

Impacts of forest fire on people living in suburban Kathmandu in the buffer zone of Shivapuri Nagarjun National Park

Dipshana Dangol¹ and Indresh Sharma²

Abstract

The research study mainly intends to gauge the impact of forest fire in the buffer zone community of Shivapuri Nagarjun National Park, mainly in the area of Chapali Bhadrakali (ward number 2) adjacent to the sprawling Kathmandu metropolitan city. The study reflects the frequent occurrence of forest fire events happening in the area and its effects, both physical and psychological, on the local communities in the buffer zone. The locals have their work cut out due to the repetition of the incident every year leaving them no alternative than to ready themselves to face the challenges. Thus, the research paper includes both the threats caused by forest fires to people's livelihoods as well as the local's perception regarding the fire incidents. Ergo, this study analyzes the impact status of the buffer zone community of Chapali Bhadrakali with regard to seasonal forest fire events.

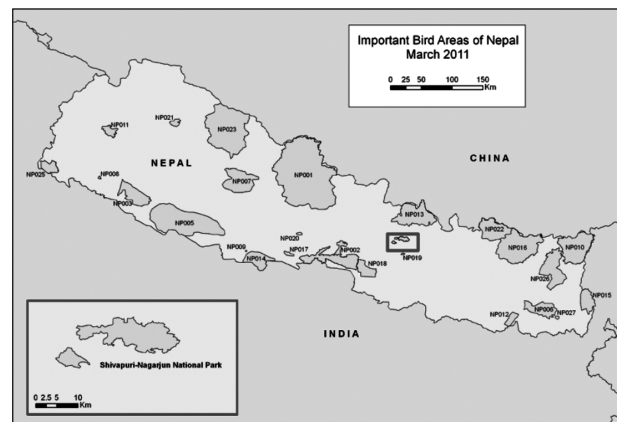
Keywords : forest fires, buffer zone, community, conservation

1. Introduction

1.1 Background

Each year forest fire poses the biggest threat to several thousand hectares of forest land in Nepal (Kathmandu Post, 2019) which directly and indirectly impacts people's livelihoods, causing loss to human settlements, health and natural vegetation. People mainly face forest fires during the dry season, in March and April, with the highest concentration of most severe fire cases (Matin et al., 2017).

Shivapuri-Nagarjun National Park (SNNP), covering an area of 159 sq km and at an elevation range of 1000 to 2,732 m is Nepal's ninth national park located on the northern fringe of the capital city Kathmandu, which is also the most populous city of the country (Ministry of Forests and Environment, 2017). In addition to it being an important watershed reserve that supplied drinking water to the capital in not so distant past, more recently, in 2005, SNNP was also declared as an important bird and biodiversity area by the government- particularly in avian fauna which numbers around 320 species (SNNP 2017).



Source- The Darwin Initiative³

The park represents the richness of the mid-hill ecosystem but sadly undergoes serious forest fire problem every year. The seasonal forest fire, mostly in the dry season, leads to insufficient food in the natural habitats of the national park. Due to the park's undulating landscape and forests, a forest fire is a challenge for park administration. Therefore, to enhance the protection and conservation

1. Graduate, Development Studies, National College, Kathmandu University affiliate
2. Faculty, Ecology and Environment, National College, KU affiliated, indresh.sharma@nationalcollege.edu.np
3. <https://www.darwininitiative.org.uk/documents/DAR18005/22052/18-005%20AR1%20Ann3.9%20Ecosystems%20poster.pdf>

