attitude 89%, environmental value 90%, normative pressure 84%, and finally, facility variables 81%. The Cronbach's alpha coefficient is used to measure the level of unidimensionality of attitudes, beliefs, and so on. In fact, we want to know to what extent the respondents' perception of the questions have been similar. The basis of this coefficient relies on scales. A scale is a set of numbers that are assigned to individuals, objects, or behaviors in a continuum (a compact and connected set) in order to quantify the qualitative features. The most common scale used in social research is the Likert scale. In the Likert scale, the basis is the homogeneity of the items where each item is then given a score (for example, from 1 to 5 for the 5-point Likert scale), and the total score of each person from the items of the list reflects his/her desired tendency. To ensure the reliability of the research results, Cronbach's alpha was calculated based on the following equations (Cronbach, 1970).

$$X= Y_1 + Y_2 + ... + Y_K \quad (3)$$

Where: K is suppose that we measure a quantity which is a sum of K components.

$$\alpha = \frac{k}{k-1}\left(1 - \frac{\sum_{i=1}^{K}\sigma_{Yi}^2}{\sigma_X^2}\right)$$

(4)

Where: $\sigma_{Y_i}^2$ is the variance of the observed total test scores, and $\sigma_{Y_i}^2$ the variance of component *i* for the current sample of persons (Develles, 1991).

If the Cronbach's alpha coefficient is 0/7 or higher, the questionnaire has a good reliability and one can be certain of the internal correlation of the questions. In the present study, the Cronbach's alpha coefficient was 0/809 and represents the internal correlation of research questions.

If the items are scored 0 and 1, a shortcut formula is (Develles, 1991):

$$\alpha = \frac{k}{k-1}\left(1 - \frac{\sum_{i=1}^{K}P_iQ_i}{\sigma_X^2}\right) \quad (5)$$

Where: P_i is the proportion scoring 1 on item *i*, and $Q_i = 1 - P_i$. This is the same as KR-20.

It is clear that the closer the Cronbach's alpha index is to 1, the more the internal correlation between the questions will be and as a result the questions will be more homogeneous. Cronbach's alpha with a reliability coefficient of 45% is regarded low, a coefficient of 75% is moderate and acceptable, and a coefficient of 95% is considered high (Cronbach, 1970). Obviously, if the alpha value is low, it is necessary to check which question item can be eliminated to increase of the amount. In order to know the details of the environmental behaviors of tourists in terms of education (pre diploma, diploma, and post diploma), a comparison of the means was obtained using the Tukey test based on the following equations (Tukey, 1949).

The formula for Tukey's test is:

$$q_8 = \frac{Y_A - Y_B}{SE} \quad (6)$$

Where Y_A is the larger of the two means being compared, Y_B is the smaller of the two means being compared, and SE is the standard error of the sum of the means (Tukey, 1949).

For unequal sample sizes, this is sometimes referred to as the Tukey–Kramer method, which is as follows:

$$\bar{y}_{i\bullet} - \bar{y}_{j\bullet} \pm \frac{qa, k, N-k}{\sqrt{2}} \hat{\sigma}_{\varepsilon} \sqrt{\frac{1}{n_i} + \frac{1}{n_j}} \quad (7)$$

Where: n_i and n_j are the sizes of groups *i* and *j* respectively. The degrees of freedom for the whole design are also applied (Tukey, 1949).

5. Results and discussion

5.1. Describing demographic variables

The distribution of the tourists in the study in terms of field variables shows that 48% of the respondents were men and 52% were women. Most of the subjects (60.3%) were in the age group of 15-30 and the lowest number of them (1.0%) was over the age of 75. The education level of 4.2% of the respondents was below diploma, 12.3% of them diploma and 83.7% of them were post diploma**.** The comparison of the above percentages shows that the group educated to post diploma has the highest number of participants with 83.7%; and 69.3% of the respondents lived in a city while 30.7% lived in a village.

5.2. Brief description of the main variables of the research

As shown in the methodology section, the "environmental value" variable has been measured with 5 items, i.e. the tourists value the environment and geo-tourism resources a lot. The results of the research in relation to the "environmental value" variable also show that, in general, the average environmental attitude is 3.93 out of 5. In other words, the tourists in the study had a positive environmental attitude. Based on the findings of the research, we can say that the average environmental knowledge of the tourists in the research was 1.25 out of 2; in other words, it can be said that the environmental knowledge of tourists is at a moderate level or slightly lower. The result suggests that the generative processes of geotourism resources are more complex than is understood by tourists without training. In fact, when tourists are not aware of the processes for generating geotourism resources, proper exploitation will not be achieved. The number of correct items in relation to environmental knowledge rises with education, but it is not ideal, and this reflects the educational understanding of how processes and geotourism resources are formed. Considering the educational capabilities of geotourism areas, such as the

