



Research Paper

Open Access

Tourism, Threat, and Opportunities for the Forest Resources: A Case Study of Gabin Jabaa, District Swat, Khyber-Pakhtunkhwa, Pakistan

Malak Sohail^{1*}, Sultan Muhammad¹, Kaleem Mehmood¹, Shoaib Ahmad Anees², Fazli Rabbi¹, Muhammad Tayyab³, Khadim Hussain⁴, Mansoor Hayat⁵ and Uzair Khan¹

1. Institute of Agriculture Sciences and Forestry, Faculty of life Sciences, University of Swat, Khyber-Pakhtunkhwa, Pakistan
2. College of Forestry, Beijing Forestry University, Beijing, 100083, China
3. Department of forestry and wildlife, University of Haripur
4. Department of Forestry and Range management, Arid agriculture university, Rawalpindi,
5. School of forestry, Northeast Forestry University Harbin, China.

*Corresponding author e-mail: malaksohailkhan1997@gmail.com

SUMMARY

The primary objective of this study was to conduct an empirical investigation on the adverse effects of tourism on forest resources in the Gabin Jabba region of the Swat district, which is located in the province of Khyber-Pakhtunkhwa, Pakistan. For this purpose, the study region was separated into three replications with different degrees of tourism activity: R1 (high), R2 (moderate), and R3 (low). In each iteration of the experiment, a systematic sampling methodology was utilized. This involved the use of four grids, each spanning 500 meters by 500 meters. From these grids, five circular plots were randomly chosen, with a radius of 8.4 meters. The plots were employed for the purpose of evaluating the quantification of seedling populations and the enumeration of tree stems. The statistical analysis was performed at a significance level of $\alpha=0.05$. Concurrently, structured questionnaires were distributed to people in the surrounding area to assess their perspectives regarding the influence of tourism on the regeneration of forests. A sample size of 50 key informants was surveyed using a sampling intensity of 10%. The results indicated that R3 exhibited the greatest number of regenerations per unit area, whereas no statistically significant differences were identified between R2 and R1. According to the survey findings, a significant majority of respondents, specifically 76%, expressed the belief that the degradation of forest resources can be linked to the lack of proper planning in the tourism sector.

Keywords: Gabin Jaba, Tourism, Regeneration, Moist temperate area, Swat, Khyber-Pakhtunkhwa

Citation: Sohail, M., S. Muhammad, K. Mehmood, S. A. Anees, F. Rabbi, M. Tayyab, K. Hussain, M. Hayat, and U. Khan. 2023. Tourism, Threat, and Opportunities for the Forest Resources: A Case Study of Gabin Jabaa, District Swat, Khyber-Pakhtunkhwa, Pakistan. International Journal of Forest Sciences 3(3):194-203.

INTRODUCTION

Tourism is one of the fastest growing industries today; events are becoming more and more relevant within the tourism industry. People have become much more interested in all sorts of activities and are going to move far away to take part in events they find

interesting (Aloysius *et al.*, 2020). It has emerged as a leading industry in modern times with expected growth from 1.4 billion (2020) to 1.8 billion in 2030. However, this sector has been affected by the COVID-19 (Altaf *et al.*, 2021).

Pakistan is placed best for tourism purposes and provide a lot of potentials for tourism industry due to diverse type of climate and topography and contributing to economic growth (Ahmad *et al.*, 2015). However, a major problem with the development of tourism is the negative image with respect to security as depicted by media sources. Other problems include deficiency of supportive infrastructure, rubbish development policies, inadequate facilities and guidance for tourists, a lack of government support and interest, and low investment in this sector (Khan *et al.*, 2020).

Despite tourism as potential for economic development, still this sector has no positive impact on natural vegetation of the area where tourists are attracted and have caused many disturbances to vegetation (Niu and Cheng, 2019). The pattern of population dynamics of seedlings, saplings and adults of a plant species can exhibit the regeneration profile, which is used to determine their regeneration status (Bekele, 1994). Further, the success of establishment of new regeneration in an area depends upon the factors including initiation of seedling, its survival, and its growth ability (Good and Good, 1972).

