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# MISCELLANEOUS NOTES

## 15. BIRDS AND STANDING CROPS

Birds are friends of the farmer and not foes, says Dr. Sálim Ali[1] mainly because they destroy insects that plague his crops. Farmers, who spend hours in driving the flocks of birds away from their crop, may not agree. Yet it is doubtful how many of them precisely know which birds are destructive and which are not and how much damage the destructive species inflict on the crop. To observe which birds come to the standing crop and what exactly they do once they alight in the fields, 20 consecutive mornings were spent in October 1979 in a group of cultivated plots which were mostly left unguarded.

The cultivated fields measured roughly 120′ × 50′ each. Two were adjacent divided only by a track, while the third was about a furlong away. The standing crop in all of them was *jowar* in various stages of ripening. Some cobs had very tender grain while in others grains were ripe and hardened. Out of the two adjacent fields, crop in one was cut after it had been observed for 4 days. The third field, though unguarded, had the farmer's cottage situated close by, and there was always some movement of men and animals around. While this discouraged certain species who otherwise would have come into the field, the farming operations and fallen grain around the hut, had attracted a flock of about 100 house sparrows who seemed to have taken a permanent residence there. As this tended to give a certain bias to observations, after the first 4 days, observations were concentrated in the remaining field which was totally unguarded and absolutely without any human interference during the observation period.

[1] ALI, SALIM (1972): The Book of Indian Birds, IXth Edition, Bombay Natural History Society, Bombay, pp. 152-153.

Observations were recorded during a one-and-half hour period between 7 and 9 a.m. Fields were also visited in the evening between 4 and 5 p.m. to record the evening activity of birds. A field, roughly of the same size but about 10 km away in the opposite direction, was also visited thrice in the morning to see if the number and variety of species differed markedly here from those in the fields under closer security. No such difference was noticed.

Except for three mornings, the sky remained cloudy during the period of observation. But there was some westerly breeze and the sun used to come out a little after 8 a.m. Evenings were sunny with a stronger breeze. During the observation period temperature varied between 18°.8′ and 32°.7′C. Most of the observations were recorded by going round the periphery of the fields. But sometimes it became necessary to enter the standing crops to observe bird activity at there base or about a foot above ground.

A total of 732 individuals belonging to 34 different species came to the fields during the period of observation. The total of course includes the flock of about 100 house sparrows and birds such as a black-winged kite, a pair of red-headed merlins, a white-eyed buzzard-eagle sand martins and common, red-rumped and wire-tailed swallows that either hovered or flew over the fields. Every day the number of species visiting the fields varied between 18 and 26 with the total number of individuals varying between 75 to 165. But when observations were concentrated on the single field, the number of species per day (during observation period) varied between 7 and 15 and the number of individuals between 24 and 58.

Out of the total of 34 species observed, 13 are known to eat grain, and out of these, eight

species were actually seen plucking out and eating grains from the cobs. These 8 species were : house sparrow, common rosefinch, baya weaver, redvented bulbul, common myna, and whitethroated, spotted and blackthroated munias. The munias attacked mainly cobs with very tender grain, otherwise they tended to eat grass and weed seeds by alighting at the foot of the standing crop. To a smaller extent rosefinches and bayas also were attracted to tender grain or searched for insects on the ground. House sparrows, redvented bulbuls and common mynas ate even hardened grain. At one time a house sparrow or a baya would eat a maximum of 14 grains each ; a bulbul and a rosefinch would eat 20 grains each, while a myna would take a maximum of 40 grains at one sitting. Normally however, munias, bayas and house sparrows would take 3-4, bulbuls, rosefinches 7-8 and mynas 13-14 grains each at one time.

Blackheaded bunting, house and jungle crows, blue rock pigeon and yellowthroated sparrow are also known to eat grain but were not observed doing so. The remaining 21 species are known to be insect or flesh-eaters and came to the fields in search of these. If the 3 birds of prey and 3 species of swallow who never alighted in the fields, are excluded, 15 species of insectivorous birds were seen to alight in the fields. Out of these 15, six were actually seen to catch and eat insects and other animal food. These 6 species were : rufousbacked shrike, common green bee-eater, piedcrested cuckoo, collared bush chat, ashy wren-warbler and Blyth's reed warbler. Other insectivorous birds included : Indian wren-warbler, black and white-bellied drongos, Indian roller, Indian pipit, Indian robin and yellow wagtail etc.

While each flock of grain-eaters did not remain in the field for more than ten minutes, the insectivorous birds tended to spend all the time in the field in question. Indeed there is reason to believe that more than half of these species even roosted in the field and for all practical purposes never left the field during the day. While everyone of the insectivorous birds was on the lookout for insects while in the field, not every individual from the graminivorous flocks would eat grain while in the field.

The number of graminivorous species visiting the field every day was only 3 or 4. These birds normally came into the fields in flocks of 3-4 to 10-12 individuals. But the number of individuals actually eating grain would be only 1-2 to 5-6 from each flock. Some of the individuals would dive down at the base of the crop among grasses and weeds for seeds and insects. The insectivorous birds came as individuals but spent almost all the time in the field. Even from the large flock of about 100 house sparrows only 30-45 were observed eating grains, the others simply indulged in chirping or preening.

What do these short observations indicate ? It appears that the majority of birds that come to the fields and spend most of their time there, are insect-eaters. The grain-eaters are fewer in numbers, spend less time in the field and even lesser time actually consuming the crop. Some of them even search for insects and remove weed seeds, activities beneficial to the farmer. While it may not be true to say that the quantity of insects removed by insectivorous birds is greater than the quantity of grain eaten by grain-eaters, in terms of value, the former may be doing a greater service to the cultivator than the amount of damage inflicted by the latter. Of course, the real damage can only be assessed by comparing the value of harvest from fields that are closely guarded and that are not guarded at all. On the basis of the present observations one may say that the actual conditions approximate more to Dr. Sálim Ali's statement than to the prevalent view of the farmers.

## BIRDS THAT CAME TO THE FIELDS WITH STANDING CROPS

**Birds that ate grain :**

1. Common Myna (*Acridotheres tristis*)
2. Redvented Bulbul (*Pycnonotus cafer*)
3. House Sparrow (*Passer domesticus*)
4. Baya Weaver (*Ploceus philippinus*)
5. Whitethroated Munia (*Lonchura malabarica*)
6. Spotted Munia (*Lonchura punctulata*)
7. Blackheaded Munia (*Lonchura malacca*)
8. Common Rosefinch (*Carpodacus erythrinus*)

**Other grain-eaters :**

9. Blue Rock Pigeon (*Columba livia*)
10. House Crow (*Corvus splendens*)
11. Jungle Crow (*Corvus macrorhynchos*)
12. Yellowthroated Sparrow (*Petronia xanthocollis*)
13. Blackheaded Bunting (*Emberiza melanocephala*)

**Birds that ate insects or other animal matter :**

14. Pied Crested Cuckoo (*Clamator jacobinus*)
15. Green Bee-eater (*Merops orientalis*)
16. Rufousbacked Shrike (*Lanius schach*)
17. Ashy Wren-Warbler (*Prinia socialis*)
18. Blyth's Reed Warbler (*Acrocephalus dumetorum*)
19. Collared Bushchat or Stonechat (*Saxicola torquata*)

**Other insect-eaters :**

20. Redwattled Lapwing (*Vanellus indicus*)
21. Indian Roller (*Coracias benghalensis*)
22. Black Drongo (*Dicrurus adsimilis*)
23. Whitebellied Drongo (*Dicrurus caerulescens*)
24. Indian Wren-Warbler (*Prinia subflava*)
25. Booted Warbler (*Hippolais caligata*)
26. Indian Robin (*Saxicoloides fulicata*)
27. Brown Rock Pipit (*Anthus similis*)
28. Yellow Wagtail (*Motacilla flava*)

**Birds of Prey :**

29. Blackwinged Kite (*Elanus caeruleus*)
30. White-eyed Buzzard-eagle (*Butastur teesa*)
31. Redheaded Merlin (*Falco chicquera*)

**Birds that hawked insects over the fields :**

32. Plain Sand Martin (*Riparia paludicola*)
33. Eastern Swallow (*Hirundo rustica*)
34. Redrumped Swallow (*Hirundo daurica*)

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ing method, and for this reason I wish to com-
dulali's note, and offer additional thoughts on
e identity of the Indian sapsucker.
ems certain that the Indian sapsucker is
*hyperythrus* Abdulali rightly noted that in the
Ripley 1982) I have used the name 'Rufous-
sucker' in reference to this species, one of the
peckers, ranging from the Himalaya, north-
ia and south-east Asia, to southern China,
Manchuria. Two sources support the notion that
is the Indian sapsucker that produced the sys-
l holes so prominent in Abdulali's photograph.
Osmaston (1916), who noted this phenomenon
, and who actually observed *Hypopicus* visit
n order to drink the sap exudate.
ionally, Zusi and Marshall (1970) implicate
oth by the field observations of Marshall, and
mical examination of the tongue by Zusi. Mar-
)smaston, observed *Hypopicus*, and no other
, visiting the rows of bark holes that he found
Thailand. Zusi's examination of a *Hypopicus*
vs that its tip is adorned with fine, soft, brush-
very similar to those found on the tongue of
merican sapsucker, and quite unlike the coar-
fer tongue structure found in other related
oodpeckers never known to feed on sap ex-
udate.

One of the reasons that Abdulali doubted that *Hypopicus* was the creator of the bark-holes that he photographed in Srinagar was that he did not believe the species occurred there. It is now known that *Hypopicus* does, indeed, range westward through Kashmir to northern Pakistan (Ripley 1982).

What is most remarkable is that, to date, there have been no direct observations of *Hypopicus hyperythrus* drilling the rows of bark holes, so that the knowledge of this species' remarkable drilling habit remains based only on indirect evidence. It would be valuable for naturalists living in the Himalayan hill stations to make an effort to provide direct observations on the drilling and sap-sucking activities of *Hypopicus hyperythrus*. In particular, it would be interesting to know the relative importance of sap in the diet of this species, and the nutritional constituents of the sap of the particular tree species most commonly used. It has been stated that sap-sucking by this form occurs only in the spring (Zusi and Marshall 1970).

One might ask whether the sap is used preferentially for provisioning nestlings. A diet high in carbohydrates might be the answer.

March 8, 1989 S. DILLON RIPLEY

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## 15. LONG DISTANCE MOVEMENT OF A MALABAR WHISTLING THRUSH *MYIOPHONUS HORSFIELDII* (VIGORS) IN THE WESTERN GHATS

the BNHS bird ringing camp at Mahabales-
strict, Maharashtra (17°55'N, 73°40'E, 1371
d mist-netted 59 birds of the Malabar whis-
*yiophonus horsfieldii* between 12 April and
One individual (Ring No. B-31672) ringed
as recorded by U.K. Koragappa, the head-
u village, Post Sampaje, North Coorg, Kar-
'N, 75°50'E), having been killed by a
d near his house on 18 January 1976. He
cover the ring from the dead bird.
tance travelled by the thrush was ap-
50 km south of the ringing place. It was
3 years, 7 months and 9 days.

There is considerable lack of information on migration and movement of birds along the Western Ghats complex. The above ring recovery of the Thrush is of interest and worthy of record. This recovery suggests that the species is not exclusively resident as has been previously recorded (Ali, S. and Ripley, S.D. 1987, HANDBOOK OF THE BIRDS OF INDIA AND PAKISTAN 9:78) but probably has a wider distribution during the monsoon when it breeds. It is restricted to perennial water sources in evergreen areas during the dry months.

March 2, 1989 V.C. AMBEDKAR

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# BIRDS OF THE SAHYADRI
# OR
# NORTHERN WESTERN GHATS

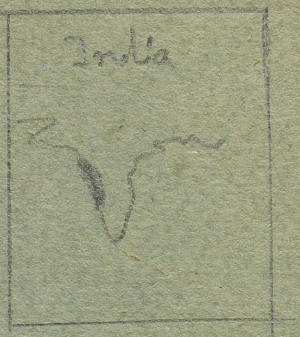
Altitudinal Distribution of Birds in North-Western Ghats of Maharashtra, India
Between 16 N – 20 N
73 E – 74 E.

By
Prakash Gole

A Study Sponsored by Orient Bird Club, U. K.

1996

Map of the Area




1 Harishchandragad, (Ahmadnagar), 1402m.
2 Mathern (Raigarh), 792m. 18·59 N, 73·18E.
3 Bhimashankar (pune) 914m
4 Sinhgarh (Pune) 1310m.
5 Panshet (pune) 640m.
6 Mahabaleshwar (Satara) 1371m. 17·58 N, 73·43 E
7 Panchgani (Satara), 1310m.
8 Chandoli ( ), 853m.
9 Vasota ( Satara), 761m.
10 Radhanagari ( Kolhapur), 853m.
11 Doodhganga ( ) 640m.

approx. 5000 feet

For every 150 meters one climbs upwards, the air temperature drops approximately 1°C.

About 250 feet of elevation is equivalent to one degree of latitude - roughly 69 miles in length northward. In a general way, then, one may expect the same rate of change in climate when ascending a mountain for 250 feet that he will find when going north on the continent 69 miles.

# BIRDS OF NORTHERN WESTERN GHATS : EXECUTIVE SUMMARY

Between December 1994 and April 1996 I observed birds in the Northern Western Ghat. The following locations were covered from this region: Harishchandragad(4600′), Matheran(2600′), Bhimashankar(3000′), Sinhgad(4300′), Panshet(2100′), Mahabaleshwar(4500′), Panchgani(4300′), Chandoli(2800′), Vasota(2500′), and Radhanagari(2800′). Figures in brackets indicate approximate altitude of these places. I did not observe birds on the Konkan side or the western face of the NWG overlooking the Arabian sea. I also did not observe birds in the region just north of Goa. Birds of this area belong to the southern western ghat.