introduction of geomorphologic and geological phenomena that are necessary to introduce the site as natural capital, and the accessibility of tourists to these products and their educational aspects through brochures, guidebooks, newspapers, guided trails and information centers, the necessary criteria for accessibility and visibility of educational product and the risks of inappropriate utilization, the existence of tourism infrastructure for tourists and leading them toward new geotourism knowledge, investment in conservation and education, and the provision of geomorphosite identification boards (Table 4), and the assessment of the beauty and landscape aspects and the transfer of these values through positive advertisement to tourists can be useful in strengthening the knowledge of tourists about these natural attractions and geotourism resources. The results of the research in relation to the "normative pressures" variable that was measured with 7 items generally showed that the social pressure average was 3.69 out of 5, so it can be said that tourists believe that they should behave with a sense of commitment toward the environment. Also, the results of the research in relation to the "facilities" variable indicated that in general, the average of opportunity was 2.89 out of 5; it can be said that tourists have the facilities and infrastructure necessary for the proper behavior toward the environment at a low and moderate level. This is related to regional management policies, and to use a very simple example, the improper use of fire can lead to widespread destruction. Thus, it can be said that the lack of necessary facilities and infrastructure is the first step in educating tourists about the geotourism resources. To identify areas of high vulnerability (Figure 3) (areas where there is a high risk of fire in the summer season, such as Tang Haianan and the tourism areas of Bangkol and Manesht), there is a need to create fire alarm panels and fire extinguishers. Also, it is necessary to create a brochure in which the name of the site, the characteristics of the region, and the recreational capacity are expressed in order to help improve and optimize the management of the areas (Figures 4 and 5). Table 4 shows the identification board for the Karstic geosite of Dole Shen and Manesht. Finally, the findings of the research in relation to the dependent variable of *environmental behavior* showed that the environmental behavior average of tourists was 3.17 out of 4, and therefore, it can be said that a high level of environmental behaviors has been reported. Table 5 shows the statistical indexes (minimum, maximum, mean, standard deviation) of the examined variables. All of the active systems in the area are sensitive to environmental changes, especially human factors, climate and morphology changes, and these changes can interfere with the balance of systems. The most obvious such destruction and change in structure of systems can be seen in the results of unappropriated exploitation from different parts of the area (Tang Heyanan, Arghavan valley), which has a high environmental and tourism value. Many of these environmental changes are so severe that it has become a threat to the tourists. Due to human manipulation, the landscapes of the area are changing and degrading. Despite the dispersion of various tourism

phenomena in the study area, which includes historical monuments and other tourism features, only the features and outlook (geotourism resources) of the area are of attention to tourists and their use in most cases is carried out using non-geotouristic methods. Appropriate perspectives on the suitable use of these resources are necessary because the underlying cause of these phenomena are the functioning of various morphogenetic systems that shaped them over time and any unappropriated exploitation of these resources will destroy them. Finally, providing a new view at the case of appropriate conservation, utilization of geotouristic resources and defining a proper framework in the form of geo-tourism concepts can be considered the most important achievement of research. It seems that the issue of increasing environmental knowledge of tourists and their appropriate use of geotourism resources can be solved by utilizing all the facilities available, proper management, training, and a different view on the management of tourism in Iran and study area. The lowest scores in the assessment sections of the variables studied were found to be related to environmental knowledge and facilities. The low environmental knowledge of tourists needs to be solved through training so that they can gain a high perception over time, with the second factor being the discussion of structural facilities that are rooted in national and regional macroeconomic, regional planning, management policies, which all require a comprehensive overview of Iran's tourism management.

Figure 3: Distribution map of Geomorphosites in protected area

Figure 4: The Attraction Sites and hazards Map of the Protected Area: (a) areas at risk of destruction, (b) Map of areas with tourist concentration.

Figure 5. The Attraction Sites Map of the Protected Area: (a) Suitable zone for winter sports; (b) Suitable zone for mountaineering; (c) Suitable zones for family camping; (d) Suitable zones for caving and rock climbing.

Table 4: Identification board for the Karstic geomorphosite of Bangkol, as a document for the evaluation and management of this site.

Table 5: Statistical indexes of main concepts and variables.

5.3. Demographic variables

As discussed earlier, according to the results of previous research and based on the theoretical model of the study, demographic variables such as gender and location are among the research principles. Here, for the role of gender and location, T-test was used and the test results are reflected in Table 6 below.

Table 6: Testing the mean difference in environmental behaviors in relation to gender and location.

According to Table 6, it can be said that there is a significant difference (0/000) in the mean value of environmental behaviors between men and women. Also, due to the significance level of 0.217, there is no difference between residents of the city and the village. In this study, the level of education and its relationship with the environmental behavior of tourists were also examined. In fact, the ANOVA test was used to answer the question of whether there is a relationship between the level of education and environmental behavior of tourists in the regions of Manesht and Bangkol. The results of ANOVA showed that the test value was 8.79 and the significance level was 0.00, indicating that the environmental behavior of tourists is significantly different in terms of education. In fact, the environmental behavior of tourists improves with training and higher education. Here the relationship between training and education is confirmed once more. In order to know the details of the environmental behaviors of tourists in terms of education (pre diploma, diploma, and post diploma), we used the Tukey test to compare the means. Table 7 shows the mean differences.

Table 7: Testing the mean difference of education level and environmental behaviors of Tourists.

The results of the statistical test in Table 8 show that the environmental behaviors of tourists have a direct and positive correlation with environmental and geotourism knowledge, values, attitudes and normative pressures. In another word, those tourists who have shown higher environmental and geotourism knowledge, values, attitude,

and normative pressures with self-efficacy have shown more environmentally friendly behaviors toward the environment. Also, the results of Table 8 show that there is no significant relationship between environmental behaviors and the existing facilities of the region.

Table 8: Correlation coefficients of independent variables with environmental and geotourism behaviors.

5.4. Multivariate regressive analysis

Using multivariable regressive analysis, we can examine the effect of a set of independent variables on a dependent variable. In fact, the multivariate regression creates a linear combination of independent variables that show the maximum correlation with the dependent variable. In order to evaluate the effect of independent variables on the dependent variable, the stepwise regression method was used and the variables that had the most determined coefficient remained in the model**.** To study the co-linearity of the independent variables, the tolerance statistics were used. The closer the tolerance level to one, the more it indicates the non-linearity of the variables. Table 9 shows that the regression is composed of 5 models (steps), and since the suitability of the model (step) in each stage is based on F statistics, the resulting information indicates that the F-test value with 99% confidence and true error of less than 0.01 is significant. In other words, independent variables are capable of explaining the changes. The highest determination coefficient is related to model (step) 5, which is 7.15%, and model (step) 4, which explains 6.24% of the dependent variable changes.

Table 9: Stepwise regression model of independent variables in explaining the environmental behavior variable.

