THE NATIONAL RED LIST
Conservation Status of the Birds of Sri Lanka - 2021








Biodiversity Secretariat
Ministry of Environment

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Cover page photographs : Top row: Sri Lanka White-eye (*Zosterops ceylonensis*), Sri Lanka Chestnut-backed Owlet (*Glaucidium castanotum*), Jungle Bush-quail (*Perdicula asiatica*), Malabar Trogon (*Harpactes fasciatus*)
Bottom Row: Sri Lanka Red faced Malkoha (*Phaenicophaeus pyrrhocephalus*), Sri Lanka Barbet (*Psilopogon rubricapillus*), Lesser Noddy (*Anous tenuirostris*), Sri Lanka Lesser Flameback (*Dinopium psarodes*)

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1.2. Biogeography and Endemism of the Birds of Sri Lanka

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The avifauna of Sri Lanka, although comprising a fewer endemic species as well as a lower percentage of endemism compared to the island's herpetofauna or ichthyofauna, is still recognized as a unique assemblage of species that paved the way for delimitation of the Ceylonese subregion (peninsular India south of the Godavari basin and Sri Lanka) of the Oriental region in Wallace's (1876) global map of zoogeography, as it followed the global avifaunal regions proposed by Sclater (1858). Contemporaneous avifaunal delimitations such as the Singhalese subregion of Blyth (1871; the hill range along the western coast of India south of Tapi basin and southern Sri Lanka) as well as the Malabar province of Blanford (1876, 1901; Western Ghats and southern Sri Lanka) have later facilitated the recognition of Western Ghats and Sri Lanka biodiversity hotpsot (Mittermeier et al. 2004; Myers et al. 2000) as a true biogeographical entity delimited mainly based on plant endemism. Although both Blyth and Blanford identified northern Sri Lanka to harbor an Indian avifaunal element, recent molecular phylogenetic evidence suggests Sri Lanka as a local avian endemism center within the hotspot (Wickramasinghe et al. 2017; Jha et al. 2021), especially with some 70 or so subspecific taxa being near-endemic to the island. It is also notable that at least 22 among the 34 bird species endemic to Sri Lanka are found in further restricted ranges, mostly in the perhumid south-western wet zone and the south-central highlands characterized by a uniquely high habitat heterogeneity. Furthermore, members of the families Timaliidae, Pellorneidae and Leiothrichidae representing seven species of the 'Asian babblers' in Sri Lanka show remarkably high endemism with four species being endemic to the island, while the other three are also endemic at subspecies level. Such high degrees of endemism have inevitably made Sri Lanka to be recognized as an Endemic Bird Area by the BirdLife International (Stattersfield et al. 1998), also being strongly supported by similar studies for other taxa, especially herpetofauna with insular endemic radiations (Schulte et al. 2002; Bossuyt et al. 2004). Further, identifying the Global 200 priority ecoregions for the conservation of a representative sample of the global biodiversity Olson and Dinerstein (1998, 2002) recognized Sri Lankan moist forests as a spatial conservation priority representing the Tropical and Subtropical Moist Broadleaf Forests Biome of the Indomalayan Realm (Olson et al. 2001). These conservation biogeographical analyses repeatedly highlight Sri Lanka as a landmass with a high bird conservation value that has preserved a considerably important evolutionary history.

Avifaunal Zones of Sri Lanka

Recognition of avifaunal zones within the island goes a long way back to the period of initial global biogeographical regionalistions. The first of such avifaunal zones were proposed by Legge (1880) in his *History of the Birds of Ceylon*, which would mark the first ever bioregionalisation attempt within the island for any taxa in the literature. Those initial avifaunal zones although been described by Legge, were mapped only 70 years later by Phillips (1952), with four major divisions of the