I encountered 168 bird species as against 232 recorded for this area. Other observers added 30 species through their observations. Three others have been added as new sight records. There are therefore, no recent records of 31 bird species in this region. They probably have disappeared from Northern Western Ghats.

45 bird families are represented in the NWG. The habitats these birds occupy are: canopy evergreen and semi-evergreen forest; evergreen and moist deciduous forest with no continuous canopy; woodlands and bungalow compounds consisting of mixed forest types; secondary forest with loss of canopy; dry deciduous forest; scrub and thorn forest; plateau grasslands; barren and rocky plateaus; scrubby and gullied slopes, ravine forest patches and steep escarpments. Birds of prey, swallows and martins were mostly seen in flight.

From the point of view of number and variety of birds, moist deciduous and semi-evergreen forests between 2100′ and 3000′ altitude are the best habitats in this region. But 25 species of forest birds, among them many endemic to Western Ghats, can only be seen in canopy forests. Canopy forest is declining everywhere in the NWG threatening the existence of these species. Shrinkage of the range of endemic species is serious at a global level. Pressures on other types of forest threaten the existence of 7 more species. Environmental conditions at Harishchandragad and Mahabaleshwar are specialized. Birds disappearing from these locations due to loss of forest are not likely to be replaced by other birds due to the specialized habitat conditions prevailing there.

The causes of disturbance of bird habitats include cutting of trees for firewood, expansion of agriculture, of settlement and tourism, collection of forest produce, and shifting cultivation. Corrective measures urgently needed appear to be: conservation and restoration/extension of forest patches including Sacred Groves; restriction on commercial and tourism development; making it compulsory for developers to take ameliorative and restorative measures; participatory forest management for local people and initiating a great effort in nature education and creating conservation awareness among all sections of people.

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Title
Abstract
Introduction – present tense

Material & methods – Past tense

Results — Past tense

And

Discussion – significance of the results. What do these finding mean?

Summary

References.

IMRAD Format.

# BIRDS OF NORTHERN WESTERN GHATS

## The Area Covered

In this final account the term Northern Western Ghat(NWG) refers mainly to the plateau portion and eastern faces of the mountain range running south from Bombay to Goa (between ~~Lat. 18 N. and 16 N. and Long. 74 E.~~). The western faces of these hills that overlook the Konkan, the coastal region of Maharashtra state, are excluded from this account. The western escarpment of the Ghat and the spurs running west from it towards the coast interrupt the south-west monsoon currents coming in from the Arabian sea. The rainfall in this coastal strip is between 4000 mm and over 6000 mm per annum during June to September and the atmosphere always has high humidity due to nearness of the sea. At one time all this region including the hills was clothed with semi-evergreen and evergreen forests. Some of these still survive, though most have fallen a victim to rampant economic development. But the region still has its characteristic bird life which requires to be described separately. The Konkan region and the adjacent hills are therefore, excluded from this account. Also excluded is the region from south of Radhanagari to Goa border which properly belongs to the southern western ghats as far as the character of birds is concerned.

The plateau areas of NWG attain a height of over 1500 metres(4700ft +) at some places. They also experience high rainfall between June and September comparable to that of the Konkan. In addition the altitude makes for temperature difference with places like Mahabaleshwar having a sub-tropical climate with pleasant winters (average temperature 12 C) and not so warm summers (average temp. 26 C). These high plateaus therefore, exhibit their own characteristic vegetation and bird fauna.

The rainfall decreases rapidly from west to east and slopes running east with altitude between 1000 m. and 600 m.(4000′ and 2000′) are characterized by moist and dry deciduous forests, scrub and grassland. Bird fauna here represents these biotopes with variations due probably to intensity of human impact and allied factors.

In this region I looked for birds between December 1994 and May 1996 and mainly between 2100′ and 4000′+ altitude. I covered the plateau areas and forests of Harishchandragad, Matheran, Bhimashankar, Sinhgad, Mahabaleshwar, Panchgani, Chandoli and Radhanagari.

## The Past Records

I could find no earlier records of a similar survey covering this entire region. The late Dr Salim Ali has recorded observations in the forties mainly from Lonavla, Matheran and Mahaba-

leshwar in his book Indian Hill Birds. The Checklist of Birds of Maharashtra by Humayun Abdulali obviously covers this region. A short account of the Avifauna of Maharashtra compiled by V. C. Ambedkar appears in the Fauna Volume of the Gazetteer of Maharashtra(1969 pp. 307-350). It presents familywise short accounts of birds occurring in Maharashtra but does not deal separately with hill birds. I could obtain some additional records from other observers who were kind enough to personally communicate their observations to me.

In his Indian Hill Birds published in 1949 the late Dr Salim Ali has included 98 birds whose distribution covers the region with which I am here concerned. They are mostly from the plateau regions, occurring around hill resorts such as Matheran and Mahabaleshwar. A number of birds that occur mainly on slopes and plateaus between 2000' and 3500' altitude do not figure in Salim Ali's book. But out of the birds mentioned by Salim Ali, the following were not seen during the present survey: Rufous tree pie, Chestnutbellied nuthatch, Velvetfronted Blue nuthatch, Goldenfronted leafbird, Tickell's blue flycatcher, Asian brown flycatcher, Bronzed drongo, Haircrested drongo, Blackhooded oriole, White wagtail, Mahratta woodpecker, Whitebellied woodpecker, Brown-capped woodpecker, Brownheaded barbet, Great hornbill, Malabar trogon, Large-tailed nightjar, Asian barred owlet, Oriental hobby, Pompadour Green-pigeon, Emerald dove, Shaheen falcon, Greater Racket-tailed drongo, Eurasian hobby and Green imperial pigeon.

Other observers have however, recorded in this region, the following species during 1980s and 1990s: Eurasian hobby, Shaheen falcon, Goldenfronted leafbird, Haircrested drongo, Blackhooded oriole, Mahratta woodpecker, Brown-capped woodpecker, Large-tailed nightjar, Asian barred owlet, Pampadour green pigeon, Emerald dove and Green imperial pigeon.

Humayun Abdulali's checklist of the Birds of Maharashtra ~~(first published in 1973)~~ 1981. in its second edition mentions 540 species and subspecies of birds occurring in this state. According to him 442 birds out of this are from Bombay and neighbouring areas of the Konkan including the Western Ghats. There are 19 forms that occur in southern areas around Mahabaleshwar and Ratnagiri. If the Konkan and the western faces of Western Ghats are excluded, 232 species from Mr Abdulali's list appear to belong to the region under reference here.

I could observe 168 bird species during the present survey while others have added 30 more through their observations. Three new species have been added to Mr Abdulali's list by recent sight records. These are: Japanese buzzard, Goshawk and Dark-fronted babbler. Thus there are no recent sight records of 31 bird species in northern western ghats between 2100' and 4000'+ altitude. These 31 species are: Eurasian tawny-eagle, Steppe eagle, Laggar falcon, Peregrine, Indian Hobby, Malabar Trogon, Malabar Grey hornbill, Blackrumped flameback, White-bellied woodpecker, Bronzed drongo, Haircrested drongo, Greater racket-tailed dron-

go, Rufous tree pie, Black-hooded oriole, White-eared bulbul, Golden-fronted leafbird, Fairy bluebird, Asian brown flycatcher, Tickell's blue flycatcher, Chestnutbellied nuthatch, Velvet-fronted blue nuthatch, Richard's pipit, Forest wagtail, Indian nightjar, Brown fish owl, Peninsular scops owl, Brown hawk owl, Alexandrine parakeet, Egyptian vulture, Besra (sparrowhawk) and Blue Chat.

Some birds like Laggar falcon, Great horned owl, Rufous tree pie, White wagtail, Indian nightjar, Brown hawk owl, Alexandrine parakeet and Egyptian vulture are found between 1500' and 2000' altitude but not higher. Some others like Malabar trogon, Malabar grey hornbill, Great hornbill, Small blue-faced malkoha, Black-rumped flameback, Common flameback, Bronzed drongo, Haircrested drongo, Greater racket-tailed drongo and Brown-capped woodpecker- appear now restricted to the Konkan region.

## 1 The Present Distribution of Birds in NWG

Let us now see how different bird families are distributed in northern Western Ghats.

(1) Phalacrocoracidae: Past tense

Great cormorant and Little cormorant are occasionally seen on reservoirs in the NWG around 2000' altitude.

(2) Ardeidae:

It is man who seems to be responsible for the entry of herons and egrets into the higher reaches of the Ghats. When he built ponds and reservoirs for his own water supply, he created conditions where an Indian Pond heron can quietly fish standing invisible among brown rocks and mud. This is how he appears on the lakes of Matheran and Mahabaleshwar. It is man's cattle again who bring in their train the cattle egret who however, is usually seen in the hills around 2000' and 2500' altitude. Both these species nest in the plains. Grey heron is occasionally seen around reservoirs at 2000' altitude.

(3) Ciconiidae:

Woolly-necked stork, singly or in pairs, can be seen on reservoirs around 2000' altitude.

(4) Phoenicopteridae:

A flock of about 30 Greater flamingos lands in July-August every year during the height of monsoon in flooded paddy fields at Malshej near Harishchandragad at an altitude of over 2000'. Flocks also seen in flight crossing the Ghats from west to east in September-October.

(5) Anatidae:

Spot-billed ducks in pairs are seen during rainy season frequenting rain-water pools and flooded paddy fields around 2000′ altitude.

(6) Accipitridae:

Many birds of prey find refuge in our hills. Some hunt and nest in them, others come to them only for hunting and scavenging and still others hunt in the plains but nest in the hills.

Blackwinged kite can be found throughout the Ghats hovering over grassy slopes, secondary and scrub forest and opened up areas amidst forested slopes. Rarely ascends the high plateaus. Nests in the plains.

Oriental Honey buzzard was seen flying or soaring over all locations except Radhanagari. A pair was seen at Vasota attacking a hive, taking turns in doing so. Nests in trees between 2000′ and 3000′ altitude. The migratory Japanese buzzard was sighted over the Mahabaleshwar plateau in March 1994 (R. Purandare, pers. communication).

Black kite is generally seen flying over barren, stony, scrub or secondary forest-covered slopes and very rarely over forested areas. Though it generally nests in the plains one pair was seen nesting on the plateau of Panchgani over 4000′ altitude. In March 1996 it had reared a single young. In winter the Large Indian kite can be seen in flight over our hills.

Shikra is usually seen around 2000′ altitude in deciduous or scrub forest or more open areas. It nests on the outskirts of cities and villages but was not seen nesting or ascending to any of our hill resorts.

Sparrowhawk was seen at Mahabaleshwar and Matheran in winter but also in mid-April; believed to be the migratory Asiatic race. A dark large hawk was seen flying over Vasota forests in March 1994 which looked very much like Goshawk. This record however, needs confirmation as it is not recorded in this part of Ghats before.

White-eyed buzzard, like Pariah kite, was seen quartering barren, scrub or secondary forest covered slopes around 2000′ altitude. It was seen at Chandoli around 2700′ altitude. It nests in the plains.

Changeable hawk eagle was seen over Mahabaleshwar plateau, Chandoli and around Matheran. Nests on suitable trees in the valleys and slopes between 2000′ and 3000′ ft. One nest was however, found on the Panchgani plateau (R. Purandare pers. commu.).Bonelli′s eagle is also commonly seen throughout our hills though rarely south of Mahabaleshwar. It nests on valley slopes upto an altitude of 2500′. Black eagle was seen at Mahabaleshwar, Vasota,

Bhimashankar and Radhanagari flying over forested slopes. Nests on valley slopes below high plateaus. In late May an eagle was seen carrying a stick in his beak from the Bhimashankar plateau down in the valley. At Radhanagari a pair was seen in December in courtship aerobatics squealing as they frolicked. Breeds around all these locations.

A Eurasian griffon was sighted over the Matheran plateau in December 1995. Longbilled and Whitebacked vultures are commonly seen flying throughout the Ghats looking for carrion. The long-billed nests on ledges in escarpments while the white-backed nests in trees upto 2000′ altitude.

In winter the Pallid harrier is generally met with around 2000′ altitude coursing over slopes covered with grass and shrubs. No other harrier was seen during the survey.

Short-toed eagle was seen only once near Matheran(December 1995) flying over secondary forest. It is an inhabitant of dry areas and stony plateaus and is rarely seen around Western Ghats. Bonelli′s eagle was seen at Bhimashankar, Mahabaleshwar and Matheran. It nests in trees between 1500′ and 3000′ altitude. Crested serpent eagle is the most common eagle of our hills. Breeds in suitable trees in valleys and slopes but not on high plateaus. Pairs and families can be seen in flight between November and May sometimes in spectacular aerial pursuit, at other times giving out their musical squeals and flying leisurely.

Ospreys can be seen around reservoirs at an altitude of 2000′.

(7) Falconidae:

Shaheen falcon was seen to be breeding in escarpments at Sinhgad and Mahabaleshwar but presumably breeds elsewhere also. Its hunting sorties cover a wide area and the falcon is often met with in nearby plains, over settlements in cities probably after parakeets. Eurasian hobby was seen only at Kas near Satara and Vasota in 1994. (Dr Dharap pers. commu.). In winter the Common kestrel is seen throughout the Ghats in scrub and secondary forest-covered areas, barren and grassy plateaus and opened up patches in moist deciduous forest. Arrives in September-October and departs in April. A resident Kestrel breeds on ledges in escarpments and was observed near Harishchandragad and Mahabaleshwar.

A group of six Red-legged or Amur falcon, a passage migrant, was seen soaring over the Matheran plateau in December 1995. It probably was on its way to cross the Arabian sea to its destination in Africa.