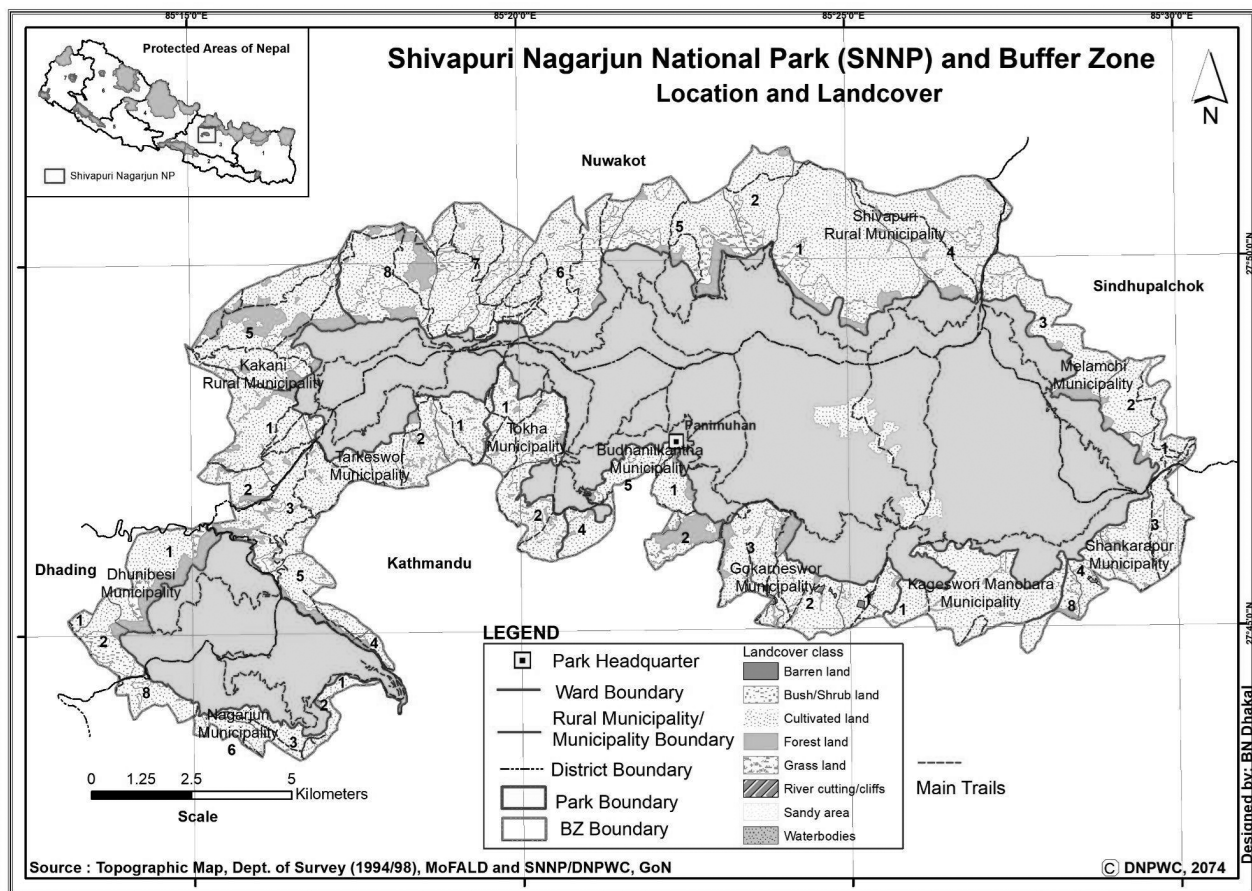
of the national park area, SNNP declared a buffer zone in 2016- fourteen years after the park's establishment in 2002. The main aim of the buffer zone was to achieve the active participation of the people in the conservation of SNNP (MoFE, 2017).

Recent history: Shivapuri Nagarjun National Park has faced numerous fire issues over the years. According to the annual SNNP report of 2012/13, forest fires were spotted in 24 different locations which also include the area around Panimuhan, Budhanilkantha, and, inside and around the area of Chapali (SNNP, 2013). Moreover, 21 forest fires were spotted again in different locations between 2013 and 2014 (Shrestha, 2015). On the 2015/16 annual report of SNNP, a fire was spotted in Nagarjun, Sundarijal, and Bishnumati during the months of March-April, and again in the same year fire incident was found in Nagarjun, Sundarijal, Tarakeswor, Suerechaur, Tokha, Bishnumati and Chisapani in the months of April-May. Almost 2600 hectares of forest land caught on fire in different locations this year (SNNP, 2016). Furthermore, in the year 2019, a forest fire was caught inside the national park which destroyed almost 8 ha of the forest land (Lama, Mandal, & Kandel, 2019), and in 2021 SNNP caught a huge forest fire impacting the national park. As stated by the 2016/17 annual report of SNNP,

