

RECREATIONAL VALUE ESTIMATION OF JAJI-ARYUB PARK USING TRAVEL COST METHOD, PAKTYA, AFGHANISTAN

Mujeeburahman Ariez^{1*}, Abdul Matin Noori², Khanzadgul Zazai³, Ziaudeen Fahim⁴,
Hedayatullah Salari⁵

¹Associate Professor, NRM Department, Agriculture Faculty, Paktya University, Afghanistan

^{2,3}Assistant Professors NRM Department, Agriculture Faculty, Paktya University, Afghanistan

⁴Assitnant Lecturer NRM Department, Agriculture Faculty, Paktya University, Afghanistan

⁵Proffessor of Horticulture Department, Agriculture Faculty, Paktya University, Afghanistan

* Email: mujeeb.ariez@gmail.com

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ABSTRACT

Protected areas play a vital role in biodiversity conservation and in providing recreational opportunities for the public. Jaji Aryub Park, located in Paktya Province of Afghanistan, is one of such protected area that has become a popular recreational destination over past four years. However, the park's economic valuation had not been previously documented. For economic valuation of the park this study was conducted using Travel Cost Method (TCM). A total of 250 structured questionnaires were distributed among visitors during the 2024–2025 recreational season, complemented by face-to-face interviews with park administrators. Data were analyzed using SPSS. The findings revealed that the average number of visitors during Eid holidays, Fridays, and regular days was approximately 5,000, 500, and 75 persons per day, respectively. The total number of visitors during the 180-day recreational season of 2024–2025 was estimated 89,800 individuals. About 40% of visitors (35,920 persons) were from neighboring areas (same or adjoining districts), with an average individual expenditure of 300 AFN per person, resulting in a total expenditure of 10,776,000 AFN. The remaining 60% (53,880 visitors) came from distant areas, with an average cost of 2,500 AFN per person, amounting to a total of 134,700,000 AFN. Consequently, the total economic value of the park during the 2024–2025 recreational season was estimated at 145,476,000 AFN (approximately USD 207,822). The study also identified several key challenges affecting the park's sustainable management and visitors' satisfaction, including poor infrastructure, restricted areas, noncompliance with environmental protection regulations, and overcrowding during peak recreational periods.

Keywords: economic valuation; Jaji Aryoub; national park; paktya

INTRODUCTION

Afghanistan, a landlocked country with eight distinct climatic zones, exhibits significant differentiation in its flora and fauna. This ecological diversity, coupled with the country's unique topography, makes it an area of high conservation value. Approximately 80% of Afghanistan's population relies directly or indirectly on biodiversity for their livelihoods, including subsistence agriculture, grazing, and the collection of forest and medicinal products (Breckle. *et al.*, 2018). Consequently, the conservation of biodiversity is critical not only for environmental sustainability but also for the socio-economic well-being of local communities.

Currently, Afghanistan has 15 designated protected areas under various categories, yet only seven of these areas have achieved some degree of formal recognition by the relevant governmental authorities (Adu *et al.*, 2024; Breckle *et al.*, 2018). Protected areas serve as critical

tools for conserving biodiversity, maintaining ecological functions, and providing a wide range of ecosystem services to human society (Artell *et al.*, 2025). Among these services, recreational and cultural benefits are particularly significant, as they generate both direct and indirect economic value (Angelo *et al.*, 2025 ; Yadav *et al.*, 2025). Accurately estimating such values is essential for evidence-based policy-making, sustainable management, and the justification of conservation investments, particularly in developing countries like Afghanistan, where financial resources for environmental protection are limited.

One emerging example is Jaji-Aryub Park, located in Paktia province in eastern Afghanistan. This area represents an ecologically and culturally significant landscape, characterized by diverse ecosystems, scenic mountain vistas, and attractive evergreen forests, which collectively draw both local and regional visitors. Although Jaji-Aryub Park was not originally included in the national protected area system, recent improvements in local security have enabled the government to declare it a national park. Since then, it has gained national recognition as a recreational hotspot, attracting a growing number of visitors during peak seasons. However, the economic value of the park's recreational services remains largely undocumented.

In the absence of market prices for recreational experiences, non-market valuation methods such as the Travel Cost Method (TCM) provide a practical framework for assessing visitors' willingness to pay for access to natural areas (Artell *et al.*, 2025; (Angelo *et al.*, 2025); (Yadav *et al.*, 2025)). The TCM has been widely applied worldwide to estimate recreational demand and consumer surplus associated with natural landscapes and protected areas (Artell *et al.*, 2025); Phaneuf & Requate, 2017; Septriani & Yusnida, 2023). Empirical studies in South and Central Asia further demonstrate the method's utility in highlighting the economic significance of parks and ecotourism resources (Chakrabarty & Mandal, 2021). Applying this approach to Jaji-Aryub Park can provide critical insights into its contribution to local livelihoods, tourism potential, and broader economic development in Afghanistan.

