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AN ANNOTATED CHECKLIST OF BUTTERFLIES AT ELEVATED PROTECTED AREAS OF PAKISTAN

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ABSTRACT

Different vegetation types, cater to the needs of butterflies at different stages of their life cycle. Some caterpillars are specific in their diet and egg-laying, such as the caterpillar of the Monarch butterfly, which mainly consumes leaves of milkweed and hence prefers laying eggs on this plant (Faldyn et al., 2018). This entomological research was undertaken at protected areas of Pakistan that include Dhirkot Nature Reserve, Pir Chanasi National Park, Banjosa Game Reserve, Pir Lasura National Park and Tolipir National Park. Forty-four different species of butterflies were recorded from the study area. The highest diversity of butterflies was observed from PCNP (34) and least from PLNP (15).

Keywords: Indian fritillary, yellow swallowtail, lepidoptera, common migrant, butterflies

INTRODUCTION

Butterflies belong to class Insecta and the order of Lepidoptera (Beccaloni et al., 2003; van Swaay et al., 2014). From nearly 28000 species of butterflies known globally, nearly 400 species of moths and butterflies have been recorded from Pakistan (Attaullah et al., 2018). These insects perform several important tasks for the maintenance of an ecosystem. These include pollination and role as a biological indicator for environmental quality (Faiz et al., 2015). Environmental factors such as climate and flora of an area have a significant effect on the population of butterflies (Perveen and Fazal, 2013). Different vegetation types, cater to the needs of butterflies at different stages of their life cycle. Some caterpillars are specific in their diet and egg-laying, such as the caterpillar of the Monarch butterfly, which mainly consumes leaves of milkweed and hence prefers laying eggs on this plant (Faldyn et al., 2018). However, some may

be categorized as general feeders that consume a variety of plants.

Plants belonging to *Quercus*, *Salix* and *Prunus* genera fulfill the nutritional needs of a wide array of lepidoptera (James, n.d.). It is essential to grow and preserve the plants that are preferred by butterflies and moths for sustenance, to help conserve their population. Pocius et al. (2018) observed a strong correlation between the varying number of phytochemicals in a specific genus of plants that was preferred by the Monarch butterflies for breeding and the oviposition of these butterflies. The aim of the present study was to assess the butterfly fauna of some protected areas of Pakistan to highlight the species diversity of butterfly fauna of the selected nature reserves and provide a baseline for the future studies in the field of entomology.

MATERIALS AND METHODS

This entomological research was undertaken at protected areas of Pakistan that include Dhirkot Nature Reserve (DNR), Pir Chanasi National Park (PCNP), Banjosa Game Reserve (BGR), Pir Lasura National Park (PLNP) and Tolipir National Park (TNP). The butterfly biodiversity was studied through a general survey and search of all microenvironments available in the protected parks for the presence of different species.

Sample collection

An in-depth study of previously reported species was conducted using Rafi and Irshad (2000); Khan et al. (2003). Two pictorial catalogues were made. One catalogue had photographs of the species that have been reported from the overall region. Second catalogue was a test catalogue with photographs of the species which were not expected for the area. A number of the residents of the area surrounding the study site were contacted with these catalogues to collect information on sighting of the animals over the last few years. These were maintained as the test to judge the experience and vision of the informant regarding animal species. The responses of the informants persisting on the presence of many of these test species were excluded from the final analysis. The information thus collected was compiled to work out relative abundance of the species, depending upon frequencies of the reported sightings. Where possible, samples of the butterflies were collected by hand net swiping method.

Study Area

Banjosa Game Reserve was surveyed from May 2009 to June 2009. It has diverse habitat conditions, from forested vegetation of tall trees having different layers of

associated flora, appearing in different combinations, to open scrub plains having very scattered trees and shrubs and the human controlled ecosystem under different levels and types of energy subsidies provided through direct/indirect human activities and the visitors to the artificially developed grasslands and a small lake used as picnic area. The human influence has also produced a variety of wild habitat conditions, with different levels of degraded forests and the invasive species of animal and plants. The human habitation with associated agricultural fields and private livestock pasture is scattered in the northern parts, which provides habitat for species having an association with human settlements.

