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***Research Article** (Open Access)*

SEASONAL POPULATION DYNAMICS OF ABU'S RED-WHISKERED BULBUL AND RED-VENTED BULBUL IN DIFFERENT MICROHABITATS OF MOUNT ABU WILDLIFE SANCTUARY, RAJASTHAN

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ABSTRACT
A study was carried out in the Mount Abu Wildlife Sanctuary on the impact of seasonal variation in population of Abu's red-whiskered bulbul and red-vented bulbul. The study was carried out in five different microhabitats, namely forest, agricultural, roadside, river bank and urban habitat. Both bulbul's species consist higher number of individuals in summer as compared to winter and monsoon season. In the study area, Abu's red-whiskered bulbul was less abundant than red-vented bulbul. Red vented bulbul population was highest found in forest, followed by river bank, agricultural, urban and lowest in road side habitat. Similarly Abu's red whiskered bulbul's numbers was also higher found in forest followed by river bank, road side, road side, agricultural and lowest individuals were observed from urban areas. Red-vented bulbul is more preferred urban area as compare to Abu's red-whiskered bulbul. Overall forest and river habitat consisted higher number of individuals of bulbuls as compared to agricultural, roadside and urban habitats.

Keywords: *Abu's red-whiskered bulbul, Red-vented bulbul, Habitat, Season, Forest, Agriculture*

INTRODUCTION

Population means organism of the same species that can interbreed and occupy a specific area. Every species population acts as a structural and functional component of an ecosystem and also performs a crucial role in maintaining food chains and webs. The first-time concept of diversity and niche differentiation was proposed by Mac Arthur and Mac Arthur (1961). According to him, certain avian species are highly adapted and able to survive in disturbed habitats or in environments with constant human presence or interference. Due to their high mobility, birds are excellent bio-indicator species and very sensitive to habitat disturbance. According to Ali and Ripley (1983), India's avifauna is one of the most interesting in the world and offers sufficient opportunities to research "population ecology". Bird's populations are influenced by spatial and temporal variation due to availability of food material in particular areas (Koen, 1982; Pyke, 1985; Levey, 1988; Poulin *et al.*, 1994).

On the other hand, environmental factors and seasonal variations also influenced bird species composition along with time and space (Vijayan, 1984; Loiselle, 1988; Blake and Loiselle, 1991). According to Koen (1982), variation in bird abundance in relation to seasons is an adaptive phenomenon. Distribution and population density of bird species also influenced by vegetation composition in particular area (Waterhouse *et al.*, 2003). Changes in habitat due to vegetation composition, seasonal changes and anthropogenic interference also influence the population of birds in a particular area. Seasonal changes among temperature and rainfall patterns largely influence bird's habitats in direct and indirect ways, resulting in changes in distribution and population composition of species (Mengesha and Bekele, 2008; Newton, 2008). Seasonal variation plays a crucial role in determining the distribution and abundance of birds. Seasonality influences resource availability in terms of food and cover; these factors directly affect breeding success and ultimately,

the survival of bird species (Mengesha and Bekele, 2008). Bird's composition is also influenced by spatial and temporal variation in microhabitat conditions (Mengesha *et al.,* 2011).

Abu's red-whiskered bulbul (*Pycnonotus jocosus abuensis*) and red-vented bulbul (*Pycnonotus cafer*) is member of Pycnonotidae family and medium sized passerine bird species. The Pycnonotidae members are widely distributed in South Asia, Africa, Madagascar and the Indian subcontinent (Sibley and Monroe, 1990; Fishpool and Tobias, 2005; Woxvold *et al.,* 2009). Available literature provide detailed information on the distribution, breeding characteristics, such as egg clutch size, nesting and vocal communications of various species of bulbuls (Vijayan, 1980; Walting, 1983; Hsu and Lin, 1997; Kruger, 2004; Fishpool and Tobias, 2005; Balakrishnan, 2010 & 2011; Farooq *et al.,* 2013; Bhattacharya and Paul, 2015; Chishty *et al.,* 2020a, 2020b, 2021a, 2021b & 2021c).

