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The Sahyadri Special

Editor

Prakash Gole



Foreword

I have to write this foreword to the eleventh volume of Ecological Society's Journal in a hurry as this truncated issue has to be ready for the 18th Maharashtra Pakshi Mitra Sammelan which begins at Karad on 25th December 1998. The full unabridged issue will come later and with it a more complete foreward which should do justice to this special issue on the Sahyadri, that part of which graces the State of Maharashtra. This issue covers the birds, the mammals and the reptiles of the Western Ghats (The Sahyadris). I am sure the reader will find it interesting and will whet his appetite for the complete issue which will follow shortly.

Vice Admiral M. P. Awati (Retd.)
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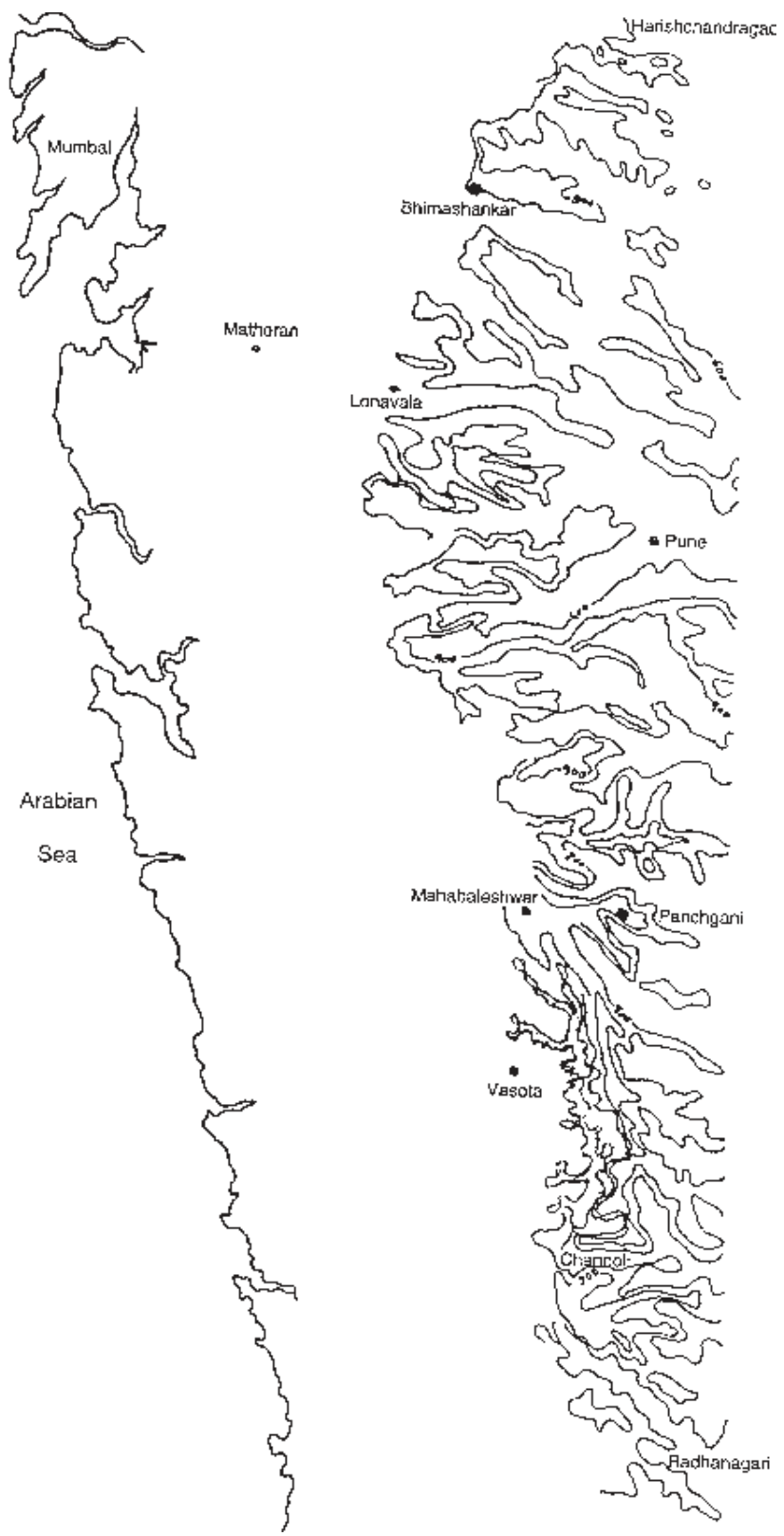


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The Sahyadri or the Northern Western Ghat



Birds of the Sahyadri

Prakash Gole

Summary

Between December 1994 and April 1996 I observed birds in the Sahyadri. The following locations were covered from this region: Harishchandragad (1402m), Matheran (792m), Bhimashankar (914m), Sinhgad (1310m), Panshet (620m), Mahabaleshwar (1371m), Panchgani (1310m), Chandoli (853m), Vasota (761m), and Radhanagari (853m). Figures in brackets indicate average altitude of these places. I did not observe birds on the Konkan side or the western face of the Sahyadri 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 205 bird species as against 246 recorded for this area. Other observers added 20 species through their observations. Three others have been added as new sight records. There are therefore, no recent records of 18 bird species in this region. They probably have disappeared from the Sahyadri.

48 bird families are represented in the Sahyadri range. 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 620m and 920m 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 this range 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.

Introduction

The Sahyadri, that part of the Western Ghat which lies in the state of Maharashtra, is a long chain of hills that stretches between Mumbai and Goa (between Lat. 19°N and 16°N and Long. 73°E and 74°E). The hills rise to a height of 1000 to 1400 metres with their highest peak Kalsubai attaining an altitude of 1646 metres or 5400 feet. Due to shifting cultivation, grazing and cutting for fuelwood and timber most of the hills present a barren aspect though at places a few protected reserve forests and wildlife sanctuaries have

retained a moist deciduous and evergreen vegetation cover. Birds inhabiting and moving over this long stretch of hills (about 700 kms in length) have not been studied over a continuous period. Ornithologists and bird-watchers have published notes and articles on birds observed at certain famous hill resorts such as Mahabaleshwar-Panchgani, Khandala and Matheran (Fairbank 1876, Buchanan 1899, Betham 1902 and 1903, Fellowes 1918, Kinlock 1922, Ali 1951, Abdulali 1965, Borges 1986, Monga and Rane 1986, Rane and Borges 1987 and Ambedkar 1991). But a study of the birds of the entire range of hills through different seasons was not attempted. I wandered through these hills between 1994 and 1998 visiting different locales, especially those which retain some sort of forest cover. An attempt was made to visit each place at least twice to observe birds during the season when majority of them breed (February to June) and when a majority of migrants is present (September to January). Due to cloud cover and poor visibility birds are difficult to see in these hills above an altitude of 1000 metres between June and August, i.e. the rainy season.

In particular I observed birds (from north to south) at Harishchandragad (1402m), Bhimashankar (914m), Matheran (792m), Panshet (620m), Sinhgad (1310m), Mahabaleshwar-Panchgani (1371 and 1310m), Vasota (761m), Chandoli (853m) and Radhanagari-Doodhganga (853 and 640m) (see map). Observations were confined to plateau areas and eastern slopes of the Sahyadri. Birds occurring on the Konkan side of the Sahyadri are not considered here. 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 Climate

The plateau areas of the Sahyadri attain a height of over 1500 metres (4900ft+) 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 temperature 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 1200m and 600m (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.

The Past Records

Rev. S. B. Fairbank had published in *Stray Feathers* in 1876 a list of birds collected in the vicinity of Khandala and Mahabaleshwar. He had mentioned that four bird species, the (Red) Spurfowl, the (Redwhiskered) Bulbul, the Blackbird, the Whistler (Malabar Whistling Thrush) and the Merry Wren-babblers (Quaker babbler) were quite common in Khandala and Mahabaleshwar. They continue to be common even today. He had also mentioned that some birds are restricted to the plateau areas while others to western slopes and lower plateaus that overlook the Konkan. "Still others could be found on eastern slopes and might extend their range in the plains to a considerable distance." E. A. Butler in his 'Tentative Catalogue of the Birds of the Deccan and South Mahratta Country' published in *Stray Feathers* in 1881 had given a list of birds occurring in the Sahyadri range from Goa to Khandala. However, he had admitted that many species occurring in the Ghats and "their neighbourhood, in the vast and wholly unworked jungles and forests that they include, must very certainly have been omitted".

The late Dr. Sálím Ali has recorded observations in the forties mainly from Lonavla-Khandala, Matheran and Mahabaleshwar 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 Dr. Sálím Ali's *Indian Hill Birds* published in 1949 I could find 104 bird species who still seem to occur in the Sahyadri range. But out of the birds mentioned by Sálím Ali, I could not come across the following birds though other observers have seen some of them: Chestnutbellied nuthatch, Velvet-fronted Blue nuthatch, Brown flycatcher, Haircrested drongo, White wagtail, Mahratta woodpecker, Black woodpecker, Pygmy woodpecker, Long-tailed nightjar, Orinetal hobby, Grey-fronted green-pigeon, Greater Racket-tailed drongo and Eurasian hobby. Other observers have however, recorded in this region, the following species during 1980s and 1990s: Eurasian hobby, Haircrested drongo, Mahratta woodpecker, Pygmy woodpecker, Long-tailed nightjar,

Grey-fronted green pigeon and Brown Hawk Owl.

Humayun Abdulali's checklist of the Birds of Maharashtra (1981 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 205 bird species during the present survey while others have added 20 more through their observations. Three new species have been added to Mr Abdulali's list by recent sight records. These are: Japanese buzzard (*Buteo buteo japonicus*), Goshawk (*Accipiter gentilis*) and Black-fronted babbler (*Rhopocichla atriceps*). There are, however, no recent sight records of the following bird species in the Sahyadri range between 620m or 2100' and 1350m or 4000'+ altitude. These species are: Tawny-eagle, Steppe eagle, Laggar falcon, Peregrine, Indian Hobby, Malabar Grey hornbill, Black woodpecker, Greater racket-tailed drongo, White-cheeked bulbul, Fairy bluebird, Brown flycatcher, Chestnutbellied nuthatch, Velvet-fronted blue nuthatch, Richard's pipit, Forest wagtail, Common Indian nightjar, Scops owl, Alexandrine parakeet, Egyptian vulture and Blue Chat. I had seen Whitecheeked bulbul and Forest wagtail in the seventies at Sinhgad and Matheran respectively. But they could not be seen now. (Forest wagtail, however, was recently seen—Nov. 1998—on the hills in Pune city).

Some birds like Laggar falcon, Great horned owl, Tree pie, White wagtail, Indian nightjar, Brown hawk owl, Alexandrine parakeet and Egyptian vulture are commonly found between 420m or 1500' and 600m or 2000' altitude but not higher. Some others like Malabar trogon, Malabar grey hornbill, Great hornbill, Green malkoha, Larger goldenbacked woodpecker, Goldenbacked three-toed woodpecker, Bronzed drongo, Haircrested drongo, Greater racket-tailed drongo and Pygmy woodpecker are now more common in the Konkan region.

I

The Present Distribution of Birds in the Sahyadri

Let us now see how different bird families are distributed in the Sahyadri.

Phalacrocoracidae :

Large cormorant and Little cormorant are occasion-

ally seen on reservoirs in the Sahyadri around 600m or 2000' altitude.

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 and a Little green heron can quietly fish standing invisible among brown rocks and mud. This is how they appear on the lakes of Matheran, Mahabaleshwar and Bhimashankar. Pond heron can also be seen along rock-pools in ravines and hill-stream gorges. It is man's cattle again who bring in their train the Cattle egret who however, is usually seen in the hills around 600m or 2000' and 850m or 3000' altitude. Both these species nest in the plains. Grey heron is occasionally seen around reservoirs at 620m altitude.

Ciconiidae :

White-necked stork, singly or in pairs, can be seen on reservoirs around 620m altitude.

Phoenicopteridae :

A flock of about 30 Greater flamingo lands in July-August every year during the height of monsoon in flooded paddy fields at Malshej near Harishchandragad at an altitude of over 600m. Flocks are also sometimes seen in flight crossing the Ghats from west to east in September-October.

Anatidae :

Spot-billed ducks in pairs are seen during rainy season frequenting rain-water pools and flooded paddy fields around 620m altitude.

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. Honey buzzard was seen flying or soaring over all locations except Radhanagari. A pair was seen at Vasota attacking a bee-hive, taking turns in doing so. Nests in trees between 600m and 900m altitude. The migratory Japanese buzzard was sighted over the Mahabaleshwar plateau in March 1994 (R. Purandare, pers. communication). Pa-

riah kite and Blackeared kite are generally seen flying over barren, stony, scrub or secondary forest-covered slopes and very rarely over forested areas. Though the Pariah kite generally nests in the plains, one pair was seen nesting on the plateau of Panchgani. In March 1996 it had reared a single young.

Shikra is usually seen around 600m 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 situated above 1200 metres. Sparrowhawk was seen at Mahabaleshwar, Matheran and Bhimashankar in winter and 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 600m. altitude. It was seen at Chandoli and Bhimashankar around 900m. altitude. It nests in the plains.

Crested hawk eagle was seen over Mahabaleshwar plateau, Chandoli, Bhimashankar and around Matheran. Nests on suitable trees in the valleys and slopes between 600m. and 1000m. 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 900m. 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. Crested goshawk and Blackcrested baza have been seen by other observers in these hills (R. Purandare pers. communication and Rane Borges 1987).

A Eurasian griffon was sighted over the Matheran plateau in December 1995. Longbilled and White-backed vultures are commonly seen flying throughout the Ghats looking for carrion. The Longbilled nests on ledges in escarpments while the White-backed nests in trees upto 600m altitude.

In winter the Pale harrier is generally met with around 600m altitude coursing over slopes covered with grass and shrubs. But one was seen at Bhimashankar at over 900m. 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. 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 600 metres.

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 and 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. The resident Kestrel breeds on ledges in escarpments and was observed near Hari-shchandragad, Bhimashankar 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.

Phasianidae :

Painted partridge and Rain quail are usually seen in the hills during rainy season around 600m to 1000m altitude near cultivation and settlements. The latter however, ascends plateaus of over 1300m altitude and is then found in grassy and scrubby wet patches. Rock bush quail is another inhabitant of barren, rocky and grass and shrub-covered habitat upto 1000m altitude, while dry deciduous forests, savanna landscapes and vegetation around bungalows in hill resorts are occupied by Jungle bush quail and Common bustard quail at similar altitudes. Here also is found the Indian peafowl but is patchily distributed. It is rarely found on plateaus above 1200m altitude. 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 appear to depart from the plateau areas to the valleys and return by end September-October. They are very vociferous in spring and sum-

mer, their breeding season.