Table 10 shows the variables that remained in the final regression model. In the stepwise regression model, all independent variables were entered in one by one and the change in geotourism (geomorphologic and geological) values was the most important variable which entered into the model, whereas the facility variable was the least important and it had the least statistical effect in explaining the changes of the dependent variable .

Table 10: The effect coefficients of the final regressive model of independent variables explaining environmental behaviors.

5.5. The effect of regression coefficients

With the help of the effect of regressive coefficients, the direct effects of each of the independent variables on the dependent variable and the extent of these effects can be identified. As a result, the theoretical model of the research was tested and transformed into an experimental model that was tested through multivariate regression at the same time. Figure 5 shows the experimental model (Figure6).

Figure 6: Experimental model of the research.

As shown in the experimental model of the research, the specified path of the arrows represents the direct effects of different variables on the dependent variable. These paths include the path of environmental and geotourism values, attitudes, knowledge, normative pressures, and suitable facilities for conducting appropriate environmental and geotourism behaviors. As Table 11 shows, the variables of geotourism value and environmental attitude in relation to geotourism resources are stronger predictor variables compared to others.

Table 11: The direct effect of independent variables on environmental behaviors.

6. Conclusion

According to the results, there is a significant relationship between gender and environmental behavior. In other words, female tourists behave more responsibly towards the environment and geotourism resources. Also, the results of the research regarding the age distribution showed that tourists from the age group of 15-30 years showed more positive environmental behaviors in relation to geotourism resources, and were more consistent in their behavior toward these resources. This is indicative of the growing trend of positive environmental behaviors among the younger generation, which may increase even more among future generations. The results of the survey relating to the appropriate environmental behavior to geotourism resources between men and women indicated that women act more responsibly toward exploiting these resources and display more protective approaches; for example, women were less interested in making fires, smoking, etc. in the area. It was observed in the study that there is a positive and significant relationship between the tourists' education level and positive environmental

reactions to geotourism resources. In fact, as the tourists' level of training increased, more consistent behavior toward environmental resources was observed. It was found that there is a positive relationship between the environmental attitudes of tourists and their environmental behaviors. Also, there is a relationship between environmental behaviors in relation to geotourism and geotourism knowledge. In fact, the more environmental and geotourism knowledge the tourists had, the more they showed consistent behaviors toward geotourism resources. Here it is worth noting that the average environmental knowledge of the tourists was 1.25 out of 2. The environmental knowledge of tourists was moderate or slightly low, but the result suggests that the generative processes of geotourism resources are more complicated than can be understood by tourists without specific training. In fact, when tourists are not aware of the processes of generating geotourism resources, proper exploitation will not be achieved. The number of correct items in relation to environmental knowledge rises with education, but it is not ideal, and this reflects the educational understanding of how processes and geotourism resources are formed. Although tourists believe that they should act responsibly toward geotourism resources and there is a positive relationship between environmental knowledge and their behavior, due to the complexity of the processes, the promotion of high and accurate knowledge requires the training of tourists in this field. In fact, with increasing education, not only a more significant relationship between the two factors of environmental behavior and environmental knowledge is achieved, but a more accurate way of exploitation is also attained.

The results of the present research indicate that there is a positive correlation between the normative pressure variable and the environmental and geotourism behavior of tourists. This suggests that normative pressure is an important determinant of environmental and geotourism behaviors. The existence of the relationship between facilities and environmental and geotourism behaviors in this research was confirmed experimentally. The regressive model results showed that the change in geotourism (geomorphologic and geological) values was the most important variable which entered into the model, whereas, the facility variable was the least important, and it had the least statistical effect in explaining the changes of the dependent variable. In achieving such a conclusion, it becomes necessary to pay attention to the promotion of geotourism and environmental values in order to attain more responsible behaviors in line with the protection of these resources. In this research, it was determined that several factors have an impact on the formation and development of appropriate environmental behaviors in relation to the geotourism resources of the Protected Areas of Manesht and Bangkol. However, the role of environmental values and attitudes toward geotourism resources is more significant than that of the other variables and in fact, these two factors are correlated with the environmental and geotourism behaviors of tourists.

These values form the basis for people's environmental and geotourism behavior and any manipulation of them will result in a positive or negative effect. Therefore, values can play an important role in forming a positive attitude toward the environment to be in line with responsible training and geotourism resources. Consequently, in order to enhance and improve the protective behavior among tourists toward geotourism resources and environment, the values that are supportive of the environment should be strengthened, and also, with the help of innovative and new approaches to tourists' training, we should protect and exploit these resources properly. The protected area of Manehst, Bankol, and Qalarang has high potential for development of getourism activities. The assessment of relationship between sustainable exploitation and conservation of geotouristic resources and the variable measurement methods in the area leads to the consideration of the capacity of tolerance, planning to create a balance between the numbers of visitors, restrictions of tourists' traffic and will reduce damage to these susceptible areas. On the other hand, increasing information about the identification and introduction of geographic features associated with tourist and recreational activities can help in informing tourists about natural and human phenomena, and processes for generating geotourism resources and planners in the management and planning of the study area. The results of the research show that if the managers of the major sectors as well as the Iranian tourism industry do not review their management strategies, in the future, we will see the deterioration of geo-tourism sources and other impacts in the study area. These challenges are intensifying and expanding, and in the absence of appropriate management, the consequences will be irreparable, with damage to these legacies being irreversible. Therefore, the most important strategies for sustainable development of the area are, review of the management of tourism in Ilam province, the training of tourists and increased facilities for conservation of resources. Implementation of practical and successful management in this region requires a comprehensive study of the area so that in addition to its ecological values, the potential capabilities of the region can also be identified.

Acknowledgements

The authors wish to thank the Dr. Nabin Baral and Prof. Angus Morrison for their valuable comments, we also thanks the Editor and anonymous reviewers for their valuable technical comments and suggestions, which greatly helped to improve the paper.

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Table 1. Environmental behavior clauses (Stern, 2000).

