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**INSIGHTS FROM THE FIELD**

# Conservation amidst Urbanization: Insights from Explorations around Bannerghatta National Park, Bengaluru

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## 1. INTRODUCTION

Protected areas (PAs) function as cornerstones of biodiversity conservation while catering to the livelihoods of nearly 1.1 billion people globally (CBD 2022). PAs have become increasingly important in urbanizing landscapes, where they supply ecosystem services such as local climate, water regulation, and pollution mitigation. In addition, they provide access to outdoor leisure for city dwellers, thereby enhancing the idea of being "close to nature" (Van Oijstaeijen *et al* 2020). However, current and future urban expansion trends indicate localized but cumulatively significant negative impacts on PAs, including fragmentation (McKinney 2002; McDonald *et al* 2008).

Bengaluru, the third-largest metropolis in India, harbours a major PA—the Bannerghatta National Park (BNP)—on its outskirts (Figure 1). Due to unplanned residential and industrial expansion, the BNP area has witnessed massive urban sprawl (Ramachandra and Setturu 2019). Our research attempts to highlight the urbanization-driven transformations in people–nature interactions around BNP, with the view of contributing to integrated strategies for the management of PAs within wider peri-urban landscapes.

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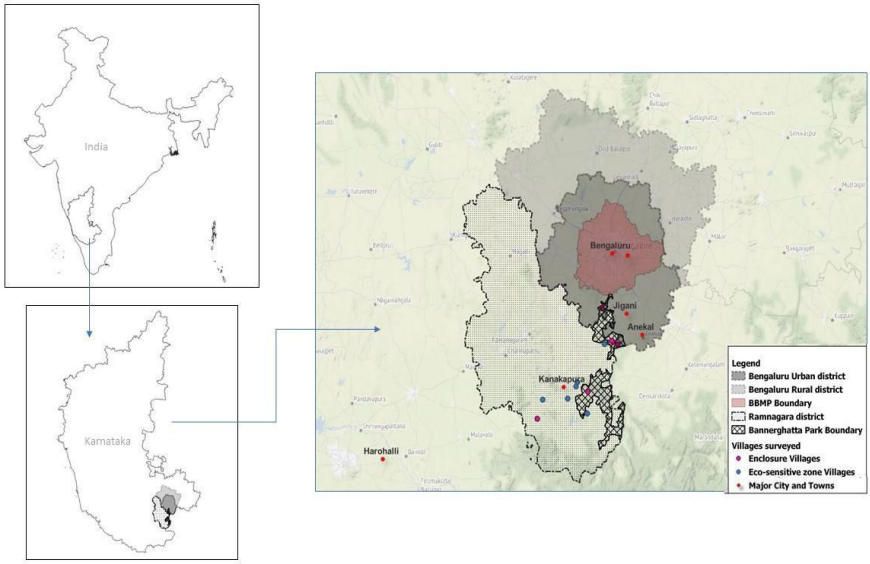
This article details the early findings from exploratory visits and surveys carried out in the first half of 2022 to understand the complexities of conservation in the fast-urbanizing landscape of BNP.

## 2. STUDY SITE

BNP, dominated by dry deciduous and scrub forests, spreads over 260 km² across four wildlife ranges: Bannerghatta, Harohalli, Anekal, and Kodihalli. It is a critical habitat for Asian elephants, leopards, and sloth bears, and it is an important ecological corridor closely linked to other PAs like the Cauvery Wildlife Sanctuary and Bandipur Tiger Reserve (Ramachandra and Setturu 2019). Following its designation as a national park in 1972, stable vegetation cover has been maintained within BNP, but the surrounding areas have suffered large-scale conversions from industrial, residential, and tourism development (Adhikari *et al* 2017). An eco-sensitive zone (ESZ) of 268.9 km² was declared vide a MoEFCC notification in 2018 to regulate land-use activities around the park. This was later reduced to an area of 168.8 km² (Rao 2019). There are 77 villages in the ESZ and 16 enclosure (EL) villages within the park (MoEFCC 2020). Local communities have traditionally been dependent on the forest for agriculture, livestock grazing, and collection of forest produce (Varma *et al* 2009). With forests coming under state control, access to forests has become a challenge (Jayaprakash and Hickey 2019).