Painted bush quail was once seen at Panshet around 640m altitude and at Radhanagari where it breeds.

Jacaniidae :

Pheasant-tailed jacana could be seen in the eighties on a pond at Khandala.

Recurvirostridae :

Blackwinged stilt used to be seen on the lakes in the Lonavla-Khandala region during the eighties.

Burhinidae :

Stone curlew inhabits barren, stony, undulating and scrub-covered areas in our hills upto about 1000m 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.).

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-covered plateaus upto an altitude of 800m. Common sandpiper is another denizen of our hill reservoirs upto an altitude of 1000m. On the barren plateau of Panchagani a small pond had attracted a Green sandpiper and Little ringed and Kentish plovers in March 1996. Snipes are seen in winter in marshy areas around 630m altitude. Likewise Curlew in small groups have been observed around reservoirs in Lonavla area (altitude 640m).

Laridae :

Occasionally Brownheaded and Blackheaded gulls in ones or twos can be found quartering irrigation reservoirs around 600m 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 (600m).

Columbidae :

Grey-fronted green pigeon was not recorded during the present survey though some observers have recorded it at Vasota (S. Ingallhallikar pers. commu.). Likewise Green imperial pigeon has been recorded at Bhimashankar and by other observers at Mahabaleshwar and Sinhgad valley (R. Purandare and S.

Ingallhallikar pers. commu.). Nilgiri wood pigeon is distributed throughout the Sahyadri and was seen at Bhimashankar, 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-legged green pigeon were seen at Bhimashankar and Panchgani. It is usually found around and below 620m altitude. Blue rock pigeons in small parties, are found around cliffs and escarpments throughout these hills.

Rufous turtle dove occurs throughout the Sahyadri range between 650m and 1300m + 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 1000m altitude but occasionally ascends the high plateaus. Thus it was recorded in Panchagani during this survey. Even the Little brown 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 recorded at Bhimashankar during this survey though other observers have seen it at Vasota also.

Psittacidae :

Indian lorikeet is found throughout the Sahyadri in moist deciduous forests but avoids heavier forests. Blossomheaded parakeet is also common in these forests though it is seldom found above 900m altitude. Blue-winged 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 600m altitude but can also be seen in Panchgani.

Cuculidae :

Koel is common around 600m altitude but was also recorded in Panchgani during this survey. Cuckoos migrating from Himalayas and further north are usually found around 620m 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. Drongocuckoo was recorded during the present survey in moist deciduous forest at Matheran. Sirkeer cuckoo is a denizen of scrub and dry deciduous forests in these

hills. Pied crested cuckoo is normally seen around 620m altitude.

Centropididae :

Crow-pheasant is another bird found throughout the Sahyadri at all altitudes in woodlands, light forests and bungalow compounds.

Strigidae :

Barn owl, Brown wood owl, Great horned owl, Brown fish owl and Collared scops owl and Barred jungle owlet were the owl species that were seen/heard during the present survey. Brown wood owl was seen at Mahabaleshwar, Matheran and Vasota in evergreen forests; Barn owl was recorded in barren, grassy plateaus around settlements at all altitudes while Barred jungle owlet was recorded in moist deciduous forests at Bhimashankar. Brown fish owl used to inhabit forest patches around hill ponds again upto 900m altitude. But was only seen at Bhimashankar during this survey. Great horned owl was recorded at Sinhgad and Bhimashankar. At night owl calls are by no means common in forests and plateau areas though in Radhanagari sanctuary in December 1995 Collared scops owl was very vocal at night and so was Brown wood owl in Matheran. Other observers have recorded Scops owl in Sinhgad valley (S. Ingalhallikar pers. commu.). Spotted owlet is common around human habitation upto 620m altitude.

Caprimulgidae :

Jungle nightjar was heard and seen in Bhimashankar and Sykes's nightjar in Radhanagari. Franklin's nightjar was seen and heard in hills around Sinhgad at a height of 800m. No other nightjars were recorded during the survey though other observers have recorded Longtailed and Franklin's nightjars at Vasota (S. Ingalhallikar pers. commu.).

Apodidae :

House swifts were seen flying over all the areas throughout the Sahyadri. Alpine swifts were seen around escarpments and plateaus at Bhimashankar, Mahabaleshwar, Matheran and Chandoli. A Brown-backed spinetail swift was seen in flight at Doodhganaga.

Hemiprocnidae :

Crested tree swifts are normally seen between 600m and 800m altitude and were recorded at Bhimashankar and Chandoli during this survey.

Alcedinidae :

The Small blue kingfisher is normally seen around 600m altitude near streams and ponds but was also recorded at Bhimashankar and Radhanagari around 900m altitude.

Dacelonidae :

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

Meropidae :

Little green bee-eater is seen throughout the Sahyadri wherever forest is opened up and dry, grassy, scrubby and secondary forest areas are created. It is found from plains to plateaus over 1300m altitude.

Upipidae :

Eurasian hoopoe is normally seen around 600m altitude and below but can be seen in Panchgani.

Bucerotidae :

Indian grey hornbill was recorded at Panchgani and nowhere else during the present survey. It is normally seen in plains and below 620m altitude. Great hornbill was recorded from Koyna forests (Vasota and surroundings). It is more common on the western faces of Western Ghats. Malabar grey hornbill also was not seen in recent years in these hills.

Megalaimidae :

Small green barbet is found throughout the Sahyadri 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. Large green barbet has become rare in the Sahyadri and was recorded below Bhimashankar plateau during the present survey.

Picidae :

Woodpeckers have also become extremely rare in the Sahyadri presumably because all old and decaying trees are promptly removed. During this survey Lesser yellownape was recorded in Mahabaleshwar mainly in spring and summer, Lesser goldenback below Bhimashankar and this and Speckled piculet in Radhanagari wildlife sanctuary. Other observers have recorded Pygmy woodpecker at Mahabaleshwar, Vasota and Sinhgad; Heartspotted woodpecker at

Sinhgad valley and Vasota and Rufous woodpecker at Mahabaleshwar, Bhimashankar and Vasota (S. Ingallahlikar and R. Purandare pers. commu.).

Alaudidae :

Malabar crested lark and Eastern skylark are found throughout the Sahyadri in grassy, open areas from 650m to 1320m altitude. Redwinged bush lark and Rufoustailed finch lark are generally met with between 600m and 700m altitude. But the former is rare. Ashycrowned and Blackcrowned finch larks are found throughout in barren and rocky areas and plateaus.

Hirundinidae :

Dusky crag martin and Redrumped swallow are the two swallows that are found throughout the Sahyadri 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 Plain sand martins were seen at Matheran, Chandoli and Radhanagari.

Laniidae :

Rufous-backed shrike is found throughout, at all altitudes in opened up forests, secondary forests and scrub 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 plains. Baybacked shrike was seen between 600m and 700m altitude in dry deciduous and secondary forests in Chandoli.

Oriolidae :

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

Dicruridae :

Except on the plateau areas above 1300m 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 800m 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 600m altitude. Bronzed drongo was recorded below Bhimashankar while Haircrested drongo was recorded by other observers.

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 900m altitude like Matheran and Bhimashankar, it is replaced by Jungle myna. But it is rare on the higher plateaus. Brahminy myna was seen only at Panchgani and nowhere else in these hills.

Corvidae :

Tree pie was seen at Bhimashankar during the present survey. Other observers have recorded it only in Sinhgad valley around 620m altitude (S. Ingallahlikar, pers. commu.). Jungle crow is however, found throughout the Sahyadri 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.

Campephagidae :

Common wood shrike was seen in light moist deciduous forest in Chandoli and in denser moist deciduous forest in Bhimashankar and Matheran. Large cuckoo shrike was seen near Panshet around 700m altitude. It is generally found lower down and is more common to the west of the Sahyadri. Scarlet minivet was seen, often in pairs, upto 900m altitude in forest clearings as well as inside forest at Bhimashankar and Matheran. It was recorded by other observers below Mahabaleshwar plateau (R. Purandare, pers. commu.). Small minivet is found normally around 600m and below though it was also observed at Panchagani during the present survey. In scrub forest Whitebellied minivet can be seen upto 600m altitude.

Irenidae :

Common Iora is found throughout the Sahyadri at all altitudes. It leaves the higher plateaus during monsoons but returns in September-October. Breeds around 620m in dry and moist deciduous forest and even in bungalow compounds.

Pycnonitidae :

Redvented bulbul is distributed throughout the Sahyadri 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 700m and 1320m altitude. Yellow-browed bulbul is found at Bhimashankar, Khandala, but is extremely common in the forests of Mahabaleshwar, Vasota and Radhanagari. White-cheeked 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 Whitebrowed bulbul in Sinhgad valley and Khandala around 630m altitude (S. Ingalhallikar pers. commu.).

Muscicapidae :

Sylviinae : Spotted babbler is distributed throughout the Sahyadri 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. Rufous-bellied babbler was seen only in Bhimashankar and Matheran forests. Other observers have seen it near Mulshi around 620m altitude (R. Purandare, Pers. commu.). Rufous babbler was seen only in Radhanagari forests. Black-fronted babbler was reported by another observer from Vasota in December 1995 (V. Santaram 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 around 1000m and below but was not seen south of Mahabaleshwar. Slatyheaded scimitar babbler is also found throughout in forest clearings, secondary forests, bungalow compounds and denser forest areas but is surprisingly extremely rare at Matheran.

Muscicapinae : Among the resident flycatchers, the endemic Whitebellied blue is confined to moist deciduous and evergreen biotopes at all altitudes and was seen at Bhimashankar, Matheran, Mahabaleshwar and Radhanagari. Blacknaped blue occurs not only in these biotopes but was also seen in forest clearings and lighter forests. Whitethroated fantail is also found in these areas at all altitudes. White-spotted fantail is confined to better wooded areas. Paradise flycatcher is also found throughout the Sahyadri 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. Tickell's blue was

recorded at Bhimashankar. Other observers have recorded it at Mahabaleshwar also.

Migratory flycatchers that are common throughout are Redbreasted and Verditer and Greyheaded. The former is found among bushes, secondary forest, forest clearings and also forested areas but the latter two are confined to moist deciduous to evergreen forests and were seen at Mahabaleshwar and Bhimashankar.

Cisticolidae :

Streaked fantail warbler is confined to grassland and low bushes throughout at all altitudes but is rare south of Mahabaleshwar. Fantail warbler was seen in *Strobilanthus* only in the Radhanagari Sanctuary around 800m altitude. Franklin's wren warbler and Plain wren warbler are confined to thorn and dry deciduous forests upto 800m altitude. Ashy wren warbler occurs in gardens and bungalow compounds at all altitudes throughout the hills. Jungle wren warbler 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 grass warbler has been recorded only at Sinhgad around 1300m altitude where it breeds also among tall grass.

Sylviidae :

The migratory *Acrocephalus*, *Phylloscopus* and *Hippolais* warblers occur throughout the Sahyadri 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 especially near wet areas. Blyth's reed warbler is found throughout at all altitudes in rank bushes, scrub, roadside hedges and Karvea growth. *P. affinis* is rare but occurs in the understorey 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 Bhimashankar and Mahabaleshwar.

Turdinae : Magpie robin is found throughout at all altitudes but 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 vocal. It is generally not seen in winter. In Radhanagari it was recorded in winter also. In Bhimashankar and Matheran it occurs in forest and near forested bungalow compounds and rarely in deeper forests away from human settlements. 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 1300m while the former is not found on higher plateaus. Indian robin is found throughout in dry, stony and thorn bush areas but rarely ascends the higher plateaus. Blue rock thrush also occurs in such areas at all altitudes. White-throated ground thrush and Eurasian blackbird occur in moist deciduous to evergreen forests; but the former occupies areas of denser forests with good canopy from 800m to over 1300m altitude and the latter occupies more open areas and plantations also. Both these are extremely vocal from March onwards. Pairs of Whitethroated ground 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 arabesque, 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. Blueheaded 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 Bhimashankar and Mahabaleshwar in summer and immediately after rains. After rains it probably migrates south as hill streams dry up progressively (Ambedkar 1991). Its extreme scarcity perhaps reflects the desiccation of our hill areas due to drying up of hill streams.

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 620m to over 1300m 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 620m altitude.

Motacillidae :

Among pipits Brown rock pipit is generally found in grassland and stony plateaus with bushes at all altitudes. Paddyfield pipit is found near settlements, fields, fallow areas and scrub at all altitudes. Indian tree pipit and the migratory tree pipit occur at all altitudes on the edges of moist deciduous and ever-

green 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 1000m 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.

Nectarinidae :

The most common sunbird in our hills in moist deciduous to evergreen forests, is the Small sunbird. In more open areas below 1320m altitude and in dry deciduous, thorn and scrub forests Purple sunbird is seen commonly. Purple-rumped sunbird normally occurs upto 620m altitude but was also recorded at Panchgani during the present survey. A pair of Yellow-backed sunbird was observed on Mahabaleshwar plateau in a tropical pine plantation and at Bhimashankar coming to Loranthus flowers. But it is more often seen between 700m and 900m altitude in moist deciduous forest, forest clearings and secondary forest areas.

Thickbilled, Tickell's and Plain-coloured 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 1000m altitude and below.

Zosteropidae :

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

Ploceidae :

House sparrows are scarce above 620m altitude in all types of forests in our hills. The only exception again is Panchgani and Bhimashankar where the house sparrow occurs. The Yellow-throated sparrow is encountered in open areas, fallow fields and forest edges upto 900m altitude.

Estrildinae : White-throated and Spotted munia are common between 620m and 700m altitude.

Fringillidae :

Common rosefinch arrives in the Sahyadri 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.

Emberizidae :

Grey-headed bunting, a migrant, is encountered in grasses and bushes on dry slopes between 600m and 650m altitude. Striolated bunting occurs in still drier and stony areas upto 700m altitude while Crested bunting occurs among bushes, secondary forest and rocks and ravines from 620m to 1300m 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 Sahyadri as their occurrence is extremely rare and irregular: White-bellied fish-eagle, Cinereous vulture, Black-crested Baza, Malabar trogon, Painted spurfowl, Painted sandgrouse, Plain-tive cuckoo, Banded bay-cuckoo, Chestnut-headed bee-eater, Indian pitta, Grey shrike, White-browed blue flycatcher, Lesser whitethroat, Blue Chat and Loten's sunbird.