(8) Phasianidae:

Painted francolin and Rain quail are usually seen in the hills during rainy season around 2000′ to 3000′ altitude near

cultivation and settlements. The latter however, ascends plateaus of over 4000′ altitude and is then found over grassy and scrubby wet plateaus. Rock bush quail is another inhabitant of barren, rocky and grass and shrub-covered habitat upto 3000′ altitude, while dry deciduous forests, savanna landscapes and vegetation around bungalows in hill resorts are occupied by Jungle bush quail and Button quail in the same region. Here also is found the Indian peafowl but is patchily distributed. It is not found on the high plateaus. It breeds in the plains. Gallinaceous birds of the forested and plateau areas are Red spurfowl and Grey jungle fowl. In the rainy season they depart from the plateau areas to the valleys and return by end September-October. They are very vociferous in spring and summer, their breeding season. Painted bush quail was once seen at Panshet around 2000′ altitude and at Radhanagari where it breeds.

(9) Burhinidae:

Eurasian thick knee inhabits barren, stony, undulating and scrub-covered areas in our hills upto about 3500′ altitude. During the present survey it was recorded from Chandoli. Another observer has recorded it from such areas on the Mahabaleshwar plateau(R. Purandare pers. commu.).

(10) Charadriidae:

Redwattled lapwing is found in our hills at all altitudes around irrigation and water supply tanks while Yellow wattled lapwing inhabits barren, rocky and grass-coverd plateaus upto an altitude of 2500′. Common sandpiper is another denizen of our hill reservoirs upto an altitude of 2000′. On the barren plateau of Panchagani over 4000′ altitude a small pond has attracted a Green sandpiper and Little ringed and Kentish plovers in March 1996. Snipes are seen in winter in marshy areas around 2000′ altitude. Likewise Curlew in small groups have been observed around reservoirs in Lonavla area(altitude 2000+′).

(11) Laridae:

Occasionally Brownheaded and Blackheaded gulls in ones or twos can be found quartering irrigation reservoirs around 2000′ altitude. River terns are also found there. On the Doodhganga reservoir south of Radhanagari and again around the same altitude, a breeding colony of River terns was observed in March 1996. Occasionally a Whiskered tern is seen on the Koyna reservoir.

(12) Columbidae:

Pompadour pigeon was not recorded during the present survey though some observers have recorded it at Vasota around 2000′ and 2500′ altitude (S. Ingalhallikar pers. commu.). Likewise Green imperial pigeon has been recorded by other observers at Mahabaleshwar, Bhimashankar and Sinhgad valley (R. Purandare & S. Ingalhallikar pers. commu.). Nilgiri wood pigeon is distributed

throughout northern western ghats and was seen at Matheran, Mahabaleshwar, Chandoli and Radhanagari forests during the present survey. They are vocal during spring and summer and descend to the ground to rock pools and streamlets to drink. Small parties of Yellow-footed green pigeon were seen at Panchgani in March 1996. It is usually found around and below 2000' altitude. Blue rock pigeons in small parties, are found around cliffs and escarpments throughout these hills.

Oriental turtle dove occurs throughout northern western ghats between 2500' and 4000'+ altitude and was recorded during the present survey at Harishchnadragad, Bhimashankar, Matheran, Mahabaleshwar, Chandoli and Radhanagari. The resident population appears to be small but is greatly augmented during winter by migrants from the north. Spotted dove is common upto 3000' altitude but occasionally ascends the high plateaus. It was recorded in Panchagani during this survey. Even the Laughing dove which is a plains species ascends high plateaus and can be found in barren areas and road cuttings as at Mahabaleshwar. Emerald dove was not recorded during this survey though other observers have seen it at Vasota and Bhimashankar.

(13) Psittacidae:

Vernal hanging parrot is found throughout the NWG in moist deciduous forests but avoids heavier forests. Plumheaded parakeet is also common in these forests though it is seldom found above 3000' altitude. Malabar parakeet occurs in moist deciduous and evergreen forests and was recorded from Mahabaleshwar and Vasota during the present survey. Other observers have recorded it at Bhimashankar and Radhanagari(Dr Dharap pers. commu.). Roseringed parakeets in noisy flocks are generally common around 2000' altitude but can also be seen in Panchgani at 4000+'.

(14) Cuculidae:

Asian koel is common around 2000' altitude but was also recorded in Panchgani at 4000'+ altitude during this survey. Cuckoos migrating from Himalayas and further north are usually found between 2000' and 2500' but have been recorded sometimes at Mahabaleshwar. It is possible that many migrant species when they come south, land on the high plateaus before descending to the plains. Drongo-cuckoo was recorded during the present survey in moist deciduous forest at Matheran. Sirkeer malkoha is however, a denizen of scrub and dry deciduous forests in our hills. Pied cuckoo is normally seen between 2000' and 2500' altitude.

(15) Centropididae:

Greater coucal is another bird found throughout NWG at all altitudes in woodlands, light forests and bungalow compounds.

(16) Strigidae:

Barn owl, Mottled wood owl, Brown wood owl and Collared

scops owl were the owl species that were seen/heard during the present survey. Mottled wood owl was seen at Mahabaleshwar and Vasota in evergreen forests; Barn owl was recorded in barren, grassy plateaus around settlements at all altitudes while Brown wood owl was recorded in moist deciduous forests at Matheran. Brown fish owl used to inhabit forest patches around hill ponds again upto 3000′ altitude. But was not seen during this survey. At night owl calls are by no means common in forests and plateau areas though in Radhanagari sanctuary in December 1985 Collared scops owl was very vocal at night and so was Brown wood owl in Matheran. Other observers have recorded Oriental scops owl in Sinhgad valley(S. Ingalhallikar pers. commu.). Spotted owlet is common around human habitation upto 2000′ altitude.

(17) Caprimulgidae:

Grey nightjar was heard and seen in Bhimashankar and Syke′s nightjar in Radhanagari. No other nightjars were recorded during the survey though other observers have recorded Largetailed and Savanna nightjars at Vasota(S. Ingalhallikar pers. commu.).

(18) Apodidae:

Little swifts were seen flying over all the areas throughout the NWG. Alpine swifts were seen around escarpments and plateaus at Mahabaleshwar, Matheran and Chandoli. A Brownbacked needletail was seen in flight at Doodhganaga.

(19) Hemiprocnidae:

Crested tree swifts are normally seen between 2000′ and 3000′ altitude and were recorded at Chandoli during this survey.

(20) Alcedinidae:

The Common kingfisher is normally seen around 2000′ altitude near streams and ponds but was also recorded at Radhanagari around 3000′ altitude.

(21) Dacelonidae:

Whitethroated kingfisher is found throughout the NWG at all altitudes near water as well as around cultivation and human settlements.

(22) Meropidae:

Little green bee-eater is seen throughout the NWG wherever forest is opened up and dry, grassy, scrubby and secondary forest areas are created. It is found from plains to plateaus over 4000′ altitude.

(23) Upipidae:

Eurasian hoopoe is normally seen around 2000′ altitude and

below but can be seen in Panchgani at 4000′+ altitude.

(24) Bucerotidae:

Indian grey hornbill was recorded at Panchgani and nowhere else during the present survey. It is normally seen in plains and below 2000′ altitude. Great hornbill was recorded from Koyna forests (Vasota and surroundings) but has disappeared from the NWG. It is more common on the western faces of Western Ghats. Malabar grey hornbill also was not seen in recent years in the NWG.

(25) Megalaimidae:

Whitecheeked barbet is found throughout the NWG at all altitudes from dry deciduous to evergreen forests. Coppersmith barbet is more common around bungalows and gardens but not in forest areas. It is seen around human settlements and hill resorts at all altitudes in the NWG. Brownheaded barbet has become extremely rare in the NWG and was not recorded during the present survey.

(26) Picidae:

Woodpeckers have also become extremely rare in the NWG presumably because all old and decaying trees were promptly removed. During this survey Lesser yellownape was recorded in Mahabaleshwar mainly in spring and summer, Greater flameback and Speckled piculet in Radhanagari sanctuary. Other observers have recorded Browncapped woodpecker at Mahabaleshwar, Vasota and Sinhgad; Heartspotted woodpecker at Sinhgad valley and Vasota and Rufous woodpecker at Mahabaleshwar, Bhimashankar and Vasota( S. Ingalhallikar and R. Purandare pers. commu.).

(27) Alaudidae:

Malabar lark and Oriental skylark are found throughout the NWG in grassy, open areas from 2500′ to 4500′ altitude. Indian lark and Rufoustailed lark are generally met with between 2000′ and 2500′ altitude. But the former is rarer. Ashycrowned and Blackcrowned sparrow larks are found throughout in barren and rocky areas and plateaus.

(28) Hirundinidae:

Dusky crag martin and Redrumped swallow are the two swallows that are found throughout the NWG at all altitudes. In winter their numbers are swelled by migratory Eurasian crag martin and Eastern swallows. Wiretailed swallow is generally found around watercourses and wet areas at all altitudes while Sand martins were seen at Matheran, Chandoli and Radhanagari.

(29) Laniidae:

Longtailed shrike is found throughout, at all altitudes in

opened up forests, secondary forests and still drier areas. In October 1995 in Mahabaleshwar they were very numerous and were seen even in forested areas, the numbers probably swelled by migrants from the north. Baybacked shrike was seen between 2000' and 2500' altitude in dry deciduous and secondary forests in Chandoli.

(30) Oriolidae:

Eurasian Golden-oriole was seen at Chandoli and Radhanagari in moist deciduous forests but around bungalow compounds in Panchagani. It was not recorded in denser forests. Blackhooded oriole was not recorded during the present survey. It is more common on the western slopes.

(31) Dicruridae:

Except on the plateau areas above 4000' altitude Black drongo was seen throughout in dry and moist deciduous forests, agricultural and settled areas and secondary forests and grassy plateaus. Ashy drongo is however, a forest bird seen at the edge of the clearings as well as inside forests above 2500'altitude. Whitebellied drongo is again restricted to forest clearings and dry deciduous forests. Greater racket-tailed drongo is extremely rare in the Ghats though seen more often on the Konkan side in forested areas below 2000'altitude. Bronzed and Haircrested drongos have not been recorded from NWG in recent years.

(32) Sturnidae:

Common myna has not as yet penetrated the forested areas and higher plateaus the only exception being the Panchgani plateau. In forested areas around 3000' altitude like Matheran and Bhimashankar, it is replaced by Jungle myna. But it is rare on the higher plateaus. Brahminy starling was seen only at Panchgani and nowhere else in the NWG.

(33) Corvidae:

Rufous tree pie was not seen anywhere in the NWG during the present survey. Other observers have recorded it only in Sinhgad valley around 2000' altitude (S. Ingalhallikar, pers. commu.). Largebilled crow is however, found throughout the NWG at all altitudes. They frequent the plateau resorts during the day and retreat to valleys and lower areas in the evening to roost. They breed in the lower areas.

(34) Campephagidae:

Common wood shrike was seen in light moist deciduous forest in Chandoli and in denser moist deciduous forest in Matheran, both at less than 3000' altitude. Large cuckoo shrike was seen near Panshet around 2500' altitude. It is generally found lower down and is more common to the west of the NWG. Scarlet minivet was seen, often in pairs, upto 3000' altitude in forest clearings

as well as inside forest at Bhimashankar and Matheran. It was recorded by other observers below Mahabaleshwar plateau around 3500′ altitude (R. Purandare, pers. commu.). Small minivet is found normally around 2000′ and below though it was also observed at Panchagani during the present survey. In scrub forest White-bellied minivet can be seen upto 2000′ altitude.

(35) Irenidae:

Common iora is found throughout the NWG at all altitudes. It leaves the higher plateaus during monsoons but returns in September-October. Breeds around 2000′ in dry and moist deciduous forest and even in bungalow compounds.

(36) Pycnonitidae:

Redvented bulbul is distributed throughout the NWG at all altitudes in suitable biotopes such as grassy and thorn scrub areas, secondary forest, dry deciduous forest and clearings in moist deciduous forests.In better shaded and forested areas it is replaced by Redwhiskered bulbul throughout. Black bulbul is found throughout in moist deciduous and evergreen forest areas between 2500′ and 4000′+ altitude. Yellow-browed bulbul is found south of Lonavla-Khandala, and is extremely common in the forests of Mahabaleshwar, Vasota and Radhanagari. It was not observed in Matheran and Bhimashankar. Whitecheeked bulbul used to be found in secondary and thorn forest areas of Sinhgad plateau but was not recorded during this survey. Other observers have recorded White-browed bulbul in Sinhgad valley and Khandala around 2000′ altitude(S. Ingalhallikar pers. commu.).

(37) Muscicapidae

Sylviinae: Puffthroated babbler is distributed throughout the NWG in moist deciduous and evergreen forest areas at all altitudes. Same is the case with Jungle and Quaker babblers though both also occur in forest clearings and secondary forest areas. Mount Abu Snowy-throated babbler was seen only in Bhimashankar and Matheran forests. Other observers have seen it near Mulshi around 2000′ altitude (R. Purandare, Pers. commu.). Rufous babbler was seen only in Mahabaleshwar and Radhanagari forests. Dark-fronted babbler was reported by another observer from Vasota in December 1995.(V. Shantaram pers. commu.). This is an addition to the Check-list of Maharashtra birds. Yellow-eyed babbler is confined to dry deciduous thorn and secondary forests at all altitudes but was not seen south of Mahabaleshwar. Indian scimitar babbler is also found throughout in forest clearings, secondary forests, bungalow compounds and denser forest areas but is surprisingly extremely rare at Matheran. (Seen at Torna)

Muscicapinae: Among the resident flycatchers, the endemic Whitebellied blue is confined to moist deciduous and evergreen biotopes at all altitudes and was seen at Mahabaleshwar, Matheran and Radhanagari. Blacknaped monarch occurs not only in these biotopes but was also seen in forest clearings and lighter for-

ests. Whitethroated fantail is also found in these areas at all altitudes. White-spotted fantail is confined to better wooded areas. Asian paradise flycatcher is also found throughout the NWG wherever shady areas are available. In September-October males in brown plumage (juveniles) are found almost in equal numbers to adults in white plumage. Brown females are also well-distributed throughout in forest areas. They leave the high plateaus during rains but return immediately in September-October.