the national park is facing many challenges along with the increasing forest fire and encroachment in the buffer zone area (SNNP, 2017). Likewise, in 2022, the buffer zone community of the SNNP suffered from forest fires, after the occurrence of the forest fire in the Panchakanya community forest (Radio Nepal, 2022), following the forest fire in the Thanidanda area, south side of Jugal Danda Nani Gumba (myRepublica, 2022). Moreover, the fires in the forest have not only destroyed the lands but also caused damage to the human settlement; wild animals like monkeys ran away from the forest, whenever there are forest fire due to their survival instinct, damaging the agricultural crops mainly maize and human properties (Shrestha, B. et al 2022).

1.2 SNNP and Buffer Zone

Shivapuri is one of the four hills, along with Nagarjun, Phulchowki, and Chandragiri, which surround the Kathmandu metropolitan area. Its namesake, the Kathmandu valley, in turn, contains in itself three districts viz. Kathmandu, Lalitpur and Bhaktapur. The district of Kathmandu has the city of Kathmandu and ten other municipalities (Kathmandu Metropolitan City, 2021). Out of the ten, Budhanilkantha municipality stands out with its unique landscape, and has areas which lie in the buffer zone of the SNNP.



The SNNP buffer zone, covering an area of 118.61 sq. km extends from Kathmandu to the districts of Nuwakot, and Dhading up to Sindhupalchowk district of Bagmati province of Nepal. It has a total number of 12,352 households with a total population of 56,474 (MoFE, 2017). According to the District Forest Office, the SNNP is surrounded by 25 buffer zone communities, with its size varying from 0.77 to 63.9 ha (Bowers et al., 2017).

The Budhanilkantha municipality lies in the Kathmandu district, with a longitude of 85.3653°E and latitude of 27.7654°N. It covers an area of 35 sq km and has a population of 153,303 residing in 32,039 households in its 13 wards (CWIS TA Hub & ENPHO, 2019). Out of which ward no. 2, Chapali Bhadrakali-the research's field site-has a total population of 6,129 with 1,453 households (DFRS, 2018). It is surrounded by the SNNP in the East and South belts, mostly having plain and sloppy land in the South-North part, covering an area of 6.270km² (DFRS, 2018). Out of all the wards in the municipality, Chapali Bhadrakali/ ward no. 2 is known for being more vulnerable to the hazards like forest fires and it falls in the park buffer zone (Ward Office, 2017).

Geographically, the municipality is more likely to face disasters like floods, landslides, forest fires, and earthquakes. Meanwhile, its ward, Chapali Bhadrakali, remains threatened by the effects caused by these disasters. Therefore, in order to reduce this risk, the area has Panchakanya Buffer Zone Community Forest Users (PBZU) that looks after the situation.

Forest trees are an integral part of rural livelihoods in Nepal. The forests in Nepal are mainly conserved and managed by community forest, which accounts for 20% of the country's total forest area and benefits almost 1.6 million households (Magarath et al., 2013). Hence in 1993, the government of Nepal initiated the buffer zone approach by adopting a participatory approach in buffer zone resources management where the Users' Group and the committee were formed to carry out the activities of the local community development smoothly and effectively (Bhusal, 2014).

1.3 Buffer zone and forest fire

Forest fire is the biggest threat in Nepal that can severely cause damage to its ecosystems resulting in biological and economic losses, human and wildlife casualties, and health hazards (Singh et al., 2020). More than 41% and about 40% of the forest fire incidents recorded in Nepal are within 1km of a settlement and road respectively; however, the fire events were lesser in the area having more distance between the forest area and settlements (Matin et al., 2017). The forest fire that occurred at the Panchakanya community forest in the year 2022 was brought under the control with the help of the officials like Armed Police Force, Nepal Army, National Park, and

Nepal Police (Radio Nepal, 2022).