island, namely the low country wet, low country dry, and the central hill zones together with the northwestern coastal zone. Although Legge mentioned the south-eastern coast of Sri Lanka to fall in the same zone with the north-western coastline due to the similarities of the rainfall pattern, Phillips's map only delineates northwest coast and the Jaffna peninsula as an avifaunal zone. Henry (1955), in his *Guide to the Birds of Ceylon* used an over-simplified zonal classification viz., wet zone, dry zone and the central hill zone. This fact has also been emphasized by Erdelen (1989) stating that, zonal restrictions are poor among birds compared to smaller vertebrates and invertebrates, due to the higher dispersal ability and comparatively larger body size in birds. However, studies on avifaunal zones in Sri Lanka had been scarce for about 40 years since 1950s, except for Senanayake et al. (1977), in which he combined the monsoon-driven climatic zones with the three peneplains of the island, also supported by data on amphibian and lizard endemism. Later, starting from the last decade of the 20th century, Legge's avifaunal zones were further developed during two attempts, initially by Kotagama (1989, 1993) and recently through the consensus of several ornithologists of the island (MoMD&E, 2019). However, all above avifaunal zones in Sri Lanka were established by intuitive discernment based on field experience, mainly of a single ornithologist at both initial attempts by Legge and Kotagama, and later based on the opinion from a group of expert birders.

During his zonation attempt Kotagama preferred Legge's avifaunal zones over those mapped by Phillips as the former was based on species distribution patterns while the latter is based on climate. Although climate plays a major role in delimiting faunal zones, it is not essentially the only factor determining the actual distribution of the faunal assemblages. Hence, while accepting the four avifaunal zones mapped by Phillips, Kotagama paid his attention to the peculiarities of the avifauna in the southeast of the island. However, instead of the rain shadow along the south-eastern coast Legge equated to the northwest, Kotagama describes the Uva basin with its peculiar savanna vegetation as a distinct avifaunal zone. Avifaunal zones of Kotagama (1989, 1993) were used as the basis during the preparation of the Biodiversity Profile of Sri Lanka for the 6th National Report to the Convention on Biological Diversity (MoMD&E, 2019), where the zonation was further updated through a consultative process involving 14 experts in the field, specifically considering some restricted distributions of species. The seven avifaunal zones and two subzones identified through this consultative process remain the accepted avifaunal zones for the island as of now: (1) Palk Bay coastal zone, (2) dry and intermediate zone, (3) Uva zone, (4) highlands zone, (5) Rakwana hill zone, (6) wet forest zone including two sub-zones namely the wet lowlands sub-zone and wet mid-hills sub-zone, and (7) marine zone (MoMD&E, 2019).

Although the availability of data on bird distribution in Sri Lanka is now reaching a considerable level of completeness, allowing a complete numerical avifaunal regionalization of the island, such an analysis still remains un-attempted except for a preliminary effort by Perera et al. (2015) based on a course quarter degree grid scale introduced by Ramdhani et al. (2010). Perera et al. (2015) suggest the said grid scale is too course for the habitat heterogeneity and patterns of species endemism in Sri Lanka suggesting an analysis at a finer scale at least as the 5×5 km grid squares, while the numerical methods that could be used in such analyses are elaborated in Perera et al. (2021).

Three main steps in the history of avifaunal regionalization in Sri Lanka discussed above are presented in the Figure 1, while the Table 1 compares their discrete zones with spatial relationships, and Table 2 summarizes the characteristic and zone restricted species in the avifaunal zones of Sri Lanka according to MoMD&E (2019).

Table 1.5. Avifaunal zones of Sri Lanka as developed by different authors over the last 140 years.

Climatic cum Avifaunal Zones of Sri Lanka (Legge, 1880; Phillips, 1952)	Avifaunal Zones of Sri Lanka (Kotagama, 1989, 1993)	Avifaunal Zones of Sri Lanka (MoMD&E, 2019)	
1. Low Country Wet	1. Low Country Wet	1. Wet Forest	1a. Wet Lowlands
	2. Mid Country		1b. Wet Mid-hills
		2. Rakwana Hills	
2. Hill	3. Hill Country	3. Highlands	
3. Low Country Dry	4. Dry Zone	4. Dry and Intermediate	
	5. Uva	5. Uva	
4. Northwestern Coastal	6. Indian	6. Palk Bay Coastal	
		7. Marine	

