

## **Fire Risks in Eco-Tourism and Strategies for Fire Safety: The Case of Tehran's National Parks**

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### **Abstract**

This research paper examines the critical issue of fire risks within the context of eco-tourism in Tehran's national parks, emphasizing the necessity of implementing robust fire safety strategies. The background outlines the growing eco-tourism sector in Iran, highlighting its significance for environmental conservation and economic development. The importance of fire safety is discussed, given the increasing threat of wildfires exacerbated by eco-tourism activities and climate change. The study evaluates existing policies and regulations related to fire safety and assesses the current infrastructure in place to manage such hazards. The roles of various stakeholders, including government entities, eco-tourism operators, and local communities, are delineated concerning their responsibilities in fire risk mitigation. Strategies are proposed, including fire prevention measures, emergency preparedness plans, community engagement initiatives, and technological innovations in fire management. The discussion synthesizes findings, exploring the implications for eco-tourism in Tehran and examining the delicate balance between promoting tourism and preserving natural habitats. Recommendations for policymakers and practitioners are provided, alongside suggestions for future research directions aimed at enhancing fire safety in eco-tourism. Ultimately, this paper underscores the vital need for integrated fire safety approaches to safeguard both the environment and the socio-economic benefits of eco-tourism in Iran.

**Keywords:** Fire Risks, Eco-tourism, Tehran's National Parks.

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## **1. Introduction**

### *1.1. Background of Eco-Tourism in Iran*

In recent decades, the emergence and rise of eco-tourism within the boundaries of the Islamic Republic of Iran, because of its world-famous landscapes, diverse ecosystems, and rich culture has interlinked itself within the practice of sustainable tourism. Conversely, eco-tourism is growing rapidly within national parks, particularly in Tehran, communities are getting worried especially about the dangers of fire which might worsen due to climatic and anthropogenic factors or because of lack of measures. With these confined areas being visited more from time to time, the more the thoracic area, which is prone to wild fires will becomes, therefore, there will be a need to have a fire safety and prevention plan. These may include, among other things, establishing fire safety zones, periodically evaluating the fire endangered areas especially in relation to the weather and vegetation, orienting people on the fire safety controls during their visit, and banning the use of matches or lighters within these zones. Further, the involvement of the surrounding communities and partnership with the local actors are crucial in establishing eco tourist strategies in the country of Iran that are effective in conserving the environment but also safeguarding the tourists and the animals in the protected areas (Ghoddousi, et al, 2018). The following are the most prominent national parks in Tehran arranged alphabetically:

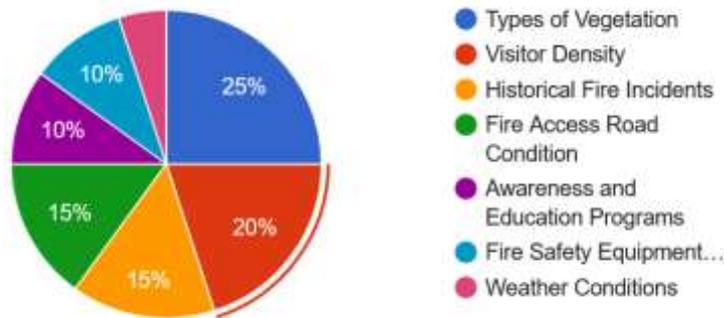
- ❖ Ab-o Atash Park
- ❖ Chitgar Forest Park
- ❖ Jamshidiyeh Park
- ❖ Mellat Park
- ❖ Niavaran Park
- ❖ Pardisan Park
- ❖ Shian Forest Park
- ❖ Sorkheh Hesar National Park
- ❖ Taleghani Forest Park

The context of Tehran's National Parks involves considering how various factors and data points contribute to fire risks and safety measures in these areas.

1. **Types of Vegetation (e.g., shrubs, trees, grassland) - 25%**
  - Different types of vegetation can contribute differently to fire risk.
2. **Visitor Density - 20%**

- The number of visitors in each park can increase the chance of accidental fires.
- 3. **Historical Fire Incidents - 15%**
  - Include data on the number of fire incidents recorded in each park over past years. This could also indicate which parks have higher fire risks.
- 4. **Fire Access Road Condition - 15%**
  - The condition of access roads for firefighting efforts can significantly impact fire safety. This segment could show the proportion of parks with good versus poor access.
- 5. **Awareness and Education Programs - 10%**
  - This could represent the percentage of parks that offer fire safety education programs to visitors.
- 6. **Fire Safety Equipment Availability - 10%**
  - Reflect the degree to which each national park is equipped with necessary fire-fighting equipment and infrastructure.
- 7. **Weather Conditions - 5%**
  - A small portion could represent average weather conditions contributing to fire risks (e.g., dry seasons, rainfall fluctuations).