However, regeneration establishment in forest ecosystem is prone to the effect of unplanned tourism and other human disturbances in various condition such as free grazing by livestock, trampling effect, and tree felling etc have regeneration problems (West *et al.* 1981). Tourism does not have only effect on regeneration but can affect wildlife population as reported by Cunha, (2010) that not only vegetation but birds and animals have significantly significant effect due to tourism activities. The main reason for this issue is the mass conversion of natural assets of the areas of tourism into hotels and other tourism infrastructures associated with tourism. Although forests are capital and provide opportunity of tourism, but on the other hand, these forests are degrading and afford great loss due to tourism activities. The development of tourism industry directly leads to deforestation at world level often results in global serious environmental issues (Kuvan, 2010). Therefore, the relationship of tourism with the environment is complex and involves many activities that can have adverse environmental effects including the construction of general infrastructure such as roads and airports, and of tourism facilities, including resorts, hotels, restaurants, shops, golf courses and marinas (Camarda and Grassini, 2003).

The present study has been framed to study the effect of increased and unplanned tourism on forest degradation. The Hypothesis of this study was tourism has adverse effect on natural regeneration and overall condition of forest. Therefore, the study has focused on how tourism affects natural regenerations and what is the perception of local communities regarding tourism and forest resource degradation. Although tourism has improved the economic wellbeing and livelihood of the local community of Swat but has also adversely affected local environment and forest area. Among the prominent tourism spots, the newly explored area of Gabin Jaba was selected attracting tourists from all areas, and the effect on natural vegetation is conspicuous and can easily be quantified.

MATERIALS AND METHODS

The research site, Gabin Jabba, is situated at the geographical coordinates of 35.1706° N latitude and 72.3711° E longitude. The location of the area is in Tehsil Matta, which is part of the Swat district. It is situated about 60 kilometers from Mingora, specifically on the western bank of the Swat River. The geographical location of this region is situated at an estimated distance of 36 kilometers westward from the primary Matta Road, which serves as a major route connecting the towns of Bahrain and Kalam.

The region is characterized by a moist temperate temperature zone and is situated at an elevation of roughly 2600 meters above sea level. The forest within this particular geographical area has a diverse array of prevailing tree species, including as *Pinus wallichiana*, *Abies pindrow*, *Piceas mithiana*, horse chestnut, and walnut, among several others. It is of significance to acknowledge that the forest in question has been declared as a protected forest, operating under an 80:20 sharing agreement. Under this structure, 80 and 20 % shares have been allotted to local communities and government respectively. The study area is represented in Figure 1.