II

The Habitat Pattern

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 construction of hotels. 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 1300m 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 each other by a broad valley. Both are between 800m and 1000m 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. Fuel-wood pressure on the forest in Matheran is less than in Mahabaleshwar though shifting cultivation and fuel-wood demand of local people at Bhimashankar are the major causes of forest depletion. 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 30 metres 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 1000m 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*, *Driopteris*, *Actinodaphne*, *Mappia 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 Sahyadri.

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 December 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, lavender, 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 hohenakeri*, *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 spinosa*, *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.

III

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 vegetation.



Birds of Thorn and Scrub forest

0 to 620m

Yellow-wattled lapwing, Black drongo, Yellow-eyed babbler, Franklin's wren warbler, Plain wren warbler, Rufous-backed shrike, Red-vented bulbul, Blue rock thrush, Purple sunbird, Jungle crow, White-bellied minivet.

621 to 920m

Yellow-wattled lapwing, Black drongo, Jungle crow, Yellow-eyed babbler, Blue rock thrush, Redvented bulbul, Iora.

921 to 1220m

Red-vented bulbul, Jungle crow, Blue rock thrush, Yellow-eyed babbler, Indian robin, Little brown dove, Small minivet, Pied bush chat, House sparrow, Little Green bee-eater.

Deciduous and Secondary forest

Shikra, Kestrel, Little Brown Dove, Common myna, Yellow-eyed babbler, Jungle wren warbler, Tailorbird, Pied bush chat, Purple sun-bird, Yellow-throated sparrow, Koel, Indian cuckoo, Crow-pheasant, Baybacked shrike, Black drongo, Jungle babbler, Tickell's flowerpecker, Red-vented bulbul, Redbreasted fly-catcher, Common Iora.

Shikra, Painted partridge, Rock bush quail, Jungle bush quail, Peafowl, Crested tree swift, Jungle crow, Purple sunbird, Rufous-backed shrike, Scarlet minivet, Red-vented bulbul, Redbreasted flycatcher, Yellow-eyed babbler, Jungle babbler, Tailor bird, Pied bush chat, Yellow-throated sparrow, Indian Cuckoo, Crow-pheasant, Sirkeer cuckoo, Rufous-backed shrike, Baybacked shrike, White-bellied drongo.

Red-breasted flycatcher, Blyth's reed warbler, Chiffchaff, Koel, Roseringed parakeet, Yellow-legged green pigeon, Coppersmith, Brahminy myna, Common myna, Magpie robin, Black drongo, Blackbird, Pariah Kite, Red-whiskered bulbul, Purple-rumped sun-bird, Jungle babbler, Spotted dove, Golden oriole, Blossomheaded parakeet, Hoopoe, White-spotted fantail fly-catcher, Grey hornbill, Tailor bird, Jungle crow.

Moist deciduous forest

0 to 620m

Black drongo, Red-whiskered bulbul, Jungle babbler, Quaker babbler, White-eye, Yellow-throated sparrow, White-throated fantail fly-catcher, Redbreasted fly-catcher, Phylloscopus affinis, Magpie robin, Crested serpent eagle, Spotted dove, Blossom-headed parakeet, Lorikeet, Jungle crow, Woodshrike, Large cuckoo-shrike, Tailor-bird, Blyth's reed warbler, Chiffchaff, Blackbird, Paradise Flycatcher.

620 to 920m

Eurasian Sparrowhawk, Crested hawk eagle, Imperial pigeon, Rufous turtle dove, Blossom-headed parakeet, Small green barbet, Jungle crow, Common Wood-shrike, Scarlet minivet, Yellow-cheeked tit, Brown wood owl, Collared scops owl, Jungle nightjar, Sykes's nightjar, Crag martin, Rufous-backed shrike, Golden oriole, Ashy drongo, Jungle myna, Iora, Red-whiskered bulbul, Spotted babbler, Rufous-bellied babbler, Slaty-headed scimitar babbler, Black-naped blue flycatcher, White-throated fan-tail flycatcher, Paradise flycatcher, Red-breasted fly-catcher, Blackbird, Blue-headed rock thrush, Blyth's reed warbler, P. affinis, Magpie robin, Tree pie, Tree pipit, Grey wagtail, Thick-billed flowerpecker, Yellow-backed sunbird, White-eye, Yellow-throated sparrow, Common rosefinch.

Semi-evergreen and Evergreen forest

None

Black eagle, Red spurfowl, Indian Peafowl, Grey jungle fowl, Nilgiri wood pigeon, Rufous turtle dove, Blue-winged parakeet, Lorikeet, Imperial pigeon, Small green barbet, Lesser golden-backed wood-pecker, Spotted piculet, Common woodshrike, Scarlet minivet, Black bulbul, White-throated ground thrush, Drongo cuckoo, Brown wood owl, Golden oriole, Ashy drongo, Red-whiskered bulbul, Yellow-browed bulbul, Spotted babbler, Quaker babbler, Rufous babbler, Slatyheaded scimitar babbler, Indian tree pipit, Tree pipit, White-eye, White-bellied blue fly-catcher, Paradise flycatcher, Red-breasted flycatcher, Verditer flycatcher, Blyth's reed warbler, Chiffchaff, Phylloscopus tytleri, P. griseolus, P. trochiloides, Shama, Blackbird, Booted warbler, Blue-headed rock thrush, Small sunbird, Yellow-backed sunbird.

BIRDS OF THE SAHYADRI

Let us now see the distribution of birds according to altitude and their use of habitats :

Cliffs	Grassy plateau	Shrubs/grassy plateau
0 to 620m None	Little green bee-eater, Red-winged bush lark, Rufous-tailed finch lark, Streaked fantail warbler, Indian robin.	Blyth's reed warbler, Chiffchaff, Stonechat, Pied bush chat, Purple sunbird
621 to 920m Long-billed vulture, Shaheen falcon, Resident kestrel, Blue rock pigeon, Alpine swift, Amur falcon, Dusky crag martin, Crag martin, Short-toed eagle, Eurasian Griffon.	Rain quail, Little green bee-eater, Malabar crested lark, Skylark, Streaked fantail warbler, Indian robin, Brown rock pipit, Painted bush quail.	Fantail warbler, Booted warbler, Chiffchaff, Pied bush chat, Stonechat, Purple sunbird, Crested bunting, Pale harrier, Sykes' nightjar.
921 to 1321m Blue rock pigeon, Alpine swift, Dusky crag martin, Crag martin, Black eagle, Honey buzzard, Crested serpent eagle, White-backed vulture.	Rain quail, Little green bee-eater, Malabar crested Skylark, Streaked fantail warbler, Yellow-eyed babbler, Brown rock pipit, Blue rock thrush.	Blyth's reed warbler, Chiffchaff, Pied bush chat, Crested bunting, Red-vented bulbul, Purple sunbird.
Cultivation	Settlement	Bungalow compound
0 to 620m Black drongo, Jungle crow, Paddy-field pipit, House sparrow.	Black drongo, Jungle crow, Tailor bird, House sparrow, Purple sunbird	Black drongo, Jungle crow, Tailor bird, House sparrow, Black redstart Grey tit, Blyth's reed warbler, Chiffchaff, White-eye, Common rosefinch.
621 to 920m Black drongo, Rain quail, Jungle myna, Jungle crow, Paddyfield pipit, Yellow-throated sparrow.	Black drongo, Jungle myna, Ashy wren warbler, Jungle crow, Purple sunbird, Tailor bird.	Black drongo, Tailor bird, Ashy wren warbler, Jungle crow, Chiffchaff, Booted warbler, Shama, Blackbird, White-eye, Yellow-cheeked tit, Common rosefinch.
921 to 1320m Rain quail, Pariah kite, Spotted dove, Jungle babbler, Grey wagtail.	Common myna, Brahminy myna, Tailor bird, Ashy wren warbler, Hoopoe, Small minivet, Yellow-legged green pigeon, Purple-rumped sunbird, House sparrow.	Tailor bird, Booted warbler, Chiffchaff, Black bird, Yellow-cheeked tit, White-eye, Common rosefinch, Golden oriole, Coppersmith.
Near Water	Grassy slopes / Secondary forest	Valley slopes
0 to 620m Redwattled lapwing, Common sandpiper, Brownheaded gull, Wire-tailed swallow, White-necked stork	Cattle egret, Pariah kite, White-eyed buzzard, Pale harrier, Short-toed eagle, Rufous-backed shrike, Indian robin, Paddyfield pipit.	Honey buzzard, Kestrel, Black drongo, Blue rock thrush, Rufous-backed shrike, Red-vented bulbul,
621 to 920m Pond heron, Common sand-piper, Small blue kingfisher, Wire-tailed swallow, Malabar whistling thrush, Grey wagtail, Yellow wagtail.	Pariah kite, White-eyed buzzard, Kestrel, Stone curlew, House swift, Black drongo, Rufous-backed shrike, Indian robin, Redvented vented bulbul, Paddyfield pipit.	Blackwinged kite, Honey buzzard, Blossom-headed parakeet, Blue-winged parakeet, Rufous-backed shrike, Black drongo, Red-vented bulbul, Jungle crow, Slaty-headed scimitar babbler.
921 to 1320 m White-breasted kingfisher, Wire-tailed swallow, Malabar whistling thrush, Grey wagtail, Little ringed plover, Kentish plover, Common sandpiper, Green sandpiper, Red-wattled lapwing.	House swift, Chiffchaff, Little Green bee-eater, Pied bush chat, Rufous-backed shrike, Yellow-eyed babbler, Red-vented bulbul, Crested bunting.	Blackwinged kite, Chiffchaff, Little Green bee-eater, Pied bush chat, Honey buzzard, Crested serpent eagle, Rufous-backed 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 620m to 920m are the best bird habitat in northern western ghats. Next in importance are thorn and scrub and deciduous and secondary forests at the same altitudes.

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 1320m, 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*, *Combretum 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 Small 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 Small 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 and Jungle 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 : Red-breasted,

White-bellied blue, Paradise and Verditer also hunted singly. The small resident population of Rufous 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 Small 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, Blue-winged 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 Spotted babbler resounded in the forest. The rich, varied repertoire of White-throated ground thrush and the low, soft cooing of Rufous 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 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 Rufous 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 Yellownaped woodpecker whose wailing calls broke through the branches from time to time. It was not there in winter. Magpie-robin and Pied bush chat had come into breeding plumage and will, like Shama, burst into song in May. Among the raptors family parties and pairs of Crested serpent and Crested 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 White-throated ground 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 October 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, Common Iora, Magpie robin and Small green 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, Small 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 bulbul. There was a great influx of Rufous-backed shrike, many of them very vocal, and could be seen everywhere, even in forests. Except the white bunches of *Mappia 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 Small green barbet and Scimitar babbler, the forest was silent though I did hear Shama and Spotted babbler. Migrants such as Blue-headed rock thrush, Red-breasted flycatcher, Grey wagtail, Sparrowhawk

and Kestrel had already arrived and the number of Rufous turtle dove increased everyday. A Mottled wood owl and a noisy party of Blue-winged 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 Panchgani. 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 1320m is occupied not by hill birds but by birds of towns and cities in the plains! Except Small green 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, Red-whiskered bulbul, Black bulbul, Paradise flycatcher, Blue-headed rock thrush, Tree pipit and even a pair of Yellow-backed 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 about 800 metres the plateau of Matheran occupies the western fringe of the the Sahyadri. 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 Bhimashankar just across the valley and on the main ridge of the Ghats. Rufous turtle dove, Common rosefinch, Yellow-backed sunbird, Malabar whistling thrush, Lesser Yellownaped woodpecker, Blue-winged parakeet and even Rufous-backed shrike are not to be seen here. Strangely enough even the Slaty-headed scimitar babbler is quite rare in Matheran. Instead 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, Rufous-bellied babbler, Drongo-cuckoo, Brown wood owl and Yellow wagtail. Indeed as the sun sets the tall trees around the tiny railway station of Matheran come 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 White-throated 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 Small green 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 1000 metres 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, some of them characterized as Sacred Groves. Birds of Bhimashankar are a mix of those of Matheran and Mahabaleshwar. Like Matheran, Shama, Scarlet minivet, Rufous-bellied bab-

bler can be seen and like Mahabaleshwar Rufous 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, Jungle nightjar, Malabar or Southern trogon, Great horned owl, Brown fish owl and Barred jungle owlet. Wherever forest has been cleared birds such as Crow-pheasant, Little Green bee-eater and Red-vented bulbul and Indian robin can be seen.

Some forest patches cover the western slopes of Bhimashankar midway between the high plateau and Konkan plains. These have characteristic moist deciduous trees such as *Terminalia sp.*, *Albizia sp.*, *Lagerstroemia sp.*, etc. which harbour such birds as Black-headed oriole, Lesser goldenbacked woodpecker, Gold-fronted chloropsis, Bronzed drongo, White-bellied drongo and White-browed bulbul. It was also noticed that some birds such as Shama, Scarlet minivet, Tcikell's blue flycatcher move between the upper plateau and these lower forests on western slopes. Thus Shama and Scarlet minivet are not normally seen on the upper plateau in winter when they are common in lower forests. They arrive on the upper plateau in late February or March.

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, Blossom-headed parakeet, Plain-coloured flowerpecker and Crested tree swift. Birds of more open habitats such as Yellow-throated sparrow, Red-breasted flycatcher, Purple sunbird, Malabar crested lark, Stone curlew, Baybacked shrike and Little brown dove can also be seen. Birds found in Mahabaleshwar

such as Ashy drongo, Small green barbet, Small sunbird, Slatyheaded Scimitar babbler, Paradise flycatcher, Black bulbul, Rufous turtle dove, Spotted babbler can also be seen at Chandoli. Birds of prey seen at this site included Crested hawk eagle, White-eyed buzzard, Blackwinged kite and Shikra.

The forest of Vasota retains its semi-evergreen and evergreen character even at a height of about 700m. Consequently birds of more open areas are absent here. On the other hand birds that are rare in Mahabaleshwar such as Blue-winged 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, Pygmy woodpecker, Goshawk, Long-tailed and Franklin's 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 Lesser goldenback 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 spintail 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 the Sahyadri as judged by the present investigation, may now be stated as follows:

1. Painted Bush Quail: Sparsely distributed throughout around 620m 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. Blue-winged Parakeet: Has almost disappeared from forests north of Mahabaleshwar. Sparse in Mahabaleshwar but more common in Vasota and

Radhanagari moist deciduous and semi-evergreen forests.