The following pie chart illustrates the above information:



**Figure 1.** Fire risks in in Tehran's National parks

### *1.2. Importance of Fire Safety in Eco-Tourism*

Fire safety in eco-tourism, especially within the national parks of Tehran, holds paramount importance because of these areas rich in natural beauty along with being ecologically sensitive. With the fast-growing eco-tourism, human activities such as campfires or throwing away cigarette butts, or even the careless behavior while investigating these regions, can raise the chances of fire incidences out of control. In the national park area of Tehran, which is rich in animals and plant species, the consequences of a bushfire would not only include damage to the flora and fauna but also significant loss for the people living there and the economies based on tourism (Jahdi, et al, 2023). It becomes crucial, therefore, to introduce the great measures against fire, such as public education or drilling, setting limits on fire use, making regular inspections and developing contingency plans. These measures are thus dictated by the need to preserve the resources but at the same time do prevent any loss of the experience of the visitors due to the objectives of eco-tourism, which seeks to create a love for nature and the mother environment while ensuring no harm is done to it.

### *1.3. Objectives of the Study*

The Case of National Parks in Tehran seeks to thoroughly evaluate and examine the fire risks associated with eco-tourism activities within these protected areas. The research aims at assessing which of the existing conditions such as natural, anthropological and infrastructural elements increase the fire hazard and therefore should be managed and controlled. The study objectives extend, also, to the analysis of the present measures employed to decrease the fire risks with regards to other calamities. To further the cause of the study, identifiable strategies promoting environmentally sustainable tourism along contribution towards fire hazard mitigation will be developed, particularly focusing on the nexus between eco-tourism and fire protection. Lastly, the purposes include developing politically and operationally enforceable measures and strategies for responsible persons and organizations to curb the wildfires on agro-ecological zones of tourism in national parks of Tehran (Andrade, et al, 2023).

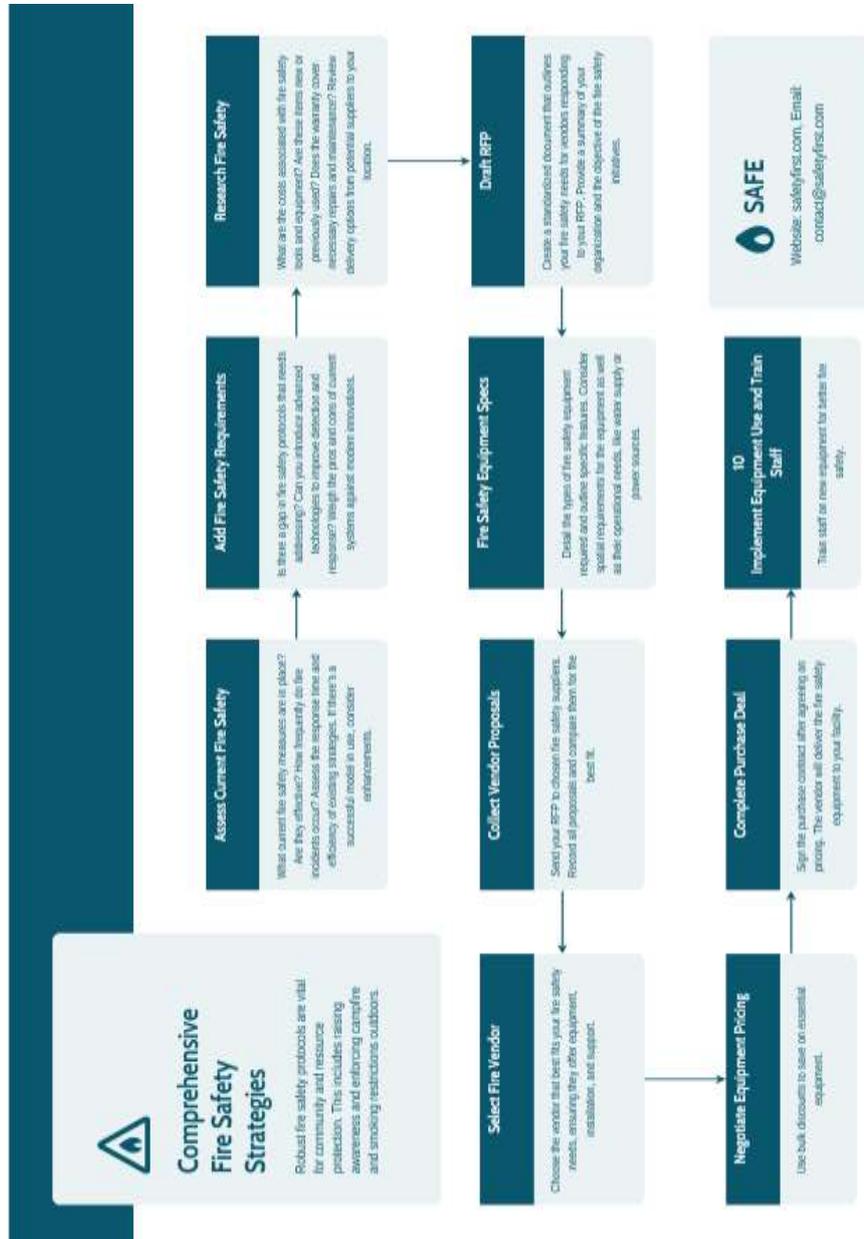
*1.4. Overview of Eco-Tourism and Its Growth in Iran*