Accurate valuation of recreational services is also essential for the design of sustainable park management strategies and financing mechanisms (Richardson & Flyr, 2024). Regional TCM applications, including zonal and individualize-cost studies from Iran and neighboring countries, offer valuable methodological precedents and benchmarks. For example, recent zonal TCM analyses in Iran (Gahar Lake) and forest recreation studies in Turkey have demonstrated approaches to scale individual welfare estimates to regional aggregate values while addressing multi-site choice and visitor heterogeneity (Kheyri *et al.*, 2020). Similarly, random-utility and site-choice formulations have been successfully applied in catchment and forest settings to capture site substitution and more nuanced visitor preferences (Bhatt., & Bhat. (2016). Properly documenting and valuing their recreational and ecosystem services using robust methodologies like the Travel Cost Method can guide policy-making, support sustainable management, and justify conservation investments in a context of limited financial resources.

METHOD

Paktya Province, located in northeastern Afghanistan, encompasses a significant portion of the country's natural forests and is characterized by a semi-arid monsoon climate. Jaji-Aryub, an eastern district of the province bordering Pakistan, contains the Mandahir Forest an ecologically important evergreen forest recently designated as a national park by the local authorities (Figure 1). This study was conducted within the boundaries of Jaji-Aryub National Park. Data were collected during the 2024–2025 recreational seasons using structured questionnaires and face-to-face interviews with park administrators. A total of 250 questionnaires were completed by visiting tourists. For estimation willing to pay 100 educated visitors in park were asked separately. The collected data were analyzed using SPSS software to calculate descriptive statistics, including means, modes, and percentages. Data visualization, such as tables and graphs, was

performed using Microsoft Excel. Due to lack of precise registration systems on the total number and areas of park visitors, several assumptions were used to approximate the economic value of the park.

1. Based on the climatic conditions of Paktya Province, the recreational season is assumed to extend from March to October, covering the spring and summer months.
2. A considerable proportion of visitors are presumed to come from neighboring areas (same or adjoining districts); therefore, their individual travel costs are expected to be lower compared to those of visitors traveling from distant regions.

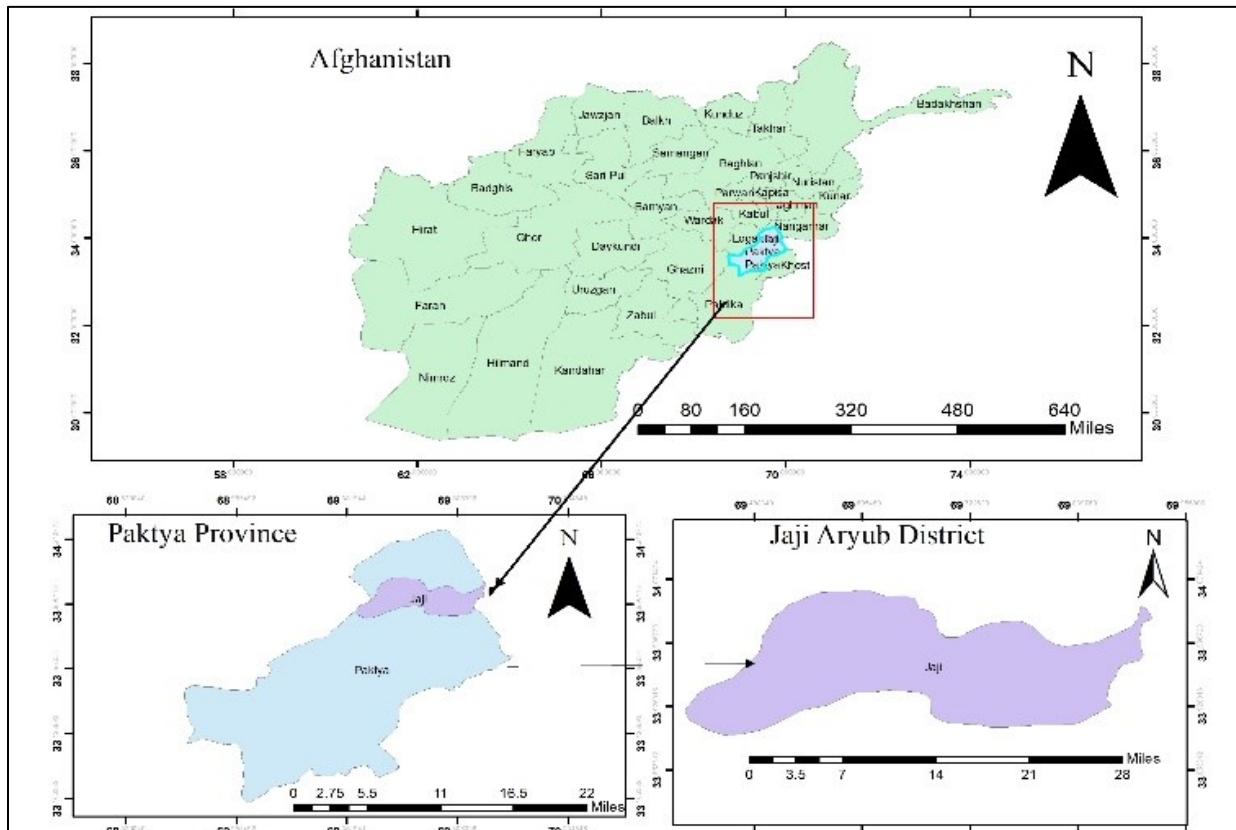


Figure 1. Study Area Map

RESULTS AND DISCUSSION

1. Sex and Age

Demographic analysis revealed that all respondents were male. The absence of female respondents may be due to prevailing cultural, social and religious norms in the study area that restrict women's participation in outdoor recreation. The age distribution of respondents varied across categories: 55.3% were between 21 and 30 years old, whereas only 4% were above 50 years. This pattern suggests that younger individuals are more inclined to visit recreational areas, possibly due to having more leisure time, greater mobility, and stronger enthusiasm for outdoor activities (Figure 2). Comparable results were found in park visitation studies from India, which reported that visitors are predominantly young adults due to their active lifestyles and flexible schedules Bhatt., & Bhat. (2016).