1	I, personally, collect the garbage during the trip and when I leave the site.
2	I tip the garbage in the trash bin in the protected area, even if it has been abandoned by another person.
3	When visiting the protected area, I will camp in any place.
4	I tip the waste and leftovers in the nearest waste disposal site.
5	While on travel or a pleasure trip, I have the fuel needed for cooking and heating in the camp.
6	If I've made a fire in the camp environment, I try to make sure that it's been completely put out.
7	I use disposable containers during the trip.
8	If I go on a trip to a protected area, I will make a fire for warming up and preparing food.
9	While on travel or a pleasure trip, I have garbage bags with me.

Table 2. Environmental knowledge items.

1	The negative influence of human intervention in the natural environment is a major risk factor.
2	The intensity of the greenhouse effect leads to global warming.
3	Plastic waste decays 50 years later in nature, thus leaving them in a geopark environment results in an unpleasant scene.
4	The destruction of tropical forests will increase the greenhouse effect.
5	Drainage of sewage into rivers, aquifers and artesian wells and karstic springs is the cause of their contamination.
6	Using renewable energies (the sun and the wind) reduces global warming and the melting of glaciers.
7	The destruction of forests and vegetation is the main cause of soil erosion and damage to beautiful geological landscapes.
8	The imbalance between the number of visitors and the exploitation capacity of geotourism sites results in their destruction.
9	Tourists' lack of recognition of the processes shaping the geotourism resources will have a negative effect on the proper utilization of them.
10	Natural oils or bacteria on your hands may create biological effects in the process of calcareous ornamentation in caves.
11	In the case of the destruction of geomorphologic and geologic features, reversibility and restoration is almost impossible or very difficult.

Table 3. Items related to environmental attitudes (Salehi & Ghaemi Asl, 2013).

1	We are encountering a point when the geotourism resources of the planet in the future can only meet the pleasure-seeking needs of a certain number people.
2	Human beings have the right to change geotechnical resources to meet their own needs.
3	When human beings have a negative impact on these resources, there will be disastrous consequences.
4	Human genius assures us that these resources will be delivered healthy and intact to future generations.
5	Human beings are widely misusing the environment, and geotourism and geological resources**.**
6	The Earth has many geotourism (geomorphologic and geologic) resources, and we just need to learn how to exploit them.
7	Future generations have the right to exploit and see these resources as much as we do.
8	The balance of nature in rebuilding the negative effects on these resources is so powerful to make it reversible.
9	Despite the advancement of human attitudes regarding the exploitation of geotourism resources, this balance is one-way and negative.
10	The destructive effects of human activities on the environment and geotourism resources are highly exaggerated**.**
11	The land is like a small spacecraft that has limited space and resources for leisure uses.
12	The purpose of human creation is the absolute exploitation of geotourism (geomorphologic and geologic) resources.
13	Balance in the generic processes of geotourism (geomorphological and geological) resources is very sensitive and easily disturbed.
14	Humans will finally learn how to deal with geotourism (geomorphological and geological) resources so that they can control them.
15	If business carries on as usual, we will soon witness a large environmental catastrophe.

Table 4. Identification board for the Karstic geomorphosite of Bangkol, as a document for the evaluation and management of this site.

Identification board for geomorphic site		
ID		**Features**
Position		Local name: Karstic Geosite (Dole Shen and Manesht) Relative position: 30 km from Ilam city on the slopes of Manesht Mount Geographic coordinates: Longitude of 46.43 degrees east and latitude of 33.76 north, and longitude of 46.45 east and latitude of 33.72 north. Height: 1750 meters
Geomorphology	Phenomena	Horizontal caves, dry valleys, Canyons, karstic springs, checkered and linear seams and cuts (lapie), grooves and Polje, sinkhole with a depth of 70 meters, Polje, natural arches, karst windows.
Emersion		The land-based factor has an important effect in the formation and development of Karstic sinkhole. Generally, the system of seams and gaps and layering surfaces play an important role in the formation of karstic complexes in the region.
Form description, morphological structure		The Asmari formation is the most important limestone unit in the region. Its prominent features are its high potential for landslides and the emergence of different springs. From the lithology point of view, it includes marl, limestone, a thin layer of gypsum alternating with shale, gypsum and marl, and in some parts, salt and anhydrite are present.
Age		It is considered to belong to the Oligocene.
Main dependency		Precipitation, user variations, geomorphology, climate change.
Secondary dependency		Climate change, tourism development, precipitation type.
Area of study		Climatic geomorphology, building geomorphology, carbonate deposits, karstic processes, periglacial forms, mass movements.
Functional aspects	Agriculture	Dry farming
	Accessibility	The road to Bangkol is the only way to reach this area and accesses the geomorphic sites at an altitude of 2200 meters from Bangkol Mount.
Level of attraction		The Dolins with their magnificent forms in the regions of Doleh Shen and Doghuleh facing the head lane from Bangkol to Ivan attract a large number of tourists every year. The depth of these hollows reaches over 80 meters at the head of Bangkol Lane (Ghaja lan, Kaboutar Kna). Many local myths believe that these hollows are associated with sea water. These geomorphosites are very attractive, spectacular, and significant.
Protection status		Despite the sensitivity of the systems involved in the formation and preservation of the landscape of this site, exploitation is carried out regardless of the necessary considerations to maintain them.
Current usage		Dry farming, Countryside, Energy transmission lines, summer tourism.
Transportation		Various types of personal vehicles.
Infrastructure		Asphalted way up to 6 km and track up to 4 km to the geosite.
Exposure		High numbers of visitors, agricultural operations in the area of the geosite, the crossing of the petrochemical pipeline from Ilam, and the dumping of waste and garbage into these valuable works have exposed them to damage.
Legal status		Protected zone

Table 5. Statistical indexes of main concepts and variables.