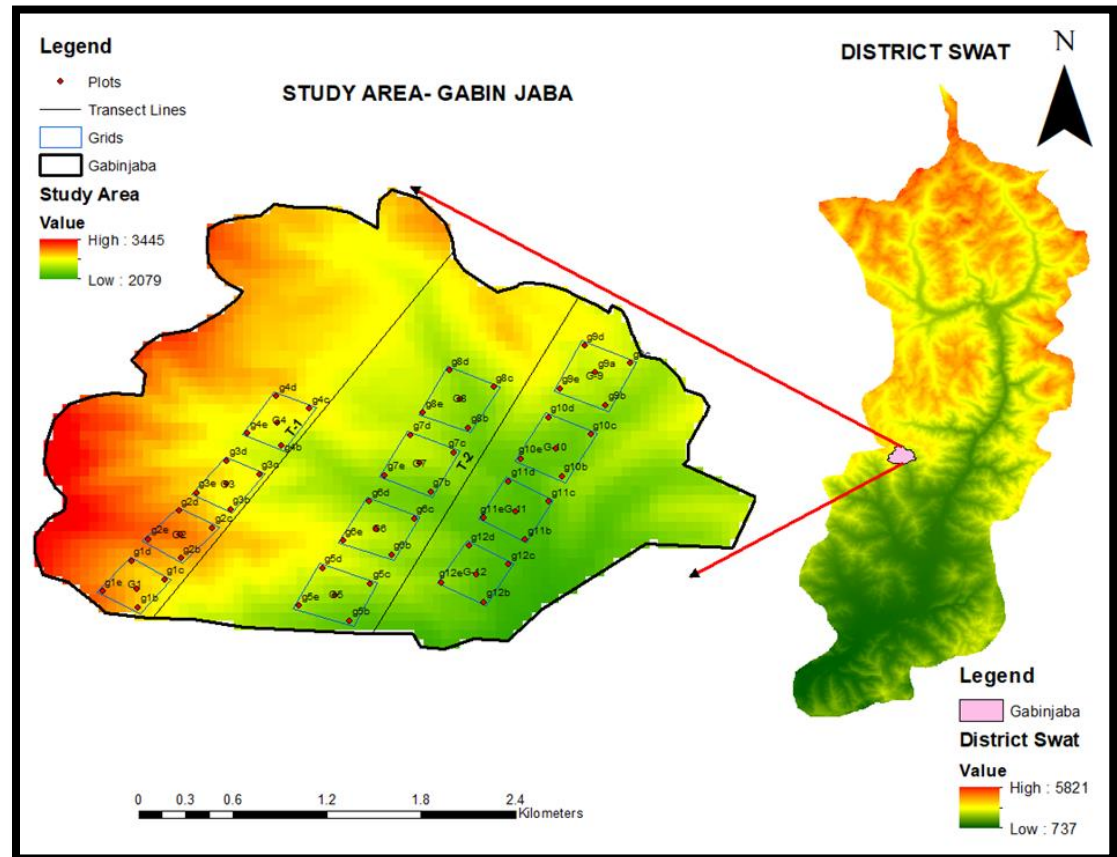


Figure 1: Map of the study area Gabin Jaba District Swat.

METHODOLOGY OF THE STUDY

To evaluate the effects of tourism, the research utilized a procedural methodology. The study area was initially partitioned into three transect lines (replications) through eye observation, considering the diverse levels of tourism activity. In this study, the

authors classified different locations based on the level of tourism activity. Specifically, Replication 1 (R1) was used to represent places with a high degree of tourism, Replication 2 (R2) signified areas with a moderate level of tourism, and Replication 3 (R3) comprised areas with the lowest intensity of tourism. Four grids, each spanning 500 meters by 500 meters, were defined within each transect line. Furthermore, diligent attempts were undertaken to guarantee that every grid situated along the identical transect line had comparable climatic and topographic attributes, encompassing factors such as the percentage of slope.

In this study, a cluster sampling methodology was employed to choose the sample. Specifically, five circular plots with a radius of 8.4 meters were chosen at random for the purpose of data collection (Ali, 2017). Regeneration was defined as any seedlings observed below a height of 31.5 cm above ground level within the circular plots (Knight 1963). The data obtained throughout the study encompassed several variables, such as the number of regenerations, tree density, slope %, X and Y coordinates, and altitude. These measurements were meticulously documented with the aid of GPS technology. The utilization of a systematic methodology facilitated a thorough examination of the effects of tourism on the forest resources within the designated research region.

STUDY DESIGN

The research utilized a robust methodology to evaluate the statistical significance of variations in regeneration and tree density among three transect lines. The analysis encompassed the subsequent procedures: The data gathered for the regeneration and tree density in the three transect lines underwent a normality test using the Shapiro-Wilk test with a significance level (α) of 0.05. This procedure was implemented to verify that the data satisfied the assumptions necessary for subsequent statistical analyses. Furthermore, the assessment of variance equality was conducted utilizing Levene's test. The data was subjected to Analysis of Variance (ANOVA) in order to ascertain if there were any statistically significant variations in regeneration and tree density across the three transect lines (R1, R2, and R3). The analysis of variance (ANOVA) is a robust statistical test that is commonly employed to compare means among several groups. The chosen significance level (α) was established at 0.05 to ensure a careful assessment of the data.

Post-hoc analysis was performed subsequent to the analysis of variance (ANOVA) in order to evaluate the statistical significance of differences between specific treatment pairs. The Tukey test, also known as Tukey's Honestly Significant Difference test, was employed for this purpose. The utilization of this post-hoc test facilitates the identification of transect lines that display statistically significant disparities in regeneration and tree density. The findings derived from the statistical analysis were visually represented through the utilization of charts and graphs. The utilization of visual representations aids in the efficient communication of findings and enhances the facilitation of result interpretation. Concurrently with the quantitative analysis, the researchers gathered qualitative data by means of standardized questionnaires that were administered to the local population. The objective of these investigations was to acquire a deeper understanding of the local community's perspectives regarding the influence of tourism on the process of forest

regeneration. The utilization of qualitative data collection methods facilitated a comprehensive comprehension of the topic matter. A representative sample of the local population was obtained by selecting 50 key informants at a 10% intensity level. The use of both quantitative and qualitative methodologies augmented the comprehensiveness of the study's results and conclusions.