4. Small Green Barbet: Common throughout the Sahyadri. Versatile in using several types of forest.
5. Malabar Crested Lark: Common throughout the Sahyadri in open, grassy plateaus. Probably numbers decline towards the south.
6. Yellow-browed Bulbul: Very rare in Lonavla-Khandala and few in Bhimashankar. But fairly common from Mahabaleshwar southwards.
7. Rufous Babbler: Sparsely distributed south of Mahabaleshwar.
8. Black-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 a 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. Small Sunbird: Fairly common in moist deciduous to evergreen forest patches.
12. Malabar or Southern Trogon: Seen only on the western slope of Bhimashankar. Believed to be more common in Konkan forests.
13. White-browed Bulbul: Noted only on the western slope of Bhimashankar; common in the Konkan region but scarce in the Sahyadri range.

Blue-faced Malkoha, Malabar Grey Hornbill, Malabar Pied Hornbill and Loten's Sunbird were not found in the region under investigation. They can be seen in the Konkan region, i.e. the western faces of the Sahyadri.

IV

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

Red-breasted flycatcher, Chiffchaff, Rufous-bellied babbler, Rufous babbler, Paradise flycatcher, White-bellied blue flycatcher, Blackbird, Shama, White-throated ground thrush, Malabar whistling thrush, Rufous turtle dove, Grey jungle-fowl, Red spurfowl, Quaker babbler, Black bulbul, Malabar trogon.

Middle level

Rufous turtle dove, Blue-headed rock thrush, *P. occipitalis*, *P. trochiloides*, Chiffchaff, Paradise flycatcher, White-bellied blue flycatcher, Shama, Brown wood owl, Mottled wood owl, White-throated ground thrush, Black bulbul, Yellow-browed bulbul, Red-whiskered bulbul, Slatyheaded scimitar babbler, Tree pipit, Small green barbet, Quaker babbler, Small sunbird, White-eye.

High level and canopy

Scarlet minivet, Verditer flycatcher, *P. magnirostris*, White-throated ground thrush, Black bulbul, Blackbird, Redwhiskered bulbul, Slatyheaded scimitar babbler, Small sunbird, Small green barbet, Ashy drongo, Drongocuckoo, Quaker babbler, Nilgiri wood pigeon, Common rosefinch.

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 certain locations I came across roving parties of birds moving through the middle and high levels of trees. In winter the parties consisted of Quaker babblers, Small sunbirds and *Phylloscopus* warblers. They were sometimes joined by Ashy drongo, Paradise Flycatcher and Scimitar babbler. In spring I did not come across mixed hunting parties though flocks of Quaker babblers, Small 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

Red-breasted flycatcher, Blyth's reed warbler, Rufous-bellied babbler, Jungle babbler, Shama, Grey jungle fowl, Red spur-fowl, Rufous turtle dove, Tailor bird, Magpie robin, Rufous babbler, *P. affinis*, Black-naped blue fly-catcher, Grey wagtail.

Middle level

Rufous turtle dove, Small green barbet, Spotted babbler, Lesser yellow-naped woodpecker, Common Iora, Red-whiskered bulbul, Shama, Black bulbul, Slaty-headed scimitar babbler, Quaker babbler, Jungle babbler, Tailor bird, Paradise flycatcher, Collared scops owl, Yellow-cheeked tit, White-throated fan-tailed flycatcher.

High level and canopy

Small green barbet, Ashy drongo, Common woodshrike, Red-whiskered bulbul, Black bulbul, Yellow-browed bulbul, Slaty-headed scimitar babbler, Quaker babbler, Tree pipit, Small sunbird, Scarlet minivet, *P. tytleri*, *P. griseolus*, *P. occipitalis*, Blackbird, Golden oriole, White-throated ground thrush, Lorikeet, Spotted piculet, Large golden-backed woodpecker, Yellow-cheeked 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-headed 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, Magpie robin, Lesser Yellownape and White-throated fantailed flycatcher.

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

Ground and low bushes

Jungle bush quail, Painted bush quail, Grey jungle fowl, Crow-pheasant, Jungle nightjar, Sykes's nightjar, Rufous-backed shrike, Jungle myna, Red-vented bulbul, Rufous-bellied babbler, Jungle babbler, Red-breasted fly-catcher, Fantail warbler, Booted warbler, Blyth's reed warbler, Chiffchaff, Pied bush chat.

Middle level

Kestrel, Rufous turtle dove, Spotted dove, Blossomheaded parakeet, Indian cuckoo, The cuckoo, Crow-pheasant, Baybacked shrike, Rufous-backed shrike, Jungle myna, Red-whiskered bulbul, Slaty-headed scimitar babbler, Quaker babbler, Red-breasted flycatcher, Jungle wren warbler, Tailor bird, *P. tytleri*, Pied bush chat, Plain coloured flower-pecker, Purple-rumped sunbird, Yellow-throated sparrow.

High level and canopy

Bonelli's eagle, Sparrowhawk, Shikra, Shaheen falcon, Yellow-legged green pigeon, Blossom-headed parakeet, Blue-winged parakeet, Grey hornbill, Small green barbet, Coppersmith, Golden oriole, Ashy drongo, Large cuckoo-shrike, Scarlet minivet, Black bulbul, Blackbird, Yellow-cheeked tit, Common rosefinch.

BIRDS OF THE SAHYADRI

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 205 bird-species that I encountered in the Sahyadri range, 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 corre-

sponds 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.

Birds of the Sahyadri Range 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	9	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 and nectar-feeders; IF=insect and fruit-eaters; IFN= insect, fruit and nectar-feeders; IC=insectivores that occasionally prey on other birds; S= seed-eaters; FSN= fruit, seed and nectar-feeders; INS= insect, nectar and seed-eaters; ICFi= insect, birds and fish-eaters; IFS= insect, fruit and seed-eaters; IS= insect and seed-eaters; FS= fruit and seed-eaters; ICN= insect, bird and nectar-feeders; IFi= insect and 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. In Matheran, the area of continuous canopy is perhaps larger than Bhimashankar which has small, scattered patches of canopy forest. In Matheran insectivorous birds are again flycatchers, thrushes, babblers and warblers while in Bhimashankar they are mainly thrushes and warblers with few babblers and 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. Destruction 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, black-bird, 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 Sahyadri.

The present survey indicates that canopy forest is fast declining all over the Sahyadri range. With it are likely to disappear 25 bird species that are more or less restricted to these forests. 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 Sahyadri: Rufous babbler, White-throated ground thrush, Small sunbird, Yellow-browed bulbul, Blue-headed rock thrush, White-bellied blue flycatcher, Red spurfowl, Nilgiri wood pigeon, Shama, Bluewinged parakeet, Mottled wood owl, Brown wood owl, Large golden-backed woodpecker, Lesser yellownaped woodpecker 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 Yellow-backed sunbird, Black bulbul, Blacknaped blue flycatcher, Verditer and Paradise flycatchers, Spotted babbler, Rufous turtle dove are also threatened and may disappear with these forests.

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 compulsory 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 Sanctu-

ary. 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.

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The List of Birds Encountered In the Sahyadri : 1970-1998

Waterbirds

Large Cormorant (*Phalacrocorax carbo*), Little Cormorant (*Phalacrocorax niger*), Little Green Heron (*Ardeola striatus*), Pond Heron (*Ardeola grayii*), Cattle Egret (*Bubulcus ibis*), White-necked Stork (*Ciconia episcopus*), Greater Flamingo (*Phoenicopterus roseus*), Spotbill Duck (*Anas poecilorhyncha*)

Birds of Prey

Black-winged Kite (*Elanus caeruleus*), Blackcrested Baza (*Aviceda leuphotes*), Honey Buzzard (*Pernis ptilorhynchus*), Blackeared Kite (*Milvus migrans lineatus*), Pariah Kite (*Milvus migrans govinda*), Shikra (*Accipiter badius*), Crested Goshawk (*Accipiter trivirgatus*), Goshawk (*Accipiter gentilis*), Sparrowhawk (*Accipiter nisus*), Japanese Buzzard (*Buteo buteo japonicus*), White-eyed Buzzard-eagle (*Butastur teesa*), Crested Hawk Eagle (*Spizaetus cirrhatu*), Bonelli's Eagle (*Hieraaetus fasciatus*), Black Eagle (*Ictinaetus malayensis*), Griffon Vulture (*Gyps fulvus*), Long-billed Vulture (*Gyps indicus*), White-backed Vulture (*Gyps bengalensis*), Pale Harrier (*Circus macrourus*), Short-toed Eagle (*Circaetus gallicus*), Crested Serpent Eagle (*Spilornis cheela*), Osprey (*Pandion haliaetus*), Shaheen Falcon (*Falco peregrinus*), Hobby (*Falco subbuteo*), Redfooted Falcon (*Falco vespertinus*), Kestrel (*Falco tinnunculus*), Indian Kestrel (*Falco tinnunculus objurgatus*)

Partridges, Quails and Fowls

Painted partridge (*Francolinus pictus*), Rain Quail (*Coturnix coromandelica*), Jungle Bush Quail (*Perdica asiatica*), Rock Bush Quail (*Perdica argoondah*), Painted Bush Quail (*Perdica erythrorhyncha*), Red Spurfowl (*Galloperdix*)

spadicea), Grey Jungle Fowl (*Gallus sonneratii*), Common Peafowl (*Pavo cristatus*), Common Bustard-Quail (*Turnix suscitator*)

Long-legged Birds

Pheasant-tailed Jacana (*Hydrophasianus chirurgus*), Black-winged Stilt (*Himantopus himantopus*), Stone curlew (*Burhinus oedicnemus*), Yellow-wattled Lapwing (*Vanellus malabaricus*), Redwattled Lapwing (*Vanellus indicus*)

Waders

Little Ringed Plover (*Charadrius dubius*), Kentish Plover (*Charadrius alexandrinus*), Curlew (*Numenius arquata*), Green Sandpiper (*Tringa ochropus*), Common Sandpiper (*Tringa hypoleucos*), Snipe (*Gallinago* sp.)

Gulls and Terns

Brownheaded Gull (*Larus brunnicephalus*), Blackheaded Gull (*Larus ridibundus*), River Tern (*Sterna aurantia*), Whiskered Tern (*Chlidonias hybrida*)

Pigeons, Doves and Parakeets

Yellow-legged Green Pigeon (*Treron phoenicoptera*), Grey-fronted Green Pigeon (*Treron pompadura*), Imperial Pigeon (*Ducula badia*), Blue Rock Pigeon (*Columba livia*), Nilgiri Wood Pigeon (*Columba elphinstonii*), Rufous Turtle Dove (*Streptopelia orientalis*), Spotted Dove (*Streptopelia chinensis*), Little Brown Dove (*Streptopelia senegalensis*), Emerald Dove (*Chalcophaps indica*), Roseringed Parakeet (*Psittacula krameri*), Blossomheaded Parakeet (*Psittacula cyanocephala*), Blue-winged Parakeet (*Psittacula columboides*), Indian Lorikeet (*Loriculus vernalis*)

Cuckoos

Cuckoo (*Cuculus* sp.), Pied Crested Cuckoo (*Clamator jacobinus*), Drongo-Cuckoo (*Surniculus lugubris*), Koel (*Eudynamys scolopacea*), Sirkeer cuckoo (*Taccocua leschenaultii*), Crow-pheasant (*Centropus sinensis*)

Owls

Barn Owl (*Tyto alba*), Scops Owl (*Otus scops*), Collared Scops Owl (*Otus bakkamoena*), Great Horned Owl (*bubo bubo*), Brown Wood Owl (*Strix leptogrammica*), Brown Fish Owl (*Bubo zeylonensis*), Barred Jungle Owlet (*Glaucidium radiatum*), Brown Hawk-Owl (*Ninox scutulata*), Spotted Owlet (*Athene*

brama)

Nightjars

Jungle Nightjar (*Caprimulgus indicus*), Sykse's Nightjar (*Caprimulgus mahrattensis*), Franklin's Nightjar (*Caprimulgus affinis*), Longtailed Nightjar (*Caprimulgus macrurus*)

Swifts

Alpine Swift (*Apus melba*), House Swift (*Apus affinis*), Brown-backed Spinetail Swift (*Chaetura gigantea*), Palm Swift (*Cypsiurus parvus*), Crested Tree Swift (*Hemiprocne longipennis*)

Trogons

Malabar Trogon (*Harpactes fasciatus*)

Kingfishers, Bee-eaters and Hoopoe

Common Kingfisher (*Alcedo atthis*), White-breasted Kingfisher (*Halcyon smyrnensis*), Green Bee-eater (*Merops orientalis*), Hoopoe (*Upupa epops*)

Hornbills

Common Grey Hornbill (*Tockus birostris*), Great Pied Hornbill (*Buceros bicornis*)

Barbets

Large Green Barbet (*Megalaima zeylanica*), Small Green Barbet (*Megalaima viridis*), Coppersmith (*Megalaima haemacephala*)

Wookpeckers

Speckled piculet (*Picumnus innominatus*), Rufous Woodpecker (*Micropternus brachyurus*), Small Yellownaped Woodpecker (*Picus chlorolophus*), Pygmy Woodpecker (*Picoides nanus*), Yellowfronted Pied Woodpecker (*Picoides mahrattensis*), Heartspotted Woodpecker (*Hemicircus canente*), Large Golden-backed Woodpecker (*Chrysocolaptes lucidus*), Lesser Golden-backed Woodpecker (*Dinopium benghalense*)

Larks and Finchlarks

Redwinged Bush Lark (*Mirafraga erythroptera*), Ashycrowned Finch-lark (*Eremopterix grisea*), Rufous-tailed Finch-lark (*Ammomanes phoenicurus*), Malabar Crested Lark (*Galerida malabarica*), Eurasian Skylark (*Alauda arvensis*), Eastern Skylark (*Alauda gulgula*)

Matins and Swallows

Plain Sand Martin (*Riparia paludicola*), Crag Mar-

tin (*Hirundo rupestris*), Dusky Crag Martin (*Hirundo concolor*), Swallow (*Hirundo rustica*), Wire-tailed Swallow (*Hirundo smithii*), Red-rumped Swallow (*Hirundo daurica*)

Shrikes

Baybacked Shrike (*Lanius vittatus*), Rufous-backed Shrike (*Lanius schach*)