The promotion of Ecotourism in Iran has come a long way, particularly with the many natural ecosystems and national parks in the country that attracts both local and foreign sustainable tourism seekers. However, with the increased level of visitation, the focus on the environmental sustainability and safety is shifting into a more prominent concern, particularly with respect to the fire threats in these natural places. For example, national parks within the region of Tehran, for instance, Golestan and Alborz national parks are prone to wildfires more than ever thanks to climate fluctuations as well as vegetation cover and anthropogenic activities. Appropriate fire safety measures should be put into place healthy tourism practices so that the fire risks among other threats are reduced. These Include broad spectrum fire service management plans, public awareness towards fire issues, community assistance for risky areas reporting, and upholding that eco-friendly project do not harm any natural resources. As such measures to curb fire outbreaks in ecotourism activities in Iran would not only preserve the rich nature of the country but also facilitate further economic growth in that sector (Sobhani, et al, 2022).

*1.5. Global Perspectives on Fire Risks and Management*

The combination of natural and human factors in places like the national parks in Tehran which is an eco-tourism anticipated area poses a great danger of fire hazards in any eco-tourism activity. Such parks are essential for both the citizens of the country and the foreign visitors, thus, there is a need for fire fighting strategies which will save the environment as well as the visitors. However, climate change, drought aggravation in certain areas, and quick inflow of tourists tend to increase the fire risks, while unpreparedness and poor response systems are associated with loss of lives and property. It is important to develop and implement all-round fire safety measures which include among others, sensitization of the public, banning campfires and smoking in the natural settings, and putting up quick response fire brigade. Furthermore, partnerships among government agencies, environmental groups and local people help in building resilience and encourage environmentally-friendly tourism so that natural resources can be enjoyed today as well as in the years to come. The use of technologies such as remote sensing and GIS in the fire risk assessment will also help in the improvement of the preparedness and response and will ultimately create a balance between the benefits of eco-tourism and the need for environmental protection (Parsons, et al, 1986). The above explanation is summarized in the following chart:



*1.6. Common Causes of Fires in National Parks*



National parks are not only inhabited spaces but also reputed places of leisure especially with eco-tourism like what is present in the national parks in Tehran. Various common factors can explain the cause of the wildfires in these national parks. Those include the recreational behaviors of people such as going for camping or a barbecue, careless burning of cigarette butts that leads to starting wildfires, and so many others. Drought, thunderstorms, and high winds are other natural fire igniting and spreading factors. These climatic events have their frequency and intensity increased due to climate change, which can be a risk multiplier. In this regard, fire safety policies,

which should include measures, such as educating tourists on responsible conduct, implementing controlled burns to reduce the amount of vegetation at risk of wildfires, and improving fire detection and suppression, should be developed in order to reduce fire risks. Furthermore, fire prevention and control programs, as well as conservation programs, can be made more effective by involving the local people who may eventually take care of the parks and its visitors as well as the natural resources (Ghorbanzadeh, et al, 2019).