Shivapuri Nagarjun National Park is one of the national parks of Nepal that is close to the human settlement and heavily surrounded by a suburban population. Within the past years, forest fire incidents in the country have been noticeably increasing, with more casualties. It has mainly impacted the buffer zone community that depends on the forest for their livelihood, adversely affecting them by limiting the resource availability of the forest and destroying public assets and infrastructure.

Although the fire management policy of the SNNP (2017-2021) has clearly mentioned its objectives to prevent forest fire in order to avoid the adverse effects of fire on wildlife and its habitat, there are no strategies planned to minimize the threats in the buffer zone area other than mentioning the buffer zone communities in the fire-prone season (Ministry of Forests and Environment, 2017). The issue lies when the government, which acts considerably during each fire-prone season, soon forgets about the necessity of forest fire prevention and firefighting after the seasonal forest fire.

The poor management and not having a systematic plan for prevention and control of forest fires, with limited resources to monitor and manage the forest fire, is only making the national park area and its buffer zone communities more vulnerable to these incidents. The forest fire risk is more severe, especially in the Buffer Zone area, having more chances of causing long-term health problems, with adverse ecological, economic, and social impacts on the community (Satendra& Kaushik, 2014). A number of villages are burnt every year with the loss of lives, cattle, and other property due to the forest fire. Yet, the organization fighting forest fires has rarely been spotted (MoFSC, 2009). As soon as the monsoon arrives, the forest fire get naturally under control, and shortly after being handled, the raging forest fires are forgotten (The Kathmandu Post, 2021).

Nepal has been experiencing unusual forest fire over the years. Out of 75 districts of Nepal, 18 were found at high risk of forest fires (Matin et al., 2017). Over 400,000ha of land is burnt annually in Nepal due to forest fires (Bajracharya, 2002, as cited in Matin et al., 2017). The monitoring and management of fire in Nepal have always been weak as the forest department has minimal resources for addressing forest fire management (Matin et al., 2017). And the ones who are affected the most are the people close to the area when these incidents occur. The forest fire erupted on 11th April 2021, near the Budhanilkantha Municipality in the Shivapuri Nagarjun National Park, impacting both the forest resources and the man-kind (THT, 2021). SNNP is closest to the country's capital Kathmandu, a highly populated city, while its buffer zone area is only less than 10 miles away from the North of the capital city (Bowers et al., 2017), which has

increased the risk of forest fire enormously.

The threats arise with the city facing urban sprawl, and its effects are clearly visible near the national park area, mainly on the northern side. The wildland-urban interface has a greater chance of being impacted by forest fire (Shephard, 2018). The frequent event of forest fire is not new to the buffer zone community, which faces loss from the incidents each year, suffering damage to health, ecological, economic, and social aspects.

The conducted study mainly helps to identify the forest fire risk and its impact in the buffer zone community of Chapali Bhadrakali-2, Budhanilkantha Municipality- one of the vulnerable wards to forest fire, following its history of disasters. The objective of this study was to determine the impact of forest fire in the Panchakanya BZ community of Shivapuri- Nagarjun National Park by assessing the consequences of forest fire on the livelihood of the buffer zone community and gauge perspectives of residents with regards forest fire. The study area of the research covered Chapali Bhadrakali- 2 of Budhanilkantha Municipality and people of the PBZU area are included in this study. Due to the uncertainty caused by COVID-19 pandemic, the methodology was adapted to fit in with the WHO guidelines. The study took the predictive assumption that the PBZU community of Chapali Bhadrakali, Budhanilkantha Municipality is affected by the seasonal occurrence of forest fires in the SNNP.

2. Methodology

The data collected from Budhanilkantha Municipality ward no 2 (Chapali Bhadrakali) was accumulated from both primary and secondary data sources. A data need assessment was carried out resulting in quantitative data collection of economic, and livelihood loss caused by the forest fire and qualitative data collection to gauge perspective of the residents through interview method, along with on site observation. The research design used is convergent parallel mixed method.