Study on the seasonal variation in the populations of bulbuls, especially on the Abu's red-whiskered bulbul (*Pycnonotus jocosus abuensis*) and red-vented bulbul (*Pycnonotus cafer*) are very scarce. The red-whiskered bulbul (*Pycnonotus jocosus*) or crested bulbul is a native passerine species of Asia. It is a frugivore and resident species of tropical Asia and has also been introduced in many tropical areas of the world (Ali and Ripley, 1983; Williams, 1983). At present total nine subspecies of red-whiskered bulbul is recognized in worldwide (Baker, 1992a; Whistler, 1931; Deignan, 1948; Ali and Ripley, 1971; Cheng, 1987; Howard and Moore, 1971) that are *P.j. fuscicaudatus*, *P.p.pattani*, *P. j. pyrrhotis*, *P.j. emeria*, *P.j. whistleri*, *P.j. monticola*, *P.j. jocosus*, *P.j. hainanensis* and *P.j. abuensis*. The *P.j. abuensis* is a subspecies of red-whiskered bulbul and occurs in Rajasthan especially in Mount Abu (Whistler, 1931).

The *P.j. abuensis* is a pale with a broken chest band and without a white tail tip. It is also known as Abu's red whiskered bulbul or *abuensis* (subspecies name on the locality) due to its distribution in specific areas in Abu hill or Mount Abu regions (Whistler, 1931). The red-vented bulbul is a common bird species in all types of habitat, including forest, cultivated lands, scrubland, grassland and urban areas and is widely distributed in Asia, particularly in the tropical forest areas of south Asia and southwest Asia (Fishpool and Tobias, 2005; Chishty *et al.,* 2021a, 2021b & 2021 c; Rasmussen and Anderton, 2005; Zia *et al.,* 2014).

Some studies on the behavioural aspects of the red-vented bulbul were conducted in Rajasthan, but no single study on the Abu's red-whiskered bulbul was done. Keeping this point in mind, the present study was carried out on the seasonal population dynamics of Abu's red-whiskered bulbul (*Pycnonotus jocosus abuensis*) and red-vented bulbul (*Pycnonotus cafer*) in different microhabitats including forest, agricultural, urban, river bank and roadside habitats of Mount Abu wildlife sanctuary, Rajasthan. The present study provides a detailed account of the impact of seasonality on the Abu's red-whiskered bulbul (*Pycnonotus jocosus abuensis*) and red-vented bulbul (*Pycnonotus cafer*) in different microhabitats.

MATERIALS AND METHODS

For the seasonal variation in population of the Abu's red-whiskered and red-vented bulbul, a study was carried out in five different microhabitats, namely forest, agricultural, roadside, urban and river bank habitat. Study was carried out from January, 2022 to December, 2022 in early morning (6.00 am to 10.00 am) and late evening (4.00 pm to 6.00 pm) time. Two one-kilometer long transects were laid to carry out the counting of the Abu's red-whiskered and red-vented bulbuls populations in each microhabitat in different seasons. Two-time surveys were conducted in every season for the determining of seasonal variation in the population Abu's red-whiskered and red-vented bulbul in different microhabitat. The individuals of Abu's red-whiskered and red-vented bulbul were counted within 50-meter strips on each side of transect (the total width of transect was 100 meter). This method was also previously adopted by Radhakrishnan and Asokan (2015). Bird counts and field visits were avoided in rainy, cloudy and windy days. A total 20 sampling points were determined in every one kilometer transect for Abu's red-whiskered and red-vented bulbul counting. At each sampling point, five minute bird counts were performed and after the five minutes, moved to the next point for the counting of Abu's red-whiskered and red-vented bulbuls. The times were noted with the help of a digital watch and photographs of microhabitat and birds were taken with a Nikon P1000 camera.

RESULTS AND DISCUSSION

Pycnonotus jocosus abuensis is a subspecies of red-whiskered bulbul. It is typically found in Mount Abu region (Whistler, 1931). On the basis of its occurrence in particular areas, "Abu Hills" or "Mount Abu," it is also known as Abu's red-whiskered bulbul (*Pycnonotus jocosus abuensis*) (Whistler, 1931). During study, we found that Abu' red-whiskered bulbul is frequently observed in forest habitat, agricultural land, river bank areas and roadside habitat, and a few individuals were also sighted in urban habitat or municipal areas. The species is widely distributed at higher elevation ranges up to Guru Shikhar areas (up to 1722 meter elevation). Red vented bulbul is commonly preferred similar habitat as Abu's red-whiskered bulbul. In contrast to Abu's red-whiskered bulbul less abundant in urban habitat as compared to red-vented bulbul. Both bulbul's species are also preferred *Lantana* dominated habitat. They are mostly active in mornings and evenings times. They remain in resting conditions in the afternoon on sunny days. Resting takes place in shrubs, bushes and trees. Five microhabitats were studied during study: forest, agricultural, roadside, urban and river bank habitat. In Mount Abu Wildlife Sanctuary, 10 transects (two in each habitat) were examined in three seasons (summer, winter and monsoon) to study seasonal population dynamics of Abu's red-whiskered (*Pycnonotus jocosus abuensis*) and red-vented bulbul (*Pycnonotus cafer*).