Dhirkot town is a small settlement of scattered houses within a moist temperate coniferous forest located on top folds of hills of the Himalayan Range. The town is famous for its landscape, scenic beauty and view-points. It has a hilly landscape with small agriculture fields scattered in patches at suitable terraces. No perennial river or stream of water is associated with this area. However, small perennial springs appear at places. The climate is temperate, with mild summers and severe winters. Dhirkot Nature Reserve was surveyed during February 2008.

PCNP mainly comprises of top folds of a hill to northeast of Muzaffarabad. The southern area is densely populated with scattered human settlements. Top folds have patches of good highland pastures with a relatively gentle slope or leveled plains. East slopes of PCNP have thicker forested vegetation and without human settlement. The valleys of the park show a typical pattern of subtropical pine forest type vegetation. However, the top regions follow a sub-tropical dry evergreen forest pattern. As the area is at an elevation of 9500 feet, it may be categorized as cold and humid forest

with respect to its climate. This area was surveyed from April 2010 to May 2010.

Pir Lasura National Park is situated on Nekyal hills towards the west of the Great Himalayan Range. The area is characterized as cold and subtropical. However, top mountain areas may have subtropical evergreen forests. General climate is cold and humid. The area has a fertile soil with relatively higher temperatures, favored for development of agriculture. Eastern slopes are relatively gentle and hold dispersed human settlements with associated scattered agriculture of fields. This area was surveyed from June 2009 to July 2009.

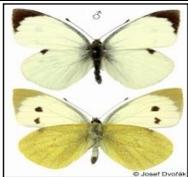
Tolipir area is fertile with small agricultural fields scattered around villages in patches at suitable terraces in the south facing slopes while north facing slopes have a thicker forested growth of tall gymnosperm trees. South slope of hills contains scattered population with agricultural fields, whereas North Slope has less human habitation. Small perennial springs appear at different places and serve as the main source of water for human consumption. The area is known for its scenic beauty, and is visited by tourists and nature lovers, especially during summers. This area was surveyed from April 2008 to May 2008.

RESULTS

Table 1. List of butterfly species recorded from protected parks, AJK

#	Names	Pictures	Remarks	Local sightings (#)
1	<i>Catopsilia pyranthe</i> Common Migrant		Egg to adult in 22-29 days, allowing 11-12 in generation a year. Common throughout all four provinces, mainly during and immediately after monsoon season, with migratory tendencies and the swift strong flight typical of the genus.	DNR-40 (A) PCNP-36 (A) BGR- 40 (A)
2	<i>Colias electo</i> African Clouded Yellow		Small, migratory, eggs lay singly on leaves, feeds on a variety of leguminous plants. Wingspan 35–40 mm (1.4–1.6 in) for males and 32–40 mm (1.3–1.6 in) for female. Adults on the wing throughout the year, with a peak from April to August. Larvae feed on <i>Medicago sativa</i> , <i>Trifolium</i> , <i>Vicia</i> and <i>Robinia pseudoacacia</i> .	DNR-17 (C) PCNP-33(A) PLNP- 1 (UC)
3	<i>Colias erate</i> Eastern Pale Clouded Yellow Butterfly		Flies in May-September. The wingspan is 23-26 mm. The butterfly flies in May to September in two generations. The larvae feed on various Fabaceae species, such as <i>Medicago sativa</i> and <i>Medicago</i> , <i>Trifolium</i> , <i>Onobrychis</i> and <i>Melilotus</i> species.	DNR-10 (C) TNP-10 (C) BGR-10 (C) PCNP-31 (A) PLNP-11 (C)
4	<i>Eurema hecabe</i> Common Grass Yellow		Found flying close to ground. Is found in open grass and scrub habitats, parasitized by multiple strains of <i>Wolbachia</i> which alter the sex-ratio. Eggs laid on <i>Abrus precatorius</i> , <i>Acacia</i> spp., <i>Aeschynomene</i> spp., <i>Albizia</i> spp. and numerous other <i>Leguminosae</i> , <i>Euphorbiaceae</i> and	DNR-34 (A) PCNP-32 (A) TNP-34 (A) BGR-34 (A)