RESULT

EFFECT OF TOURISM ON NATURAL REGENERATION

This study rigorously evaluated the influence of tourism on the natural regeneration of the forest. The analysis consisted of conducting a hypothesis test ($H_0: \mu_1 = \mu_2 = \mu_3$), which proposes that there is no statistically significant variation in natural regeneration across the three replications (R1, R2, and R3). The null hypothesis was rejected based on the results of the analysis of variance (ANOVA) done at a significance level (α) of 0.05. This suggests that there are notable differences in the process of natural regeneration among the three replications, indicating that levels of tourism activities have a noticeable impact on this feature of the forest ecosystem. The maximum number of regenerations was observed in Replication 1 (R1), which is associated with a region characterized by few visitor activities. The observation is graphically represented in Figure 2, indicating that R1 displayed the highest level of natural regeneration. On the other hand, no notable discrepancies were detected between the two remaining replications, indicating that regions characterized by moderate and low levels of tourist (R2 and R3) had comparable levels of natural regeneration.

The findings underscore the significance of mitigating the influence of tourism on the process of natural regeneration. Additionally, they emphasize the necessity of implementing sustainable practices in regions that encounter heightened levels of visitor engagement. These measures are crucial in order to safeguard the forest's regenerative potential and maintain its long-term vitality.

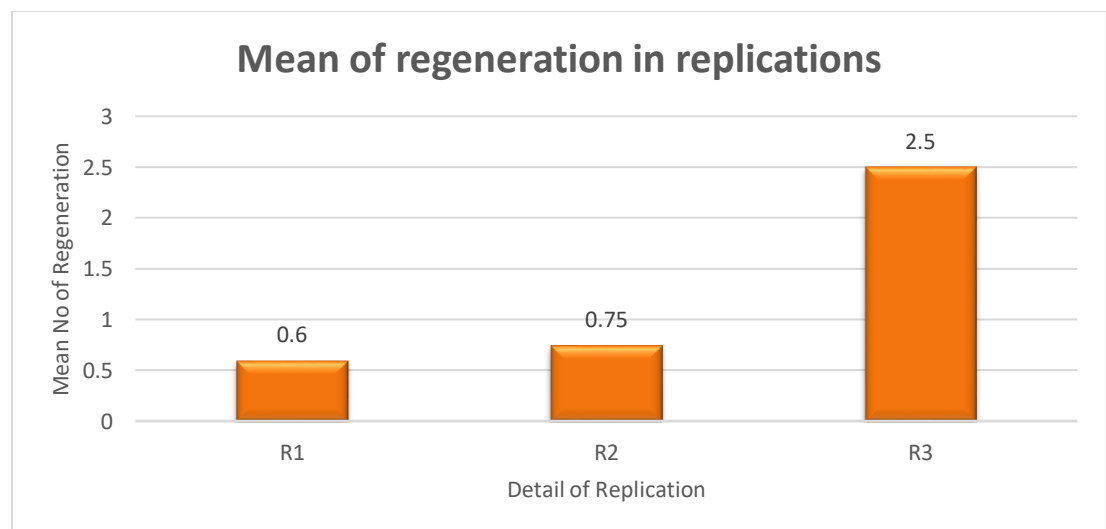


Figure 2: Detail of regeneration on various replications.
EFFECT OF TOURISM ON DENSITY OF FOREST

The performed investigation was to evaluate the influence of tourism on the density of forests, and the obtained findings were significant. The study undertaken at a significance level (α) of 0.05 revealed a statistically significant difference in forest density. This suggests that there is a noticeable impact on forest density based on the level of tourism activity seen along the three transect lines (R1, R2, and R3). The research indicated that Replication 1 (R1) exhibited the highest forest density. The graphical representation of this finding may be observed in Figure 3, which visually demonstrates that the transect line in question displayed the highest density of trees and flora. This discovery implies that regions characterized by significant tourism activities may exhibit a greater level of forest density. However, it is crucial to take into account the potential trade-offs and environmental consequences that may arise from the growth of tourism in these regions. In summary, the results underscore the necessity of implementing meticulous administration and sustainable methodologies in regions characterized by significant tourism engagement. This approach is crucial in order to uphold and safeguard the abundance of forest resources, all the while accommodating the preferences and requirements of tourists.