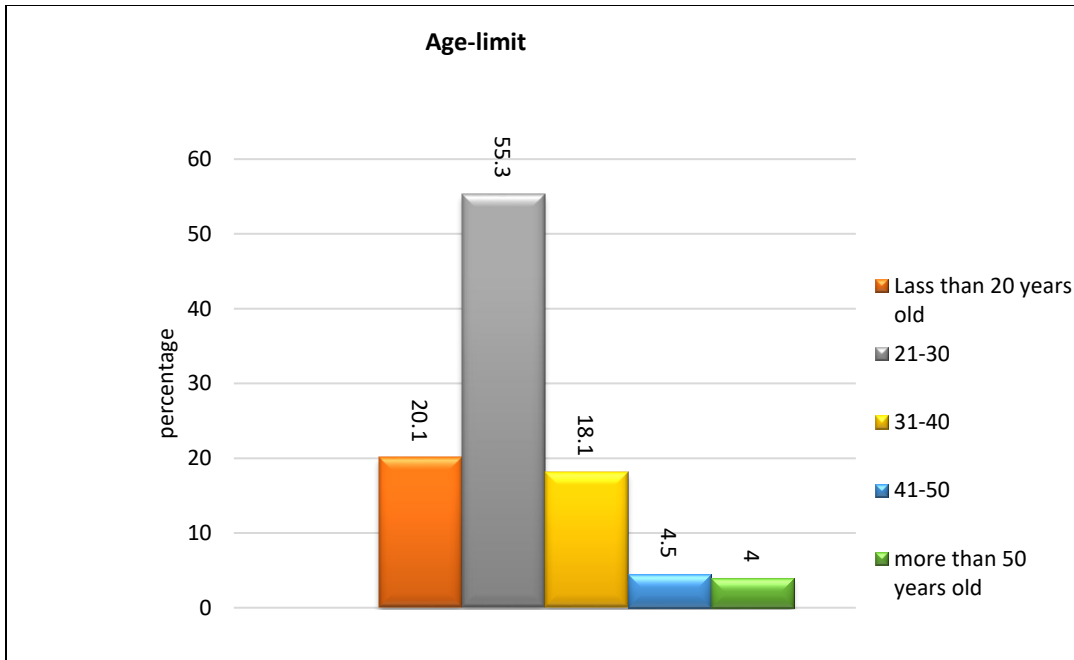


Figure 2. Age and Sex of Respondents

2. Geographical Distribution of Respondents

Respondents originated from various regions of Afghanistan. Approximately 32.2% were from the northeastern region, while only 11.2% were from the western region. The southern, northern, and central regions accounted for 25.1%, 15.1%, and 16.6% of respondents, respectively (Figure 3). This distribution indicates that Jaji-Aryub Park attracts visitors from across the country, with the highest proportion originating from the northeastern region. This trend may be explained by the region's climatic conditions during the recreational season, temperatures in the northeastern areas are relatively high, prompting residents to visit Paktya Province, where the climate is cooler. Additionally, the park's geographic proximity and lower travel costs likely contribute to this visitation pattern. Similar spatial trends have been documented in travel cost method (TCM) studies across South Asia, where proximity, accessibility, and climatic comfort are key determinants of visitation frequency (Kheyri *et al.*, 2020).