**Figure 1:** Location Map of BNP Indicating the Study Villages




**Source**: Map created using QGIS (version 3.14.16)

## 3. METHODOLOGY

In order to examine trends in forest dependence and livelihoods around BNP, we explored villages from its four wildlife ranges and purposively selected 12 villages—6 EL villages and 6 from the ESZ where urbanization-induced changes (land conversions, change in occupation, etc)—were observed (Figure 1). Semi-structured questionnaire-based surveys were conducted by randomly sampling 8–10 households from each village using the list obtained from the local *anganwadis* (child care centre/school). Here, we present our initial analysis based on the data collected from a total of 102 respondents.

## 4. RESULTS: OBSERVATIONS AND REFLECTIONS

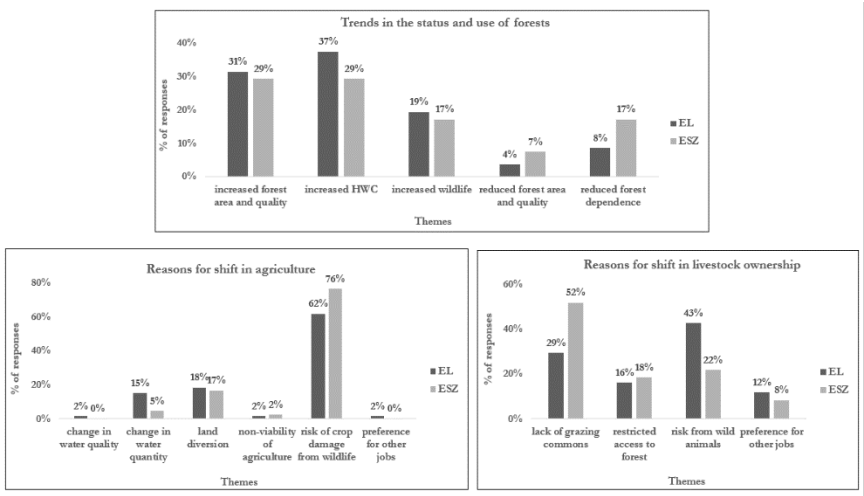
### 4.1. Status and Use of Forests

When probed about trends in the status of the forests, 37% and 29% of the respondents from EL and ESZ villages, respectively, indicated that human–wildlife conflict (HWC) and incidences of crop damage, livestock loss, and loss of human life have increased (Figure 2). This was subsequently linked to an increase in forest area and quality (29% responses in ESZ and 31% in EL) as the Karnataka Forest Department (KFD) is actively undertaking plantations and reclaiming encroached lands. People also relate increased forest protection to reduced forest dependence, especially in ESZ villages (17% responses), while EL villages within the park continue to have some extent of forest dependence.

### 4.2 Changes in Agriculture

Despite the proximity to a megacity, the majority of the population around BNP continues to practise agriculture. A major trend perceived by respondents is a change in cropping patterns, especially from ragi (Finger millet), the staple crop, to mulberry for sericulture over the last two decades. About 76% of the ESZ and 62% of EL respondents (Figure 2) cited crop damage from wildlife as the most significant reason for the shift. The fragmented nature of the BNP, combined with the relatively high density of elephants, has fuelled HWC. Finger millet (57%), red gram and maize (12% each), and coconut (7%) were the main crops that were harmed (Venkataramana *et al.* 2017), making them unpopular. Meanwhile, commercial viability, better water supply and road transport, and accessibility to Asia's largest cocoon market in Ramanagara and other urban markets in Bengaluru have nudged farmers to grow either mulberry or fruits and vegetables.