			<i>Cucurbitaceae</i> species.	
5	<i>Gonepteryx rhamni</i> Brimstone Butterfly		Lives up to 13 months, most of this time is spent in hibernation, much camouflaged looking like leaves, only one brood a year. Wingspan 60-70 mm. On the upper side male is sulphur yellow and female is white with a greenish tinge but both have an orange spot in the center of each wing, never settle with their wings open and from the underside the sexes are more difficult to separate but the female is still paler.	DNR-24 (A) PCNP-27 (A) BGR-24 (A) PLNP-14 (C) TNP-24 (A)
6	<i>Graphium cloanthus</i> The glassy bluebottle		Black with broad and transparent areas on the wing, hind wings has tails, common, non-threatened tropical butterfly. The wingspan is about 8.0 – 9.0 cm, is black with broad and transparent areas on the wing. Hind wings have tails. These butterflies are strong in flight and where common, congregate at damp patches.	DNR- 21 (A) PCNP- 29 (A)
7	<i>Junonia orithya</i> Blue Pansy		Occurs in open areas, often sitting on bare ground, has a stiff flap and glide style of flight, maintains territory, larva parasitize Acanthaceae, Annonaceae, Convolvulaceae, Labiatae, Plantaginaceae, Scrophulariaceae, Verbenaceae and Violaceae.	DNR-27 (A) PCNP-27 (A) TNP-27 (A) BGR-27 (A)
8	<i>Papilio clytia</i> Common mime		Excellent example of a Batesian mimic lives in hilly regions, plentiful in the premonsoon, flight fluttering, neither weak nor strong, sometimes stays close to the ground.	DNR-8 (FC)
9	<i>Papilio demoleus</i> The Lemon Butterfly		Prominent tail. tolerance and adaptation to diverse habitats, found in savannahs, fallow lands, gardens, evergreen and semi-evergreen forests, swarms in groves of its food plants, stream and riverbeds, female goes hurriedly from plant to plant, lay a single egg at a time on top of a leaf egg round and light yellowish.	DNR-14 (C) PCNP-29 (A) TNP-14 (C) BGR-14 (C)
10	<i>Papilio machaon</i> The common yellow swallowtail		Yellow with black wing and vein markings and a wingspan of 8 to 10 cm, hind wings have a pair of protruding tails. Just below each tail is a red eye spot, strong and fast flight, but pauses to hover over flowering herbs frequents the Alpine meadows and hillsides and 'hill-topping', usually 2-3 broods in year.	DNR-12 (C) PCNP- 27 (A)
11	<i>Papilio philoxenus</i> Papilio Butterfly		Has an orange "forked gland", called the osmeterium. When in danger, it looks like a snake's tongue, averts and releases a foul smell to repel predator.	TNP-19 (C) BGR-19 (C) PLNP-23 (A) DNR-4 (UC)