A combination of household survey (n=32)-- with use of a schedule with both open and close-ended questions- and key informant interviews (KIIs) along with site observation were used as primary data sources. Due to which an element of triangulation is used in analyzing the results. Literature, ward records, journals, and official websites were used as secondary data sources.

A 5-point rating scale was used to determine the perspectives of locals regarding forest fire. Also, an interview schedule was constructed and two respondents viz. the ward chairman of the Chapali Bhadrakali-2 and chairperson of PBZU were identified as the key informants. The interviews were recorded and later transcribed and organized according to themes and analyzed before inserting as an important part of results. Finally, observation was carried out by taking notes and

field photographs. Free, prior and informed consent was taken from all the participants with verbal consent before recording audio and clicking photographs. Meanwhile, throughout the research, anonymity and confidentiality is maintained wherever it was sought.

3. Results



Fig. 1: Demarcation of study site

Source- Google Map



Fig. 2: Detailed view showing land uses of the study area covered

Source- Google Map

3.1 Livelihood of Buffer zone Community

As shown in Fig 3, out of the total households surveyed, the majority i.e. 63.33% are involved in Agriculture and Livestock as their income source. Few respondents were involved in business/ finance/others and some were unemployed.

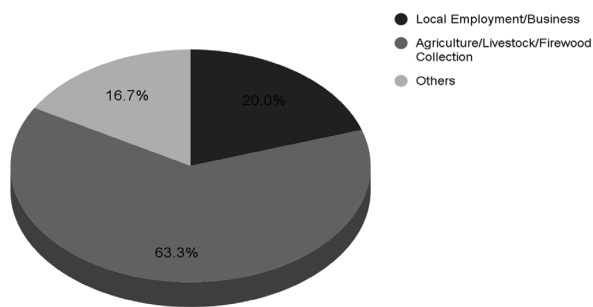


Fig. 3: Major livelihoods at the community

3.2 KII schedule with Ward Chairman

"The 2021 Shivapuri Nagarjun National Park forest fire affected the community more indirectly than directly. With the water resources drying out, the people had to bear the impact for almost two months." ---Mr. Rajendra Khadka, Ward Chairperson

Chairman Mr. Khadka has served the Chapali Bhadrakali for over four years. He explains that besides the direct effect of forest fire drying up water resources, the community people have also suffered from an indirect loss due to the forest fire happening over the years. The forest is home to wild animals, and when the disasters like fires occur in forest, they tend to move outside the area, searching for a place to escape. And when the same event happens in the Shivapuri Nagarjun National Park's forest, the wild animals, mainly monkeys, come out of the forest looking for shelter and food but end up destroying property, field, and agricultural land of the people.

Mr. Khadka added that the ward has offered to help the people who suffered from the loss or property damages from such circumstances. The ward has also taken precautions, to avoid casualties, like providing training to local people, creating fire lines to avoid spreading in every direction, and more. He also believes that adding water sources in the forest area would make it easier and quicker to control fire. He also opined that placing the firefighting equipment near the forest area would help to manage the situation more swiftly. He also added that though at the present, not many people are overly dependent on forest resources, but, a similar incident of 2015 of supplies disruption with India could increase dependency of the local residents on forest resources.

Mr. Khadka states that the supplied disruption with India created havoc among the people due to gas shortage. With that, the local community started targeting the forest resources to cook their meal and run their daily livelihoods. As the situation was tough, the administration could not stop the people and had to accommodate by providing the solution of one tree per house.

In order to not repeat the same chaos in future, the ward is planning for alternatives. He further concluded by saying that 'dependency on the forest resources is not the solution; we have to search for alternatives'.