Migratory flycatchers that are common throughout are Kashmir and Verditer. The former is found among bushes, secondary forest, forest clearings and also forested areas but the latter is confined to moist deciduous to evergreen forests.

(38) Cisticolidae:

Zitting cisticola is confined to grassland and low bushes throughout at all altitudes but is rare south of Mahabaleshwar. Goldenheaded warbler was seen in Strobilanthus only in the Radhanagari Sanctuary around 3000′ altitude. Greybreasted prinia and Plain prinia are confined to thorn and dry deciduous forests upto 3000′ altitude. Ashy prinia occurs in gardens and bungalow compounds at all altitudes throughout the NWG. Jungle prinia is found in better wooded localities than those occupied by the Plain. Common tailorbird is found throughout from thorn and dry deciduous forest to evergreen forests including groves and gardens and bungalow compounds at all altitudes. Bristled grassbird has been recorded only at Sinhgad around 4000′ altitude where it breeds also among tall grass.

(39) Sylviidae:

The migratory Phylloscopus and Hippolais warblers occur throughout the NWG at all altitudes from bush and thorn to evergreen forest biotopes. H. caligata and P. collybita are found among bushes in forest clearings and rank undergrowth. P. affinis is rare but occurs in the under storey of the forest. P. tytleri, P. griseolus, P. trochiloides and P. occipitalis occur in forest canopy and middle storeys at all altitudes. P. magnirostris appears to be rare and was seen only at Mahabaleshwar.

Turdinae: Orinetal magpie robin is found throughout at all altitudes but White-rumped shama was seen to be more common only at Bhimashankar and Matheran and rarely in Mahabaleshwar and Radhanagari. In Mahabaleshwar it appears to arrive in summer and then is very vocal. It is generally not seen in winter. In Radhanagari it was recorded in winter also. In Bhimashankar and Matheran it occurs near forested bungalow compounds and rarely in deeper forests away from human settlements. Common redstart was not seen in any of the hills and plateau areas (3000′ and above) but appears to be confined to areas around 2000′ and lower. Stonechat is confined to rocky areas and bushes while Pied bush chat occupies forest edges, secondary forests and opener areas. It however, ascends to over 4000′ while the former is not found on higher plateaus. Black robin is found throughout in dry, stony and thorn

Ambedkar, V.C. (1991): Long distance movement of a Malabar Whistling Thrush in the Western Ghats.

JBNHS, Vol. 88(1): 133.

bush areas but rarely ascends the higher plateaus. Blue rock thrush also occurs in such areas at all altitudes. Orangeheaded thrush and Eurasian blackbird occur in moist deciduous to evergreen forests; but the former occupies areas of denser forests with good canopy from 2500′ to over 4000′ altitude and the latter occupies more open areas and plantations also. Both these are extremely vocal from March onwards. Pairs of orangeheaded thrush can be seen in courtship when the male perched on a horizontal branch bows elegantly with outstretched neck and slightly parted wings while his better half listens motionless. The male′s repertoire is varied and arabasque, his tone varies from contralto to falsetto with frequent modulations till he reaches a crescendo. There he stops abruptly only to begin a contralto all over again. The courtship song often goes on over half an hour with the female sitting like a rock without twitching or ruffling a feather. Bluecapped rock thrush migrates to these forests in winter and can then be seen at all altitudes. Malabar whistling thrush generally occurs near hill streams in forests as well as in cleared areas. But during the present survey it was hardly seen and appears to have become extremely scarce. It was only seen in Mahabaleshwar in summer and immediately after rains. After rains it probably migrates south as hill streams dry up progressively. Its extreme scarcity perhaps reflects the desiccation of our hill areas due to drying up of hill streams. (Ambedkar, 1991).

(40) Paridae:

The only tit seen during the present survey was Yellow-cheeked tit. It is seen in forest clearings, bungalow compounds and adjoining forest areas but not in deeper forests from 2000′ to over 4000′ altitude. Other observers have recorded Grey tit at Mahabaleshwar but it is usually found in lighter forests, dry deciduous and thorn scrub areas from plains to 2000′ altitude.

(41) Motacillidae:

Among pipits Longbilled pipit is generally found in grassland & stony plateaus with bushes at all altitudes. Paddyfield pipit is found near settlements, fields, fallow areas and scrub at all altitudes. Indian olive-backed pipit and the migratory tree pipit occur at all altitudes in moist deciduous and evergreen forest areas and plantations, the latter in winter only. Grey wagtail is found near hill-streams, ponds, and paths and roads in forest in winter at all altitudes. These wagtails appear to land on our high plateaus in September-early October as they come in from the north before descending to the plains. Yellow wagtails occur near water-bodies upto 3000′ altitude in winter. Forest wagtail was not recorded during the present survey though I had seen it in Matheran during the 1970s. Large pied wagtail, though a plains species, was encountered at Panchgani at an altitude of over 4000′.

(42) Nectarinidae:

The most common sunbird in our hills in moist deciduous to

evergreen forests, is the crimson-backed sunbird. In more open areas below 4000′ altitude and in dry deciduous, thorn and scrub forests Purple sunbird is seen commonly. Purple-rumped sunbird normally occurs upto 2000′ altitude but was also recorded at Panchgani during the present survey. A pair of Crimson sunbird was observed on Mahabaleshwar plateau in a tropical pine plantation. But it is more often seen between 2500′ and 3000′ altitude in moist deciduous forest, forest clearings and secondary forest areas.

Thickbilled, Pale-billed and Plain flowerpeckers were seen mostly in opened up forest areas, bungalow compounds, moist deciduous and dry deciduous forests. Thickbilled flowerpecker was seen even on high plateaus while the other two were encountered more often around 3000′ altitude and below.

(43) Zosteropidae:

Orinetal white-eyes were seen at all altitudes throughout the NWG especially in better wooded and forest areas, bungalow compounds, even among trees in areas of heavy traffic and movement. On high pltaeau they were not seen during winter but appeared in spring beginning by late January.

(44) Ploceidae:

House sparrows are scarce above 2000′ altitude in all types of forests in our hills. The only exception again is Panchgani where the house sparrow occurs above 4000′ft. The chestnut-shouldered sparrow is encountered in open areas, fallow fields and forest edges upto 3000′ altitude.

Estrildinae: White-throated and Scaly-breasted munia are common between 2000′ and 2500′ altitude.

(45) Fringillidae:

Common rosefinch arrives in the NWG by October and leaves by mid-April. It is encountered in almost all types of habitats, from shrub and secondary forest to moist deciduous and evergreen forests and even in bungalow compounds.

(46) Emberizidae:

Chestnut-eared bunting, a migrant, is encountered in grasses and bushes on dry slopes between 2000′ and 2500′ altitude. House bunting occurs in still drier and stony areas upto 3000′ altitude while Crested bunting occurs among bushes, secondary forest, and rocks and ravines from 2000′ to 4000′ altitude. It is rarely seen in better wooded and forest-covered slopes and plateaus.

In addition the following birds can only be called vagrants in the NWG as their recent occurrence is extremely rare and

irregular: White-bellied fish-eagle, Cinereous vulture, Painted spurfowl, Painted sandgrouse, Grey-bellied cuckoo, Banded bay-cuckoo, Chestnut-headed bee-eater, Indian pitta, Grey shrike, Rufousbellied babbler, Ultramarine flycatcher, Greyheaded canary-flycatcher, Blyth's reed warbler, Lesser whitethroat, Indian blue robin and Long-billed sunbird.

## 2 The Habitat Pattern

In Northern Western Ghats I observed birds at the following places: Harishchandragad(altitude 4719'), Matheran(2650'), Bhimashankar(3000'), Panshet(2100'), Sinhgad(4300'), Vasota(2500'), Mahabaleshwar(4500'), Panchgani(4320'), Chandoli(2800'), Radhanagari(2800') and Doodhganga(2000'). Harishchandragad, Matheran, Bhimashankar, Mahabaleshwar-Panchgani are plateau areas with good forest cover. The semi-evergreen to evergreen character of these forests is due to the heavy monsoonal rainfall they receive between June and September every year. Due to high altitude and consequent moderation of tropical climate, the forests of Mahabaleshwar and Harishchandragad exhibit characteristics of montane sub-tropical forest with a leavening of plant species found in temperate climate. The extensive Harishchandragad plateau is not all forest which is confined to its upper gradients. The lower plain areas have been reduced to grassland and scattered trees due to grazing and cutting. In Mahabaleshwar also close canopy forest occupies only about 30% of the plateau area, the rest being opened up or cut down to various degrees. Dominant tree species in these comparatively high altitude forests include Memecylon umbellatum, Actinodaphne hookeri, Eugenia jambolana, Allophylus kobbe, Olea dioica and Litsea tomentosa. As winter rains are rare and a long dry period(October to May) produces moisture stress species like Randia dumetorum prevalent in drier forests are common here.

In Harishchandragad forests on the west, north and east have been cut down due to human pressure mainly during religious festivals when a lot of pilgrims gather. Almost 70% of the area is now covered by low scrub and coarse grasses. The tree composition of forest patches shows a higher percentage of Ficus and Terminalia species than is prevalent in Mahabaleshwar. Memecylon, Actinodaphne, Eugenia, Randia and Olea also occur.

The plateau of Mahabaleshwar is a well known hill resort with a permanent residential population of 20,000 which increases to over 100,000 during the busy summer tourist season. Forest in Mahabaleshwar is cut down for fuel demand of the local population and on account of hotel-building construction. Large areas to the north and east of the plateau are now without forest canopy. Large trees have disappeared and secondary growth has replaced them. The habitat of the typical birds of the evergreen and semi-evergreen forests has disappeared from over 50% of the plateau area. While the forest is under heavy human pressure, large private estates within the municipal limits of the town are instrumental in preserving the green cover. Lofty trees are confined to these private estates only, with their characteristic

bird life.

Panchgani and Sinhgad though having an altitude of over 4000′ differ in character from Mahabaleshwar and Harishchandragad. Panchgani is situated on the Mahabaleshwar plateau but to the latter′s east. There is a marked difference in rainfall from over 6000 mm in Mahabaleshwar to just 1500 mm in Panchgani. The vegetation in Panchgani partakes mainly of deciduous species with a scattering of moist deciduous ones. Moreover a number of exotic trees such as Silver Oak and Eucalyptus in large numbers have been planted and the deciduous forest has also a depleted character. As we shall shortly see birdlife in Panchgani is quite different from the one found in Mahabaleshwar. The Sinhgad plateau is similar in character to Panchgani but is mainly a grassland and scrub-covered one. The trees are stunted and gnarled and do not grow tall probably due to high velocity winds. In the valleys some forest patches can be found and the ravines in these valleys still preserve a few characteristic birds.

The plateaus of Matheran and Bhimashankar are separated from eachother by a broad valley. Both are between 2500′ and 3000′ in altitude, receive comparable rainfall and exhibit comparable vegetation, animal and birdlife. Both are hill resorts though Bhimashankar is also a famous place of pilgrimage. The resident population of Matheran is less than 10,000 while that of Bhimashankar is around 5000 only. Fuelwood pressure on the forest is less than in Mahabaleshwar though shifting cultivation is a common practice at Bhimashankar for which forest is cut down periodically. Vehicles are not allowed inside the town of Matheran. There are no asphalt roads and the atmosphere is more sylvan than in Bhimashankar. As in Mahabaleshwar the private estates in Matheran are large and preserve many lofty trees. But the trees in the reserve forests are lofty too, many over 100′ in height. Forests to the north and west are better preserved than those to the east and south. In Bhimashankar large, lofty trees are confined to two sacred groves, the remaining forest patches showing a mixed structure. The tree composition in Matheran and Bhimashankar forests is a mixture of evergreen and semi-evergreen species. While Actinodaphne, Memecylon and Eugenia are present, Randia is much less evident showing probably more moisture retention even in the dry season than in Mahabaleshwar. The dominant tree species include Memecylon, Eugenia, Bridelia, Olea, Ficus, Careya and Heterophragma. Macaranga, Litsea and Symplocos are also present. Indeed nowhere in northern western ghats are Memecylon and Eugenia loftier than in Matheran.

At Chandoli well-preserved semi-evergreen forest is now confined to the west near the source of the river Varna. This area is without roads and is almost inaccessible. Though some of the pristine forest in this area was submerged under the Varna reservoir, the reservoir also became instrumental in isolating the forest area and helped preserve the rest of the forest. During the survey it was not possible to gain access to this forest. I had to be content with investigating the remaining forest patches to the north and south of the reservoir together with areas under

more or less cutting pressure.

Vasota, Radhanagari and Doodhganga lie in the direct line of the southwest monsoon in the main ridge of Western Ghats and therefore, receive heavy rainfall in summer (6000mm+). But the height of the hills is not above 3000'and the sub-tropical character of vegetation is not evident. The semi-evergreen and evergreen forests of these hills consist of Holigarna grahamii, Glochidion hohenakeri, Symplocos, Derris scandens, Ficus glomerata, Eugenia, Terminalia, Olea, Diospyros, Driptis, Actinodaphne, Mappea foetida, Kydia callisima etc. Where the forest is cut down grasses such as Andropogon, Cymbopogon and herbs such as Vernonia have taken over. These forests are better protected being not on the main tourist map. They form a part of wildlife sanctuaries with more or less organized management for wildlife protection. The bird and animal life in these forests is therefore, more varied than anywhere else in the NWG.