Number	Scale/ concept/ variable	Standard deviation	Mean	Minimum and maximum score
1	Environmental attitude related to geotourism resources	1.14	3.93	**1-5**
2	Environmental knowledge related to geotourism resources	0.35	1.25	**1-2**
3	Environmental value associated with geotourism resources	1.15	4.02	**1-5**
4	Normative pressure	1.11	3.69	**1-5**
5	Facilities	1.31	2.89	**1-5**
6	Environmental behaviors related to geotourism resources	0.83	3.17	**1-4**

Table 6. Testing the mean difference in environmental behaviors in relation to gender and location.

Two-legged variables	Groups	Number	Mean	T- test	Significance level
Gender	Female	212	31.78	-3.129	0.000
	Male	188	31.07		
Location	City	275	31.64	0.339	0.217
	Village	125	31.38		

Table 7. Testing the mean difference of education level and environmental behaviors of tourists.

Education	Mean		Pre diploma	Diploma	Post diploma
Pre diploma	27.39	Mean difference		0.87	-3.93
		Significance level		0.89	0.15
Diploma	28	Mean difference	0.85		-3.91
		Significance level	0.88		0.00
Post diploma	33.14	Mean difference	3.09	3.93	
		Significance level	0.18	0.00	

Table 8. Correlation coefficients of independent variables with environmental and geotourism behaviors.

Variables	Dependent variable (environmental behavior related to geotourism resources)	
	Intensity of correlation	Significance level
Geotourism values	0.241	0.000
Environmental attitude in relation to Geotourism resources	0.229	0.000
Normative pressure	0.151	0.000
Environmental and geotourism knowledge	0.147	0.000
Appropriate facilities	0.07	17.0

Table 9. Stepwise regression model of independent variables in explaining the environmental behavior variable.

Model	Multiple correlation coefficient (R)	Coefficient of determination (R square)	Adjusted coefficient of determination (adjust R square)	F- test value	Significance level
1	0.364	0.133	0.129	62.188	0..000
2	0.426	0.179	0.179	44.733	0..000
3	0.469	0.218	0.214	37.488	0..000
4	0.486	0.239	0.236	32.274	0..000
5	0.503	0.253	0.241	22.265	0..000

Table 10. The effect coefficients of the final regressive model of independent variables explaining environmental behaviors.

Variable	Beta coefficient	T-test	Significance	Tolerance
Constant value	-	-0.908	0.000	-
Environmental values to geotourism (geomorphology and geology)	0.242	5.642	0.000	0.813
Environmental attitudes (in relation to geotourism resources)	0.231	4.917	0.000	0.836
Normative pressure	0.151	3.243	0.000	0.916
Environmental and geotourism knowledge	0.150	3.318	0.000	0.931
Proper facilities	0.109	2.428	0.017	0.914

Table 11. The direct effect of independent variables on environmental behaviors.

Variables	Direct effect	Indirect effect	Total effect
Knowledge related to geotourism resources	0.153	-	0.153
Appropriate facilities	0.108	-	0.108
Environmental attitude in relation to geotourism resources	0.243	-	0.243
Normative pressure	0.161	-	0.161
Environmental values related to geotourism resources	0.252		0.252