Orioles and Drongos

Golden Oriole (*Oriolus oriolus*), Blackheaded Oriole (*Oriolus xanthornus*), Black Drongo (*Dicrurus adsimilis*), Ashy Drongo (*Dicrurus leucophaeus*), White-bellied Drongo (*Dicrurus caerulescens*), Bronzed Drongo (*Dicrurus aeneus*), Haircrested Drongo (*Dicrurus hottentotus*)

Mynas

Brahminy Myna (*Sturnus pagodarum*), Rosy Pastor (*Sturnus roseus*), Common Myna (*Acridotheres tristis*), Jungle Myna (*Acridotheres fuscus*)

Treepie and Crows

Tree pie (*Dendrocitta vagabunda*), Jungle Crow (*Corvus macrorhynchos*)

Wood-shrikes and Cuckoo-shrikes

Common Wood-shrike (*Tephrodornis pondicerianus*), Large Cuckoo-shrike (*Coracina novaehollandiae*), Blackheaded Cuckoo-shrike (*Coracina melanoptera*)

Minivets, Iora and Chloropsis

Scarlet Minivet (*Pericrocotus flammeus*), Little Minivet (*Pericrocotus cinnamomeus*), White-bellied Minivet (*Pericrocotus erythropygius*), Common Iora (*Aegithina tiphia*), Golden-fronted Chloropsis (*Chloropsis aurifrons*), Fairy Bluebird (*Irena puella*)

Bulbuls

Redwhiskered Bulbul (*Pycnonotus jocosus*), Whitecheeked Bulbul (*Pycnonotus leucogenys*), Redvented Bulbul (*Pycnonotus cafer*), Whitebrowed Bulbul (*Pycnonotus leuteolus*), Yellow-browed Bulbul (*Hypsipetes indicus*), Black Bulbul (*Hypsipetes madagascariensis*)

Babblers

Spotted Babbler (*Pellorneum ruficeps*), Slatyheaded Scimitar Babbler (*Pomatorhinus horsfieldii*), Rufous-bellied Babbler (*Dumetia hyperythra*), Yellow-eyed Babbler (*Chrysomma sinense*), Common Babbler

(*Turdoides caudatus*), Rufous Babbler (*Turdois subrufus*), Jungle Babbler (*Turdois striatus*), Quaker Babbler (*Alcippe poiocephala*)

Flycatchers

Red-breasted Flycatcher (*Muscicapa parva*), White-bellied Blue Flycatcher (*Muscicapa pallipes*), Tickell's Blue Flycatcher (*Muscicapa tickelliae*), Verditer Flycatcher (*Muscicapa thalassina*), Greyheaded Flycatcher (*Culicicapa ceylonensis*), White-browed Fantail Flycatcher (*Rhipidura aureola*), White-throated Fantail Flycatcher (*Rhipidura albicollis*), Paradise Flycatcher (*Terpsiphone paradisi*), Blacknaped Blue Flycatcher (*Hypothymis azurea*)

Warblers

Fantail Warbler (*Cisticola exilis*), Streaked Fantail Warbler (*Cisticola juncidis*), Franklin's wren warbler (*Prinia hodgsonii*), Plain wren warbler (*Prinia subflava*), Ashy wren warbler (*Prinia socialis*), Jungle wren warbler (*Prinia sylvatica*), Tailor Bird (*Orthotomus sutorius*), Bristled Grass Warbler (*Chaetornis striatus*), Blyth's reed warbler (*Acrocephalus dumetorum*), 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*)

Thrushes and Chats

Magpie-robin (*Copsychus saularis*), Shama (*Copsychus malabaricus*), Stone Chat (*Saxicola torquata*), Pied Bush Chat (*Saxicola caprata*), Indian Robin (*Saxicoloides fulicata*), Blue-headed Rock Thrush (*Monticola cinclorhynchus*), Blue Rock Thrush (*Monticola solitarius*), Malabar Whistling Thrush (*Myiophonus horsfieldii*), White-throated Ground Thrush (*Zoothera citrina*), Blackbird (*Turdus merula*)

Tit

Grey Tit (*Parus major*), Yellowcheeked Tit (*Parus xanthogenys*)

Pipits and Wagtails

Indian Tree Pipit (*Anthus hodgsoni*), Tree Pipit (*Anthus trivialis*), Paddyfield Pipit (*Anthus novaeseelandiae*), Brown Rock Pipit (*Anthus similis*), Forest Wagtail (*Motacilla indica*), Yellow Wagtail (*Motacilla flava*), Grey Wagtail (*Motacilla cinerea*),



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Large Pied Wagtail (*Motacilla maderaspatensis*)

Flowerpeckers

Thickbilled Flowerpecker (*Dicaeum agile*), Tickell's Flowerpecker (*Dicaeum erythrorhynchos*), Plain-coloured Flowerpecker (*Dicaeum concolor*)

Sunbirds to Munias

Purple-rumped Sunbird (*Nectarinia zeylonica*), Small Sunbird (*Nectarinia minima*), Purple Sunbird (*Nectarinia asiatica*), Yellow-backed Sunbird

(*Aethopyga siparaja*), White-eye (*Zosterops palpebrosa*), House Sparrow (*Passer domesticus*), Yellow-throated Sparrow (*Petronia xanthocollis*), White-throated Munia (*Lonchura malabarica*), Spotted Munia (*Lonchura punctulata*)

Common Rosefinch (*Carpodacus erythrinus*)

Buntings

Greynecked Bunting (*Emberiza buchanani*), Striolated Bunting (*Emberiza striolata*), Crested Bunting (*Melophus lathami*).

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Snakes of the Sahyadri

Compiled by Sanjay Thakur

Sr. No.	Common Names	Scientific Names	Family	IUCN Category / Status-Distribution
1.	Common blind snake or Brahminy worm snake	<i>Ramphotyphlops braminus</i> (Daudin, 1803)	Typhlopidae	LR-nt / R-NEn
2.	Slender blind snake	<i>Typhlops porrectus</i> (Stoliczka, 1871)	Typhlopidae	LR-nt / R-NEn
3.	Large-scaled shieldtail	<i>Uropeltis macrolepis</i> (Peters, 1861)	Uropeltidae	VU / LC-En
4.	Phipson's shieldtail	<i>Uropeltis phipsoni</i> (Mason, 1888)	Uropeltidae	LR-nt / R-NEn
5.	Indian rock python	<i>Python molurus molurus</i> (Linnaeus, 1758)	Boidae	LR-nt / R-NEn
6.	Common sand boa	<i>Eryx conica</i> (Schneider, 1801)	Boidae	LR-nt / R-NEn
7.	Common or Red sand boa	<i>Eryx johni</i> (Russell, 1801)	Boidae	LR-lc / R-NEn
8.	Whitaker's sand boa	<i>Eryx whitakeri</i> Das, 1991	Boidae	VU / NR-NEn
9.	Indian trinket snake	<i>Elaphe helena</i> (Daudin, 1803)	Colubridae	LR-nt / C-NEn
	Montane trinket snake	<i>Elaphe helena monticollaris</i> Schulz, 1992	Colubridae	VU / LC-NEn
10.	Indian rat snake	<i>Ptyas mucosus</i> (Linnaeus, 1758)	Colubridae	LR-nt / VC-NEn
11.	Banded racer	<i>Argyrogena fasciolatus</i> (Shaw, 1802)	Colubridae	LR-nt / C-NEn
12.	Slender or Gunther's racer	<i>Coluber gracilis</i> (Gunther, 1862)	Colubridae	LR-nt / VR-NK
13.	Banded kukri snake	<i>Oligodon arnensis</i> (Shaw, 1802)	Colubridae	LR-lc / NR-NEn
14.	Streaked kukri snake	<i>Oligodon taeniolatus</i> (Jerdon, 1853)	Colubridae	LR-nt / VR-NK
15.	Common bronzeback tree snake	<i>Dendrelaphis tristis</i> (Daudin, 1803)	Colubridae	LR-lc / NR-NEn
16.	Travancore wolf snake	<i>Lycodon travancoricus</i> (Beddome, 1870)	Colubridae	LR-nt / R-NK
17.	Barred wolf snake	<i>Lycodon striatus</i> (Shaw, 1802)	Colubridae	LR-nt / VR-NEn
18.	Common wolf snake	<i>Lycodon aulicus</i> (Linnaeus, 1758)	Colubridae	LR-lc / VC-NEn



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19.	Dumeril's Black-headed snake	<i>Sibynophis subpunctatus</i> (Dumeril & Bibron, 1854)	Colubridae	LR-nt / R-NK
20.	Checkered keelback water snake	<i>Xenochrophis piscator</i> (Schneider, 1799)	Colubridae	LR-lc / VC-NEn
21.	Buff-striped keelback	<i>Amphiesma stolata</i> (Linnaeus, 1758)	Colubridae	LR-nt / VC-NEn
22.	Beddome's keelback	<i>Amphiesma beddomei</i> (Gunther, 1864)	Colubridae	LR-nt / LC-NEn
23.	Green Keelback	<i>Macropisthodon plumbicolor</i> (Cantor, 1839)	Colubridae	LR-nt / VC-NEn
24.	Beddome's cat snake	<i>Boiga beddomei</i> (Wall, 1909)	Colubridae	DD / C-NEn
25.	Forsten's cat snake	<i>Boiga forsteni</i> (Dumeril & Bibron, 1854)	Colubridae	LR-nt / R-NEn
26.	Common Indian cat snake	<i>Boiga trigonatus</i> (Schneider in : Bechstein, 1802)	Colubridae	LR-lc / C-NEn
27.	Leithi's sand snake or Pakistani ribbon snake	<i>Psammophis leithi</i> (Gunther, 1869)	Colubridae	LR-nt / VR-NK
28.	Common Vine snake	<i>Ahaetulla nasutus</i> (Andersson, 1898)	Colubridae	LR-nt / C-NEn
29.	Common Indian krait	<i>Bungarus caeruleus</i> (Schneider, 1801)	Elapidae	LR-nt / C-NEn
30.	Slender coral snake	<i>Calliophis melanurus</i> (Shaw, 1802)	Elapidae	LR-nt / R-NEn
	Black slender coral snake	<i>Calliophis melanurus nigrescens</i> (Gunther, 1862)	Elapidae	LR-nt / R-NK
31.	Spectacled cobra	<i>Naja naja</i> (Linnaeus, 1758)	Elapidae	LR-nt / C-NEn
32.	Russell's viper	<i>Daboia russelli</i> (Shaw and Nodder, 1797)	Viperidae	LR-nt / C-NEn
33.	Indian Saw-Scaled viper	<i>Echis carinatus</i> (Schneider, 1801)	Viperidae	LR-nt / C-NEn
34.	Bamboo pit viper	<i>Trimeresurus gramineus</i> (Shaw, 1802)	Viperidae	LR-nt / NR-NEn
35.	Malabar pit viper	<i>Trimeresurus malabaricus</i> (Jerdon, 1853)	Viperidae	LR-nt / LC-En

Category (IUCN)

Critically Endangered
Endangered
Vulnerable
Lower Risk — near threatened
Lower Risk – least concern
Lower Risk – conservation dependent
Data Deficient

Abbreviation

CR
EN
VU
LR-nt
LR-lc
LR-cd
DD

Status

Very Common
Common
Not Rare
Rare
Very Rare
Locally Common

Abbreviation

VC
C
NR
R
VR
LC

SNAKES OF THE SAHYADRI

Distribution

Endemic
Non-Endemic
Not Known

Abbreviation

En
NEn
NK

Status and distribution of reptiles in the given list is restricted only to the Sahyadri ranges in Maharashtra. The IUCN category given in the list is for species distributed throughout India.

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Mammals of the Sahyadri

Sanjeev B. Nalavade

Introduction

The Sahyadri or Northern Western Ghats is a major mountain chain of the country. The hills were once covered with rich forests, most of which are now depleted. The dominant forest cover is of deciduous type with small intermittent evergreen and semievergreen patches such as Bhimashankar, the Koyna valley and Mahabaleshwar.

Politically the region lies in three states, viz., Gujarat, Maharashtra and Goa. The total area under the Northern Western Ghats is around 65000 km². The region covers 12 districts, one each from Gujarat and Goa and 10 districts from Maharashtra.

History of Earlier Faunal Studies

The first significant mammal collection in the region was done by W. H. Sykes about one hundred and fifty years ago. In his paper, published in the proceedings of the Zoological Society, London in 1831, he listed 39 mammal species from the Bombay presidency, most of which were from the Ghat country. A. L. Adams, Army Medical Officer, stationed at Pune in the mid 18th century, also came out with a paper on wild mammals around the station (1858). T. C. Jerdon's 'Mammals of India' was published in 1867. This was the first comprehensive account of Indian mammals to be published till the date. It described more than 250 mammal species from the subcontinent including many species from the Sahyadris. The district gazetteers, the publication of which started in 1876 in the then Bombay Presidency had a separate section on wildlife for each district. The founding of the Bombay Natural History Society (BNHS) in 1883 and its starting the first natural history journal in 1886

was a landmark event in the study of natural history of the Indian subcontinent as a whole and western ghats in particular. Initially many articles were memoirs or reports of 'Shikar' expeditions or collection hunting. Two lawyers from Mumbai, Reginald Gilbert and J. D. Inverarity were early contributors to the journal. Their brief notes related mostly to wild game animals found in the Sahyadri. The two volume 'Founa of British India' – Mammal series by W. T. Blanford appeared in 1888-91. A milestone event in the Indian mammalogy happened in the second and third decades of the 20th century – the 'Mammal Survey of British India'. The survey was carried out by the BNHS. It covered more than forty different localities from the subcontinent, two of which, viz., Koyna (Satara-Ratnagiri) 1914 and 'Dekhan' (Poona) 1918 were from the Sahyadri. These surveys described many new species for the area and extended geographical ranges for already known species. The mammalian series of 'Fauna of British India' was revised by R. I. Pocock and published in 1939-41 in two volumes. This was the time when Bro. Navarro of the St. Xavier's, Mumbai had just started collecting small mammals – especially bats from the Sahyadri.

The first significant work of the post-independence era for the region was that of Brosset (1962-63) on the bat fauna. His four part 'Bats of Central and Western India' is still regarded as the pioneering work on the bats of the area. His work covers 43 localities and 35 bat species, out of which 9 localities and 29 species are from the Sahyadri. Interestingly, about thirty years later (1994), Bates, Harrison and Muni revisited some of these localities and tried to evaluate changing status of some species. The sixties and seventies saw some notable accounts on the bats of the Sahyadri by Dr.