## More About the Forest Character

Generally there are two flowering seasons in these forests, one as the monsoon wanes in late August and September, and the other beginning in late January as spring arrives. A number of herbaceous plants and creepers bloom in the late monsoon followed by grasses after the retreat of the monsoon.

These forests are not known for flowers of flashy, bright and dazzling colours. Their petals have soft tints: lilac, pink, lavendar, lemon yellow, mauve, sky blue and white. There are a few insectivorous plants whose flowers trap insects. What really dazzles are not individual flowers but carpets of yellow, pink and lilac as lush green meadows sparkle with innumerable wild flowers during the monsoon.

This is the season when insect life is probably at its peak and many birds are raising their young. It is also the season when the first migratory birds arrive from the north. As they arrive, they land on these hill plateaus before descending to the plains.

The flowering in spring is small and inconspicuous except a few species such as Memecylon. Flowers of some of the large bushes and lofty trees such as Olea dioica, Glochidion hohenackeri, Bridelia retusa, Ficus glomerata and Actinodaphne hookeri are small and not easily seen. As the season progresses, larger and more conspicuous flowers bloom, e.g. those of Memecylon umbellatum, Terminalia chebula, Vanqueria spinoza, Pavetta indica, Lobelia nicotiniifolia, Flacourtia latifolia, Holerrhina antidysenterica, Heterophragma roxburghii, Lasiosiphon eriocephalus and Randia dumetorum. These attract insects, bees and birds. Strobilanthus flowers once in seven years when droves of bees collect honey which is then harvested by man. Litsea wightii likewise flowers once in nine years, both flowering during the monsoon.

Razi, B.A. (1955): The phytogeography of the Mysore hill tops.
J. Mysore Univ. Sect. B vol. 14(1): 87-107.
vol. 15(11): 109-144

phytogeography - The branch of botany that is concerned with the geographical distribution of plants. (Ask Dr. Vito. Vanbik)

Brooks, M. (1952): The Allegheny Mountains as a Barrier to Bird Movement.
Auk, vol. 69: 192-198.

3

On this background let us examine what birds were seen in these locations during the present investigation. We will first give the distribution of birds seen according to altitude and type of habitat.

| Altitude | I<br>Birds of thorn & Scrub forest | II<br>Deciduous & secondary forest |
|---|---|---|
| ~~Upto~~ 2000′<br>0 — 609 m. | Yellow-wattled lapwing, Black drongo, Yellow-eyed babbler, Franklin's wren warbler, Plain prinia, Longtailed shrike, Red-vented bulbul, Blue rock thrush, Purple sunbird, Large-billed crow. White-bellied minivet | Shikra, Kestrel, Laughing Dove, Common myna, Yellow-eyed babbler, Jungle Prinia, Common Tailorbird, Pied bush chat, Purple sunbird, Chestnut-shouldered Petronia, Asian Koel, Common Cuckoo, Greater Coucal, Bay-backed shrike, Black drongo, Jungle babber, Tickell's flowerpecker, Redvented bulbul, Kashmir flycatcher, Common iora. |
| 2100′-3000′<br>640 m. - 914 | Yellow-wattled lapwing, Black drongo, Large-billed crow, Yellow-eyed babbler, Blue rock thrush, Redvented bulbul, Iora. | Shikra, Painted francolin, Rock bush quail, Jungle bush quail, Peafowl, Crested tree swift, Large-billed crow, Purple sunbird, Long tailed shrike, Scarlet minivet, Red-vented bulbul, Kashmir flycatcher, Yellow-eyed babbler, Jungle wren babbler, Tailor bird, Pied bush chat, Chestnut-shouldred Petronia, Common Cuckoo, Greater coucal, Sirkeer malkoha, ~~Longtailed shrike,~~ Baybacked shrike, White-bellied drongo, Jungle babbler. |
| 3100′-4000′+<br>920 - 1220 | Large-billed crow, Blue rock thrush, Yellow-eyed babbler, Indian robin, Laughing dove, Small minivet, Pied bush chat, House sparrow, Little Green bee-eater. | Red-vented bulbul, Kashmir flycatcher, Booted warbler, Chiffchaff, Asian Koel, Roseringed parakeet, Yellow-footed green pigeon, Coppersmith Barbet, Brahminy Starling, Common myna, Oriental Magpie robin, Black drongo, Eurasian Blackbird, Black Kite, Red-whiskered bulbul, Purple-rumped sunbird, Jungle babbler, Spotted dove, Eurasian Golden oriole, Plum-headed parakeet, Eurasian Hoopoe, White-spotted |

4000′ — 5000′
1230 — 1524

| | | |
|---|---|---|
| | | fantail fly-catcher, Indian Grey hornbill, Common Tailor bird, Large-billed crow. |
| | III | IV |
| Altitude | Moist deciduous forest | Semi-evergreen and Evergreen forest |
| Upto 2000′ | Black drongo, Red-whiskered bulbul, Jungle babbler, Quaker babbler, Oriental White-eye, Chestnut-shouldered Petronia, White-throated fantail fly-catcher, Kashmir fly-catcher, Phyllo-scopus affinis, Orinetal Magpie Robin, Crested Serpent Eagle, Spotted Dove, Plum-headed Para-keet, Vernal Hanging Parrot, Large-billed Crow, Woodshrike, Large cuckoo-shrike, Common Tailor-bird, Booted Warbler, Chiffchaff, Eurasian Blackbird, Paradise Flycatcher. | None |
| 2100-3000′ | Eurasian Sparrowhawk, Changeable hawk eagle, Imperial pigeon, Oriental turtle dove, Plum- headed parakeet, White-cheeked barbet, Large-billed crow, Common Woodshrike, Scarlet minivet, Yellow-cheeked tit, Brown wood owl, Collared scops owl, Grey ni-ghtjar, Sykes′ night-jar, Collared sand mar-tin, Long-tailed shrike, Eurasian Golden oriole, Ashy drongo, Jungle myna, Common iora, Red-whiskered bulbul, Puff-throated babbler, Mount Abu Spotted babbler, Slatyheaded scimitar babbler, Black-naped blue fly- | Black eagle, Red spurfowl, Indian Peafowl, Grey jungle fowl, Nilgiri wood pigeon, Oriental turtle dove, Mala-bar parakeet, Vernal hanging parrot, Imperial pigeon, White-cheeked barbet, Large flameback, Spotted piculet, Woodshrike, Scarlet minivet, Black bulbul, Orangeheaded thrush, Drongo cuckoo, Brown wood owl, Eurasian Golden oriole, Ashy drongo, Redwhiskered bulbul, Yellow--browed bulbul, Puffthroated babbler, Quaker babbler, Rufous babbler, Slatyhea-ded scimitar babbler, Indian tree pipit, Tree pipit, White-eye, White-bellied blue flycatcher, Paradise flycatcher, Kash -mir flycatcher, Verdi-ter flycatcher, Booted warbler, Chiffchaff, Phy- |

| | | | |
|---|---|---|---|
| | catcher, White-throated fantail flycatcher, Paradise flycatcher, Kashmir flycatcher, Oriental blackbird, Blue-capped rock thrush, Booted warbler, P. affinis, Orinetal Magpie Robin, Indian tree Pipit, Tree Pipit, Grey wagtail, Thick-billed flowerpecker, Crimson sunbird, White-eye, Chestnut-shoulderd Petronia, Common Rosefinch. | lloscopus tytleri, P. griseolus, P. trochiloides, White-rumped Shama, Oriental Blackbird, Booted warbler Blue -capped rock thrush, Crimson-backed sunbird, Crimson sunbird, Vernal hanging parrot. | |
| Altitude | V Cliffs | VI Grassy plateau | VII Shrubs/grass plateau |
| Upto 2000′ | None | Little green bee-eater, Indian lark, Rufous-tailed lark, Zitting cisticola, Indian robin. | Booted warbler Chiffchaff Stonechat, Pied bushchat, Purple sunbird |
| 2100-3000′ | Long-billed vulture, Shaheen falcon, resident Kestrel, Blue rock pigeon, Alpine swift, Amur falcon, Dusky crag martin, Short-toed Snake-eagle, Eurasian Griffon. | Rain quail, Little green bee-eater, Malabar lark, Oriental skylark, Zitting cisticola, Indian robin, Long-billed pipit, Plain sand martin, Painted bush quail. | Fantail warbler Booted warbler Chiffchaff, Pied bush chat, Stonechat, Purple sunbird, Crested bunting Pallid harrier Sykes′ nightjar |
| 3100-4000′+ | Blue rock pigeon, Alpine swift Dusky crag martin, Black eagle, Honey buzzard, Crested serpent eagle, White-rumped vulture. | Rain quail, Little green bee-eater, Malabar lark, Oriental skylark, Yellow-eyed babbler, Zitting cisticola, Long-billed pipit Blue rock thrush. | Booted warbler Chiffchaff, Pied bush chat, Crested bunting, Red-vented bulbul, Purple sunbird. |

| Altitude | VIII Cultivation | IX Settlement | X Bungalow com-pound |
|---|---|---|---|
| Upto 2000′ | Black drongo Large-billed crow, Paddyfield pipit, House sparrow. | Black drongo Large-billed crow, Common Tailor bird, House sparrow Purple sunbird | Black drongo Large-billed crow Common Tailor bird House sparrow Black redstart Grey tit, Booted warbler Chiffchaff White-eye Common rose-finch. |
| 2100-3000′ | Black drongo Rain quail Jungle myna Jungle crow, Paddyfield pipit, Chestnut-shouldered Petronia | Black drongo Jungle myna Ashy Prinia Large-billed crow, Purple sunbird, Common Tailor bird | Black drongo Common Tailor bird Ashy Prinia Large-billed crow, Chiffchaff Booted warbler White-rumped shama, Eurasian Blackbird, White-eye, Yellow-cheeked tit, Common rosefinch |
| 3100-4000′+ | Rain quail Black kite Spotted dove Jungle babbler, Grey wagtail | Common myna Brahminy Starling Com. Tailor bird Ashy Prinia, Hoopoe Small minivet Yellow-footed green pigeon, Purple-rumped sunbird, House sparrow | Com. Tailor bird Booted warbler Chiffchaff Eurasian Black bird, Yellow-cheeked tit, Oriental White-eye, Common Rosefinch, Eurasian Golden Oriole, Coppersmith Barbet |

| Altitude | XI Near Water | XII Grassy slopes Secondary forest | XIII Valley slopes |
|---|---|---|---|
| Upto 2000′ | Redwattled lapwing, Common sandpiper, Brownheaded gull, Wire-tailed swallow. | Cattle egret, Black kite White-eyed buzzard Pallid harrier Short-toed eagle, Long-tailed shrike Indian robin | Honey buzzard Kestrel, Black drongo, Blue rock thrush, Long-tailed shrike, Red-vented bulbul |

| Altitude | Near Water | Grassy slopes Secondary forest<br><br>Paddyfield pipit | Valley slopes |
|---|---|---|---|
| 2100-3000′ | Pond heron, Common sandpiper, Small blue kingfisher, Wire-tailed swallow, Malabar whistling thrush Grey wagtail Yellow wagtail | Black kite, White-eyed buzzard, Kestrel, Eurasian thick knee Little swift Black drongo Long-tailed shrike, Indian robin, Red-vented bulbul Paddyfield pipit | Blackwinged kite, Honey buzzard, Plumheaded parakeet, Malabar parakeet Long-tailed shrike, Black drongo Red-vented bulbul, Large-billed crow, Slaty-headed scimitar babbler |
| 3100-4000′+ | Whitethroated kingfisher Wire-tailed swallow Malabar Whistling thrush Grey wagtail Little ringed plover, Kentish plover, Common sandpiper Green sandpiper, Red-wattled lapwing | Little swift Chiffchaff Little Green bee-eater Pied bush chat, Long-tailed shrike Yellow-eyed babbler Crested bunting Red-vented bulbul | Blackwinged kite Chiffchaff Little Green bee-eater, Pied bush chat, Honey buzzard, Crested Serpent Eagle, Long-tailed shrike, Slaty-headed scimitar babbler, Red-rumped swallow, Spotted dove. |

It appears from this distribution that moist deciduous and semi-evergreen and evergreen forests between the altitude 2100 to 3000 feet are the best bird habitat in northern western ghats. Next in importance are thorn & scrub and deciduous and secondary forests at altitudes between 2000 and 3000 feet.

Birds of Mahabaleshwar

Among the locations I visited Mahabaleshwar has the largest area (about 200 sq km) and the most extensive forests. I visited this high plateau thrice: in January 1995, April 1995 and October 1995. In January the migrant birds are supposed to be at their peak numbers, in April most of them have left but the breeding season of resident birds is supposed to have begun and in October while breeding birds are raising their young most of the migrants have yet to arrive.