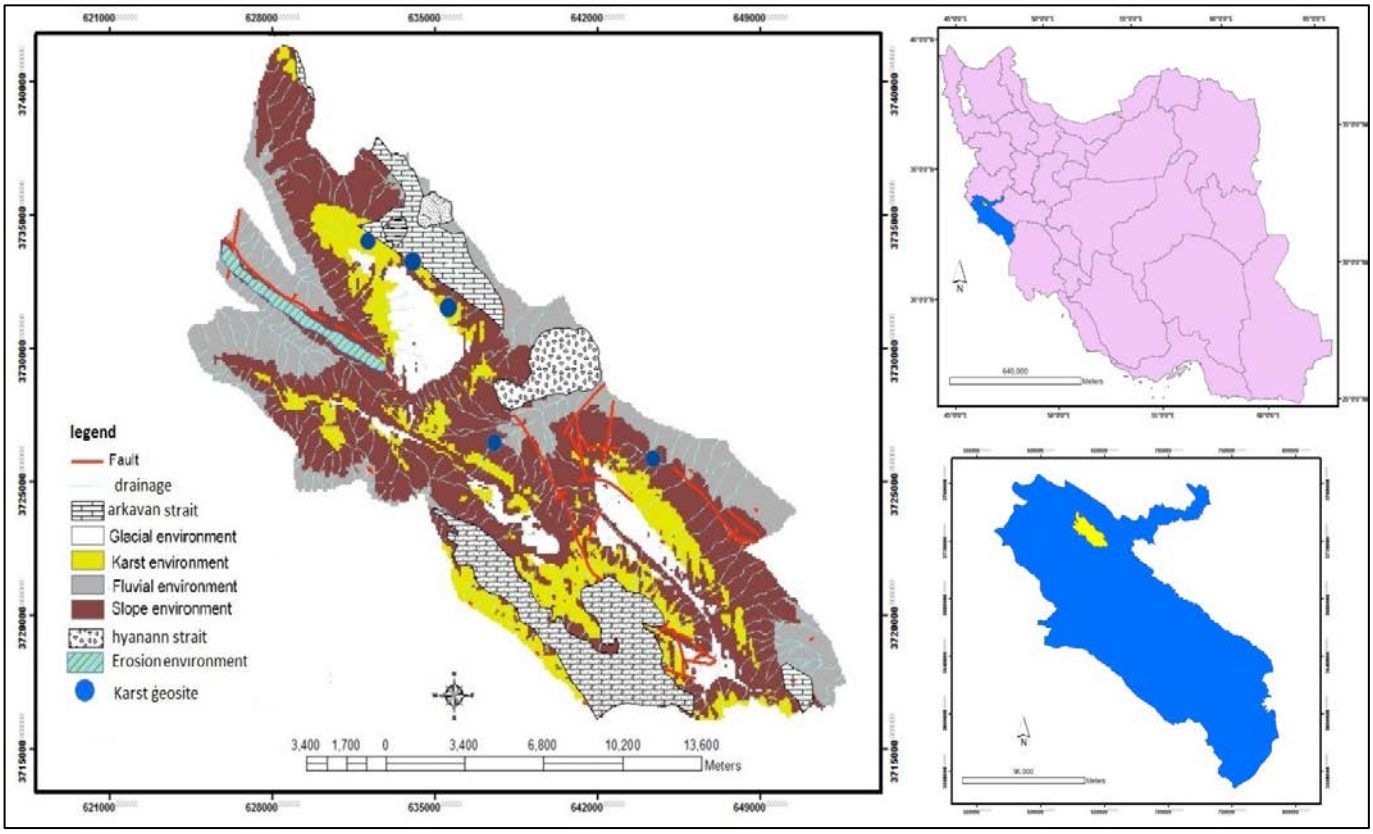

Figure 1. General position of Manesht and Ghelarang Protected Area regarding the political provincial and national borders.