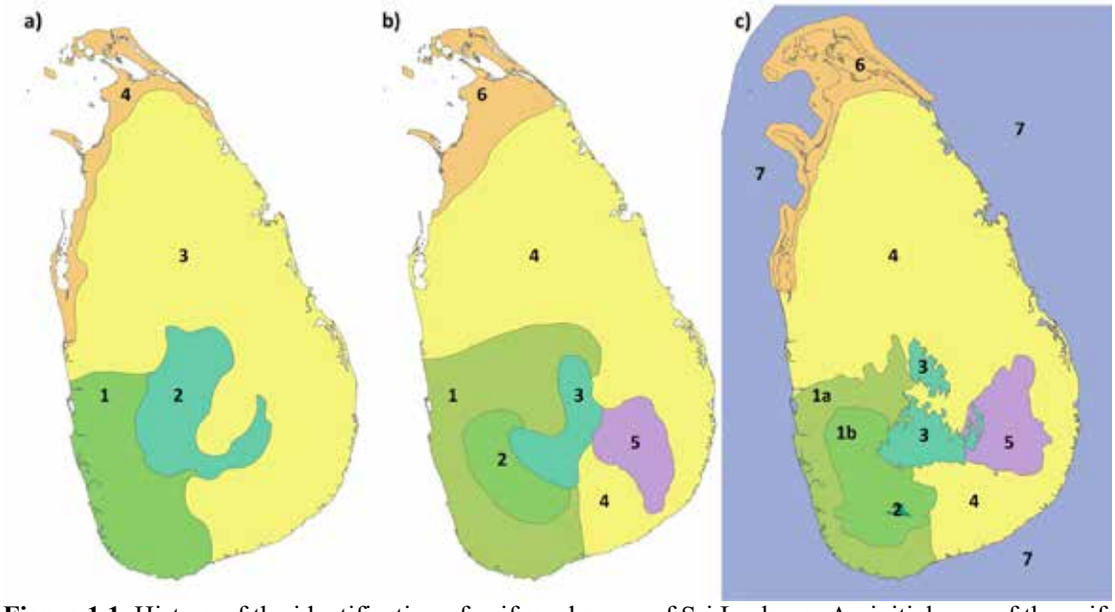

Figure 1.1. History of the identification of avifaunal zones of Sri Lanka: **a.** An initial map of the avifaunal zones of Ceylon proposed by Legge (1880) in his intuitive discernment, mapped by Phillips (1952), **b.** Avifaunal zones of Sri Lanka revised a century after Legge, by Kotagama (1989, 1993), based again on intuition however with much higher data availability, **c.** Avifaunal zones of Sri Lanka modified through a consultative process involving 14 experts in the field including co-authors of this book during the preparation of the Biodiversity Profile of Sri Lanka for the 6th National Report to the Convention on Biological Diversity (MoMD&E, 2019). See Table 1 for the names of avifaunal zones and subzones denoted by numbers and Table 2 for endemic and characteristic bird species found in each avifaunal zone by MoMD&E (2019).

Table 1.6. Characteristic and zone restricted species in the latest delineation of the avifaunal zones of Sri Lanka (MoMD&E, 2019)