12	<i>Papilio polyctor</i> Common Peacock		Its sexes are very nearly alike. Wingspan 90-130 mm. This Peacock occupies lower elevations than the similar Blue Peacock. It is on wings from mid-April to the end of September from about 600- 2100 m. It has distinct dry and wet season forms. The butterfly frequents Buddleia flowers. Its foodplant is <i>Xanthoxylon alatum</i> of the Rutaceae family.	DNR-16 (C) PCNP- 19 (C) PLNP-1 (UC)
13	<i>Papilio polytes</i> The Common Mormon		Known for mimicry displayed by the numerous forms, jet black with row of white spots in middle part of hind wing, prefers lightly wooded country, most common in the monsoon and post-monsoon months, eggs laid singly on top of the leaves.	DNR-17 (C) PCNP-18 (C) TNP-17 (C)
14	<i>Parnassius actius</i>		Rare and declining due to changes in habitat, Vulnerable.	DNR-12 (C)
15	<i>Pieris brassicae</i> Large white		Female lays 20-100 yellow eggs on plants of cabbage family, a pest on food crops, preference for cultivated <i>Brassica oleracea</i> . has two broods in a year, first: May, Second: June. Wings: white, with black tips on the forewings of both males and females, underside pale greenish and serves as excellent camouflage when at rest. Black markings generally darker in summer brood. Wingspan is 5 to 6.5 cm	DNR-30 (A) PLNP-34 (A) TNP-30 (A) BGR- 30 (A) PCNP-24 (A)
16	<i>Pieris cinida</i> Pieris butterfly	-	-	DNR-8 (FC)
17	<i>Vanessa cardui</i> Painted Lady		Well-known colorful, strange screw of pattern. Wingspan 55-70 mm. It occurs in any temperate zone, including mountains in the tropics. The species is resident only in warmer areas, but migrates in spring, and sometimes again in autumn. Larvae feed on Asteraceae spp., including <i>Cirsium</i> , <i>Carduus</i> , <i>Centaurea</i> , <i>Arctium</i> , <i>Helianthus</i> , and <i>Artemisia</i> spp.	DNR-15 (C) PCNP-24 (A) PLNP- 7 (FC) TNP- 15 (C) BGR- 15 (C)
18	<i>Argynni hyperbius</i> Indian fritillary		Adult on top orange with black spots. Female has larger black spots, creating black areas on the wingtips.	PCNP- 38 (A) PLNP-7 (FC) TNP- 37 (A)
19	<i>Danuis genutia</i> Common tiger		Wingspan 75-95mm. Occurs in scrub jungles, fallow land adjacent to habitation, dry and moist deciduous forests, preferring areas of moderate to heavy rainfall. Also found in degraded hill slopes and ridges, both, bare or denuded. Leathery, tough	PCNP-36 (A) TNP- 28 (A) BGR- 28 (A)

			to kill. Lays its egg singly under the leaves of any of its host plants of family <i>Asclepiadaceae</i>	
20	<i>Argynnis kamala</i> Common silver strip		Wingspan 65-75 mm. More Common and widespread than the Large silverstrip, and on the wing from late May to September usually above 2000 m and up to 3000 m. There are two broods the first butterflies emerging in May and the second brood on the wing in late September. The food plants are <i>Violaceae</i>	PCNP-35 (A) PLNP-10 (C)
21	<i>Atrophaneura polyeuctes</i> Common windmill		Wingspan is 110-130 mm. Larvae feed on poisonous plants from which they are able to sequester toxins which protect them from predators. Even to humans they smell unpleasant. Hind wing OF both male and female with three sub- marginal red spots. Tail has double red spot. Antennae black, palpi thorax and abdomen crimson beneath	PCNP-34 (A)
22	<i>Danaus chrysippus</i> Lesser wanderer		Wingspan 70-80mm. Found in the mountains. Primarily of open country and gardens. Rests with its wings closed. When basking sits close to the ground and spreads Wings with its back to the sun so that the wings fully exposed to the sun's rays. Also has a tough, leathery skin to survive such occasional attacks. Protected from attacks due to the unpalatable alkaloids ingested during the larval stages.	PCNP-33 (A) TNP-23 (A) PLNP-5 (UC)
23	<i>Eurema laeta</i> Lime grass yellow		Wing span 30-45 mm. The Lined Grass-yellow is similar to the No-brand Grass-yellow butterfly which is larger with broader brown band on upper surface of hindwings and no dark lines on the underside. The female lays her eggs on <i>Cassia pumila</i>	PCNP-33 (A)
24	<i>Catopsilia florella</i> African emigrant		The wingspan is 54–60 mm for males and 56–66 mm for females. Adults are on wing year-round. It is the only African representative of its genus. The butterflies are sexually dimorphic - males are white, and females may be white or yellow. They are strong fliers and occasionally migrate in large numbers.	PCNP-31 (A)
25	<i>Neptis hylas</i> Common sailor		Wingspan 50-60 mm. A species of nymphalid butterfly. Has a characteristic stiff gliding flight achieved by short and shallow wing beats just above the horizontal. Has been observed to make sounds whose function has not been established. The butterflies, like the entire <i>Neptis</i> genus, are easy to recognize by their rather continuous, sailing circling flight, interspersed with few rapid shallow flaps of their wings.	PCNP-30 (A) TNP-13 (C) BGR-13 (C)
26	<i>Pararge schakra</i> Common Wall		Male upper side ground color silky brown; cilia of both wings whitish. Forewing has a transverse row of four large orange spots, the apical one the largest, bearing a black, white-centered eyespot; beyond the row of orange spots a sub-terminal dark brown line	PCNP-28 (A)