Even at a height of over 4000′, the winter in Mahabaleshwar is

mild, the temperatures hovering around 10 and 25 degrees celsius. In January it was more than two months since the dry season had begun and there was little dew early morning to make the forest exude wetness. Most of the brooks and freshets that were inflated torrents during the monsoon, were reduced to trickle or gone dry. Monsoon flowers had withered too. The trees appeared almost flowerless though a few Olea dioica, Ligustrum nilgherrense, Litsea zeylanica and Maesa indica were flowering. Here and there one suddenly saw a drab corner lit up with such flowering shrubs as Lasiosiphon eriocephalus, Combratum extensum and tall, white spikes of Lobelia nicotiniifolia. All these flowers mainly attracted insects and bees. Nectar-feeding birds were not seen visiting them. The only sunbird present was the Crimson-backed sunbird which preferred to join the mixed hunting parties of Quaker babblers and Phylloscopus warblers to hunt insects. Outside forest areas Purple sunbird replaced the Crimson-backed and was seen to visit flowers of Lasiosiphon. Slatyheaded scimitar babblers, Yellow-browed bulbuls and Yellow-cheeked tits searched for insects alone or in pairs in flowering trees or tangles of moss that covered their branches. Every year trees are stripped of their moss cover after the monsoon as moss is in great demand for ornamental gardening. This must deprive birds of a large supply of insect food. Black bulbuls, Jungle and Rufous babblers moved in groups of 3 to 5-7 birds among trees and thickets, chattering as they searched.

Not all Phylloscopus warblers joined the hunting parties. Many moved singly from branch to branch examining methodically every nook and cranny twittering as they hopped. Flycatchers: Kashmir, White-bellied blue, Asian Paradise and Verditer, also hunted singly. The small resident population of Oriental turtle dove is augmented every winter by migrants from the north. They were seen everywhere perched on telegraph wires, cooing from thickets, moving on quiet roads where they collected grit and seeds at roads' edges, and dozing on broad branches in the afternoon. They were vocal in early morning and also evening and must be subsisting on seeds of grass and herbs that flower after the monsoon. Red-whiskered bulbul who is perhaps the most abundant bird of our hills, appears to be opportunistic and omnivorous, subsisting on whatever is available: insects, fruit, berries, nectar, garbage etc.

In mid-April the Mahabaleshwar forests are delightful not only to the eye but also to the human ear as so many birds are in full song. Though bright mauve clusters of Memecylon are on the wane, brilliant yellow flowers of Randia attracted many a Crimson-backed sunbird in pairs and flocks. It is an unforgettable sight to see a flock of six of these in brilliant crimson perched on the bare branches of a small tree. The sparkling white flowers of Jasminum, Pavetta and Carissa attracted insects and bees. Spikes of Lobelia could still be seen. Even the weed Eupatorium was in flower attended by droves of insects. Actinodaphne, Olea, Terminalia and Zizyphus species were in fruit though probably not yet ripe enough to attract Nilgiri wood pigeons, Malabar parakeets and the bulbuls.

But it was the bird song that made walks in the forest so charming. Roving and boistrous parties of Redwhiskered and Black Bulbul were evident everywhere, the latter particularly garrulous and noisy as they flew from tree to tree. Duets of Scimitar babblers, long drawn out calls of Grey jungle fowl and Red spurfowl and musical cacophony of Puffthroated babbler resounded in the forest. The rich, varied repertoire of Orangeheaded thrush and the low, soft cooing of Oriental turtle dove added variety while a single rhapsodic whistle of Malabar whistling thrush came as a pleasant surprise. I had neither seen nor heard this beautiful songster in winter in Mahabaleshwar. Like the chattering sunbirds and introspective white-eyes none of these songsters had paired. The paired ones like the Yellow-browed bulbul, Ashy drongo and Eurasian Blackbird did not indulge in singing. Probably they were busy in more serious work. Even the parties of Quaker babbler, so energetic and ebullient were not in evidence and its characteristic call was uncommon. Migratory birds that were still in evidence included Phylloscopus warblers, Grey wagtail and Common rosefinch now in brilliant breeding plumage. But most of the Oriental turtle doves, so much common during winter had left leaving behind the small resident population hiding in bushes as if unwilling to come out. Migratory flycatchers had left leaving behind a few Paradise and Whitebellied blue flycatchers. A welcome addition was the Lesser Yellownape whose wailing calls broke through the branches from time to time. It was not there in winter. Oriental Magpie-robin, Pied bush chat had come into breeding plumage and will, like White-rumped Shama, burst into song in May. Among the raptors family parties and pairs of Crested serpent and Changeable hawk eagle could be seen.

But what makes bird-watching in summer particularly delightful is finding a waterhole where one can sit and observe well concealed. I did find one and what a feast it offered. The squabbling, fighting parties of Red-whiskered and Black bulbul, the professional flitting of a Grey wagtail, the bold and confident approach of Eurasian Blackbirds, the equally cautious approach of Orangeheaded thrushes, the indifference of Quaker babblers, the shy, quick sorties of Scimitar babblers and Lesser yellownape woodpecker crowned by the extreme wariness of Nilgiri wood pigeons was something worth a fortune.

I visited Mahabaleshwar again in Ocotber to witness the post-monsoon bird activity. By this time most of the resident birds had finished breeding and could be observed, singly or in flocks. Black bulbul, Scimitar babbler, Ashy drongo, Common iora, Magpie robin and White-cheeked barbet moved singly and rarely in pairs. The flycatchers such as the Paradise, the White-bellied blue and Blacknaped blue were also observed singly. Mixed hunting parties consisting of flocks of Quaker babbler, Crimson-backed sunbird, Redwhiskered bulbul and Phylloscopus warblers moved through the forest as the day advanced. These parties were often attended by a single Ashy drongo, a Paradise flycatcher or a pair of Yellow-browed bublubl. There was a great influx of Long-tailed shrike, many of them very vocal, and could be seen every-

where, even in forests. Except the white bunches of Mappea foetida flowers, not much flowering was in evidence as most of the monsoon herbs had withered. But their place was taken by scintillating butterflies such as Red Helen and Blue Mormon. As the monsoon torrents still flowed, the presence of Malabar whistling thrush was bewitching though not common. Except the ubiquitous call of White-cheeked barbet and Scimitar babbler, the forest was silent though I did hear White-rumped Shama and Puff-throated babbler. Migrants such as Blue-capped rock thrush, Kashmir flycatcher, Grey wagtail, Sparrowhawk and Kestrel had already arrived and the number of Oriental turtle dove increased everyday. A Mottled wood owl and a noisy party of Malabar parakeet confirmed earlier sightings which were only partial glimpses. Mahabaleshwar does hold surprises every time one visits the place.

Birds of Panchgani

Situated atop the same plateau but about 20 kms east of Mahabaleshwar, Panchgani presents an altogether different landscape. Within just 20 kms the rainfall has dropped to less than half of Mahabaleshwar giving rise to vegetation that is primarily deciduous tending to moist deciduous in some moisture retaining patches. Moreover rampant urbanisation and massive introduction of exotic trees such as Eucalyptus and Silver Oak have even the deciduous forest in retreat everywhere. Scattered large trees in bungalow compounds amidst an army of Eucalyptus and Silver Oak is the vegetation of Panchagani. There is no forest anywhere but large areas are completely barren and given over to commercial tourism. The result: this hill resort at an altitude of over 4000 feet is occupied not by hill birds but by birds of towns and cities in the plains! Except White-cheeked barbet all the Panchgani birds can be seen in Pune or on its outskirts. But many forest birds reappear within just 10 km of Panchgani as one travels towards Mahabaleshwar. Here the state Forest Department maintains a plantation of tropical pine trees amidst a forest of moist deciduous trees. Typical Mahabaleshwar birds: Quaker babbler, Redwhiskered bulbul, Black bulbul, Paradise flycatcher, Blue-capped rock thrush, Tree pipit and even a pair of Crimson sunbird in pines can be observed here. Urbanisation and disappearance of original forest cover seem to explain the 'urban' character of Panchgani's birds.

Birds of Matheran

Rising from almost the sea level to a height of over 2500 feet (803 metres) the plateau of Matheran occupies the western fringe of the NWG. Its lower height and slightly northern position have kept it away from the main onslaught of the south-west monsoon. Precipitation is markedly lower than Mahabaleshwar and so is the vegetation character different. But the rate of urbanisation and demands of commercial tourism are also low preserving the original forest vegetation at many places. Most of the Mahabaleshwar birds are present in Matheran also. But there are certain marked differences. This hill resort appears to be outside the range of Yellow-browed bulbul whose northern limit is Lonavla, just 25 km

south and on the main ridge of the Ghats. Oriental turtle dove, Rufous babbler, Common rosefinch, Crimson sunbird, Malabar whistling thrush, Lesser Yellownape, Malabar parakeet and even Long-tailed shrike are not to be seen here. Strangely enough even the Slatyheaded scimitar babbler is quite rare in Matheran. Instead White-rumped shama, rare in Mahabaleshwar, is quite common in Matheran. Other birds which are rare in Mahabaleshwar but common in Matheran are Scarlet minivet, Indian kestrel, Mount Abu spotted babbler, Drongo-cuckoo, Brown wood owl and Yellow wagtail. Indeed as the sun sets the tall trees around the tiny railway station of Matheran become alive in winter as many Yellow wagtail from the surrounding countryside come to roost in them.

I visited Matheran in April when the forest was full of song particularly of Shama and the courting Orangeheaded thrushes. Jamun, Careya arborea, Heterophragma and Holahrrena antidysenterica and Lea were in flower. Memecylon, Olea and Actinodaphne were in fruit. Birds were mainly attracted to flowers of Careya and Holahrrena. In December the forest was mostly silent, even the strident calls of Red-whiskered bulbul and the monotone of White-cheeked barbet could be heard but rarely. Paradise flycatchers, among them many in juvenile brown plumage were everywhere. The other flycatchers that could be observed in Mahabaleshwar were all there but I missed the forest wagtail which I had seen here more than 20 years ago. But Matheran too was not without its element of surprise. A troop of Amur falcon doing spectacular aerobatics and a solitary Griffon vulture satisfied the usual craving for the unusual.

## Birds of Bhimashankar

Bhimashankar, which faces Matheran from the east, is separated from the latter by a broad valley. Bhimashankar almost straddles the main ridge of the Ghats and at a height of over 3000 feet receives the full force of the monsoon though not as heavy as Mahabaleshwar. This large undulating plateau is like Mahabaleshwar, the source region of many rivers such as the Bhima and the Ghod. Its moist deciduous to semi-evergreen forests show a character very similar to the forest of Matheran. The forest however, remains in patches due to the practice of shifting cultivation by the local communities. Large continuous forest tracts like Matheran are very few, most of them characterized as Sacred Groves. Birds of Bhimashankar are a mix of those of Matheran and Mahabaleshwar. Like Matheran, White-rumped Shama, Scarlet minivet, Mount Abu spotted babbler can be seen and like Mahabaleshwar Oriental turtle dove, Scimitar and Quaker babbler, Grey junglefowl and Red spurfowl, Black eagle and Crested serpent eagle can also be seen. Birds which were seen at Bhimashankar but not the other two places were: Jungle myna, Emerald dove, Green imperial pigeon and Grey nightjar. Wherever forest has been cleared birds such as Greater coucal, Little Green bee-eater and Red-vented bulbul can be seen.

## Birds of Chandoli, Vasota and Radhanagari

All these places are south of Mahabaleshwar. All of them are protected forests declared as animal and bird sanctuaries. They are as yet away from organized commercial tourism but Vasota forests are patronized by a number of mountaineering and trekking enthusiasts. All of these forests surround large reservoirs built for irrigation and power. Consequently forests away from the dam site and in the interior portion of the reservoirs are isolated and better preserved than those nearer dam sites. Their character varies from moist deciduous to evergreen.

Due to its inaccessibility I could not visit the dense evergreen forests of interior Chandoli. The forest nearer the Varna dam is now cut up to various degrees though some patches still retain good canopy cover. Remaining dry and moist deciduous forest tracts exhibit typical birds of these habitats. Some of them are: White-bellied drongo, Jungle myna, Common woodshrike, Plum-headed parakeet, Plain flowerpecker and Crested tree swift. Birds of more open habitats such as Chestnut-shoulderd petronia, Kashmir flycatcher, Purple sunbird, Malabar lark, Eurasian thick knee, Baybacked shrike and Laughing dove can also be seen. Birds found in Mahabaleshwar such as Ashy drongo, White-cheeked barbet, Crimson-backed sunbird, Scimitar babbler, Paradise flycatcher, Black bulbul, Oriental turtle dove, Puff-throated babbler can also be seen at Chandoli. Birds of prey common at this site include Changeable hawk eagle, White-eyed buazzard, Blackwinged kite and Shikra.

The forest of Vasota retains its semi-evergreen and evergreen character even at a height of about 2500'. Consequently birds of more open areas are absent here. On the other hand birds that are rare in Mahabaleshwar such as Malabar parakeet can be seen here in abundance together with all the other Mahabaleshwar birds. Birds that are recorded in Vasota but not in any other of the above places include: Heart-spotted woodpecker, Rufous woodpecker, Brown-capped woodpecker, Goshawk, Large-tailed and Savanna nightjar and Fairy bluebird. These were recorded by other observers and not during the present survey.

Radhanagari forests are more moist deciduous in character than truly evergreen. But as they are better protected and managed as an animal sanctuary, they also have a character of their own as far as bird life is concerned. Like Vasota they show woodpecker species such as Greater flame-back and Speckled piculet, and other typical birds such as Sykes's nightjar and Painted bush quail. Collared scops owl was also found to be numerous. Other remarkable sightings were a brown-throated spinetail and a breeding colony of River terns on an island in the Doodhganga reservoir. The other Mahabaleshwar birds can also be seen in Radhanagari.

The region between Radhanagari and Goa shows birdlife that is more akin to the birds found in the southern portion of Western Ghats and therefore, is not covered in the present survey.

## The Endemic Birds

The status of certain endemic birds in northern Western Ghats as judged by the present investigation, may now be stated as follows:

1. Painted Bush Quail: Sparsely distributed throughout around 2000′ altitude. Seen at Panshet (west of Pune) and at Radhanagari sanctuary where nesting was confirmed.

2. Nilgiri Wood Pigeon: Distributed in moderate numbers throughout in semi-evergreen and evergreen forests. Possibly declining in numbers due to paucity of fruit-bearing trees in these forests.