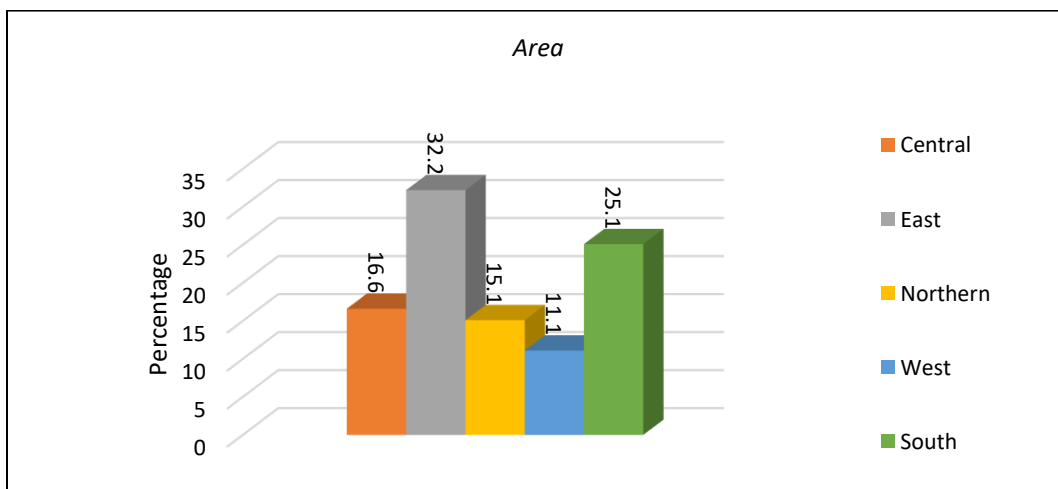


Figure 3. Geographical Distribution of Respondents

3. Occupation

Analysis of occupational status indicated that 38.7% of respondents were engaged in private business, and 21.6% were students. Farmers, government employees, and unemployed individuals constituted 11.1%, 19.6%, and 9.0% of the respondents, respectively. The predominance of businesspeople and students among visitors may reflect both their relatively greater financial flexibility and the park’s accessibility. Notably, the participation of students from Paktya University may be linked to the park’s proximity to the campus and its popularity as a convenient and affordable recreational destination (Figure 4). These findings align with similar results from visitor studies (Septriani & Yusnida, 2023). Such patterns suggest that economic capacity and time availability are strong predictors of park visitation in developing-country contexts.

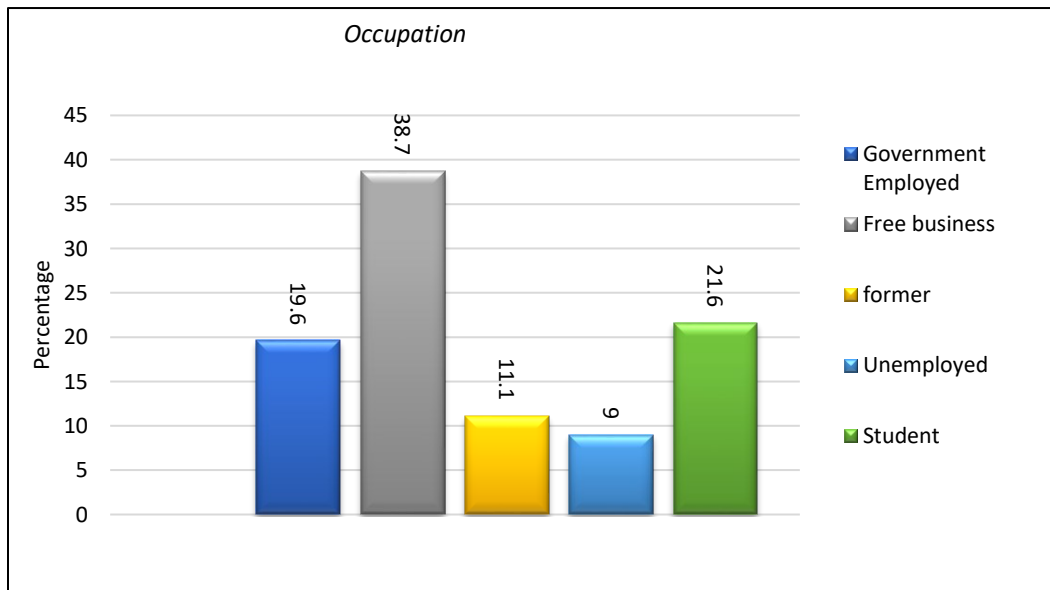


Figure 4. Occupation of Respondents

4. Monthly Income

Given Afghanistan’s broader socioeconomic context where the majority of individuals earn between 5,000 and 10,000 AFN per month the income distribution of respondents exhibited similar patterns. Approximately 50.3% of respondents fell within this low-income category, while 30.7% and 14.1% represented middle-income groups. Only 3.5% and 1.5% of respondents reported belonging to higher-income classes (Figure 5) These results are consistent with national income trends reported by the National Statistics and Information Authority (Artell, 2025), which indicate that most households in rural Afghanistan earn less than 10,000 AFN monthly. Comparable findings were also reported in travel cost studies in Pakistan and India, where the majority of park visitors belonged to lower- or middle-income categories, highlighting that recreational demand is often driven by affordability and proximity rather than high income (Kheyri *et al.*, 2020; Septriani & Yusnida, 2023).