27	<i>Lethe rohria</i> Common tree brown		Wings span 58-70 mm. This the larger butterfly than Banded tree brown, with the forewing arcuate at the tip and the hindwing markedly dentate along its border. In males and females, upper side is Vandyke-brown, slightly darker, especially in the female, towards apex of fore wing	PCNP-25 (A) TNP-14 (C) BGR-14 (C)
28	<i>Papilio polyxenes</i> Black swallowtail		The Black Swallowtail has a wingspan of 80 - 110 mm. The upper surface of the wings is mostly black. On the inner edge of hindwing is a black spot centered in larger orange spot. A male of this species has a yellow band near edge of wings; a female has row of yellow spots. The hindwing of the female has an iridescent blue band. Has an orange "forked gland", called the osmeterium. When in danger, it looks like a snake's tongue, averts and releases a foul smell to repel predator.	PCNP-25 (A)
30	<i>Melanites leda</i> Common evening brown		Common species found flying at dusk. Flight erratic. Resident known to fight off visitors to the area during dusk hour. Chase behavior elicited even by pebbles thrown nearby. Caterpillars feed on a wide variety of grasses including rice, bamboos, Andropogon, <i>Rotboellia cochinchinensis</i> , <i>Brachiaria mutica</i> , <i>Cynodon</i> , <i>Imperata</i> , and millets such as <i>Oplismenus compositus</i> , <i>Panicum</i> and <i>Eleusine indica</i> . Adults feed mainly on nectar, in rare cases visit rotting fruits.	PCNP-24 (A) TNP-13 (C) BGR-13 (C)
31	<i>Pontia callidice</i> Peak white		Wingspan: 42-52mm. In both sexes, the underside of forewing apex has greenish bars rather than black. A true Alpine species, often seen flying in July and August from 2700-4570 m frequently on the edge of snow fields. There is some similarity between this species and the Bath white, <i>Pontia daplidice</i> , but the habitat of the former is usually enough to identify it.	PCNP-21 (A)
32	<i>Pontia daplidice</i> Bath white		In open grassy or flowery places. Typically, around bare ground with the foodplant <i>Reseda</i> sp. (e.g. Weld, Mignonette). Also takes various Brassicaceae. Flies from the beginning of spring, until late summer. A very strong flier. Usually seen flying very rapidly and directly across usually dry places with grass or stones. Can be found warming up on rocks in the sun when close approach is easiest.	PCNP-20 (A) PLNP-7 (FC) TNP-14 (C) BGR-14(C)
33	<i>Papilio</i> spp.		Wing span 110-130 mm. Similar in general appearance to <i>Papilio polyctor</i> , but in this species, the male lacks any black elliptical bars of woolly scent scales on the veins of forewing, and both sexes have a deeper blue post-distal patch on the hind wing, which enters the lower part of the cell. Food: kerosene, a variety of citrus plants and <i>Euodia</i>	PCNP-19 (C)