Avifaunal zone	Characteristic species	Zone restricted species
Palk Bay Coastal	*Anous stolidus* (Brown Noddy), *Phoenicopterus roseus* (Greater Flamingo), *Thalasseus bergii* (Great Crested Tern)	#*Anas poecilorhyncha* (Spot-billed Duck), #*Coturnix coromandelica* (Rain Quail), #*Cursorius coromandelicus* (Indian Courser), #*Dicrurus macrocercus* (Black Drongo), #*Francolinus pondicerianus* (Grey Francolin), #*Lanius schach* (Long-tailed Shrike), *Streptopelia decaocto* (Collard Dove)
Dry and Intermediate	*Anthracoceros coronatus* (Malabar Pied Hornbill), *Coracina macei* (Large Cuckooshrike), *Ploceus manyar* (Streaked Weaver)	None
Uva	*Phaenicophaeus leschenaultia* (Sirkeer Malkoha)	#*Francolinus pictus* (Painted Francolin), #*Perdicula asiatica* (Jungle Bush-quail), #*Treron phoenicoptera* (Yellow-footed Green Pigeon),
Wet Forest	**Phaenicophaeus pyrrhocephalus* (Sri Lanka Red-faced Malkoha)	**Centropus chlororhynchos* (Sri Lanka Green-billed Coucal), **Dicaeum vincens* (Sri Lanka White-throated Flowerpecker), **Dicrurus lophorinus* (Sri Lanka Drongo), **Garrulax cinereifrons* (Sri Lanka Ashy-headed Laughingthrush), **Urocissa ornata* (Sri Lanka Blue-Magpie),
Rakwana Hills	**Eumyias sordidus* (Sri Lanka Dull-blue Flycatcher), **Pycnonotus penicillatus* (Sri Lanka Yellow-eared Bulbul)	None
Highlands	**Eumyias sordidus* (Sri Lanka Dull-blue Flycatcher), **Pycnonotus penicillatus* (Sri Lanka Yellow-eared Bulbul), *Saxicola caprata* (Pied Bushchat), *Turdus simillimus* (Indian Blackbird), **Zosterops ceylonensis* (Sri Lanka White-eye),	**Elaphrornis palliseri* (Sri Lanka Warbler), **Myophonus blighi* (Sri Lanka Whistling-thrush)
Marine	Pelagic bird species such as Shearwaters, Petrels, Storm-petrels, Frigatebirds, Tropicbirds, Jaegers and pelagic Terns	None

**** species endemic to Sri Lanka.***

 # these species, although being listed here as restricted to the respective zones in Sri Lanka, are not endemic to Sri Lanka.

Ecological Biogeography of the Sri Lankan Avifauna

Similar to other groups of biotas, the avifauna of the island has been shaped by its intrinsic attributes such as the location of Sri Lanka in Asia, the country being a continental (land-bridge) island, its internal geography detailed by the climate, topography/relief, soils and the vegetation. Furthermore, the eventful geological history the island has been through have made some more interesting imprints on the avifauna discussed separately in the next section.

Sri Lanka being located between Northern latitudes 5° and 10°, within the tropical belt and the northern section of the intertropical convergence zone receives a high incipient solar radiation throughout the year and monsoonal rainfall supporting a high biomass and a greater bird species richness as high as 520. Further, Sri Lanka being a continental land-bridge island, the bird species richness has inevitably been enriched by colonization from the mainland India over the long evolutionary history of the island's avifauna. The situation of the island in the Indian Ocean also makes it the southernmost landmass at its longitude until Antarctica, providing a final destination for some 179 northern hemispheric migratory birds using the Central Asian Flyway (Weerakoon & Gunawardena 2012; Kotagama & Ratnavira 2017; MoMD&E 2019). Furthermore, being an island surrounded by the vast Indian Ocean with a coastline of approximately 1620km, Sri Lanka endows a remarkable richness of pelagic sea birds (Kotagama & De Silva 2006; De Silva 2011; Seneviratne et al. 2015; Panagoda et al. 2020).

The tropical aseasonal climate of the island allows the resident birds to breed several times a year corresponding with the periods of monsoons and supported by the year-round supply of food (Legge 1983; Henry 1955; Kotagama & Ratnavira 2017). Location of highlands in the south-central section of the island and the differential amounts of moisture brought in through the two monsoons result in heavy rainfall on the south-western quarter during the southwest monsoon, while the northeast monsoon sweeps through the dry zone with comparatively low rainfall. The influence of two monsoons, delineate Sri Lanka with three climatic and six bioclimatic zones (Wijesinghe et al. 1993), which were initially mapped as Climatic cum Avifaunal Zones of the island by Phillips (1952) incorporating Legge's (1880) descriptions.

Combined with the climatic filtering, the three marked peneplains in the island's topography have isolated species and populations promoting insular speciation, even among highly mobile groups like birds, although to a lesser degree in comparison to groups such as herpetofauna. The variety of the climate and topography, together with the various types of soils found in certain areas, has resulted in a surprisingly diverse gradient of different vegetation types within the island providing an array of niches for a diverse avifauna (see Ashton & Gunatilleke, 1987 for floristic regions and MoMD&E, 2019 for a description of the ecosystem diversity in Sri Lanka), ranking Sri Lanka marginally second to Malaysia in term of the bird species richness per 10,000 km^2 of land (Baldwin 1991). This peculiar physiography has made Sri Lanka one of those few countries in which the avifauna can be so evidently detailed by its topography and climate (Whistler 1944; Kotagama & Ratnavira 2017).