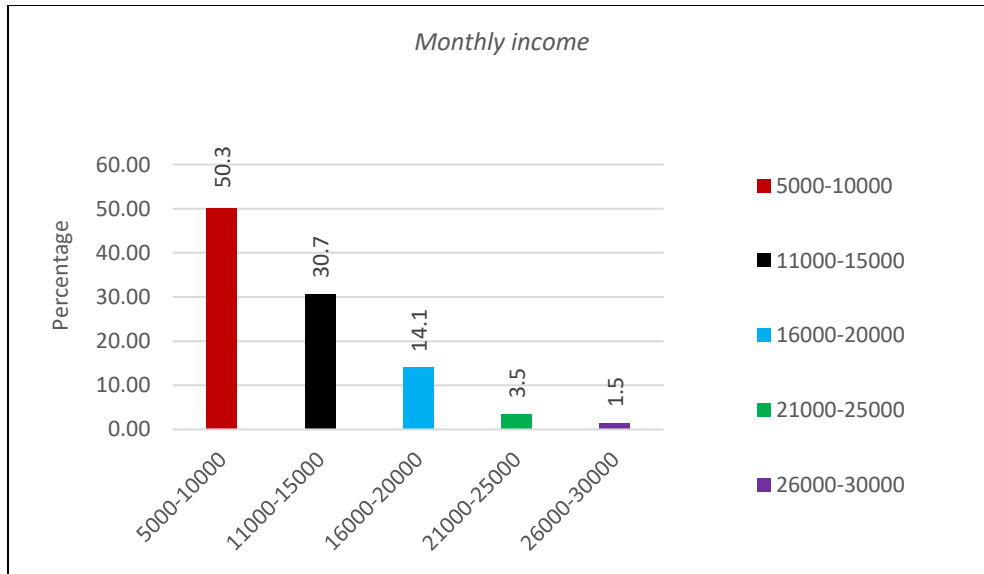


Figure 5. Monthly Income of Respondents

5. Sources of Awareness about The Park

Jaji-Aryub Park has gained significant popularity over the past four years. Data revealed that 36.2% of respondents learned about the park through friends, while 26.6% cited Facebook as their primary source of awareness. Television, radio, and other media platforms accounted for the remaining sources (Figure 6). These findings suggest that interpersonal communication and social media play major roles in promoting recreational sites in the region. Similar patterns have been documented in visitor studies across South Asia, where word-of-mouth and social media are among the most influential channels for tourism promotion (Septriani & Yusnida, 2023). The growing influence of digital media reflects the expansion of internet access and the increasing reliance of youth on online platforms for leisure planning in Afghanistan and neighboring countries Bhatt., & Bhat. (2016).

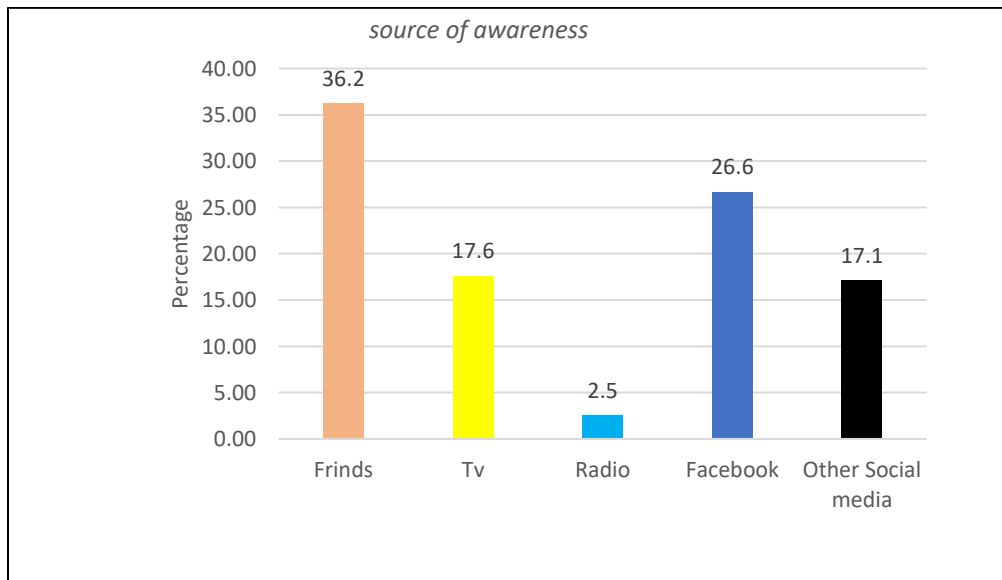


Figure 6. Source of Awareness About Park

6. Visit Seasons and Days

Visitation patterns varied across seasons and specific days. The majority of respondents (96.4%) reported visiting the park during spring and summer, the remaining 3.6 of respondents said that they visit during autumn, while no respondents reported visiting during winter (Figure 7). This absence of winter visits may be attributed to the region's cold climatic conditions. Regarding specific days, the highest number of visits occurred during Eid holidays (58.3%), followed by other holidays (17.6%) and Fridays (9.0 %) (Figure 7). This trend likely reflects the availability of public holidays and the cultural preference for recreation during religious celebrations. Comparable seasonal visitation trends were reported in Ayubia and Margalla Hills National Parks, Pakistan, where summer and spring seasons accounted for the majority of visits due to favorable weather and holiday periods (Artell *et al.*, 2025);(Balasubramanian, 2020).These results confirm that climatic conditions and cultural events strongly influence recreational behavior in Muslim-majority regions.