3. Malabar Parakeet: Has disappeared from forests north of Mahabaleshwar. Sparse in Mahabaleshwar but more common in Vasota and Radhanagari moist deciduous and semi-evergreen forests.

4. White-cheeked Barbet: Common throughout the NWG. Versatile in using several types of forest.

5. Malabar Lark: Common throughout NWG in open, grassy plateaus. Probably numbers decline towards the south.

6. Yellow-browed Bulbul: Very rare in Lonavla-Khandala and Bhimashankar. But fairly common from Mahabaleshwar southwards.

7. Rufous Babbler: Sparsely distributed from Mahabaleshwar southwards.

8. Dark-fronted Babbler: Recorded only at Vasota. Probably very rare elsewhere.

9. White-bellied Blue Flycatcher: Moderately common in semi-evergreen and evergreen forests. But declining due to destruction of this habitat.

10. Malabar Whistling Thrush: Has become very rare as resident bird. With the approach of the monsoon birds arrive to breed in suitable locations but leave these areas with the onset of dry season and drying up of hill-streams.

11. Crimson-backed Sunbird: Fairly common in moist deciduous to evergreen forest patches.

Blue-faced Malkoha, Malabar Trogon, Malabar Grey Hornbill, Malabar Pied Hornbill, White-browed Bulbul, Long-billed Sunbird are not found in the region under investigation. They can be seen in the Konkan region, i.e. the western faces of the NWG.

Canopy cover: The percentage of the ground that is covered when a polygon drawn about the extremities of the undisturbed canopy of each plant is projected upon the ground and all such projections in a given area are added together.

A covering over a throne or bed, a small overhanging roof.

4 Importance of the Forest Canopy.

To get an idea of the overall distribution of birds in these forests, it is better to classify the forest habitats as follows:

1. Closed canopy evergreen and semi-evergreen forest;

2. Evergreen forest with loss of canopy at some places;

3. Low-height, lighter evergreen or semi-evergreen forest with little canopy.

Birds observed at different levels in these habitats are given below:

1. CLOSED CANOPY EVERGREEN AND SEMIEVERGREEN FOREST

| Ground and low bushes | Middle level | High level and canopy |
|---|---|---|
| Kashmir flycatcher | Oriental turtle dove | Scarlet minivet |
| Eurasian chiffchaff | Blue-capped rock thrush, P. occipitalis, P. trochiloides | Verditar flycatcher P. magnirostris |
| Mt Abu snowy-throated babbler | Eurasian chiffchaff | Orangeheaded thrush |
| Rufous babbler | Asian Paradise fly. | Black bulbul |
| Asian Paradise flycatcher, | White-bellied Blue flycatcher, | Eurasian blackbird |
| White-bellied Blue flycatcher, | White-rumped Shama | Redwhiskered bulbul |
| Eurasian blackbird | Brown wood owl | Slatyheaded scimitar babbler, Crimson-backed sunbird, |
| White-rumped shama | Mottled wood owl | White-cheeked barbet |
| Orangeheaded thrush | Orangeheaded thrush | Ashy drongo, Drongo-cuckoo, Quaker babbler, Nilgiri wood pigeon, Common rose-finch |
| Malabar whistling thrush, Oriental turtle dove | Black bulbul, Yellow-browed bulbul, Red-whiskered bulbul | |
| Grey junglefowl | Slatyheaded scimitar babbler, Tree pipit | |
| Red spurfowl, | Olive-backed pipit | |
| Quaker babbler | Slaty-headed scimitar babbler, White cheeked barbet, Quaker babbler, Crimson-backed sunbird, White-eye | |
| Black bulbul | | |

Certain birds such as Red-whiskered bulbul, Black bulbul and Quaker babbler moved through all levels of the forest. Greater stratification of feeding habitat was observed during winter when migrants were present. With their disappearance from mid-March onwards, especially with warblers and flycatchers migrating, bulbuls, thrushes and babblers came to occupy their places. At places I came across roving parties of birds moving through the middle and high levels of trees. In winter the parties consisted of Quaker babblers, Crimson-backed sunbirds and Phylloscopus warblers. They were sometimes attended by Ashy drongo, Paradise Flycatcher and Scimitar babbler. In spring I did not come across mixed hunting parties though flocks of Quaker babblers, Crimson-

backed sunbird and white-eye were seen hunting on their own.

2. LIGHT EVERGREEN FOREST WITH LOSS OF CANOPY AT SOME PLACES

| Ground and low bushes | Middle level | Higher level and canopy |
|---|---|---|
| Kashmir flycatcher Booted warbler Eurasian chiffchaff Mt Abu snowy-throat -ed babbler, Jugle babbler, White-rumped Shama, Grey junglefowl, Red spurfowl, Oriental turtle dove, Common Tailor bird, Oriental magpie robin, Rufous babbler, P. affi-nis, Blacknaped monarch, Grey wagtail | Oriental turtle dove, White-cheeked barbet Puff-throated babbler, Lesser yellownape, Common Iora, Red-whiskered bulbul, White-rumped Shama, Black bulbul, Slaty-headed scimi -tar babbler, Quaker babbler, Jungle babbler, Tailor bird, Asian Paradise flycatcher, Collared scops owl, Yellowcheeked tit, White-throa-ted fantail flyca-tcher. | White-cheeked barbet Ashy drongo, Common woodshrike, Red-whiskered bulbul, Black bulbul, Yellow-browed bulbul Slaty-headed scimitar babbler, Quaker babbler, Tree pipit, Crimson-backed sun-bird, Scarlet minivet P. tytleri, P. griseo -lus, P. occipitalis Eurasian blackbird Eurasian Golden oriole, Orangeheaded thrush, Vernal hanging parrot, Spotted picu--let, Large flameback Yellowcheeked tit |

It appears that once the process of opening of canopy is begun, certain species tend to lose their specialized habitat and probably retreat to other areas. White-bellied blue flycatcher, Nilgiri wood pigeon, Blue-capped rock thrush, Phylloscopus magnirostris, P. trochiloides, Verditer flycatcher and the owls: Mottled and Brown Wood, were not observed outside closed canopy forests. Other birds that appear instead are: Yellowcheeked tit, Common Iora, Common woodshrike, Oriental Magpie robin, Lesser Yellownape and White-throated fantail flycatcher.

3. LOW-HEIGHT LIGHTER EVERGREEN OR SEMI-EVERGREEN FOREST WITH LITTLE CANOPY

| Ground and low bushes | Middle level | Higher level and canopy |
|---|---|---|
| Jungle bush quail, Painted bush quail, Grey jungle fowl, Greater coucal, Grey nightjar, Sykes's nightjar, | Common kestrel Oriental turtle dove, Spotted dove, Plumheaded parakeet, Indian cuckoo, The cuckoo Greater coucal, | Bonelli's eagle Sparrowhawk Shikra, Shaheen falcon, Yellow-legged green pigeon, Plum-headed parakeet, |

| | | |
|---|---|---|
| Long-tailed shrike, | Baybacked shrike, Long-tailed shrike | Malabar parakeet |
| Jungle myna, Red-vented bulbul, Mt Abu snowy-throated babbler, Jungle babbler, Kashmir flycatcher, Golden-headed cisticola, Booted warbler, Eurasian chiffchaff, Pied bush chat | Jungle myna, Red-whiskered bulbul, Indian scimitar babbler, Quaker babbler, Kashmir flycatcher, Jungle prinia, Common Tailor bird, P. tytleri, Pied bush chat, Plain flowerpecker, Purple-rumped sunbird, Chestnut-shouldered petronia | Common grey hornbill, White-cheeked barbet, Coppersmith barbet, Oriental Golden oriole, Ashy drongo, Large cuckooshrike, Scarlet minivet, Black bulbul, Eurasian blackbird, Yellowcheeked tit, Common rosefinch |

With loss of canopy the character of birds has changed further. A number of birds which can be observed in drier or more 'civilized' habitats such as urban gardens have made their appearance even if the character of vegetation remains semi-evergreen to evergreen. It appears therefore, that it is the existence of canopy cover and not the composition of tree species that seems to be primarily responsible for the occurrence of forest birds.

## DISCUSSION

The 168 bird-species that I encountered in northern western ghats may be said to be the birds that can commonly be seen in the region at present. Among them there are 25 species which are more or less restricted to canopy forests and rarely seen outside it. Their presence or absence indicates the presence or absence of this particular habitat at a particular location. Their proportion in the total number of birds encountered at a particular place may indicate the proportion of canopy forest area in its total area. Thus in Mahabaleshwar these birds formed about 28% of the total number of species seen there. This corresponds to the actual extent of canopy forest on Mahabaleshwar plateau. In Panchgani these birds are not found at all. The canopy forest also is totally absent there. In Radhanagari their proportion in the total is about 30, in Matheran 27, in Bhimashankar 26, in Vasota 25 while in Chandoli it is as low as 6 only. Roughly speaking these proportions indicate the extent of canopy forests in these locations. At no location all the 25 species were encountered together.

36 bird species were found in forests in which loss of canopy covered more than 50% of the forest area. While the canopy forest birds formed 14% of the total number of birds seen, these 36 birds formed 21% of the total. Birds occurring in secondary forest and woodland and scrub formed 28% of the total. The remaining birds belong to more open areas such as grassland, fallow fields, barren and stony areas, roadsides and escarpments. These proportions may be said to reflect the extent of these habitats available at the locations examined during the present survey.

Let us now examine the composition of bird species according to their food habits. The following table classifies birds encountered at different locations according to their food habits.

5

Birds of Northern Western Ghats according to Their Food Habits

| Food Habit | Har'gad | M'ran | B's.kar | M'shwar | P'gani | V'ta | C'li | R'gari |
|---|---|---|---|---|---|---|---|---|
| I | 13 | 27 | 8 | 28 | 20 | 7 | 16 | 22 |
| IN | 3 | 5 | 2 | 5 | 2 | 3 | 6 | 5 |
| IF | 1 | 1 | 3 | 5 | 7 | 2 | 4 | 4 |
| IFN | 6 | 2 | 4 | 6 | 4 | 2 | 5 | 3 |
| IC | 1 | - | 1 | 2 | - | 1 | 1 | 1 |
| S | 1 | - | 2 | 3 | 3 | - | 1 | 2 |
| FSN | - | - | - | 2 | - | 1 | 2 | - |
| INS | - | - | - | 1 | 4 | 1 | - | 1 |
| ICFi | 1 | - | - | 1 | 1 | - | 1 | - |
| IFS | 1 | 1 | 2 | 2 | - | 1 | 1 | - |
| IS | 1 | - | - | - | 1 | - | 1 | 2 |
| FS | - | - | - | - | - | 1 | - | 1 |
| ICN | - | - | - | - | 1 | - | - | 1 |
| IFi | - | - | - | - | - | 1 | - | 1 |
| Fi | - | 1 | - | - | - | - | - | - |
| F | - | 2 | 1 | 1 | - | - | - | - |
| O | - | 1 | - | 1 | 3 | - | - | - |
| C | 5 | 10 | 3 | 9 | 4 | 4 | 6 | 2 |
| Total | 33 | 50 | 27 | 66 | 48 | 24 | 44 | 45 |

The locations in the table are: Harishchandragad, Matheran, Bhimashankar, Mahabaleshwar, Panchgani, Vasota, Chandoli and Radhanagari. The abbreviations used in the table indicate: I= insectivorous birds; IN= insect & nectar-feeders; IF=insect & fruit-eaters; IFN= insect, fruit & nectar-feeders; IC=insectivores that occasionally prey on other birds; S= seed-eaters; FSN= fruit, seed & nectar-feeders; INS= insect, nectar & seed-eaters; ICFi= insect, birds & fish-eaters; IFS= insect fruit & seed-eaters; IS= insect & seed-eaters; FS= fruit & seed-eaters; ICN= insect, bird & nectar-feeders; IFi= insect & fish-eaters; Fi=fish-eaters; F= fruit-eaters; O= omnivorous birds and C= birds of prey.

The table shows that insectivorous birds are dominant everywhere. But their character varies, e.g. on plateaus where rainfall is heavy and closed canopy forests are extensive, they are mainly flycatchers, thrushes and warblers but in an open plateau like Panchgani they are robins, chats, wren warblers(prinias), hoopoe etc. Matheran and Bhimashankar forests have many identical species of trees, bushes and climbers. But in the former the area of closed canopy forest is greater than the latter. In Matheran insectivorous birds are again flycatchers, thrushes, babblers and warblers while in Bhimashankar they are a few babblers and thrushes but no flycatchers. With the opening up of canopy flycatchers, thrushes and babblers appear to suffer most. Woodpeckers appear only in close canopy forests of Mahabaleshwar, Vasota and Radhanagari. They are absent from all other places. Destruc-

tion of forests and removal of old trees appear to be the causes for their disappearance. Birds of prey are a class apart. They are by no means restricted to the Ghat areas for feeding. Next in number come insect, fruit and nectar-feeders such as bulbul, blackbird, white-eye and iora; followed by insect and nectar-feeders such as sunbird, drongo, babblers and then follow insect and fruit-eaters such as tit, barbet, bulbul and thrush. Their numbers indicate the paucity of fruit and nectar-bearing trees in the forests of NWG.