H. R. Bhat of National Institute of Virology, Pune. Dr. M. S. Pradhan (1977, 1993) of the Zoological Survey of India (W. R. S., Pune) has produced brief accounts on the rodents of Dhule, Nasik and Thane districts. K. K. Tiwari and his associates collected small mammals in the Sahyadri in the early seventies. The first ever comprehensive account of mammals of the state was presented by J. C. Daniel in the 'Fauna' gazetteer (1974) which described 86 species.

Dr. Jay Samant and his students have produced some fine accounts on the wildlife and conservation areas from the Southern Sahyadri. Nalavade (1987) surveyed and produced a report on the mammalian fauna of Pune district. About the same time Renee Borges worked on the food biology of the Giant Squirrel from Bhimashankar.

General Survey of the Mammalian Fauna

Of the 372 mammal species noted from India, Maharashtra has so far recorded 108 species of which 86 are found in the Sahyadri. These are insectivorous mammals (4 sp.), bats (29 sp., 4 fruit bats, 25 insectivorous), primates (4 sp.), pangolin (1 sp.), carnivora (18 sp.), herbivores (8 sp.), hare (1 sp.) and rodents (20 sp.).

On the basis of their distribution, the frequency of occurrence and population size these animals can be grouped as follows :

1. Abundant mammals : Most rats and mice, palm squirrels, three species of fruit bats (except Ceylon fruit bat) and grey musk shrew. All these mammals are still holding their own, rather most rats and mice are said to have become more abundant than in the past, thanks to agricultural development.

2. Common mammals : Blocknaped hare, wild boar, bonnet monkey and hanuman langur, common palm civet, common mongoose and pipistrelle bats (mostly ceylon and pigmy). Many of these animals were once abundant but have been forced to become common after heavy, steady persecution and habitat loss. According to late Mr. D. S. Phanase, an old time small game hunter from Pune, the average number of individuals in a wildboar sounder from Pune ghats has gone down from about 20-30 in the thirties to 10-15 in the eighties (pers. comm.).

3. Occasional mammals : Common tree shrew, pigmy shrew, pangolin, small Indian civet, jackal and fox, hyaena, jungle cat, leopard, ruddy mongoose, mouse deer, barking deer, sambar, four-horned antelope, gaur, giant squirrel, porcupine, many insectivorous bats, especially those belonging to the following families Emballonuridae (tomb-bats), Rhinolophidae

(horseshoes) and Molossidae (wrinkle-lipped bats).

4. Rare Mammals : Painted bat, peshwa bat, longwinged bat (*miniopterus* sp.), rhesus macaque, wild dog, sloth bear, smooth-coated otter, wolf, leopard-cat, rusty spotted cat, tiger, spotted deer, blue bull or nilgai, common giant flying squirrel and kondana rat. The last one is a new addition to the mammalian fauna of the Sahyadri. The rat was discovered at Sinhagad by Dr. Mishra of NIV, Pune. The only place in the Sahyadri where rhesus macaque is found is the Dangs forest in Gujarat. The longwinged bats are mostly confined to Mahabaleshwar. The largest colony of these bats found anywhere in the world is at the Robber's Cave near Mahabaleshwar. This colony supports more than 1,00,000 bats (Brossel, 1963). Sloth bear, tiger and spotted deer once roamed throughout the length and breadth of the ghat are now mostly confined to the southernmost part. Wolf may occasionally be seen in the hills following sheep flocks.

5. Mammals with unknown status : Anderson's shrew, slender loris, desert cat, ratel or honeybadger, club-footed bat and wroughton's freetail bat. Last two bats are confined to the southernmost tip of the region. There is an unconfirmed report of ratel from Thane forest (Chandrakant Wakankar, pers. comm.). Z.S.I., Pune has in their possession two skins of the desert cat collected from Kamshet, near Pune in the mid-sixties (Lamba, 1967). Ceylon fruit bat is probably spreading northward. Agrawal has collected this bat in Goa in 1973, the first authentic record for India. This bat was recently collected at Mahabaleshwar by ZSI's team (Dr. Pradhan, pers. comm.).

6. Extinct mammals : So far, there is not a single mammal from the Sahyadri, which can be treated as authentically extinct. But many mammals from the rare group especially spotted deer and tiger are likely to become locally extinct within the next decade or so.

Northward Impoverishment of Mammal Species along the Sahyadri

One of the most remarkable features of the Indian Zoogeography is the occurrence of the Malayan and Indo-Chinese elements in the fauna of Peninsular India of which the Sahyadri is also a part. Many genera and species of all the vertebrate groups have such a discontinuous distribution that on the one hand they are found in the south western ghats or all along the western ghats upto the Narmada. On the other hand their nearest population or populations of associated genera are found hundreds of kilometers away in the northeast India and further east upto Indochina. Most of these species are absent from the intermediate areas

of Central India, i.e., they are separated from each other by hundreds of kilometers of ecologically unsuitable country. Among the western ghats, mammals, the fishing cat (*Felis* sp.), otters (*Lutra* and *Aonyx* sp.), the mountain goat or Tahrs (*Hemitragus* sp.) and many genera of insectivorous bats have such disjunct distributions of these. Only smooth coated otter and insectivorous bats like painted bat are found in the Sahyadri. As a result we have maximum species concentration in the humid south-west. As one moves northward along the western ghats the number of vertebrate species including mammals goes on decreasing. This effect of northward impoverishment of fauna is more prominent to the north of Goa (see the table).

Table : Northward Faunal Impoverishment along the Sahyadri

Area	Approx. Latitude	No. of mammal species (selected group only)
Goa ghats	15°N	38
Amboli-Sawantwadi	16°N	33
Mahabaleshwar-Koyna	17°5'N	32
Khandala-Matheran	19°N	30
Nashik-Dangs	20°5'N	25

(Insectivorous bats and rats & mice excluded)
(Data from various sources)

Remark

The Sahyadri plays the most important role in the zoogeography of western India. About 70% of all the vertebrate fauna (80% of the mammalian fauna) recorded so far from the region is concentrated in the Sahyadri. Some of them are so unique that they are found only in the Sahyadri and not elsewhere. e.g. the Kondana rat has so far been recorded only from Simhagad, Wroughtous bat recorded only from Talewadi caves along the Goa Border (Belgaun district) and found nowhere else in the world. The ghat country provides a variety of remote and inaccessible habitats to the mammalian fauna – the last hopes for our vanishing wildlife.

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MAMMALS OF THE SAHYADRI

List of Mammals of North-Western Ghats

Scientific Name	Common Name	Regional Status*		
		N	C	S**
Order Insectivora				
Family Tupaiidae : Tree-shrew				
<i>Ananthana ellioti</i> (Waterhouse)	Madras Tree-shrew	+	+	+
Family Soricidae : Shrews				
<i>Suncus murinus</i> (Linne)	Grey Musk Shrew	+	+	+
<i>Suncus Stoliczkanus</i> (Anderson)	Anderson's Shrew	?	+	-
<i>Suncus etruscus</i> Savi	Indian Pigmy Shrew	+	+	+
Order Chiroptera				
Sub-Order Megachiroptera : Fruit-eating Bats				
Family Pteropidae : Fruit bats				
<i>Rousettus leschenaulti</i> I. (Desmarest)	Fulvous Fruit-Bat	+	+	+
<i>Pteropus giganteus</i> g. (Brunnich)	Indian Flying Fox	+	+	+
<i>Cyanopterus sphinx</i> (Vahl)	Short-nosed Fruit Bat	+	+	+
<i>Cyanopterus brachyotis ceylonensis</i> (Gray)	Ceylon Fruit Bat	-	+	+
Sub-Order Microchiroptera : Insectivorous Bats				
Family Emballonuridae : Tomb-bats				
<i>Taphozous melanopogan</i> (Temminck)	Black-bearded Tomb Bat	+	?	?
<i>Taphozous longimanus</i> (Hardwicke)	Longarmed Tomb Bat	?	+	+
<i>Taphozous saccolaimus</i> (Lesson)	Pouch-bearing Tomb Bat	?	+	+
<i>Taphozous theobaldi</i> (Temm)	Pouch-bearing Tomb Bat	-	-	+
Family Megadermatidae : False Vampires				
<i>Megaderma spasma</i> Linne	Malay False Vampire	+	+	+
<i>Megaderma Iyra</i> Geoffroy	Indian False Vampire	+	+	+
Family Rhinolophidae : Horseshoe / Leaf-nosed Bats				
<i>Rhinolophus rouxi</i> Temminck	Roux's Horseshoe Bat	+	+	+
<i>Rhinolophus lepidus</i> Blyth	Blyth's Horseshoe Bat	+	+	+
<i>Rhinolophus luctus beddomei</i> Anderson	Great En. Horseshoe Bat	?	+	+
<i>Hipposideros speoris</i> (Schneider)	Schneider's Leafnosed Bat	?	+	+
<i>Hipposideros fulvus</i> (Gray) (formerly <i>H. bicolor</i> T.)	Bi-coloured Leafnosed Bat	+	+	+
<i>Hipposideros galeritus</i> (Cantor)	Cantors's Leafnosed Bat	?	+	?
<i>Hipposideros lankadiva</i> Kelaart	Kelaart's Leafnosed Bat	-	-	+
Family Molossidae				
<i>Tadarida aegyptiaca</i> (Geoffroy)	Wrinkle-lipped Bat	+	+	+
Family Vespertilionidae				
<i>Myotis horsefieldi</i> Temminck (formerly <i>M. peshwa</i>)	Peshwa Bat	?	+	?
<i>Pipistrellus coromandra</i> (Gary)	Indian Pipistrelle	?	+	+

* + = present, - = absent, ? = likely to be present, Ex. = past records, extinct today

** N = Northern Sahyadri (Dangs to Harishchandragad), C = Central Sahyadri (Harishchandragad to Mahabaleshwar), S = Southern Sahyadri (Mahabaleshwar to Goa)



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<i>Pipistrellus mimus</i> (Wroughton)	Indian Pygmy Pipistrelle	+	+	+
<i>Pipistrellus ceylonicus</i> (Kelaart)	Kelaart's Pipistrelle	+	+	+
<i>Pipistrellus dormeri</i> (Dobson)	Dormer's Pipistrelle	+	+	+
<i>Hesperoptenus tickelli</i> (Blyth)	Tickell's Bat	?	+	+
<i>Scotophilus temmincki</i> (Horsefield)	Lesser Yellow Bat	+	+	+
<i>Scotophilus heathi</i> (Horsefield)	Greater Yellow Bat	+	+	+
<i>Miniopterus schreibersi</i> (Kuhl)	Longwinged Bat	—	?	+
<i>Kerviola picta</i> (Pallas)	Painted Bat	?	+	+
<i>Tylonycteris pachypus</i> (Temminck)	Clubfooted Bat	—	—	?
<i>Otomops wroughtoni</i> (Thomas)	Wroughton's Freetailed Bat	—	—	+

Order Primates : Apes and Monkeys

Family Cercopithecidae : Macaques and Langurs

<i>Macaca radiata</i> (Geoffroy)	Bonnet Monkey	+	+	+
<i>Macaca mulatta</i> (Zimmerman)	Rhesus Monkey	+	—	—
<i>Presbytis entellus</i> (Dufresne)	Hanuman Langur	+	+	+
<i>Loris tardigradus</i> (Linn.)	Slender Loris	—	Ex.	?

Order pholidota : Pangolin

<i>Manis crassicaudata</i> Gray	Indian Pangolin	+	+	+
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Order Carnivora : Dogs, Cats, Bears, Civets, etc.

Family Canidae : Dogs

<i>Canis lupus pallipes</i> Sykes	Wolf	+	+	+
<i>C. aureus</i> Linne	Jackal	+	+	+
<i>Vulpes bengalensis</i> (Shaw)	Indian Fox	+	+	+
<i>Cuon alpinus</i> (Pallas)	Indian Wild Dog	?	+	+

Family Ursidae

<i>Melursus ursinus</i> (Shaw)	Sloth Bear	Ex.	Ex.	+
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Family Mustelidae : Otters

<i>Lutra perspicillata</i> Geoffroy	Smooth-coated Otter	+	+	+
<i>Mellivora capensis</i> (Schreber)	Ratel or Honeybadger	?	—	—

Family Viverridae : Civets and Mongooses

<i>Viverricula indica</i> Desmarest	Small Indian Civet	+	+	+
<i>Paradoxurus hermaphroditus</i> (Pallas)	Common Palm Civet	+	+	+
<i>Herpestes edwardsi</i> (Geoffroy)	Common Mongoose	+	+	+
<i>Herpestes smithi</i> Gray	Ruddy Mongoose	+	+	+

Family Hyaenidae : Hyaena

<i>Hyaena hyaena</i> Linn.	Striped Hyaena	+	+	+
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Family Felidae : Cats

<i>Felis lybyaca ornata</i> Gray	Desert Cat	+	+	—
<i>Felis chaus</i> Guldenstaedt	Jungle Cat	+	+	+
<i>Felis bengalensis</i> Kerr	Leopard Cat	?	+	+
<i>Felis rubiginosa</i> Geoffroy	Rusty-spotted Cat	+	+	?
<i>Panthera pardus</i> (Linne)	Leopard	+	+	+
<i>P. tigris</i> (Linne)	Tiger	Ex.	+	+

MAMMALS OF THE SAHYADRI

Order Artiodactyla : Pigs, Deer, Antelopes

Family Suidae : Pigs

Sus scrofa cristatus Wanger Wild Boar + + +

Family Tragulidae : Mouse-deer

Tragulus meminna (Erxleben) Indian Chevrotain or Mouse-deer + + +

Family Cervidae : Deer

Muntiacus muntjak aureus (H. Smith) The Muntjac or Barking Deer + + +

Axix a. a. (Erxleben) Cheetal or Spotted Deer Ex. Ex. +

Cervus unicolor niger (Blainville) Sambar + + +

Family Bovidae : Antelope and Wild cattle

Tetracerus quadricornis (Blainville) Choushinga or Four-horned Antelope + + +

Boselaphus tragocamelus (Pallas) Nilgai or Blue bull + + ?