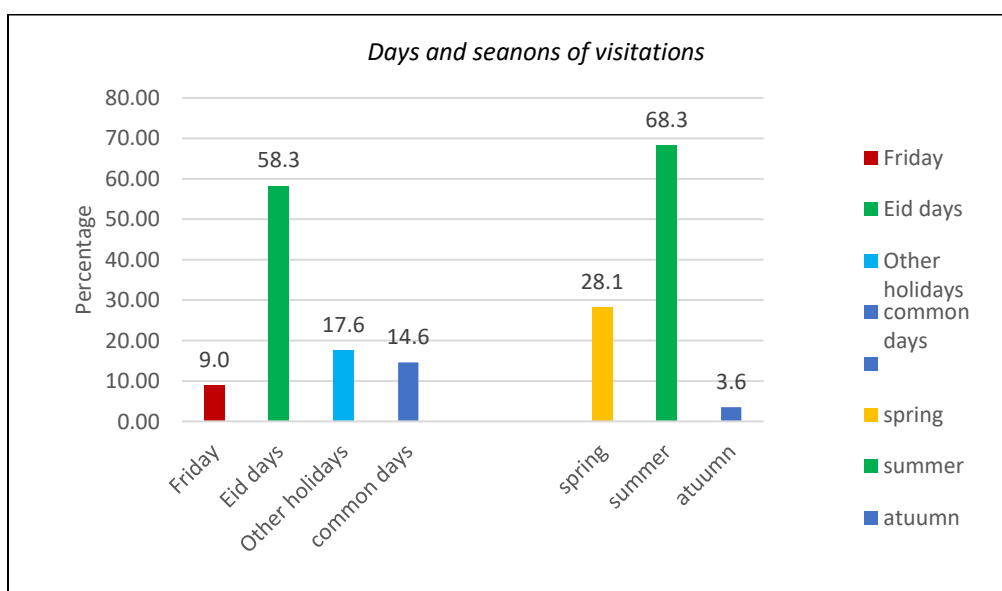


Figure 7. Seasons and Days of Visitations

7. Problem While Visiting (Park Facilities)

According to the respondents, several constraints affected their recreational experience within the park. Approximately 40% reported a deficiency in visitor infrastructure, particularly the absence of adequate hotels and restaurants. Another 31% identified the lack of sufficient parking facilities as a major concern, while 15.5% cited unprofessional or inappropriate behavior by park staff. The remaining 13% of respondents indicated that they did not encounter any notable problems during their visit (Figure 8). These challenges are likely associated with the park's limited spatial capacity and the high concentration of visitors during the peak recreational season, which may strain existing facilities and management systems.

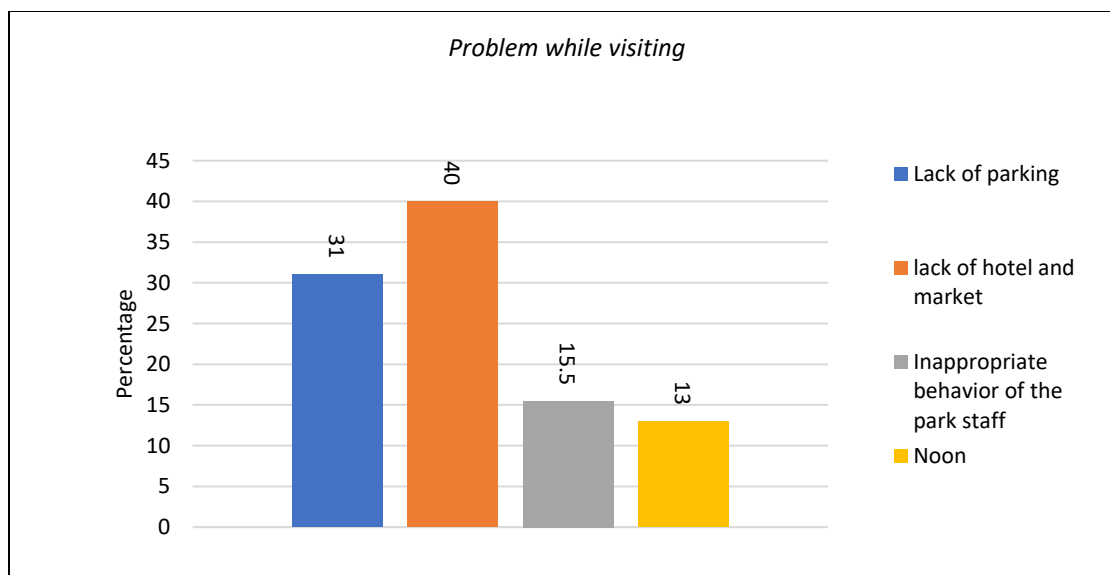


Figure 8. Park Facilities

8. Total Economic Value of the Park

Based on the study's assumptions, the province's climate is most favorable for recreation during spring and summer, which together account for an estimated 180-day recreational season. Data indicated that the average number of visitors during Eid holidays, Fridays, and regular days was approximately 5,000, 500, and 75 persons per day, respectively, during 2024–2025, resulting in an estimated total of 89,800 visitors for the season. According to the second assumption, about 40% of visitors (35,920 persons) were from neighboring areas, with an average expenditure of 300 AFN per person, yielding a total of 10,776,000 AFN. The remaining 60% (53,880 visitors) traveled from more distant regions, spending an average of 2,500 AFN per person, with a total expenditure of 134,700,000 AFN. Based on these estimates, the total economic value of the park during the 2024 recreational season was approximately 145,476,000 AFN (equivalent to about USD 207,822). Similar results were reported by (Bhatt., & Bhat. (2016); Santos & Galicia, (2025).