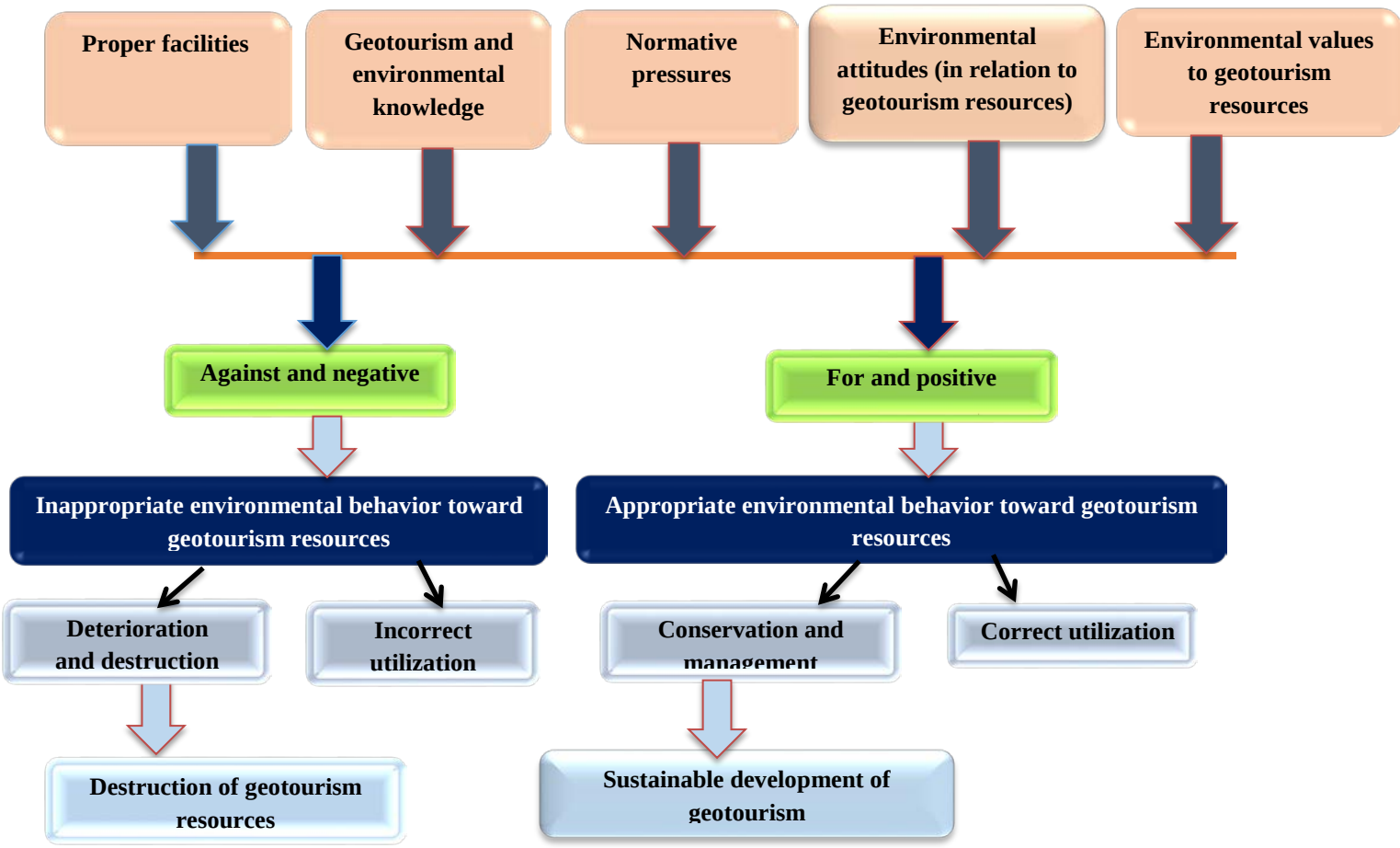

Figure 2. Flowchart and designed research model

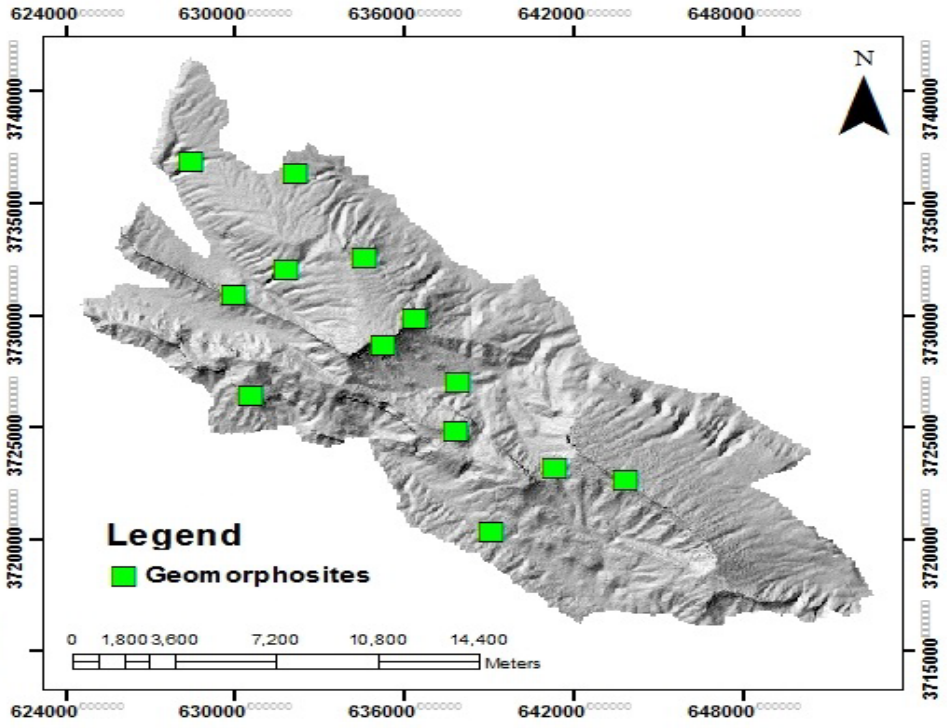

Figure 3. Distribution map of Geomorphosites in protected area.

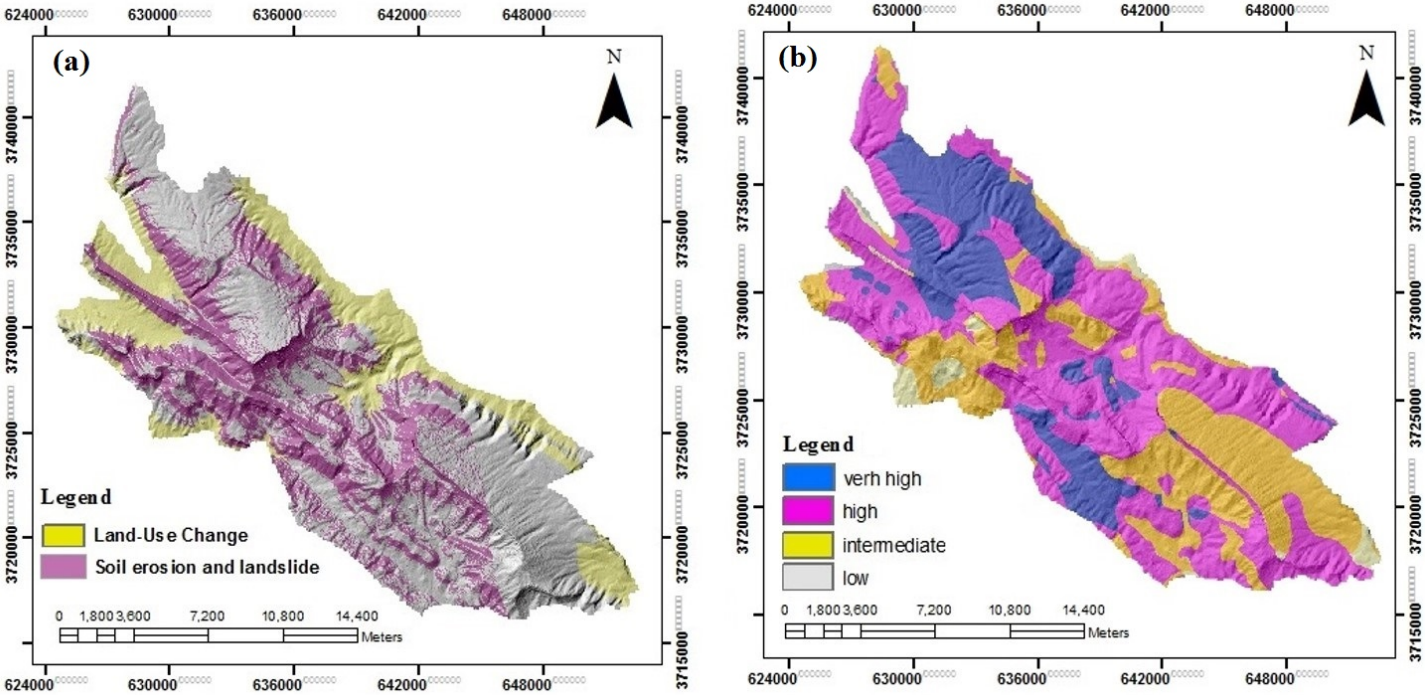

Figure 4. The Attraction Sites and hazards Map of the Protected Area: (a) areas at risk of destruction, (b) Map of areas with tourist concentration.