Bos gaurus H. Smith Gaur Ex. + +

Order Lagomorpha

Family Leporidae : Hare

Lepus nigricollis (Cuvier) Indian Blacknaped Hare + + +

Order Rodentia : Squirrels, Porcupine, Rats and Mice

Family Scuriidae : Squirrels

Petaurista philippensis p. (Elliot) Common Giant Flying Squirrel Ex. Ex. +

Funambulus palmarum (Linne) Three-striped Palm Squirrel + + +

Funambulus pennanti Wroughton Five-striped Plam Squirrel + + +

Funambulus tristriatus Waterhouse Jungle striped Squirrel - + +

Ratufa indica elphinstoni (Erxleben) Indian Giant Squirrel + + +

Family Hystricidae : Porcupines

Hystrix indica i. Kerr Indian Crested Porcupine + + +

Family Muridae : Rats and Mice

Vandeleuria oleracea (Bennet) Long-tailed Tree Mouse + + +

Milardia meltada m. (Gray) Soft-furred Field Rat + + +

M. kondara Mishra Kondana Field Rat - + -

Rattus blanfordi (Thomas) Blandford's Rat + + +

Rattus rattus (Linne) Common House Rat + + +

Mus musculus (Linne) House Mouse + + +

Mus dunni Wroughton Dunni Mouse + + +

Mus (Pyromys) saxicola Elliot Saxicola Mouse + + ?

Mus booduga (Gray) Little Indian Field Mouse + + +

Mus platythrix Bennet Indian Brown Spiny Mouse + + +

Golunda ellioti Gray Indian Bush Rat + + +

Bandicota bengalensis (Gray and Hardwicke) Indian Mole-Rat + + +

Bandicota indica Bechstein Bandicoot Rat + + +

Talera indica (Hardwicke) Indian Gerbil + + +

□

Turtles and Lizards of the Sahyadri

Sanjeev B. Nalavade

Maharashtra has a rich reptilian fauna divided into 19 families and 105 species grouped into three orders, viz., Crocodylia (Crocodyles), Chelononia (Turtles and Tortoises) and Squamata (Sub-order Lacertilia : Lizards, Sub-order Ophidia : Snakes). The number of species recorded under each order so far is 1, 11 and 93 (31 lizard sp. and 62 snake sp.) respectively. The present note covers only turtles, tortoises and lizards found in the Sahyadri.

Out of the eleven Chelonids recorded from the state only four occur in the Sahyadri. They are the Peninsular black tortoise or pond terrapin, Peninsular flapshell or mud turtle, Deccan softshell or Leithis turtle and the Indian starred tortoise. The first three are the fresh water varieties whereas the last one is a land tortoise. The pond terrapin is the commonest freshwater tortoise of the region. It is mostly found in reservoirs. Another common turtle frequenting reservoirs is the Deccan softshell (*Aspiderettus leithii*). Peninsular mud or flapshell turtle (*Lissemys punctata*) has so far been recorded from Pune only. This turtle which frequents a variety of habitats — reservoirs, streams, ricefields, etc. is likely to occur elsewhere in the Sahyadri. Indian starred tortoise, the only land tortoise from the region appears to be rare.

Of the 31 lizard species recorded for the state, 25 occur in the Sahyadri. These are divided into seven families, viz., Fam. Geckonidae : Geckoes (10 sp.), Fam. Eublepharidae : Fat-tailed gecko (1 sp.), Fam. Agamidae : Old world lizards (4 sp.), Fam. Chamaeleontidae : Chameleons (1 sp.), Fam. Scincidae : Skinks (6 sp.), Fam. Lacertidae : Cabrita (2 sp.) and Fam. Varanidae : Monitor lizard (1 sp.).

Geckoes form the largest family with 10 species Brook's gecko appears to be the commonest gecko of

the region and has been recorded from all the major hill stations like Igatpuri, Matheran, Khandala, Mahabaleshwar and Panhala. But the true ghat gecko is the rock gecko which is found on all types of rock formations — cliffs, caves and fortwalls. Northern and southern house geckoes are mostly found in large settlements. Termite hill gecko, banded gecko and bark gecko are widely distributed, but nowhere common. Fat-tailed gecko, a typical gecko of arid and semi-arid country has Pune as its southernmost limit (Daniel, 1983). Of late this gecko seemed to be making inroads into the wetter parts of the ghat country like Igatpuri (Nalavade, 1997).

The three lizard species — Fan-throated, Blood-sucker and forest calotes are common throughout the ghat country. Within that country they seem to have different habitat preferences. Forest calotes is the true forest lizard of the region and prefers to stay in forest, bloodsucker is generally seen in gardens, hedges and scrubland, whereas the fan-throated generally seems to avoid thick forested land and prefers open scrub country and lateritic flats. Draco or flying lizard occurs only in the Goa ghats and the adjoining forested tracts of Kolhapur and Sindhudurga districts. This is its northernmost limit. The chameleon is apparently uncommon.

Of the six skink species — two species, viz., the Common Brahminy skink and the Little skink are common everywhere. The former mostly prefers human habitations. No definite information is available about the status and distribution of lacertid lizards — the snake-eyes. Monitor lizard — the largest of them all, was once quite common, throughout the western ghats. It has been so heavily persecuted for its meat and skin that it is now a threatened species.

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List of Chelonia and Lacertilia of Northern Western Ghats

Scientific Name

Common Name

Order Chelonia : Tortoise and Turtles

Family Bataguridae : Freshwater Tortoises or Terrapins or Pond Turtles

Melanochelys trijuga trijuga (Schweigger)

Penninsular Black Tortoise or Pond terrapin

Family Trionychidae : Freshwater or Mud Turtles or Softshell Turtles

Lissemys punctata punctata (Lacepede)

Aspiderettus leithii (Gray)

Penninsular Mud or Flapshell Turtle

Deccan Softshell or Leith's Turtle

Family Testudinidae : Land Tortoises

Geochelone elegans

Indian Star Tortoise

Order Squamata (Lepidosuaria) : Lizards and Snakes

Sub-Order Lacertilia : Lizards

Family Geckonidae : Geckos

Cyrtodactylus dekkansensis (Gunther)

Cyrtodactylus albofasciatus Stoliczka

Cnemaspis Kaniana (Kelaart)

Hemidactylus maculatus Dum and Bibr.

Hemidactylus brooki Gray

Hemidactylus albofasciatus Grandison and P W Soman

Hemidactylus frenatus Schlegel

Hemidactylus leschenaulti Dum and Bibr.

Hemidactylus flaviviridis Ruppel

Hemidactylus triedrus (Daudin)

Deccan Banded Gecko

Ground Gecko

Dwarf Gecko

Rock Gecko

Brook's Gecko

Grandison's Stripped Gecko

Southern House Gecko

Bark or Tree Gecko

Northern House Gecko

Termite Hill Gecko

Family Eublepharidae

Eublepharis macularius Blyth

Fat-tailed Gecko

Family Agamidae : Old World Lizards

Sitana ponticeriana Cuvier

Calotes versicolor (Daudin)

Fan throated or Sita's Lizard

Bloodsucker or Common Garden Lizard or

Common Calotes

Calotes rouxi Dum and Bibr.

Forest Calotes

Draco dyssumieri Dum and Bibr.

Draco or Flying Lizard



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Family Chamaeleontidae : Chameleons

Chamaeleon zeylanicus laurenti

Indian Chameleon

Family Scincidae : Skinks

Mabuya macularia (Blyth)

Little Shink

Mabuya carinata (Schneider)

Common Brahmany Skink

Mabuya trivittata (Hardwick and Gray)

Gray's Skink

Riopa punctata (Gmelin)

Gmelin's Snake Skink

Riopa guentheri (Gray)

Gunther's Snake Skink

Riopa lineata (Gray)

Lineated Snake Skink

Family Lacertidae : Cabrita or Snake-eyes

Ophisops beddomei (Jerdon)

Beddomei's Snake-eye or Race-runner Lizard

Ophisops jerdoni (Blyth)

Jerdon's Snake-eye or Race-runner Lizard

Family Varanidae : Monitor Lizard

Varanus bengalensis (Schneider)

Common Indian Monitor



Rare and Endemic Plants of the Sahyadri

S. D. Mahajan

Vegetation of Western Ghats i.e. the Sahyadri mountain range in Maharashtra is originally very rich and diverse. The area is characterised with high degree of biodiversity in floristic composition, second only to the great Himalayan Mountain ranges in India.

The primary climax formation in general must have been the subtropical, mixed deciduous forest, with pockets of evergreen/semi-evergreen vegetation at higher altitudes on western leeward side. The western slopes in the Konkan area and the eastern higher slopes and valleys in the rainshadow region over the deccan plateau sustain moist deciduous forests. The post climax and secondary climax seral communities show various associations of *Terminalia tomentosa*, *Tectona grandis* (planted), *Lagerstroemia parviflora*, *Anogeissus latifolia*, *Adina cordifolia*, *Bombax ceiba*, *Heterophragma quadriloculare*, *Holoptelea integrifolia*, *Macaranga peltata* with others species.

The lower eastern slopes as well as west-east offshoot ranges with decreasing degree of precipitation have dry deciduous forests as well as thorn forest and extensive secondary grasslands.

The entire area is highly degraded, even totally devastated at places due to human interference of

varied nature. The natural ecosystems conserved in the form of numerous Deva Rais (sacred groves) are also threatened, partly degraded or completely destroyed. The protected forests and sanctuaries/national parks do need better eco-friendly treatment, restoration programmes and habitat management activities.

The entire area is characterised by high degree of endemism. The rare endemic, threatened, vulnerable as well as endangered species of plants seem to be on the verge of extinction due to habitat destruction and/or over-exploitation. The best way to conserve them along with non-vascular cryptogams and animal species, seems to be total protection of ecosystems wherever possible. Restoration projects are urgently needed to be undertaken. Afforestation programme consisting of commercial plantation, energy plantation, eco-plantation, etc. should be useful to reduce the ever-increasing pressure on the remnant natural forest areas. Proper planning, efficient management and overall coordination in the activities will only be fruitful.

Important vascular plant species are enumerated in this article with their local names (wherever available), localities and ecological status.

Vegetation of the Sahyadri : Enumeration of Rare, Endemic and Endangered Vascular Plants

Sr. No.	Botanical Name	Habit	Local Name	Localities	Remarks/Status
1.	<i>Aponogeton satarensis</i> Sunar Raghavan	H		Mavashi Plateau, Dist. Satara	Very rare, endemic, endangered
2.	<i>Abution ranadei</i> Wood. et. Stapf.	S		Amba ghat, Dist. Ratnagiri	Very rare, endemic, endangered
3.	<i>Achyranthes coynei</i> Sant.	C		Khandala, Dist. Pune	Very rare, endangered
4.	<i>Asparagus jacquemonti</i> Baker	C		Between Pune and Karla	Indeterminate, endemic
5.	<i>Anotis lancifolia</i> Hook f.	H		Bhandardara, Malshej ghat, Amba ghat, Mahabaleshwar, Chandoli, Ud giri Devrai	Endemic to the Western ghats
6.	<i>Adenoon indicum</i> Dalz	S	Motha sonaki	Katraj ghat, Khandala bavada, Phonda ghat	Rare, endemic to the Western ghats
7.	<i>Ammania floribunda</i> C. B. Clarke	H		Mahabaleshwar, Kas, Koyana- nagar, Vishalgad, Masai plateu (Kolhapur)	Endemic to the Western ghats (plateau locali- ties)
8.	<i>Achyranthes malabarica</i> Muell	H		Pune, Kolhapur	Endemic to West side of the Peninsula
9.	<i>Aneilema pauciflorum</i> Wight	H		Matheran, Mahabaleshwar	Rare, endemic
10.	<i>Aleseodaphne semicarpifolia</i> Ness var. Rufa Hook f.	T	Phadgas	Matheran, Meroli, Koyana forest	Endemic to the Western ghats
11.	<i>Alysicarpus pubescenes</i> Law. var. Vasavadae	H		Puné Dist.	Endemic to Puné Dist.
12.	<i>Arisaema caudatum</i>	H		Konkan	Very rare, endemic
13.	<i>Arthraxon hispidus</i> var. junnarensis	H		Junnar Taluka Dist. Puné	Rare, endemic
14.	<i>Arthraxon hispidus</i> var. santapau	H		Mawal area Dist. Puné	Rare, endemic
15.	<i>Arundinella spicata</i>	H		Mahabaleswar, Pasarni ghat	Rare, apparently endemic
16.	<i>Aspidopteris roxburghiana</i> A. Juss.	C		Lohagad, Khandala, Bhoma hill (Lonavala)	Rare
17.	<i>Barleria gibsonioides</i> Blatter and McC.	S		Panchgani only	Very rare, endemic
18.	<i>Begonia phrixophylla</i> Blatter and McC.	H		Mahabaleshwar	Rare, endemic
19.	<i>Butea superba</i> Roxb.	CS	Palasvel	Shedani devarai, Mulshi Dist. Puné, Barhe Dist. Nashik	Rare, endemic
20.	<i>Begonia concanensis</i> A. DC.	H		Lonawala, Khandala	Rare, endemic to West side of the peninsula
21.	<i>Balanophora indica</i> Wall	H		Khandala, Mahabaleshwar, Dajipur, Palasamba, Gaganbawda	Rare, endemic