#### *1.7. Vulnerable Areas in Tehran's National Parks*

Although the national parks in Tehran are critical for eco-tourism in providing green areas, most of them are threatened by wildfires due to a number of reasons such as climate, people and the ecology of the region. In most cases, the fire risk is attributed to the sensitive zones within these parks with high levels of green cover and also are near town areas which can encourage the outbreaks of fire within the regions during the hot seasons when the green cover is dry and very moist. These parks record high inflow of visitors and this can lead to higher chances of incidences of fire due to littering, campfires or careless acts. So as to control such risks and protect eco-tourism from collapse, fire safety management should be elementarily in place inclusive of fire awareness campaigns, facility of smoking and campfires zones, timely repairing of fire breaks, and Updating on Weather. In addition, community participation in park management helps to address the issues of fire threats since this helps in the incorporation of community members into the various firefighting, which ensures that the parks and the people visiting them remain safe without sacrificing environmental conservation (Moharramnejad, et al, 2013).

#### *1.8. Impact of Eco-Tourism Activities on Fire Risks*

The promotion of eco-tourism initiatives in Tehran national parks, in line with environmental education and sustainable development, is without a doubt, for introduction comprises higher risks of fire outbreaks due to human encroachment into previously untouched areas. This is due to the fact that more people visiting the locations often assists the occurrence of greater cases of litter, unattended fires, and activities that may result in the outbreak of fires. In addition, the psycho physical damage sustained to the region as a

result of panic building to establish eco-tourism, in forms such as pathways, campsites, visitor lodges, etc, puts the region in a more dangerous position with regard to fires raging uncontrolled. Therefore, proactive measures must be put in place to checklist every need category including fire risk management where a cordon is procured to restrict fire usage, designated camping sites are developed, posters educating the public on fire hazards are placed periodically and undertakings like burning already cut out vegetation and clearing of plants are done. Thus, protecting national parks from the excessive naturalistic recreation via adjusting tourism by effective fire prevention measures helps to both protect the natural environment and provides beautiful and educational landscapes for the tourists visiting natural parks around Tehran (Reihanian, et al, 2012).

#### *1.9. Existing Policies and Regulations in Iran*

Even though eco-tourism puts emphasis on environmental education and protection, the latter might have a negative effect in increasing the fire hazards in sensitive areas such as the national parks in Tehran. With all the activities that involve people such as in hiking, camping and even in the valleys of the worlds increases the chances of fire breaking out without intention to do so especially in places prone to dryness and accompanied with combustibility of vegetation. They also result in some types of waste being deposited like burnt out cigarette sticks and shards of glass, which can catch fire given the right circumstances. Such supportive elements of eco-tourism of which include trails, camps, and information centers may alter the balance of the ecosystems thus interfering with their natural regulation of fires. In order to reduce such dangers, it is essential to prepare advanced plans for fire safety including informing the public about fire safety measures and restrictions on the use of campfires, cleaning up overgrown areas to decrease combustible materials, and control burning of designated areas. It is possible for the national parks in Tehran to integrate these two seemingly contradictory practices, and thrive in preserving the natural beauty of the landscapes for a long time while preventing biodiversity and loss of lives for the visitors of the parks (Habib, et al, 2014).

*1.10. Evaluation of Fire Safety Infrastructure*

The external evaluation of the fire safety infrastructure concerning ecotourism especially within the national parks located in Tehran is important in fire risk management, which is an inherent risk in any ecotourism activity, natural or anthropogenic. Most of these parks which are biodiversity-rich and provide space for recreation, it is imperative to evaluate the fire alarm systems, the availability of means for access for relevant agencies within the locality, firebreaks or other means aimed at minimization of the spread of fires, where they occur. Also, a proper assessment should extend to the activities of parks addressing fire safety among its visitors and those of the tour operators managing the visitors. Through these measures, it becomes possible to conceptualize a solid fire safety management plan for the sustainable management, and preservation of the environment without putting the safety of the eco-tourists in danger and the activities of the national parks in eco-tourism development in Teheran (Jamali, et al, 2021).