The present survey indicates that canopy forest is fast declining all over northern western ghats. With them are likely to disappear 25 bird species that are more or less restricted to them. In places like Mahabaleshwar and Harishchandragad high altitude and high rainfall combine to make their environment specialized. Here once the canopy forest goes many of these 25 bird species are unlikely to be replaced by birds of more open habitats. Where such specialized environment does not obtain, these can be replaced by others as exemplified by Panchgani. Thus the loss of canopy forest may involve the disappearance of the following birds from the NWG: Rufous babbler, Orangeheaded thrush, Crimson sunbird, Yellow-browed bulbul, Blue-capped rock thrush, White-bellied blue flycatcher, Red spurfowl, Nilgiri wood pigeon, White-rumped shama, Bluewinged parakeet, Mottled wood owl, Brown wood owl, Large flameback, Lesser yellownape and Heartspotted wood pecker. Among them 5 are endemic to Western Ghats. The danger of their range shrinking further is very real.

The pressure on other types of forest such as moist deciduous, dry deciduous and woodlands is no less and such birds as Crimson-backed sunbird, Black bulbul, Blacknaped monarch, Verditer and Asian Paradise flycatchers, Spotted babbler, Oriental turtle dove are also threatened to disappear from the NWG.

The causes of decline of forest and rapid changes in existing habitats are:

1. Cutting of forest for firewood and for domestic and agricultural purposes;

2. Cutting of forest for building construction, for providing tourist amenities and consequent expansion of roads;

3. Disturbance of forest due to collection of forest produce such as honey, medicinal and rare plants, mosses and due to human movement and vehicular traffic and immigrant construction labour;

4. Disturbance due to cattle grazing and trampling;

5. Forest cutting due to expansion of settlements for increased resident population;

6. Expansion of agriculture and agro-based activities;

7. Shifting cultivation; and

8. Absence of any corrective or ameliorative measures.

The corrective measures appear to be:

1. Conserve existing forest patches, especially canopy forests and initiate forest restoration projects;

2. Restore sacred groves to their original extent and give them effective protection by offering incentives to villages surrounding them;

3. Restrict commercial development, and make it compulsoary for developers to restore natural habitats as a compensatory measure;

4. Initiate a strong nature education programme among all sections of the people and an awareness drive through illustrated literature, maps, charts, posters, and media exposure, especially in tourist resorts.

5. Involve local people like wood-cutters in participatory forest management and make them protect and plant trees while allowing controlled exploitation of the forest.

Some non-government organizations and peoples' groups are becoming aware of the gravity of these problems and they are actively opposing more urbanization of such places as Mahabaleshwar and Matheran. Places such as Harishchandragad, Bhimashankar and Vasota are under pressure even though they are declared as protected areas. Permission to mine in the area threatens Radhanagari Sanctuary. Strong opposition from local people is essential to avert these threats. There is therefore, a great urgency to develop a strong awareness and nature education programme and initiate forest restoration and forest participatory management projects all over the northern western ghat.

Acknowledgement

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# BIRDS OF NORTHERN WESTERN GHATS : EXECUTIVE SUMMARY

Between December 1994 and April 1996 I observed birds in the Northern Western Ghat. The following locations were covered from this region: Harishchandragad(4600′), Matheran(2600′), Bhimashankar(3000′), Sinhgad(4300′), Panshet(2100′), Mahabaleshwar(4500′), Panchgani(4300′), Chandoli(2800′), Vasota(2500′), and Radhanagari(2800′). Figures in brackets indicate approximate altitude of these places. I did not observe birds on the Konkan side or the western face of the NWG overlooking the Arabian sea. I also did not observe birds in the region just north of Goa. Birds of this area belong to the southern western ghat.

I encountered 168 bird species as against 232 recorded for this area. Other observers added 30 species through their observations. Three others have been added as new sight records. There are therefore, no recent records of 31 bird species in this region. They probably have disappeared from Northern Western Ghats.

~~45~~ 46 bird families are represented in the NWG. The habitats these birds occupy are: canopy evergreen and semi-evergreen forest; evergreen and moist deciduous forest with no continuous canopy; woodlands and bungalow compounds consisting of mixed forest types; secondary forest with loss of canopy; dry deciduous forest; scrub and thorn forest; plateau grasslands; barren and rocky plateaus; scrubby and gullied slopes, ravine forest patches and steep escarpments. Birds of prey, swallows and martins were mostly seen in flight.

From the point of view of number and variety of birds, moist deciduous and semi-evergreen forests between 2100′ and 3000′ altitude are the best habitats in this region. But 25 species of forest birds, among them many endemic to Western Ghats, can only be seen in canopy forests. Canopy forest is declining everywhere in the NWG threatening the existence of these species. Shrinkage of the range of endemic species is serious at a global level. Pressures on other types of forest threaten the existence of 7 more species. Environmental conditions at Harishchandragad and Mahabaleshwar are specialized. Birds disappearing from these locations due to loss of forest are not likely to be replaced by other birds due to the specialized habitat conditions prevailing there.

The causes of disturbance of bird habitats include cutting of trees for firewood, expansion of agriculture, of settlement and tourism, collection of forest produce, and shifting cultivation. Corrective measures urgently needed appear to be: conservation and restoration/extension of forest patches including Sacred Groves; restriction on commercial and tourism development; making it compulsory for developers to take ameliorative and restorative measures; participatory forest management for local people and initiating a great effort in nature education and creating conservation awareness among all sections of people.

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The List of Birds Encountered During the Present Survey

Little Cormorant(Phalacrocorax niger)
Pond Heron(Ardeola grayii),
Cattle Egret(Bubulcus ibis)
Woollynecked Stork(Ciconia episcopus),
Greater Flamingo(Phoenicopterus roseus),
Spotbill Duck(Anas poecilorhyncha),
Black-winged Kite(Elanus caeruleus),
Honey Buzzard(Pernis ptilorhyncus),
Black Kite(Milvus migrans govinda),
Sparrowhawk(Accipiter nisus),
White-eyed Buzzard(Butastur teesa),
Changeable Hawk Eagle(Spizaetus cirrhatus),
Bonelli's Eagle(Hieraaetus fasciatus),
Black Eagle(Ictinaetus malayensis),
Griffon Vulture(Gyps fulvus),
Long-billed Vulture(Gyps indicus),
White-rumped Vulture(Gyps bengalensis),
Pallid Harrier(Circus macrourus),
Short-toed Eagle(Circaetus gallicus),
Crested Serpent Eagle(Spilornis cheela),
Osprey(Pandion haliaetus),
Shaheen Falcon(Falco peregrinus),
Redfooted Falcon(Falco vespertinus),
Kestrel(Falco tinnunculus),
Indian Kestrel(Falco tinnunculus objurgatus),
Painted Francolin(Francolinus pictus),
Rain Quail(Coturnix coromandelica),
Jungle Bush Quail(Perdicula asiatica),
Rock Bush Quail(Perdicula argoondah),
Painted Bush Quail(Perdicula erythrorhyncha),
Red Spurfowl(Galloperdix spadicea),
Grey Jungle Fowl(Gallus sonneratii),
Common Peafowl(Pavo cristatus),
Eurasian Thick-knee(Burhinus oedicnemus),
Redwattled Lapwing(Vanellus indicus),
Little Ringed Plover(Charadrius dubius),
Kentish Plover(Charadrius alexandrinus),

Green Sandpiper(Tringa ochropus),
Common Sandpiper(Tringa hypoleucos),
Brownheaded Gull(Larus brunnicephalus),
Blackheaded Gull(Larus ridibundus),
River Tern(Sterna aurantia),
Yellow-footed Green Pigeon(Treron phoenicoptera),
Blue Rock Pigeon(Columba livia),
Nilgiri Wood Pigeon(Columba elphinstonii),
Oriental Turtle Dove(Streptopelia orientalis),
Spotted Dove(Streptopelia chinensis),
Laughing Dove(Streptopelia senegalensis),
Roseringed Parakeet(Psittacula krameri),
Plumheaded Parakeet(Psittacula cyanocephala,
Malabar Parakeet(Psittacula columboides),
Vernal Hanging Parrot(Loriculus vernalis),
Pied Cuckoo(Clamator jacobinus),
Drongo-Cuckoo(Surniculus lugubris),
Asian Koel(Eudynamys scolopacea),
Greater Coucal(Centropus sinensis),
Collared Scops Owl(Otus bakkamoena),
Mottled Wood Owl(Strix ocellata),
Brown Wood Owl(Strix leptogrammica),
Grey Nightjar(Caprimulgus indicus),
Sykse's Nightjar(Caprimulgus mahrattensis)
Alpine Swift(Apus melba),
Little Swift(Apus affinis),
Brown-backed Needletail(Chaetura gigantea),
Crested Tree Swift(Hemiprocne longipennis),
Common Kingfisher(Alcedo atthis),
White-throated Kingfisher(Halcyon smyrnensis),
Little Green Bee-eater(Merops orientalis),
Eurasian Hoopoe(Upupa epops),
Indian Grey Hornbill(Tockus birostris),
White-cheeked Barbet(Megalaima viridis),
Coppersmith Barbet(Megalaima haemacephala),
Speckled piculet(Picumnus innominatus),
Lesser Yellownape(Picus chlorolophus),
Large Flameback(Chrysocolaptes lucidus),
Ashycrowned Sparrow-Lark(Eremopterix grisea),
Rufous-tailed Lark(Ammomanes phoenicurus),
Malabar Lark(Galerida malabarica),
Eurasian Skylark(Alauda arvensis),
Oriental Skylark(Alauda gulgula),
Plain Martin(Riparia paludicola),
Eurasian Crag Martin(Hirundo rupestris),
Dusky Crag Martin(Hirundo concolor),
Barn Swallow(Hiruno rustica),
Wire-tailed Swallow (Hirundo smithii),
Red-rumped Swallow(Hirundo daurica),
Baybacked Shrike(Lanius vittatus),
Long-tailed Shrike(Lanius schach),
Eurasian Golden Oriole(Oriolus oriolus),
Black Drongo(Dicrurus adsimilis),
Ashy Drongo(Dicrurus leucophaeus),
White-bellied Drongo(Dicrurus caerulescens),

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Brahminy Starling(Sturnus pagodarum),
Common Myna(Acridotheres tristis),
Jungle Myna(Acridotheres fuscus),
Large-billed Crow(Corvus macrorhynchos),
Common Wood-shrike(Tephrodornis pondicerianus),
Large Cuckoo-shrike(Coracina novaehollandiae),
Blackheaded Cuckoo-shrike(Coracina melanoptera),
Scarlet Minivet(Pericrocotus flammeus),
Little Minivet(Pericrocotus cinnamomeus),
White-bellied Minivet(Pericrocotus erythropygius),
Common Iora(Aegithina tiphia),
Redwhiskered Bulbul(Pycnonotus jocosus),
Redvented Bulbul(Pycnonotus cafer),
Yellow-browed Bulbul(Hypsipetes indicus),
Black Bulbul(Hypsipetes madagascariensis),
Puffthroated Babbler(Pellorneum ruficeps),
Slatyheaded Scimitar Babbler(Pomatorhinus horsfieldii),
Mount Abu Snowy-throated Babbler(Stachyris oglei abuensis),
Yellow-eyed Babbler(Chrysomma sinense),
Rufous Babbler(Turdois subrufus),
Jungle Babbler(Turdois striatus),
Quaker Babbler(Alcippe poioicephala),
Kashmir Flycatcher(Muscicapa parva),
White-bellied Blue Flycatcher(Muscicapa pallipes)
Verditer Flycatcher(Muscicapa thalassina),
White-browed Fantail Flycatcher(Rhipidura aureola),
White-throated Fantail Flycatcher(Rhipidura albicollis),
Asian Paradise Flycatcher(Terpsiphone paradisi),
Blacknaped Monarch(Hypothymis azurea),
Fantail Warbler(Cisticola exilis),
Zitting Cisticola(Cisticola juncidis),
Franklin's Prinia(Prinia hodgsonii),
Plain Prinia(Prinia subflava),
Ashy Prinia(Prinia socialis)
Jungle Prinia(Prinia sylvatica),
Common Tailor Bird(Orthotomus sutorius),
Booted Warbler(Hippolais caligata),
Eurasian Chiffchaff(Phylloscopus collybita),
Tytler's Leaf Warbler(Phylloscopus tytleri),
Tickell's Leaf Warbler(Phylloscopus affinis),
Olivaceous Leaf Warbler(P. griseolus),
Large-billed Leaf Warbler(P. magnirostris),
Dull Green Leaf Warbler(P. trochiloides),
Large-crowned Leaf Warbler(P. occipitalis),
Oriental Magpie-robin(Copsychus saularis),
White-rumped Shama(Copsychus malabaricus),
Pied Bush Chat(Saxicola caprata),
Black Robin(Saxicoloides fulicata),
Blue-capped Rock Thrush(Monticola cinclorhynchus),
Blue Rock Thrush(Monticola solitarius),
Malabar Whistling Thrush(Myiophonus horsfieldii),
Orangeheaded Thrush(Zoothera citrina),
Eurasian Blackbird(Turdus merula),
Yellowcheeked Tit(Parus xanthogenys)
Indian Tree Pipit(Anthus hodgsoni),

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Brown Rock Pipit(Anthus similis),
Yellow Wagtail(Motacilla flava),
Grey Wagtail(Motacilla cinerea),
Large Pied Wagtail(Motacilla maderaspatensis),
Thickbilled Flowerpecker(Dicaeum agile),
Tickell's Flowerpecker(Dicaeum erythrorhynchos),
Plain Flowerpecker(Dicaeum concolor),
Purple-rumped Sunbird(Nectarinia zeylonica),
Crimson-backed Sunbird(Nectarinia minima),
Purple Sunbird(Nectarinia asiatica),
Crimson Sunbird(Aethopyga siparaja),
Oriental White-eye(Zosterops palpebrosa),
House Sparrow(Passer domesticus),
Chestnut-shouldered Petronia(Petronia xanthocollis),
Common Rosefinch(Carpodacus erythrinus),
Greynecked Bunting(Emberiza buchanani),
Crested Bunting(Melophus lathami).

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