34	<i>Pieris</i> spp.		<i>Pieris</i> spp. are found in damp, grassy places with some shade, forest edges, hedgerows, meadows and wooded river valleys. The later generations, widen their catchment areas in the search for alternative forage crops in drier, but flowery places. Common, very variable, occurs all the year around, at up to 12,000 feet	PCNP-19 (C) BGR-8 (FC) TNP-8 (FC)
35	<i>Precis</i> spp.		Wingspan 55-80 mm. Both sexes are dark brown all over the upper wings with rather indistinct, darker brown vertical bands and wavy lines. Individuals maintain a territory and are usually found close to the ground level and often bask in the sun. Regularly visit flowers and have habit of flying low to the ground and gliding between bouts of fluttering. The eggs are often laid on the ground or on dry twigs near the host plants rather than on them. On hatching the larvae find their way to the host plants.	PCNP-18 (C)
36	<i>Precis almanac</i>			TNP-12 (C)
37	<i>Parnassius actius</i>		Wingspan 50-60mm. This rather small Apollo is not heavily marked with black scaling and its marginal borders are thin and rather obscure pale grey. It is a rare butterfly and declining due to changes in its habitat and is thus considered to be Vulnerable. More information is needed on this species.	PCNP-15 (C)
38	<i>Vanessa polychloros</i> Large tortoise shell butterfly		The butterfly has a wingspan of 50 to 55 mm. The base-colour of the wings is a rusty red, and at each wingtip it bears a distinctive, black, blue and yellow eye-spot . The underside is a cryptically colored dark-brown or black.	PCNP-12 (C)
39	<i>Phlantha phlantha</i> Common leopard		The Common Leopard is a medium sized butterfly with a wingspan of 50–55 mm with a tawny color and marked with black spots. The underside of the butterfly is glossier than the upper and both the male and female are similar looking. A more prominent purple gloss on the underside is found in the dry season form of this butterfly.	PCNP-12 (C) PLNP-2 (UC)
40	<i>Deudorys epijarbus</i>		The larvae feed on <i>Sapindus trifoliatus</i> , <i>Euphoria longan</i> , <i>Litchi chinensis</i> , <i>Aesculus indicus</i> and <i>Connarus</i> species (in seed capsules), <i>Harpullia pendula</i> , <i>Pometia pinnata</i> , <i>Caryota rumphiana</i> and <i>Sarcopteryx martyana</i> .	PCNP-10 (C)

41	<i>Aglais urticae</i> Small tortoise shell		Adult is striking, with its dark body and red and yellow wings, which have a row of blue dots around the rear edge, underwings dull.	PLNP-4 (UC)
42	<i>Catopsilia crocale</i> Common emigrant		Upperside of male chalky-white, fore wing, the whole, or sometimes only the apical half, of the costa narrowly black, this color widened out irregularly at the apex; termen widely black at apex, color narrowed posteriorly, border in some specimens almost reaches the tornus.	PLNP-3 (UC)
43	<i>Colias fieldi</i> Dark clouded yellow		Has a yellow female but wing shape and hindwing pattern are same as white female and not like male.	PLNP-3 (UC) TNP-4 (UC)
44	<i>Pieris rapae</i> Small white		Upper side creamy white with black tips to the forewings. Females also have two black spots in the center of the forewings. Under wings yellowish with black speckles. sometimes mistaken for a moth due to its plain-looking appearance	BGR- 22 (A) TNP-22 (A)

Abbreviations: Abundant=A, Common= C, Fairly Common = FC, Uncommon = UC

DISCUSSION

Present study suggests that a minimum of 34 species of butterflies (Table 1) were distributed in PCNP. All the species were regarded as abundant or common, as per their global distribution/population level by IUCN, and hence have little conservation value at international level. No specific report is in hand on butterfly fauna of PCNP or this specific tract. Khan et al. (2003) reported biodiversity of butterflies present in the district Poonch; the present list runs in considerable conformity with the list developed for Poonch. Two other reports on general butterfly fauna of Pakistan (Rafi et al., 2000) and India (Antram, 2002) have indirect reference on possible distribution of butterfly species in Pir Chinasi tract.