*1.11. Stakeholder Roles and Responsibilities*

As far as the fire risks in eco-tourism, particularly in one of the national parks in Tehran, is concerned, identification of respective stakeholders and their roles is essential for the overall fire safety management. According to many fire safety professionals, fire safety is not an attempt by a lone individual. There is always the existence of agencies of the government like the Department of Environment and the local fire services who create and enforce the regulations and come up with strategies for the prevention of fires. Then there are other players, notably the eco-tourism operators and the park managers, who also carry out tasks that help to mitigate fire hazards within the facilities. They implement the fire safety measures, routinely orient the employees on fire safety measures, and also educate the tourists on the fire dangers and measures for prevention of fire. Societal agencies and the community who live in these areas also take part in such efforts by taking part in fire-watch programs and conservation initiatives, while environmental non-governmental organizations may seek to lobby for fire-wise development. Moreover, the tourists themselves are liable to observe certain instructions, for instance, litter hygienically, and use of fire in certain prescribed ways. Hence, these and all other stakeholders need to work together to create and promote significant risk awareness and preparedness

in the parks of Tehran and in the community so as promote eco-tourism in a sustainable way (Sunkar, et al, 2022).

## **2. Strategies for Fire Risk Mitigation**

### *2.1. Fire Prevention Strategies*

In relation to environmental threats and eco-tourism in particular national parks of Tehran, fire intervention modes are very important as they contribute towards protecting the environment as well as keeping the visitors safe. These strategies tend to be more all-inclusive in that they also include thorough assessment of manageable areas in order to establish possible wildfire risk zones, use of fire to burn off some of the vegetation in order to reduce the potential fuel load and construction of fire lines. Both the visitors and the locals have a role to play in education and awareness examples of which include waste management and respect of fire which in turn limit the chances of fire being caused by man. On top of those, the infrastructure put in place to assist in active firefighting such as quick response teams and water sources must be in place. Finally, through the implementation of sustainable land management and the use of new fire detection and monitoring techniques, such as aerial and satellite imagery watching over the national parks, the wildlife of these parks will be better sustained thus ensuring that the region maintains its eco-tourism levels which in turn maintains a positive correlation between the environment and the economy (Firouz, 1976).

### *2.2. Emergency Preparedness and Response Plans*

Well-drafted emergency preparedness and response plans are considered fire risk reduction measures to eco-tourism operational in Tehran's national parks due to the likelihood of conflicts between the natural resources and human activities leading to forest fires. These measures should also include risk assessment and risk management plans to identify the risk prone areas within the parks and measures on how park managers, local people and visitors can work together. Executing fire safety and firefighting training programs will help the relevant stakeholders to detect any signs of fire and act appropriately on time. Besides, the use of fire alarm systems, the use of drones to watch the areas, and the installation of clear exit signs would help in preparing better. Conducting constant drills, incorporating local

communities, and undertaking fire safety education awareness campaigns targeting the tourists will help in strengthening the resistance against the fire outbreaks which would ensure healthy ecotourism in the national parks of Tehran while protecting the economy and the people (Torabi, et al, 2020).

### *2.3. Community Involvement and Awareness Programs*

The role of community engagement and awareness initiatives cannot be overlooked in the fire mitigation efforts in eco-tourism, especially for the national parks. Objectives of these initiatives include teaching the locals, the visitors and the stakeholders about the specific fire risks that are rampant due to, camping, throwing waste inappropriately, and destroying the natural environment. These programs are based on the notion that encouraging partnerships of the park management, the indigenous people and the visiting eco-tourists enables the putting into place adequate measures geared towards preventing anything harmful to the environment and promoting things like fire zones, holistic signs and awareness campaigns against fire. By including the local population in the process of identifying and managing threats of fires, their relationship with the environment is enriched and those local communities feel more responsible for the fire protection. In addition, local knowledge and practices are incorporated which contributes in making the fire safety measures effective and practical over time, which improves the biodiversity of the national parks in Tehran and the people who depend on eco-tourism for their economic activities (Ni'mah, et al, 2018).

### *2.4. Role of Technology in Fire Management*

Technology has a very important part in fire management as far as fire risks in eco-tourism settings such as the national parks around Tehran, especially enhancing safety and reducing the possibilities of undesirable occurrences are concerned. Auxiliary facilities like geographic information systems (GIS), earth observation satellite systems, and fire forecasting systems will be applied in fire danger area determination, land cover change assessment, and fire risk prediction based on existing climatic variables and anthropogenic factors of threat. Drones with thermal imaging technology will also help in the expanded area coverage as hotspots will be quickly located and information relayed to the ground crew in the shortest time possible. Moreover, most of the mobile applications can help enhance the

education and participation levels of the visitors by sending alerts, giving tips on fire safety, and the dos and don'ts when visiting natural places. With such innovations, stakeholders in eco-tourism can undertake measures that support the management of risks associated with these activities, together with creating awareness in the local people, developing better response strategies without posing the threats to the environment and the visitors in the national parks in Tehran (Nuhu, et al, 2021).