During study, we observed a total of 2560 individuals of both bulbul species. Out of them, 1908 individuals were red-vented bulbul and 652 individuals were Abu's red-whiskered bulbul. Both bulbul species exhibit similar trends of seasonal variation in population size. Maximum numbers of bulbul's individuals were reported in the summer, followed by the winter and a minimum in the monsoon season. Radhakrishnan and Asokan (2015) also observed similar seasonal trends in population fluctuations of red-vented bulbul in the Cauvery delta region of southern India. During the study, highest red-vented bulbul individuals were observed in summer (1021) followed by winter (509) and lowest individuals were found in monsoon season (378). Similarly, the number of Abu's red-whiskered bulbuls was highest in summer (294), followed by winter (219) and monsoon (139).

Seasonal variation in population of Abu's red-whiskered and red-vented bulbuls in different microhabitats:

Overall, 759 individuals of both bulbul species were found in forest habitat, followed by river-bank habitat (614), agricultural area (453), roadside area (374), and urban habitat (360). In forest habitat, a total of 502 individuals of red-vented bulbul and 257 individuals of Abu's red-whiskered bulbul were found. The number of red-vented bulbuls was 286 in the summer, 118 in the winter, and 98 in the monsoon season observed from forest habitat (Figure 1). Similarly, the summer population of Abu's red-whiskered bulbul in forest habitat was 112, followed by 89 in winter and 56 in monsoon (Figure 2). In river bank habitat, a total of 614 individuals of bulbuls were found, of which 426 were red-vented bulbul and 188 were Abu's red-whiskered bulbul. In this habitat, the summer season has 224 individuals of red-vented bulbuls, followed by 114 in the winter and 88 in the monsoon (Figure 1). Similarly, the highest number of Abu's red-whiskered bulbuls was observed in the summer (85) followed by the winter (64) and the monsoon (39) (Figure 2). In agricultural habitat, 381 individuals of red-vented bulbul and 72 individuals of Abu's red-whiskered bulbul were observed throughout the study period. Out of them, 203 red-vented bulbul individuals were observed in the summer, 107 in the winter and 71 in the monsoon season (Figure 1). Similarly, the most of Abu's red-whiskered bulbuls individuals were seen in the summer (37) followed by the winter (23) and the monsoon (12) (Figure 2). In road side habitat, total 374 individuals of both bulbul species were observed. Out of those red-vented bulbuls (247) and Abu's red-whiskered bulbuls (127) were observed. In the summer season, the most individuals (119) of red-vented bulbuls were observed as compared to the winter (74) and monsoon (54) (Figure 1). Similarly, summer (54 individuals) had the highest number of Abu's red-whiskered, followed by winter (41) and monsoon (32) (Figure 2). According to our observations and study, urban area was the fourth most preferable habitat by red-vented bulbuls, while least preferable habitat by Abu's red-whiskered bulbuls. In the urban habitat total 360 individuals of bulbuls were observed. Out of them, 352 individuals of red-vented bulbuls and only 8 individuals were Abu's red-whiskered bulbuls. Out of 352 individuals of red-vented bulbuls, the maximum number of individuals was observed in the summer (189), winter (96) and