3.3 KII Schedule with Chairman, PBZU

"I believe the huge forest fire we faced this year (2021) will undoubtedly repeat in the future. The main risk is to human settlement. Ironically, it is also one of the reasons behind the rising number of forest fire incidents over the years." --Mr. Bikas Shrestha, Chairperson of PBZU

Chairman Mr. Bikas Shrestha has been looking after the Panchakanya Buffer Zone Community Forest Users for over two years. He believes that forest fire occurrences are quite common in the Shivapuri Nagarjun National Park, mainly on the upper side of Bishnumati and Wasik village. He wryly added that that area faces forest fire events every year, but the incident of 11 April 2021 drew public's attention as it was more devastating and one of the worst forest fire experiences in 2021 so near the country's capital.



Fig. 4: Upper Hill Area of Chapali Bhadrakali

Mr. Shrestha adds to his statement, mentioning that the PBZU has been handling forest fires for years; however, the year 2021 was exceptional. That year the national park had to undergo 2 to 3 hectares of land damage impacting the local community severely.

In the Buffer zone, people are restricted to use resources from the national park. Nevertheless, they are still allowed to enter the area once a year for collecting leaf litter, fodder, foliage and some non timber forest products. These activities help keep the forest area clean while also reducing forest fire risk by clearing out the dried wood and leaves.

The Chairperson also mentions as they are taking control of the forest fire event, numbers of fatalities are decreasing. Regardless, the local people still have difficulties in their livelihood.

Shivapuri is rich in natural resources, mainly water, and the people who are dependent on water from the park for drinking purposes, extend from ward no 2 to ward no 8. The occurrence of forest fires each year destroys the trees and shrubs in the area, resulting in the dried-out primary water sources locally called pani-muhan. On top of that, he estimated that the increasing urban sprawl contributes to approximately 75% of the forest fire in the area. This results in absence of open area more and more as people move towards the SNNP periphery wanting to connect to nature.

Mr. Shrestha mentioned that though they ‘cannot stop people who want to visit the park as the forest belongs to everyone’; however, what they can do is ‘search for the solution’. According to him the SNNP forest fire of 2021 was controlled with the help of committee people with additional support. The negative impact the fire left behind was the ‘air pollution that everyone in the area had to bear’.

However, it was more extreme for the community who resided closer to the forest fire spots and suffered more due to it-- a tough situation given that it was during the COVID-19 pandemic. He also shared that for a long time, an issue has been ongoing between the Buffer zone community and local government regarding handling the responsibilities of the forest. Yet, ‘forest fire management laws are yet to be made’.

3.4 Loss Caused By Forest Fire in the Community

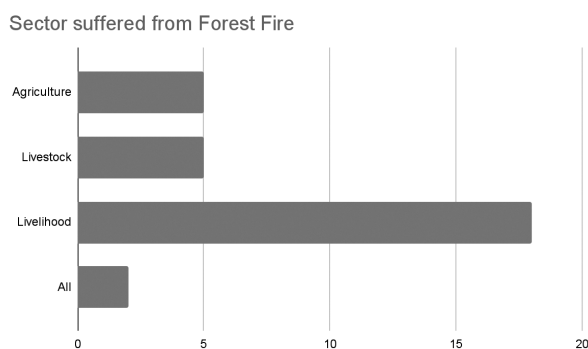


Fig. 5: Sectors suffered from Forest Fire

As shown in Fig. 5, out of the total respondents, equal proportion i.e. 16.67% believes that agriculture and livestock sectors suffered the most due to forest fire. But the biggest response i.e. 60% believes that it was livelihood that got affected the most. Most of the respondents consider the reason behind this sector's suffering is the pollutants caused by the forest fire. Two respondents gave no replies.