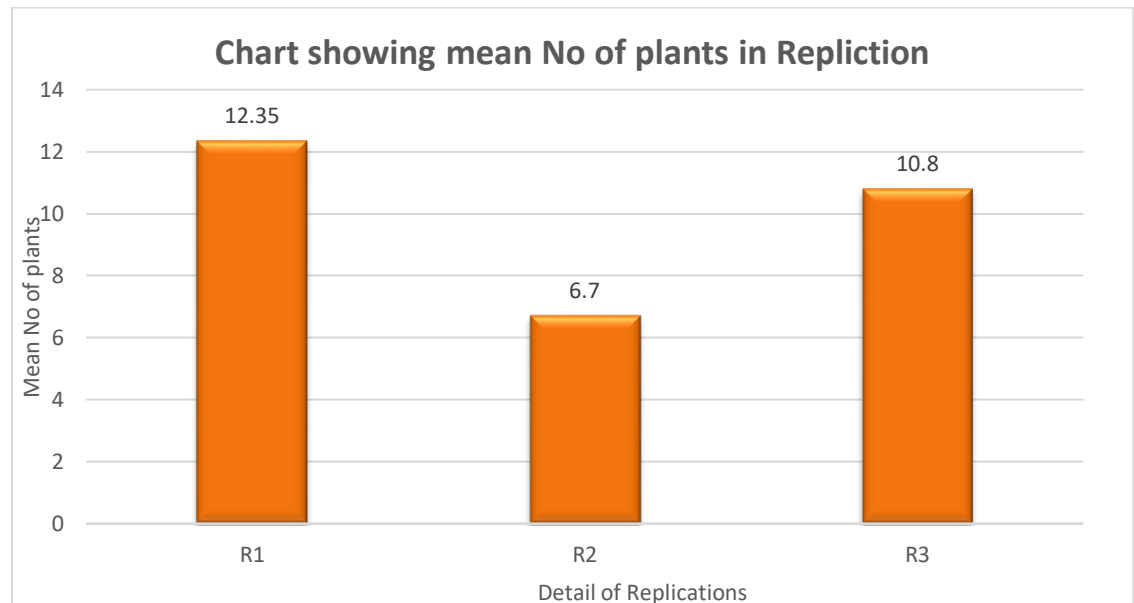


Figure 3: Detail of forest density along various replications.

PERCEPTION OF PEOPLE REGARDING EFFECT OF TOURISM ON FOREST

This study aimed to examine the local community's view of the impact of tourism on forest resources. The results of the study demonstrate a diverse array of viewpoints among the participants. A substantial proportion of participants, accounting for 76% of the surveyed population, voiced apprehensions over the deterioration of forest resources as a result of unregulated tourist endeavors. The group expresses concern regarding the potential negative impacts of tourism on the overall health of the forest ecosystem. A minority of the participants, comprising 14% of the survey respondents, expressed the viewpoint that the state of the forest is indeed seeing positive changes due to the influence of tourism. Significantly, subsequent examination uncovered that the participants predominantly consisted of persons engaged in tourism-related

enterprises. The individual's viewpoint could be shaped by the economic advantages that arise from activities associated with tourism. A segment of the local population, comprising 10% of its members, held the viewpoint that tourism exerted no observable impact on the forest's health. The group did not observe any statistically significant good or negative effects related to tourism. Figure 4 vividly depicts the diverse perspectives existing throughout the local community. The presence of a multitude of perspectives among local inhabitants on the impact of tourism on forest resources is apparent, with a significant portion expressing apprehensions over potential degradation. The aforementioned findings highlight the significance of effectively overseeing and controlling tourism endeavors in order to strike a harmonious equilibrium between economic advantages, environmental preservation, and the welfare of the indigenous population.