**Figure 2:** Trends in Forest Dependence, Agriculture, and Livestock Ownership around BNP




**Source**: Primary data from household surveys

Land-related conflicts and diversion are prevalent both in EL (18%) and ESZ (17%) villages. All the respondents sampled from two of the EL villages do not have legal land documents, which affects their rights for agriculture and water supply. They either lease out land or continue to practise agriculture in "problematic areas", which people claim to be agricultural land or diverted *gomala* (grazing commons), while KFD calls it encroachment. We could see a live example of this in one of the EL villages where there is no demarcation between the *gomala* and the forest boundary. The village also faces the possibility of resettlement due to increasing HWC, but people are unwilling and unsure of the life that they will have elsewhere.

### 4.3 Changes in Livestock Ownership

Total livestock ownership has reduced in both EL (30% responses) and ESZ (38%) villages. Specifically, goat and sheep (11%) and local cattle breeds (11%) have reduced over time in ESZ villages. The major reason for this shift in ESZ was the lack of *gomalas* (52% responses) (Figure 2), which have reduced in both area and access, owing to diversion for agriculture, housing, etc, or even inclusion in forest areas. Restricted access to forest fringes for livestock grazing was recorded in both ESZ (18% responses) and EL (16% responses) villages. KFD has declared livestock grazing along with forest encroachment, smuggling, fires, etc, as restricted activities in order to promote natural regeneration in forests (Manjunath 2016).

Risk from wild animals is the most pertinent challenge (43% responses) for livestock ownership in EL. Increasing incidences of leopard attacks have reduced the attractiveness of rearing sheep that need to be grazed. Local cattle breeds have become rare, as high-yielding hybrid cows are preferred to cater to the ever-increasing milk demands of Bengaluru. Exotic breeds reduce the "burden" of grazing as they can be comfortably stall-fed but are quite expensive to maintain and often face high disease risk. Losing hybrid cattle to wildlife depredation proves expensive, turning people hostile towards conservation efforts (Margulies and Karanth 2018), which is an instance of conflict between urbanization and conservation.

An old couple, Gurappa and Bairamma, whom we interacted with in Chudahalli, an EL village, report witnessing frequent HWC. They lost their 26-year-old son to elephant trampling when he had gone out to graze sheep in the forest. They sold all their livestock and are now dependent on their 0.5-acre land. Sadly, Gurappa himself was subject to an elephant attack a couple of years later when he was keeping watch on his ragi crop at night. Recent reports show increasing cases of HWC involving elephants, leopards, and wild boars (Venkataramana *et al* 2017), despite installing electric and railway fencing (Saklani *et al* 2018). Fragmentation caused by mining and construction affects elephant migration routes, drawing them to farmlands. About 27% of ESZ respondents reported that mining activities in their villages lead to dust, noise pollution, and crop damage.

The attraction of urban centres like Bengaluru, Kanakpura, Jigani, Anekal, etc, and the need for an improved lifestyle, have also prompted shifts from agriculture and dairying to factory-based and private jobs and daily-wage work.

## 5. CONCLUSION

The proximal stressors on this landscape—loss of commons and ecological corridors and the resultant HWC, tightening forest protection, mining, etc—could be broadly linked to two major drivers: urbanization and conservation. The pull factors of urbanization, including high demand for commodities like vegetables, milk, and construction material, along with changing aspirations, have incentivized the shift to alternative livelihoods. Meanwhile, the push factors of conservation—leading to increasing HWC and restricted access to forests—have pushed people out of forest-dependent livelihoods, exacerbating the urbanization pull.

Our field observations indicate that the impacts of these shifts are not felt equally across the spatial and social gradient; for instance, marginalized caste groups and people located closer to the forest are affected more by the lack of access to grazing lands, impacts of HWC, etc. Thus, it is crucial

to further explore social and spatial differentiations in the impacts of urbanization on BNP for the effective integration and management of the PA in the rapidly urbanizing landscape.

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**Ethics Statement**: I hereby confirm that this study complies with requirements of ethical approvals from the institutional ethics committee for the conduct of this research.

**Data Availability Statement**: The data used in this paper is not provided in a repository as the data collection and analysis is ongoing.

**Conflict of Interest Statement:** No potential conflict of interest was reported by the author.

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