9. Eco-friendly Behavior of Visitors

Environmental protection is a shared responsibility, and adherence to environmental regulations is particularly important within protected and recreational areas. According to survey data from Jaji-Aryub Park, 16.6% of respondents stated that environmental protection measures were followed very highly by visitors, while 29.65% believed they were followed highly. In contrast, 27.64% and 22.11% of respondents indicated that such measures were followed at low and very low levels, respectively, only 4% of respondents had no opinion on the matter (Figure 9). These findings suggest that compliance with environmental protection measures among visitors remains limited. The restricted area of the park and excessive visitor numbers likely contribute to the weak implementation of environmental protection practices, posing a significant challenge to the park's sustainable management. Comparable studies in Pakistan and Nepal have similarly highlighted the challenges of ensuring visitor adherence to environmental rules in protected areas. In Pakistan, research has shown that while visitors generally express support for conservation, actual compliance with site regulations remains low due to weak monitoring and limited enforcement (Khalid, 2024). More broadly, evidence from developing-country contexts indicates that a lack of environmental education, insufficient signage, and inadequate enforcement capacity often undermine eco-friendly behavior among tourists (Wang *et al.*, 2022); (Ali & Irfan, 2021).

Strengthening environmental education, on-site interpretation, signage, and enforcement mechanisms can therefore play a crucial role in enhancing eco-adherence and maintaining ecological integrity in recreational landscapes such as Jaji-Aryub Park.

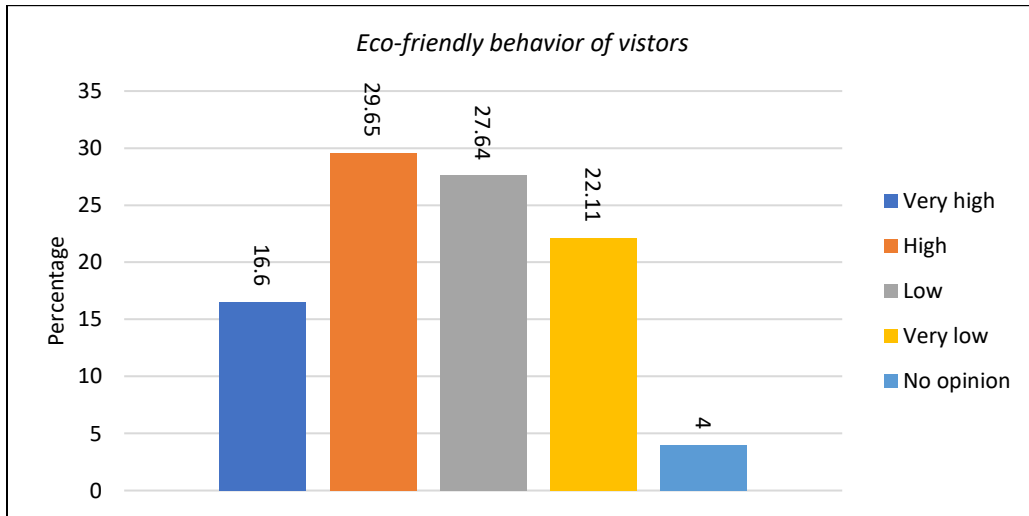


Figure 9. Eco-Friendly Behaviors of Respondents

10. Price of Iterance Ticket

Visitor opinions regarding entrance fees and other expenses also varied: 20.1% considered them very high, 41.2% described them as high, and 38.2% and 0.5% rated them as reasonable and low, respectively. These perceptions may reflect the respondents' differing economic conditions (Figure 10). Similar findings were observed in visitor satisfaction surveys in Margalla Hills and Ayubia National Parks, where inadequate facilities and management practices were cited as major constraints to sustainable tourism development (Adu *et al.*, 2024). Thus, investment in visitor infrastructure and staff training is crucial for promoting both visitor comfort and conservation-oriented behavior.