Fauna of Tolipir National Park was represented by 20 species of butterflies (Table 1). Faiz et al. (2015) conducted a similar study during summer of 2014 and also reported 20 species of butterflies. A quick comparison showed that there has been no noticeable change in the diversity of butterflies at TNP from April-May of 2008 to summer of 2014. All the species were regarded as abundant or common, as per their global distribution/population level by IUCN, except for *Colias feldii* *Colias* spp., which was found to be uncommon and hence have little conservation value at international level.

Fauna of Pir Lasura National Park was represented by 15 species of butterflies (Table 1). Most of the species observed were either fairly common or uncommon, only *Pieris brassicae*, *Papilio philoxenus* and *Gonepteryx rhamni* were found to be abundant in PLNP.

The present survey of DNR resulted in identification of a minimum of 17 butterfly species, from the samples collected from the areas in/around the nature reserve (Table 1). Common migrant, Common grass yellow and Large white butterflies

were sighted in relatively higher frequencies, while eastern pale clouded yellow butterfly (*Colias erate*), common mime (*Papilio clytia*), Pieris butterfly (*Pieris cinida*) and Papilio butterfly (*Papilio philoxenus*) presented rare sightings. Other seven species were frequent.

Studies on the butterfly fauna of the District Bagh have been undertaken previously. The general Dhirkot tracks were included in the folds of these studies (Khan et al., 2003; Rafi et al., 2000). Sampling conducted during summer (March-October) revealed the presence of 17 species from the Dhirkot area. This study also did not specifically target DNR yet the list generated under this study runs in considerable conformity with the present list. The present list includes all the species of Khan et al. (2003). The present list, however, contains four additional species, viz., glassy bluebottle, common mormon, common yellow swallowtail (*Papilio machaon*) and wingspan (*Parnassius actius*), to the previously reported list.

The relative abundance of the different butterfly species exhibited two different patterns in the two studies. The change in the relative abundance of different species can be attributed to differences in the mode of collection, the sampling period, and seasonal variation in the climatic conditions. No study was available on the host selection by these butterfly species, which needs to be studied. Such studies can help in analysis of the role of these species in ecosystem management.

In this study, the Common Migrant had the highest observed sighting in two areas of the study site (40- BGR; 40-DNR). Atluri et al. (2004) observed all the stages of ontogenesis for this species year-round in their experiment with an increase from July to September. PLNP, generally had the least diversity of butterfly species. However, only one sighting was recorded for the Common

Peacock and African Clouded yellow butterfly from PLNP. These findings are similar to those from a study conducted in Chakwal, Punjab (Pakistan), whereby the Common Peacock butterfly was reported as very rare and the Common Migrant butterfly was observed to be common (Khan and Hanif, 2016). Their site of study included botanical gardens surveyed from March to December 2014.

No literature was available on host selection or on role of these species in pollination especially from PCNP, which may suggest the importance of the butterfly fauna for the study area or their role in the future management of ecosystem of the area.

CONCLUSION

A total of forty-four different species were observed during the study. Thirty-four species of butterflies were recorded from Pir Chinasi National Park, twenty species of butterflies were recorded from Tolipir National Park, seventeen from Dhirkot Nature Reserve, fifteen from Pir Lasura National Park and seventeen from Banjosa Game Reserve. This study highlights the species diversity of butterfly fauna of the selected nature reserves and provides a baseline for the future studies in the field of entomology.

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