### **Effective Fire Risk Mitigation Strategies**

Implementing fire prevention strategies is crucial to safeguarding both the environment and eco-tourism in Tehran's national parks. A streamlined approach can enhance visitor safety while preserving natural resources.



### **3. Discussion**

#### *3.1. Implications for Eco-Tourism in Tehran*

The challenges for eco-tourism in Tehran, especially in view of the fire hazards posed by the national parks within the city, indicate that there is an urgent need for a fire protection plan that will be part of the tourism strategy. The rising number of tourists in such pristine areas simultaneously increases the risk of anthropogenic activities and in turn fires that can ravage the environment and diminish the very aspects that comprise the tourist attraction. To this end, it is necessary for eco-tourism stakeholders and the concerned local government to draw and implement fire management guidelines first before doing the actual promotion of these ecotourism

activities. This might involve creating physical restrictions such as firebreaks, ensuring visitors are continuously educated on fire hazards and the causes and effects of wildfires, and carrying out preventive activities such as controlled burns. Additionally, such cooperation can increase the capacity of agencies to detect and control fire threats. As part of competition, the city of Tehran must deal with the issues of fire safety in advance so that the ecotourism business is developed and the ecology of the region is preserved for a better tourist experience and sustainable tourism development in the country (Hanifezadeh, 2021).

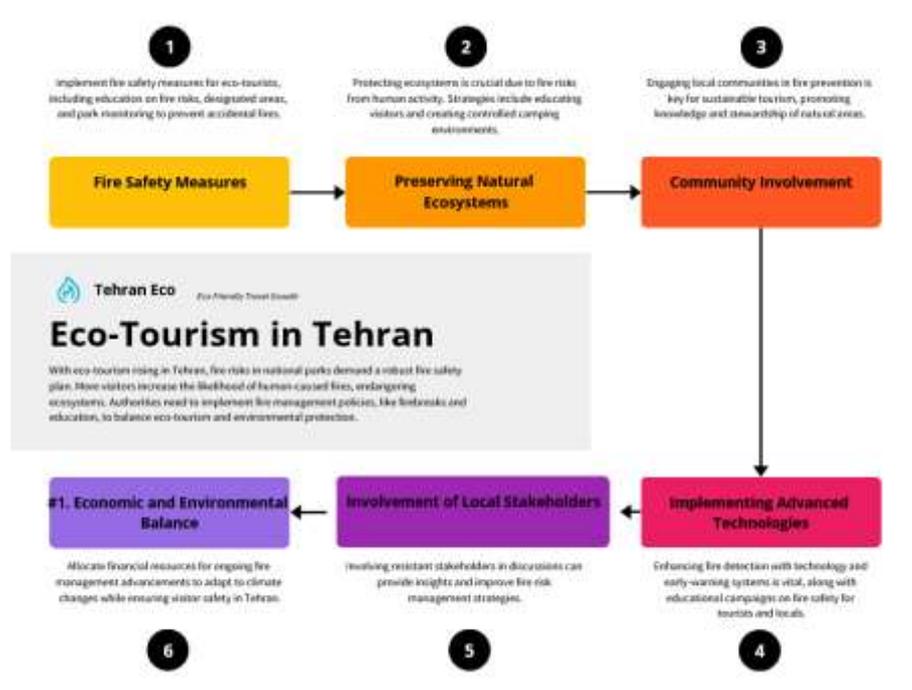
### *3.2. Balancing Eco-Tourism and Environmental Conservation*

Finding the right balance between eco-tourism and environmental protection, especially in the case of Tehran's national parks, has many facets, especially the risk of fire both to natural ecosystems and to the safety of the visitors. Eco-tourism leads to exploration of nature, which is on one hand a good thing, however, it tends to cause an increase in the risk of wild fires as a result of camp fires, littering, and the safety of the animal sensitive areas being compromised due to increased human activities. In order to achieve the above goal and still allow eco-tourism to flourish, it is imperative that certain measures be put in place, such as, educating the tourists about fires and fire hazards, improving the park and placing camping and fire use areas in designated areas, and providing fire safety by constant maintenance and monitoring of the park so that fire is not accidentally ignited. It is also vital that measures to restore and prevent burning also include the involvement of local residents which encourages awareness and support aimed at developing sustainable tourism and advancing conservation of nature within the environment. Thus, if fire safety is seen as an integral part of the project rather than a restriction to the activities, the national park can achieve a balance between eco-tourism and conservation of its rich flora and fauna (Asadpourian, et al, 2020).