3.5 Perception towards impact on livelihood and property

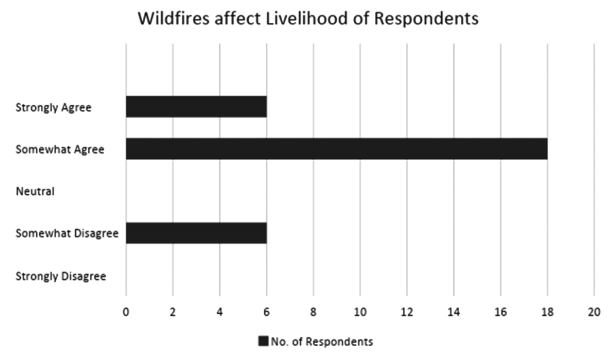


Fig. 6: Community’s perception towards impact on livelihood

The data were also analyzed for gauging residents’ perception regarding forest fire, to know the long-term psychological effect on the people after facing the menace every year. On that account, a big majority of the respondents agreed that forest fire affect their livelihood. Two were no replies.

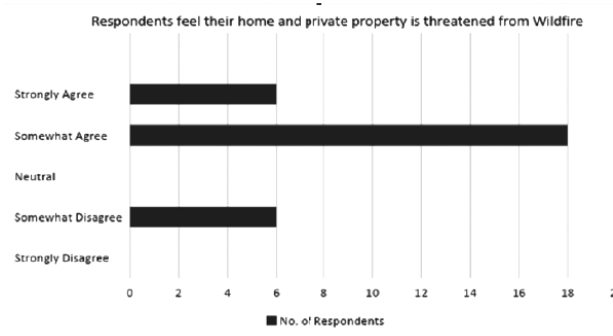


Fig 7: Perception regarding threat to private property

Likewise, a big majority of the respondents also felt threatened by chances of their homes and property being gutted by the seasonal occurrence of forest fire in the area. Moreover, most of the informants –two were no replies– also agreed that forest services should put efforts to safeguard private properties within fire-prone areas.

4. Discussion and Conclusion

The buffer zone committee of the Shivapuri Nagarjun National Park had to go through several challenges in controlling, minimizing, and managing the forest fire in the forest. In doing so, the local people have always played a crucial role in handling the fires, with equal participation in the management plan.

The people residing in the national park buffer zone are well familiar with the causes and consequences of the forest fire that repeat every year. Regardless of being familiar with the situation, they become hopeless when fire outbreaks every fire-prone season. Mainly the people who live in the upper hill area encounter more challenges

than the individuals living in the lower hill.

The fires that repeat in every dry season due to natural cause is hard to get away from or even take control of. However, the forest fire could get worse and more challenging due to anthropogenic cause. In the case of Chapali Bhadrakali, urbanization has played a big role in the increasing number of forest fires annually. Being a famous nearby national park to the Kathmandu metropolis, the SNNP gets a large visitor footfall resulting in human activities which, in turn, could also be responsible for most of the fire occurrences. The testimony lies in the fact that the fire in the national park mainly occurs in the location where there are many visitors. Also, locally speaking, within last few years, people have migrated to the buffer zone area of the national park mainly for its refreshing habitat and rental land for agricultural purposes.

Besides, an increase in the number of forest fire would only bring disasters to human settlement and the environment resulting in the loss of human lives and ecosystem. The people residing near the Shivapuri Nagarjun National Park are mostly dependent on its water sources for drinking purposes. With the increasing incidents of forest fire, the water sources of the national park are drying out, destroying the important ecosystem services that benefited the community. A case in point is the fire that occurred in SNNP in 2021 which dried out the water sources for around two months. Furthermore, the impurities generated from that forest fire got mixed in the water degrading the agricultural production and harmed health of livestock.

The communities residing on the upper hill of the Chapali Bhadrakali are primarily dependent on agriculture and livestock for their living. Those communities are restricted to collect resources from the national park. However, there are no limitations on the resources near the forest area. As it happens, the locals collect the necessary things from nearby the forest area rather than the national park itself for sustaining their livelihoods. However, only a few individuals depend on forest resources like fuel woods for their livelihood nowadays. Also, most of them are not aware of the training programs conducted by the local government. Yet, without proper firefighting training and tools, those communities still have to douse down the fire themselves. One of the respondents commented that 'if we don't settle the fire in time, it will just grow bigger and put our settlement area at risk'. The people of PBZU might not have faced serious fatalities for now, but they are terrified by the frequent fire they face every year.

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