Historical Biogeography of the Sri Lankan Avifauna

Sri Lanka's close affinity to the Indian mainland made it possible for many avian lineages evolved in larger continental Asian land mass during the recent evolutionary history to easily disperse into the island. However, before colliding with the Asian landmass, the Deccan plate consisting of India and Sri Lanka, had a prolonged geological history dating back to the time it was sandwiched between the African-Malagasy plate and the Antarctic plate in the southern supercontinent, Gondwanaland, from which it started breaking up more than 167 million years ago (Ma) (Yoshida et al. 1992; Meert & Van Der Voo 1997; Chatterjee et al. 2013). Nevertheless, Sri Lanka had been connected to the mainland India during the period of its relatively rapid northward drifting over the Tethys Sea, until about 50 Ma (Chatterjee et al. 2013; Kularathna et al. 2015; Premarathne and Ranaweera 2021). It was during the early Miocene epoch, approximately 20Ma, the island was first separated from mainland India due to marine transgression (Cooray 1967; Jacob 1949; Lajmi et al. 2019). The Miocene aridification and Plio-Pleistocene glacial and inter-glacial periods resulted in alternative cycles of connecting Sri Lanka and India over the Palk isthmus during glaciation events and isolation from the mainland during inter-glacials, resulting in respective biotic colonisations and isolation driven speciation especially among taxa with low dispersal ability (Meegaskumbura et al. 2002; Bossuyt et al. 2004; Biswas and Pawar 2006; Agarwal et al. 2017; Lajmi et al. 2019; Meegaskumbura et al. 2019; Pethiyagoda et al. 2021; Reuter et al. 2021; Sudasinghe et al. 2021). It is interesting to note such patterns of lineage accumulation and insular speciation have also been common for birds, as suggested earlier by Ripley (1949) and confrimed recently by molecular evidence (Wickramasinghe et al. 2017; Jha et al. 2021). Furthermore, recently emerging evidence on other taxa for out-of-Sri Lanka gene exchanges (Jayawardena et al. 2017; Meegaskumbura et al. 2019) has not yet been substantiated for birds, opening new avenues of research.

Different evolutionary signatures have accumulated in Sri Lanka during the continental drift as shown by its avifauna (Legge 1983). Further, such diversity of lineages, including those of birds, are presumed to have taken refuge in the southern Western Ghats and Sri Lanka during the end Cretaceous eruptions of Deccan Traps some 66 Ma (Joshi and Karanth 2013). According to Ripley (1961), the Indian avifauna consist of Indo-Chinese, African, and Palearctic affinities, among which the Indo-Chinese, or more correctly the Indo-Malayan elements, predominate. The African/Gondwanan elements are scarce mainly due to the plate tectonics and late divergence of most of the major bird lineages, while the Indo-Malayan elements had more recent dispersal opportunities (Daniels 2001; Ripley and Beehler 1990; Srinivasan and Prashanth 2006). One such option was explained by the Satpura hypothesis (Hora, 1949,1953), where dispersal via mountain ranges from the eastern Himalayas through Central hills of Assam, Vindhyas range, Kaimur ridge, and the Satpura range of hills to western Ghats was hypothesized, initially for freshwater fish fauna. In connection to this, the migration of montane forms of biota from the Himalayas to peninsular India and then to Sri Lanka is presumed to be supported by colder and wetter climates along the mountain bridges compared to those of the plains (Joshi and Karanth 2013). Interestingly similar comments made by Legge (1880) on such affinities in Sri Lankan avifauna during a time the historical biogeographic

knowledge was scarce are remarkable. More recent geological events have isolated the mountains of south India and Sri Lanka resulting in the highlands of the western Ghats and Sri Lanka harbouring evolutionary relicts, further supported by the expansion of rain forests on their western and southern aspects due to heavy southwest monsoon rainfall also promoting speciation (Jha et al. 2021). Hence, as shown by many groups of the Sri Lankan flora and fauna, the high degree of specialization and endemism in the south-western wet zone, especially within highlands is well demonstrated also by the avifauna (De Silva 1980; Legge 1880; Fernando et al. 2016; Abeyrama and Seneviratne 2017; Wichramsinghe et al. 2017).