### *3.3. Recommendations for Policymakers and Practitioners*

In the context of eco-tourism and specifically in the case of the national parks around Tehran, which experience certain fire risks, the steps of policy makers and practitioners should include the design and the application of a well-defined fire management system, attending to the local ecosystem as

well as to the tourism dynamics. This includes improvement of the fire monitoring lenses and installing technologies for early fire detection with compliment of education campaigns to tourists and local people on fire safety through effective communication strategies. In addition, applying land management practices such as managed fallow and fuels treatments can help reduce the volume of ground fuels and the potential of fire. Engaging local people and equipping them with fire suppression and prevention knowledge and skills will cultivate the principles of responsible tourism without jeopardizing eco-tourism. Lastly, adequate finances and management support should be provided for the continuous development and evolution of the fire management strategies in relation to climatic development, to avoid compromising the beauty of the national parks and the safety of the visitors to them in Tehran (Ni'mah, et al, 2018).



#### 4. Conclusion

##### 4.1. Summary of Findings

The research highlights significant fire risks associated with eco-tourism in Tehran's national parks, emphasizing the urgent need to address these challenges in the context of climate change and increasing visitor numbers.

The analysis indicates that the influx of tourists, particularly during the summer months when vegetation becomes more susceptible to fire, exacerbates fire hazards. Alarmingly, it was found that many visitors are unaware of fire prevention measures, while park management often lacks the necessary personnel and resources to effectively mitigate fire risks.

In response to these challenges, this study recommends several strategies to enhance fire safety within these national parks. Key proposals include implementing educational programs for tourists to promote safe behaviors during their visits, regulating the use of campfires and barbecues, and improving firefighting resources and infrastructure. Furthermore, strengthening outreach initiatives and establishing partnerships with environmental organizations and interest groups are crucial for integrating effective fire management strategies while conserving biodiversity and promoting sustainable eco-tourism.

Overall, it is imperative to address these fire hazards to safeguard Tehran's national parks while simultaneously facilitating responsible eco-tourism activities. Addressing the dual objectives of environmental protection and visitor safety will not only enhance the resilience of these natural areas but also ensure the continued viability of eco-tourism in the region (Adab et al., 2018).

### **5. Future Directions for Research and Practice**

Within the fire risks related research in eco-tourism practice in the future, and particularly in national parks around Tehran, the fire risks management should focus on an integrated approach combining environmental monitoring, community education, and readiness for emergency situations. It will also be necessary to assess climate change effects on the incidence and behavior of fire that will help in developing strategies for informing both the decision makers and those in the business of eco-tourism. In addition, these relationships among local residents, government and eco-tourism businesses will help to develop and practice land use management approaches that are environmentally friendly and therefore lower risks of fires whilst enhancing satisfaction of the guests. For that purpose, development of fire safety trainings for tour guides and eco-tourism staff combined with campaigns addressed to tourists will be of key significance for fire safety culture's development. Also, use of tools such as real-time data collection and remote

sensing will mitigate fires and responses to them and this will help to conserve the environment while engaging in ecotourism activities (Ghorbanzadeh, et al, 2019).

#### *5.1. Final Thoughts on Fire Safety in Eco-Tourism*

The final reflections on fire safety concerning eco-tourism, particularly concerning national parks in Tehran, highlight the importance of being perceptive, strategic, and not reducing the factors aiding fires while enhancing people's experience of nature. Coupled with the increased interest in eco-tourism, environmental or climate change and other reasons such as people and uniqueness of the area themselves pose threats of wild fires. Full blown fire safety measures, which integrate preventing the spread of fire through educating people, assessing risks, practicing appropriate land use and setting up fire teams, must be adopted. Also, building collaborative efforts among governments, the people and the eco-tourism industry will work to better these environments. The importance of fire hazards cannot be undermined especially in the national parks of Tehran since they help to preserve the rich biodiversity within the parks, support the eco-tourism business and also protect people from harassment and causing harm to the animals inside them (Salehabadi, et al, 2014).

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