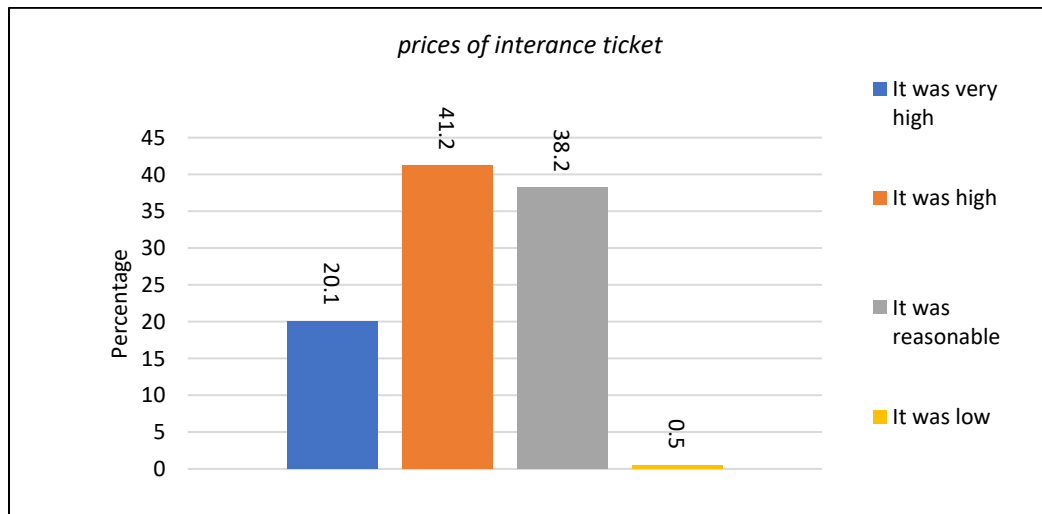


Figure 10. Satisfaction Level about Ticket Prices

11. Willingness to Pay More

A majority of respondents (57%) expressed a willingness to pay more for the sustainable development and conservation of the park, while 43% were unwilling to contribute additional funds (Figure 11). This variation in willingness may be influenced by differences in educational background and awareness regarding the importance of protected areas. Those unwilling to pay more may be constrained by economic challenges or dissatisfaction with the level of services provided by park administration. Comparable studies using the Travel Cost and Contingent Valuation Methods in South and Southeast Asia have found that visitors' willingness to pay is positively correlated with environmental awareness, income, and satisfaction with site management (Artell *et al.*, 2025); Bhatt., & Bhat. (2016); (Khan, 2006). These findings suggest that improving environmental education and park services could strengthen public support for conservation financing in Afghanistan. Encouraging community involvement and transparent use of collected funds may further increase trust and visitor willingness to contribute to the park's sustainable management.

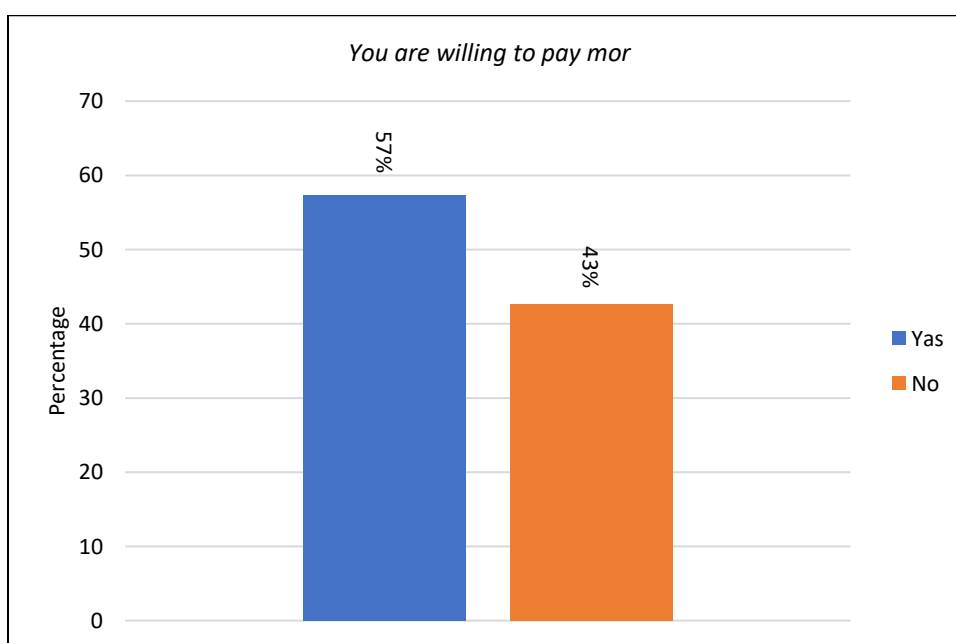


Figure 11. Willing To Pay More

CONCLUSION and RECOMENDATIONS

Conclusion

This study evaluated the recreational and economic value of Jaji Aryub Park in Paktya Province, Afghanistan, using the Travel Cost Method (TCM). Findings revealed that the park is a significant recreational destination, attracting nearly 90,000 visitors annually, with a total estimated economic value of approximately 145.47 million AFN (around USD 207,822) during the 2024–2025 recreational season. Most visitors were young males, primarily from neighboring regions, highlighting both cultural patterns and the park's geographic accessibility.

Despite its ecological and recreational importance, several challenges threaten the sustainable management of the park. These include inadequate infrastructure, overcrowding during peak recreational periods (spring and summer), limited compliance with environmental protection measures among visitors, and insufficient awareness and experience of park staff in ecotourism

management. The lack of facilities such as parking areas and markets further limits visitor satisfaction and may reduce the potential for repeat visits.

Recomendations

To ensure the park's long-term sustainability, the following measures are recommended:

- Expansion and infrastructure improvement: The park's area should be increased, and visitor facilities enhanced to accommodate growing numbers and improve the recreational experience.
- Carrying capacity management: The number of visitors should not exceed the park's ecological carrying capacity. Alternative recreational sites should be developed and promoted to reduce overcrowding during peak seasons.
- Environmental protection enforcement: Strict environmental protection regulations should be established and effectively implemented to preserve the park's ecological and aesthetic values.
- Capacity building for park staff: Training programs should be conducted to improve staff knowledge and skills in ecotourism management and sustainable resource use.
- Public awareness and education: Awareness campaigns, sign boards, guiding signboards, park map, brochures and media broadcasting should be launched to encourage visitors to follow environmental protection guidelines and engage in responsible tourism practices.

Implementing these measures will help balance ecological conservation with recreational use, ensuring that Jaji Aryub Park continues to provide both environmental and economic benefits for current and future generations.

Limitations of the Study

Several limitations also appeared during study. Due to legal and social disputes among local communities, accurate information regarding the precise area of Jaji Aryub Park was not obtainable. Additionally, data collection was conducted over a single year, which may limit the generalizability and accuracy of the economic valuation. For future research, it is recommended that data should be collected over multiple years and from diverse visitor categories to improve the reliability of economic estimates. Determining the park's exact area is also essential for accurately assessing its carrying capacity and for supporting sustainable management strategies.

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