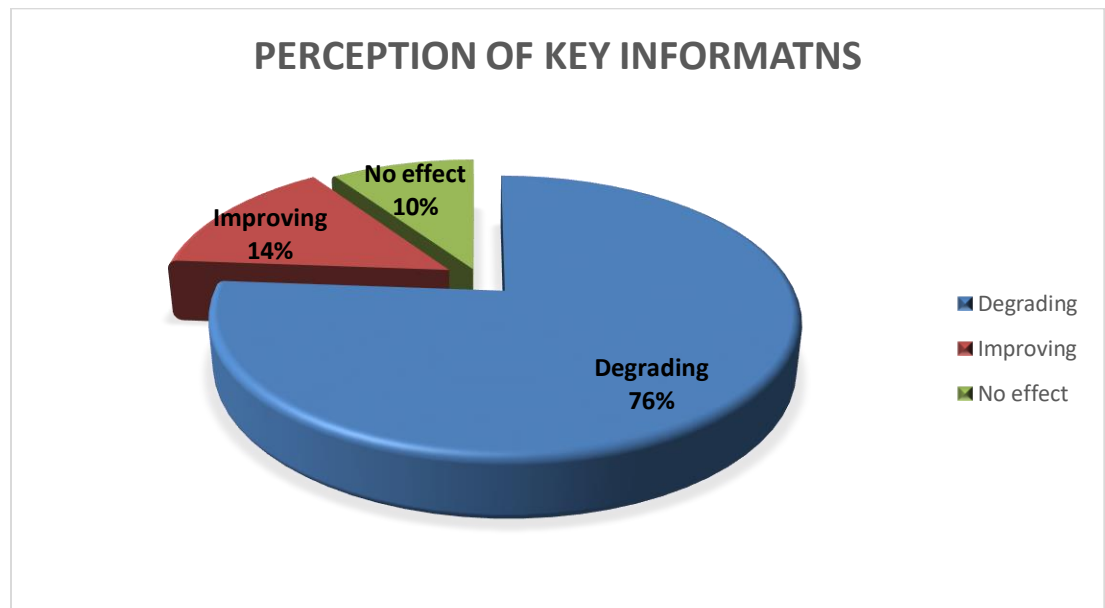


Figure 4: Perception of the people regarding the degradation of forest due to tourism.

TOURISM TREND

The research of tourist trends reveals that there was a lack of significant tourism activity prior to the year 2015. Since 2018, there has been a notable increase in tourism, demonstrating a constant and increasing pattern. The visual representation of the escalating number of tourists in the region is portrayed in Figure 5.

The results indicate that the region is positioned for sustained expansion in tourism endeavors in the forthcoming decades. The aforementioned trend emphasizes the growing appeal of the region to tourists and emphasizes the necessity of taking proactive efforts to effectively manage and control tourism in order to maintain its sustainability and mitigate any negative effects it may have on the local environment and resources.