Ripley (1949, 1980) explains historical affinities of Sri Lankan avifauna, confirming Legge's (1880) claims on south Indian elements (closest relatives of the birds of south-western wet highland of Sri Lanka have been found in the Western Ghats of South India including Nilgiri Hills, while those of the north-western dry zone of Sri Lanka have been found in the "Carnatic" dry plains of eastern South India), together with evidence for relict avifauna with major disjunctions in their distribution. Sri Lankan species with their closest relatives not found in India, but in the eastern Himalayas, Malaysian region, and/or even in Sumatra and Java in the east are recorded as discontinuous distributions of avian lineages, while such presences in Madagascar or Africa in the west are rarely been recorded (see De Silva 1980). In an attempt in delimiting affinities of our endemic avifauna, the author of this chapter carried out a preliminary chorological analysis on the distribution of the ecologically, geographically and taxonomically closest relative in each lineage of all 34 Sri Lankan endemic bird species, based on the Phylogenetic Super Tree of Sri Lankan Avifauna presented in Abeyrama and Seneviratne (2017a, b, supported by Wickramasinghe et al., 2017, and Krishan et al., 2020) (see Dayananda et al., in press; data available at https://www.researchgate.net/publication/359237493_2022_03_15_Zoogeographical_affinities_of_SL_avifauna). The analysis documented;

- **a.** Two monotypic Sri Lankan endemic bird genera, one with a Malabar/Western Ghats affinity (*Sturnornis*, *Elaphrornis*) and the other with an African affinity (*Elaphrornis*)
- **b.** Three Sri Lankan endemic species with a considerable disjunction in their lineage, two of them showing Himalayan affinities (*Pycnonotus penicillatus*, *Urocissa ornata*) and one with Malayan affinity (*Dicaeum vincens*)
- **c.** Twenty Sri Lankan endemic species with their closest relative found extralimital to Sri Lanka but not with considerable disjunctions. They include seven species with Malabar/Western Ghats affinity (*Zoothera imbricata*, *Geokichla spiloptera*, *Eumyias sordidus*, *Rubigula melanicterus*, *Psilopogon rubricapillus*, *Tephrodornis affinis*, *Columba torringtoni*), five species with Western and Eastern Ghats affinity (*Pomatorhinus melanurus*, *Myophonus blighi*, *Treron pompadora*, *Psilopogon flavifrons*, *Psittacula calthrapae*), five species with peninsular/south Indian affinity (*Gallus lafayettii*, *Galloperdix bicalcarata*, *Argya cinereifrons*, *Argya rufescens*, *Ocyceros gingalensis*) and three species with Malayan affinity (*Loriculus beryllinus*, *Pellorneum fuscocapillus*, *Phaenicophaeus pyrrhocephalus*).
- **d.** Nine Sri Lankan endemic species with their closest relative found in Sri Lanka with a wider geographic range extending out of Sri Lanka, showing one species with Malabar/Western Ghats affinity (*Gracula ptilogenys*), two species with peninsular/south

Indian affinity (*Glaucidium castanotum*, *Dinopium psarodes*), five species with Malayan affinity (*Otus thilohoffmanni*, *Zosterops ceylonensis*, *Chrysocolaptes stricklandi*, *Centropus chlororhynchos*, *Dicrurus lophorinus*) and one species with Palaeotropical affinity, except Australia (*Cecropis hyperythra*).

Inferring Sri Lanka's place in the Palaeotropical bird biogeography, the overall the result indicated a prominent peninsular/ south Indian (35%), Malabar/Western Ghats (26%) and Indo-Malayan (26%) affinities together with uncommon Himalayan (6%), African (3%) and the Palaeotropical (3%) affinities among Sri Lankan endemic avifauna.

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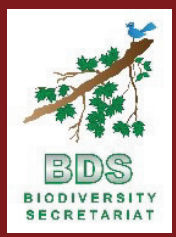

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