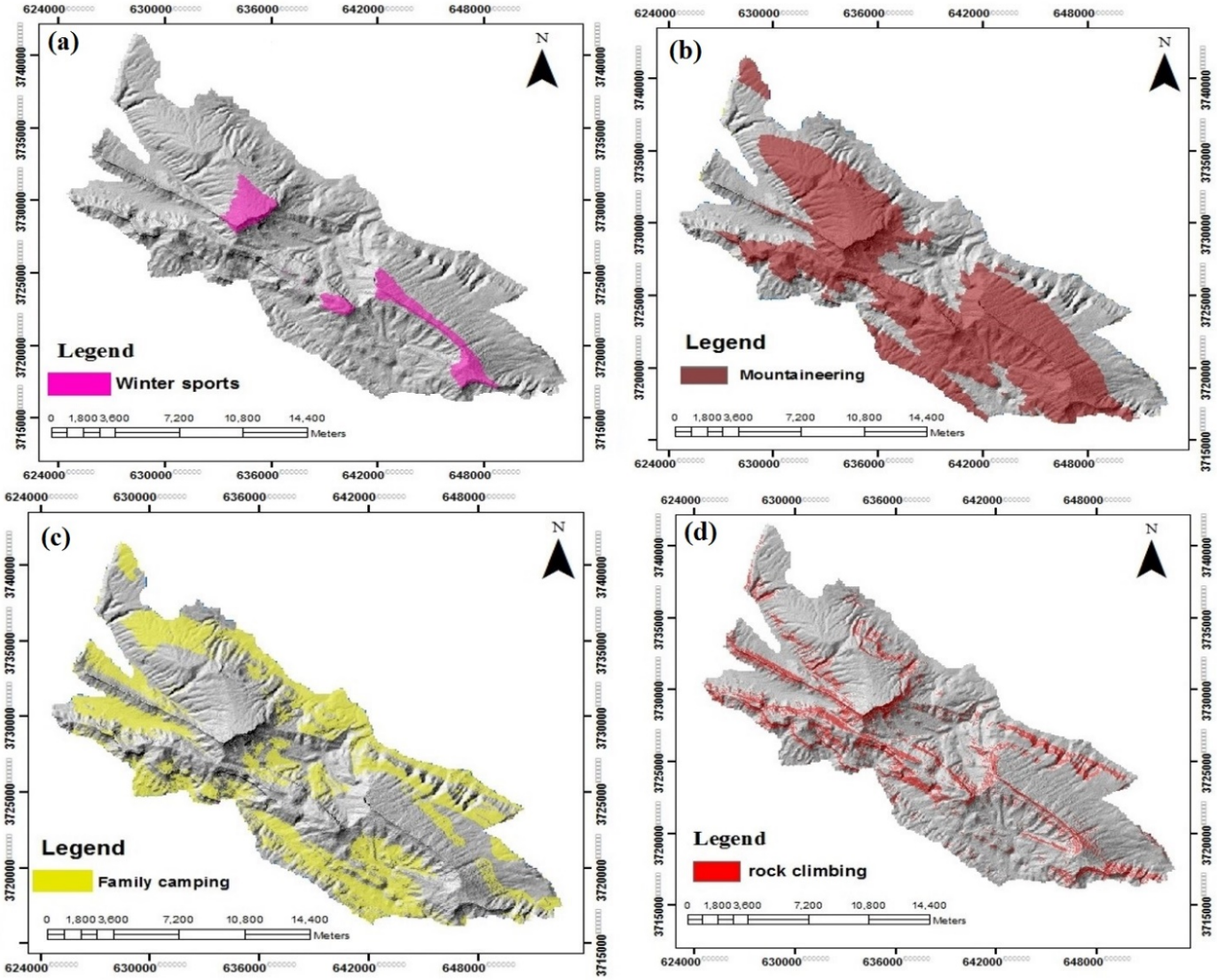

Figure 5. The Attraction Sites Map of the Protected Area: (a) Suitable zone for winter sports; (b) Suitable zone for mountaineering; (c) Suitable zones for family camping; (d) Suitable zones for caving and rock climbing.

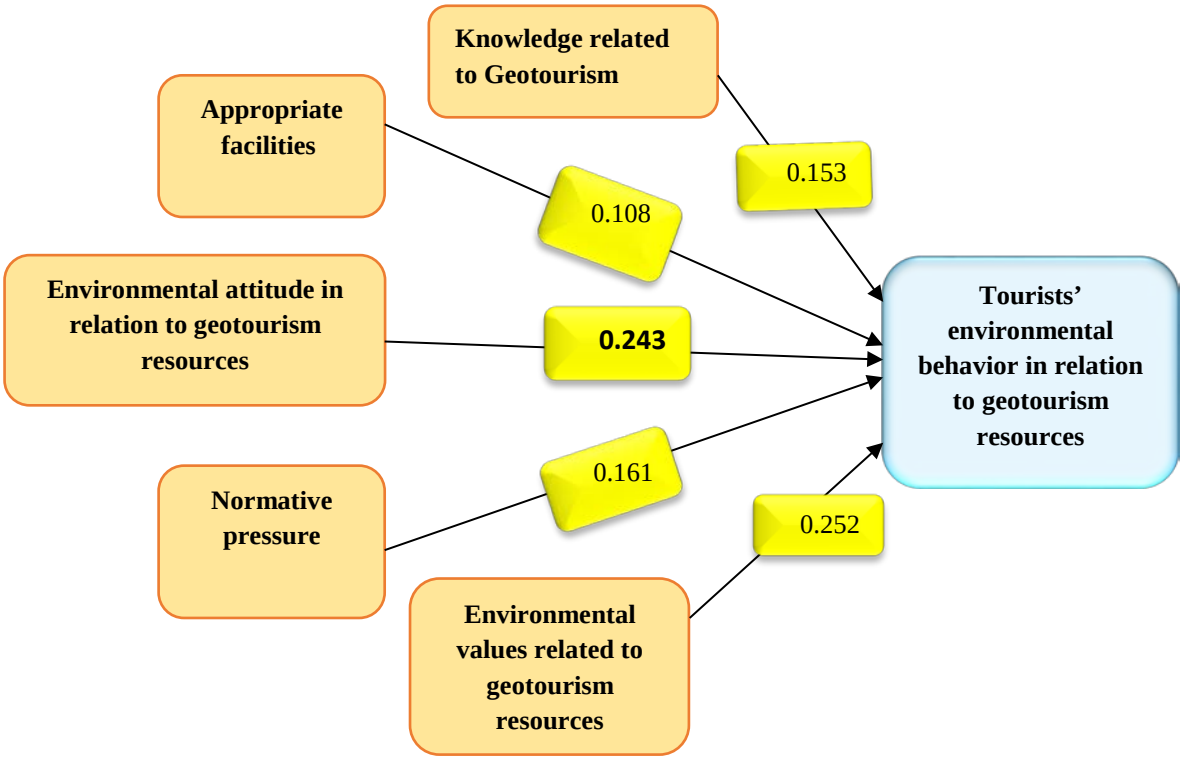

Figure 6. Experimental model of the research