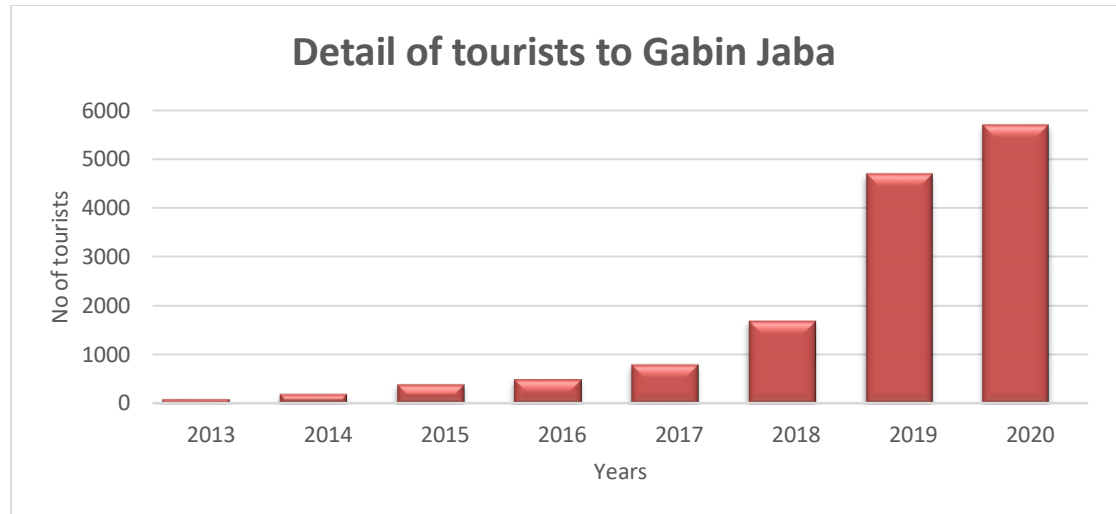


Figure 5: Detail of tourists from 2013 to 2020.

DISCUSSION

The main aim of this study was to examine the negative impacts of tourism on forest degradation and to document the perspectives of the local people regarding the declining condition of forest resources. According to (Altaf *et al.*, 2021) Pakistan is harboring immense tourism potential due to a unique geographical setup, scenic landscapes, biological and cultural diversity, and hospitable people. However, several problems i.e. security, inadequate facilities etc., deter the development of this sector. (Khan *et al.*, 2020).

Similarly, Swat District's economy has been greatly influenced by tourism, among other contributing reasons. This may be attributed to the district's varied landscapes and picturesque features, which are evident throughout the year, including both summer and winter seasons. But still there are certain hurdles and constraints which hinder the growth and development of tourism thus it has little impact on the economy and adverse impact on the natural resources of the area. The absence of regulations in tourism operations has continually resulted in adverse effects on forest resources and the environment. The susceptibility of forests to the negative impacts of unregulated tourism has continuously affected their regenerative capacity, overall density, and overall condition. One significant consequence is the process of girdling, which leads to a decrease in density and overall deterioration of the forest environment. According to West *et al.* (1981), the occurrence of regeneration concerns is predominantly observed in forests that have been subjected to human disturbances, including uncontrolled livestock grazing, trampling, and tree felling.

The assertion made by Kuvan (2010) has been additionally supported, since it illustrates that the proliferation of tourism on a broad scale has resulted in noteworthy social and environmental difficulties at a worldwide level. The primary cause of these challenges can be attributed to the widespread transformation of natural resources in tourist destinations into hotels and related infrastructure. Camarda and Grassini (2003) have also provided evidence to support the notion that certain tourism activities can result in negative environmental impacts. Niu and Cheng (2019) have further substantiated that, although the potential for economic advancement, the tourism industry has exerted an adverse influence on natural flora, resulting in

disturbances to vegetation on a worldwide scale. According to Cunha (2010) findings, the impact of tourism extends beyond the depletion of forest resources and encompasses the degradation of wildlife habitats, resulting in a decline in wildlife populations within these regions.

The examination of local attitudes provided more evidence supporting the notion that tourism has a detrimental effect on forest resources. The main factors contributing to this adverse effect include girdling, the growth of infrastructure linked to tourism, and accompanying activities. However, a small number of key informants challenged these assumptions by saying that tourism does not have any negative impacts on forest resources. The individuals in question were commonly involved in enterprises associated with the tourism industry. The tourism sector experienced a notable increase in activity starting in 2015, after a period of decreased international tourism to Pakistan following the events of 9/11. The results of our study are consistent with the research undertaken by Goodrich (2002), which examined the negative effects of conflict on the tourism industry. In summary, this research effectively establishes the adverse impacts of uncontrolled tourism on forest resources, resulting from a range of disturbances including girdling, tenting, and hotel development. The veracity of these findings was additionally corroborated by local key informants. Considering the growing prevalence of tourism, it is advisable to consider the implementation of ecotourism as a strategy to alleviate the adverse effects on forest resources.