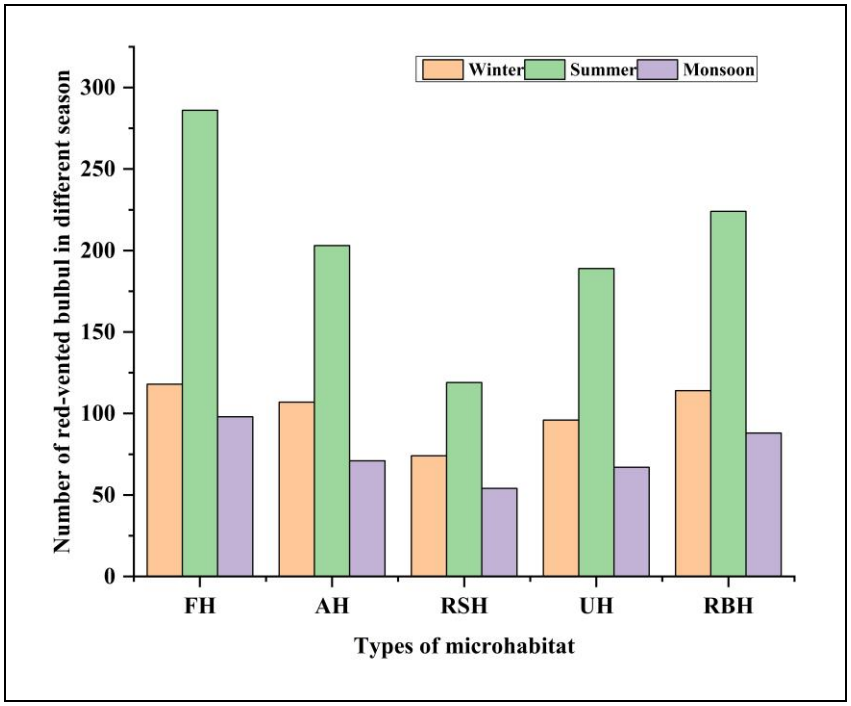

Figure 1: Seasonal variation in population of Red-vented bulbul in different microhabitat (FH-Forest habitat, AH- Agricultural habitat, RSH- Road side habitat, UH-Urban habitat, RBH-River bank habitat).

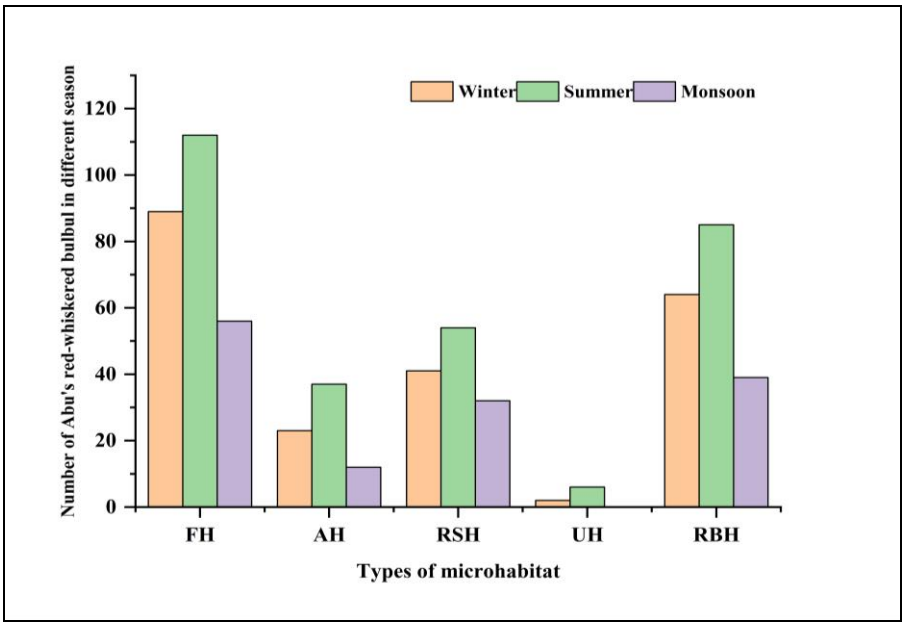

Figure 2: Seasonal variation in population of Abu's red-whiskered bulbul in different microhabitat (FH-Forest habitat, AH- Agricultural habitat, RSH- Road side habitat, UH-Urban habitat, RBH-River bank habitat).

monsoon (67) (Figure 1). Six individuals of Abu's red-whiskered bulbul were observed in the summer, two in the winter and none in the monsoon season (Figure 2). Habitat characteristics also have an impact on the population fluctuations of bulbuls in various microhabitats. Because forest and riverbank habitats provide sufficient amounts of food material in the form of fruits, flowers, and buds. Food availability in specific habitats is a major driving factor that influences habitat utilization pattern by bird species (Block and Brennan, 1993). The occurrence of bulbuls might be influenced by the vegetation composition in a particular area (Radhakrishnan and Ashokan, 2015). Dense vegetation's provide more suitable sites for foraging, roosting, nesting and perching for birds. Dense vegetation also provides a sufficient amount of food materials. In study area, forest and riverbank habitats consisted of dense vegetation as compared to other habitats.

Figure 3: Abu's red-whiskered bulbul

Figure 4: Red-vented bulbul

Figure 5: Forest habitat

Figure 6: River bank habitat

Figure 7– Road side habitat

Figure 8- Agricultural habitat

Figure 9: Red-vented bulbul and Abu's red-whiskered feeding in urban habitat

Figure 10: Abu's red-whiskered bulbul foraging in forest habitat

CONCLUSION

Long-term population monitoring provides detailed information regarding the status and changes in population size, as well as the factors causing these changes. Assessment of the population dynamics of wildlife species is essential for the conservation and management of these species. The study of population dynamics of particular species provides adequate information related to the current status of desirable species in selected areas or habitats.

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