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22.	<i>Bombax insigne</i> Wall	T	Deva-savar	Mangav devarai, Panshet, Kalubai Devarai, Malshej ghat, Phonda ghat	Rare
23.	<i>Bauhinia foveolata</i> Dalz.	T	Chamoli	Neral to Matheran, Kalubai devarai	Rare, endemic
24.	<i>Bocagea dalzelli</i> Hook f.	H	Sageri	Matheran	Rare, endemic
25.	<i>Crinum eleonora</i> Blatt. and McC.	H		Lingmala, Mahabaleshwar	Rare, endemic
26.	<i>Cryptocoryne tortuosa</i> Blatt. and McC.	H		Mahabaleshwar	Very rare, endangered, endemic
27.	<i>Ceropegia attenuata</i> Hook.	C		Thane, Raigad and Puné Dists.	Rare, endemic to the Western ghats
28.	<i>Ceropegia evansii</i> Mc Cann.	C		Khandala, Sakarpathar-Ambavané range	Endemic to Maharashtra, vulnerable
29.	<i>Ceropegia huberi</i> Ansari	C		Amba ghat Dist. Ratnagiri	Endemic to the Western ghats
30.	<i>Ceropegia lawii</i> Hook f.	C		Harishchandragad, Konkan	Endangered, endemic
31.	<i>Ceropegia panchganensis</i> Blatter and McC	C		Panchgani and Mahabaleshwar	Endangered, endemic to Maharashtra
32.	<i>Ceropegia sahyadrice</i> Ansari and Kulkarni	C		Ambavané-Sakarpathar range Dist. Puné	Rare, endemic to Maharashtra
33.	<i>Ceropegia jainii</i> Ansari and Kulkarni	C		Amboli ghat only	Rare, endemic
34.	<i>Ceropegia maccannii</i> Ansari	C		Puné and Raigad Dists.	Rare, endemic
35.	<i>Ceropegia mahabalei</i> Hemadri et Ansari	C		Ralegaon hills and Bhivade Khurd Tal. Junnar Dist. Puné	Endangered, endemic
36.	<i>Ceropegia noorjahanensis</i> Ansari	C		Pasarni ghat Dist. Satara	Very rare, endemic
37.	<i>Ceropegia rollae</i> Hemadri	C		Harishchandragad and Durga hill, Junnar, Pune	Rare, endemic
38.	<i>Ceropegia vincaefolia</i> Hook. emend Ansari	C		Mumbai, Thane, Raigad, Ratnagiri and Satara Dists.	Endemic to Maharashtra
39.	<i>Coelanchne minuta</i> Bor	C		Mahabaleshwar, Amboli	Rare, endemic to Maharashtra
40.	<i>Crotalaria filipes</i> Benth. var. <i>trichophora</i> Cooke	H		Khandala, Chaskaman, Dimbhé	Rare
41.	<i>Cyathocline lutea</i> Law ex Wt.	H		Puné and Thane Dists.	Endemic to the Western ghats
42.	<i>Carissa suavissima</i> Bedd. ex Hook	CS	Karva-ndvel	Ugwai near Dajipur, Kalubai forest Malshej ghat	Rare, endangered
43.	<i>Cynoglossum denticulatum</i> var. <i>zeylanica</i> C. B. Clarke	S		Puné, Pratapgad, Koyana valley, Panchgani, Mahabaleshwar	Rare, endemic to the Western ghats
44.	<i>Coleus spicatus</i> Benth	H		Nashik, Vani, Bhandardara	Rare, endemic



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45.	<i>Cleistanthus malabaricus</i> Muell. Arg. in DC.	T		Ugwai devrai, Dajipur Dist. Kolhapur	Rare, endemic
46.	<i>Croton gibsonianus</i> Nimmo.	H		Harishchandragad, Bhandardara	Rare, endemic to the Western ghats
47.	<i>Canarium strictum</i> Roxb.	T	Ral- dhoop	Hirdoshi near Varandha ghat, Koyana forest	Rare, endemic to the Western ghats
48.	<i>Canscora khandalensis</i>	H		Khandala	Rare, endemic
49.	<i>Cissus woodrowii</i> Dalz. Syn. <i>Vitis woodrowii</i> Stapt.	S	Girnul	Vetal hill, Puné, Katraj ghat, Khambatki ghat, Dimbhé, Chaskaman, Otur hills	Common in Pune Dist. Apparently endemic to the Western ghats
50.	<i>Chukrassia tabularis</i> Adr. Juss.	T	Dalmar	Roha, Matheran	Rare in Western ghats, not endemic
51.	<i>Clitoria biflora</i> Dalz.	H	Supli	Neral, Bhajé, Lohagad, Kalyan	Rare, endemic to Maharashtra
52.	<i>Crotalaria vestita</i> Baker in Hook f.	S		Khandala, Mahabaleshwar, Malshej	Rare, endemic to the Western ghats
53.	<i>Canscora khandalensis</i> Sant.	H		Khandala	Rare, endemic
54.	<i>Canavalia stocksii</i> Dalz.	H	Ran Abai	Lonawala, Khandala, Mahabaleshwar	Rare, endemic
55.	<i>Clematis smilacifolia</i> Wall.	C	Devjai	Phonda ghat, Sawardé Rai (Dist. Kolhapur)	Rare
56.	<i>Clematis wightiana</i> Wall.	C		Mahabaleshwar	Rare
57.	<i>Crinum woodrowii</i> Baker	H		Mahabaleshwar	Very rare
58.	<i>Dipcadi maharashtrensis</i> Deb et Dasgupta	S		Panchgani plateau	Very rare, endemic, endangered
59.	<i>Dicanthium armatum</i> (Hook f.) Blatter and McC.	H		Junnar, Bhimashankar, Khandala, Panchgani	Rare, endemic to Maharashtra
60.	<i>Dicanthium maccannii</i> Blat.	H		Panchgani, Devgiri	Vulnerable, endemic to Maharashtra
61.	<i>Dicanthium woodrowii</i> (Hook f.) Jain et Desh.	H		Paud, Dist. Puné (only)	Rare, endemic
62.	<i>Dimeria woodrowii</i> Stapf.	H		Ratnagiri	Rare, endemic to Maharashtra
63.	<i>Dicliptera ghatica</i> Sant.	H		Meroli, Khandala ghat only	Rare, indeterminate
64.	<i>Drimia razii</i> Ansari	H		Divé ghat, Dist. Puné only	Rare, endemic
65.	<i>Decaschistia trilobata</i> Wight.	S		Kumbharli ghat, Mawal Dist. Pune, Pavangad, Marleshwar, Udagiri Devrai	Rare, endemic to the Western ghats
66.	<i>Delphinium dasycaulon</i> Fres. Mus.	H		Junnar, Khadkala (Dist. Puné)	Very rare, not endemic
67.	<i>Dicliptera cuneata</i> Nees.	S		Mulshi, Ajiwali, Kolawade (All Dist. Puné)	Rare, endemic
68.	<i>Derris breviceps</i> Baker in Hook f.	CS		Kumbharli ghat, Palasamba (Dist. Kolhapur)	Rare, endemic

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69.	<i>Dimorphocalyx lawianus</i> Hook f.	S		Khandala, Matheran	Rare, endemic to the Western ghats
70.	<i>Eriocaulon humile</i> Moldenke	H		Khandala, Matheran	Vulnerable, endemic
71.	<i>Euphorbia katrajensis</i> Gage	H		Katraj ghat	Rare, endemic to Pune Dist.
72.	<i>Euphorbia panchganensis</i> Blatt and Mc Cann	H		Panchgani, Puné, Satara and Sindhudurg Dists.	Rare, endemic
73.	<i>Erinocarpus nimmonii</i> Graham	T	Cher	Khandala, Ambawané, Chandoli, Kolhapur	Indeterminate, endemic to the Western ghats
74.	<i>Eriolaena candollei</i> Wall	T	Hadang, Bothi	Seetecha Dara, Sinhagad	Rare, not endemic
75.	<i>Eriocaulon minutum</i> Hook f.	H		Konkan	Rare, endemic
76.	<i>Frerea indica</i> Dalz.	H		Junnar, Purandar, Sinhagad, Sajjangad	Endangered, endemic
77.	<i>Flemingea gracilis</i> (Mukerjee) Ali	S		Khandala, Lonawala, Matheran	Rare, endemic to Maharashtra
78.	<i>Flacourtia latifolia</i> T. Cooke	T	Tambat	Mahabaleshwar, Koyana forest, Chandoli	Rare, endemic
79.	<i>Fumaria parviflora</i> Lam.	H	Pit-papada	Shirur, Baramati, Phaltan	Rare
80.	<i>Gymnema khandalense</i> Sant.	C		Khandala, Roha	Rare, endemic
81.	<i>Griffithella hookeriana</i> Warming	H		Koyana riverbed, Kalubai Devrai, Dajipur, Gajapur, Amba ghat	Rare, endemic
82.	<i>Hypoestes lanata</i> Dalz.	H		Roha, Dapoli, Northern Western ghats	Rare, endemic
83.	<i>Habenaria panchganensis</i> Sant. and Kapad.	H		Panchgani, Sindhudurg Dist.	Rare, endemic to the Western ghats
84.	<i>Hitchenia caulina</i> Baker	H	Chavar	Mahabaleshwar (abundant), Khandala, Panchgani, Dajipur, Radhanagari	Endemic to the Western ghats
85.	<i>Homonoia retusa</i> Muell.	S	Choti Sherani	Puné, Khadaki	Rare, endemic
86.	<i>Heracleum sprengeianum</i> W. and A.	H		Lohagad, Khandala, Ajiwali (Mulshi)	Rare, endemic
87.	<i>Iphigenia magnifica</i> Ansari et Rolla Rao	H		Dhulé, Raigad and Puné Dists.	Vulnerable, endemic to the Western ghats
88.	<i>Iphigenia stellata</i> Blatter	H		Panchgani, Mahabaleshwar, Panhala, Dajipur	Vulnerable, endemic
89.	<i>Indigofera dalzellii</i> T. Cooke	H		Panchgani, Kas plateau, Thoséghar	Rare, endemic
90.	<i>Impatiens acaulis</i> Arn. in Hook	H	Pan terada	Malshej ghat, Matheran, Mahabaleshwar, Shivtharghal Amba ghat	Rare, restricted to peculiar habitat
91.	<i>Isachne lisboae</i> Hook f.	H		Panchgani, Mahabaleshwar	Rare, apparently endemic



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92.	<i>Jatropha nana</i> Dalz.	S		Hills around Puné, Bawdhan, Pashan	Rare, apparently endemic
93.	<i>Kalanchoe bhidei</i> T. Cooke	H		Wai to Wathar, Panhala	Rare, endemic
94.	<i>Litsea stocksii</i> Hook f.	T		Meroli, Matheran, Mahabaleshwar, Chandoli	Rare, endemic
95.	<i>Loranthus obtusus</i> Wall	S	Band-guli	Mahabaleshwar, Chandoli, Udgiri Devarai	Rare, endemic to the Western ghats
96.	<i>Lansium anamallayanum</i> Bedd.	S	Pandhara Telya	Bhimashankar	Rare, endemic to the Western ghats
97.	<i>Mallotus lawii</i> Muell	S		Meroli, Khandala, Matheran	Rare, endemic
98.	<i>Monsonia senegalensis</i> Guill and Perr.	H		Puné, Bawdhan, Shirur	Very rare, endemic
99.	<i>Memecylon umbellatum</i> Burm. var. <i>capitellata</i> C.B.Cl.	T		Kumbharli ghat	Rare, endemic
100.	<i>Nanothamnus sericeus</i> Thomas	S		Nashik and Pune Dists.	Rare, endemic to the Western ghats
101.	<i>Nogra dalzelli</i> (Baker) Merr.	S		Panchgani, Mahabaleshwar, Harishchandragad	Vulnerable, endemic
102.	<i>Neuracanthus sphaerostachys</i> Dalz.	S		Matheran, Khandala, Khadakwasla	Rare, endemic
103.	<i>Oxystelma esculentum</i> R.Br.	C	Dudhani	C.M.E. campus, Dapodi, Puné	Very rare, endemic
104.	<i>Oldenlandia aspera</i> DC.	H		Puné, Kolhapur	Rare, endemic to West side of the peninsula
105.	<i>Pimpinella katrajensis</i> Rao et Hemadri	H		Katraj ghats and Pandhgani plateau	Very rare, endemic
106.	<i>Premna coriaria</i> C. B. Clarke	C		Lonawala, Khandala, Malshej ghat, Dajipur	Rare, endemic
107.	<i>Pimpinella monoica</i> Dalz.	H		Kas, Panchgani, Ganganbawda, Mahabaleshwar	Endemic to the Western ghats
108.	<i>Peucedanum grande</i> C. B. Clarke	H	Baphali	Matheran, Khandala, Chandoli, Amba	Endemic to the Western ghats
109.	<i>Pavetta hispidula</i> W. and A.	S	Papati	Matheran (Monkey hill), Bhimashankar, Purandar fort	Rare, endemic
110.	<i>Pancratium parvum</i> Dalz.	H		Purandar fort	Rare, endemic
111.	<i>Polyalthia cerasoides</i> Hook and Benth.	T	Hum	Jawhar, Bhatsanagar, Malshej ghat	Rare, endemic
112.	<i>Pittosporum dasycanlon</i> Miquel.	T	Gap-sundi	Mahabaleshwar, Gaganbawda	Rare, endemic
113.	<i>Paracarym lambertianum</i> C. B. Clarke	H		Mahabaleshwar	Very rare, apparently endemic
114.	<i>Rourea santaloides</i> W. and Arn.	C	Tambada Telya	Miradongar (Pen), Bhimashankar	Rare, endemic
115.	<i>Pygeum gardneri</i> Hook f.	T	Daka	Mahabaleshwar, Khandala, Malshej, Gaganbawda	Rare, endemic

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116. <i>Sarcostemma intermedium</i> Decaisne	S		Katraj ghat, Khambatki ghat	Very rare, endemic to the Western ghats
117. <i>Swertia minor</i> T. Cooke	H		Khandala, Panchgani, Kas, Masai plateau	Rare, endemic
118. <i>Solanum bigeminatum</i> Nees	S		Mahabaleshwar, Gaganbawda, Phonda ghat	Very rare, endemic to West side of the peninsula
119. <i>Saccopetalum tomentosum</i> Hook f.	T		Jyotiba hill, Kolhapur, Radhanagari	Very rare, endemic
120. <i>Smithia purpurea</i> Hook	H		Lonawala, Khandala, Mahabaleshwar, Bhimashankar	Rare, endemic
121. <i>Striga sulphurea</i> Dalz and Gibs.	H		Shivneri fort, Harishchandragad	Rare, endemic
122. <i>Thallictrum dalzellii</i> Hook	H		Malshej plateau, Purandar fort	Rare, endemic to the Western ghats
123. <i>Unnona pannosa</i> Dalz.	T		Hatkhamba, Devrukh, Marleshwar	Very rare, endemic
124. <i>Utricularia albo-coerulea</i> Dalz.	H		Mahabaleshwar, Koyananagar	Rare, endemic
125. <i>Vigna khandalensis</i> (Sant.) Raghavan and Wadhwa	C		Ahmednagar, Pune and Satara Dists.	Rare, endemic
126. <i>Vitis araneosa</i> Laws in Hook f.	C		Highest ghats west of Junnar, Dist. Pune	Very rare, endemic to West side of the peninsula
127. <i>Wagatea spicata</i> Dalz.	CS	Wakeri	Khandala, Pratapgad, Koyana valley, Panhala, Radhanagar, Dajipur	Endemic to Western ghats

H = Herb, S = Shrub, C = Climber, CS = Climbing Shrub, T = Tree

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The Blossomheaded Parakeet



The Whitespotted Fantail Flycatcher



The Crested Hawk Eagle