CONCLUSION

In conclusion, this study highlights the substantial tourism potential of Swat, particularly emphasizing Gabin Jaba as a prominent tourist attraction that makes a considerable contribution to the local economy. Nevertheless, it is imperative to not disregard the detrimental effects of tourism on forest resources. The increase in tourism activities has been linked to negative impacts on the health of forest ecosystems, particularly due to practices such as girdling and the expansion of hotels and other enterprises related to tourism. Based on the findings, it is very advisable to introduce and actively promote the concept of ecotourism within the region. Ecotourism presents a sustainable framework for tourism that places emphasis on the preservation and maintenance of natural habitats, encompassing valuable forest resources. Through the implementation of ecotourism principles, the region of Swat, namely Gabin Jaba, has the potential to optimize the advantages of tourism while concurrently addressing its adverse effects on the natural environment, with a special emphasis on the preservation of invaluable forest resources. The current trend towards ecotourism has the potential to serve as a paradigm for implementing responsible and sustainable practices within the tourism industry. This approach aims to safeguard the long-term welfare of both the indigenous community and the surrounding ecosystem.

Competing interests: Not applicable

Funding: The study was conducted on a self-help basis without any funding from outside.

Authors' contributions: The details of contribution by each author in the article. Mr. Malak Suhail collected the data and compiled the experimental work. Mr. Sultan Muhammad handled the analysis of the data. Kaleem Muhammad design the material and methods, reviewed the manuscript. Muhammad Tayyab designed the study's methodology, and Fazli Rabbi created the conceptual framework, focusing on the issues associated with forest regeneration. Khadim Hussain and Shoaib Ahmad Anees studied the relevant material and identified gaps. Mansoor Hayat and Uzair Khan were critically read this article.

Acknowledgements: All the staff of forest as well as local people are acknowledged for their help in data collection.

REFERENCES

- Ahmad, H., M. Öztürk, W. Ahmad, and S.M. Khan. 2015. Status of natural resources in the uplands of the Swat Valley Pakistan. In *Climate change impacts on high-altitude ecosystems* Springer, Cham. 49-98.
- Ali, A.2017. Carbon stock Assessment of forest of KP. Pakistan Forest Institute, Peshawar.
- Aloysius, N. A. , Yousaf, Saira, and M. Saba. 2020. Challenges and Opportunities for ecotourism in District Jaffna, Sri Lanka. *Journal of Wildlife and Ecology* 4(3):122-129
- Altaf, M. T. , Hussain, M. S. H. Khan, M. Umair, U. Atique, K. J. Iqbal, J. Naseer, A. Saeed, G. Yasin, M. A. Latif, R. M. Shafiq, A. Saleem, S. Adil, and M. H. Hamed. 2021. An overview of Pakistan Tourism Sector, potential hindrances, and Impact of COVID-19-a review. *Journal of Wildlife and Ecology* 5(4):186-201.
- Bekele. T. 1994. Studies on remnant Afromontane forests on the central plateau of Shewa, Ethiopia, Ph.D. thesis, Uppsala University, Uppsala.
- Camarda, D. and L. Grassini. 2003. Environmental impacts of tourism.
- Cunha,. A.A.2010. Negative effects of tourism in a Brazilian Atlantic Forest National Park. *Journal for Nature Conservation*, 18(4). 291-295.
- Goodand, N.F. and R.E. Good. 1972. Population dynamics of tree seedlings and saplings in mature Eastern hardwood forest, *Bulletin of the Torrey Botanical Club* 99(4): 172-178.
- GOODRICH, J.N. 2002. September 11, 2001, attack on America: a record of the immediate impacts and reactions in the USA travel and tourism industry. *Tourism Management*, vol. 23, no. 6. 573-580.
- Khan, M. S. H., N. A. Khalid, Raja, S. Ullah, and F. Anjum. 2020. Tourists' prospective about recreation at daman-e-koh and linked hiking trails in Margalla Hills National Park, Islamabad. *Journal of Wildlife and Ecology* 4(1):1-14.
- Knight, D.H. 1963. A distance method for constructing forest profile diagrams and obtaining structural data. *Tropical Ecology*. 4: 89–94.
- Kuvan, Y.2010. Mass tourism development and deforestation in Turkey. *Anatolia*, 21(1), .155-168.
- Niu, L. and Z. Cheng. 2019. Impact of tourism disturbance on forest vegetation in Wutai Mountain, China. *Environmental monitoring and assessment*, 191(2).81.
- West, D.C., H.H. Shugart and J.W. Ranney. 1981. Population structure of forests over a large area. *Forest Science* 27: 701-710.