

# Preparation of Biodiversity Conservation Plan for Mysore Forest Division

## Technical Report



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## **Technical Report**

Submitted to

Karnataka Forest Department  
Mysore Forest Division, Mysore

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**Kumara, Saptha, Sadananda  
And Shivaprakash**

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## Introduction

Increasing human population all over the world, especially in the tropical countries, has caused loss of vegetation cover and potential habitats, which in turn has affected animal distribution. Furthermore it has resulted in an uneven and highly clumped distribution of animals (Myers *et al.*, 2000). Habitat loss due to human activities is the leading cause of species extinction (Pimm and Raven, 2000). Along with habitat destruction, game hunting and poaching of wild animals have also contributed to uneven distribution of animals as well as increased the species' extinction process. For the past hundred years there has been an accelerated loss of wildlife, especially of the mammalian species, in India. Awareness regarding the effect of human interference on natural processes has led to the development of conservation and management strategies in order to retain and restore the remaining wildlife and their habitats. Although a few steps have been initiated from time to time to protect wildlife, it was only in 1972, that a comprehensive act was promulgated (Wildlife Protection Act, 1972). One of the most significant outcomes of this act was the declaration of a large number of Wildlife reserves, Wildlife Sanctuaries and National Parks (Bisht, 1995), which today is known as the Protected Area Network.

On the other hand, large forest areas have been declared as 'Reserved Forests' called 'territorial' ranges where the main focus of forest management is the production of timber, firewood and pulpwood. These areas are generally under severe pressures from grazing, collection of firewood etc. as they act as buffer areas to the Protected Areas. However, a large percent of wild animals actually live in these territorial forests, and these forests have become reservoirs for many rare and endemic populations of plant and animal species e.g. good population of Mysore slender loris was recently identified in many territorial forests of Kolar, Bengaluru and Tumakur districts (Kumara *et al.*, 2006), Similarly large population of lion-tailed macaque was identified in Sirsi-Honnava and is one of the largest population in the wild, which was recently discovered (Kumara and Singh, 2004). We strongly believe that many species of wildlife and forest patches can be conserved in the long run only if wildlife



conservation along with management component are incorporated in the management plans of the territorial forest divisions.

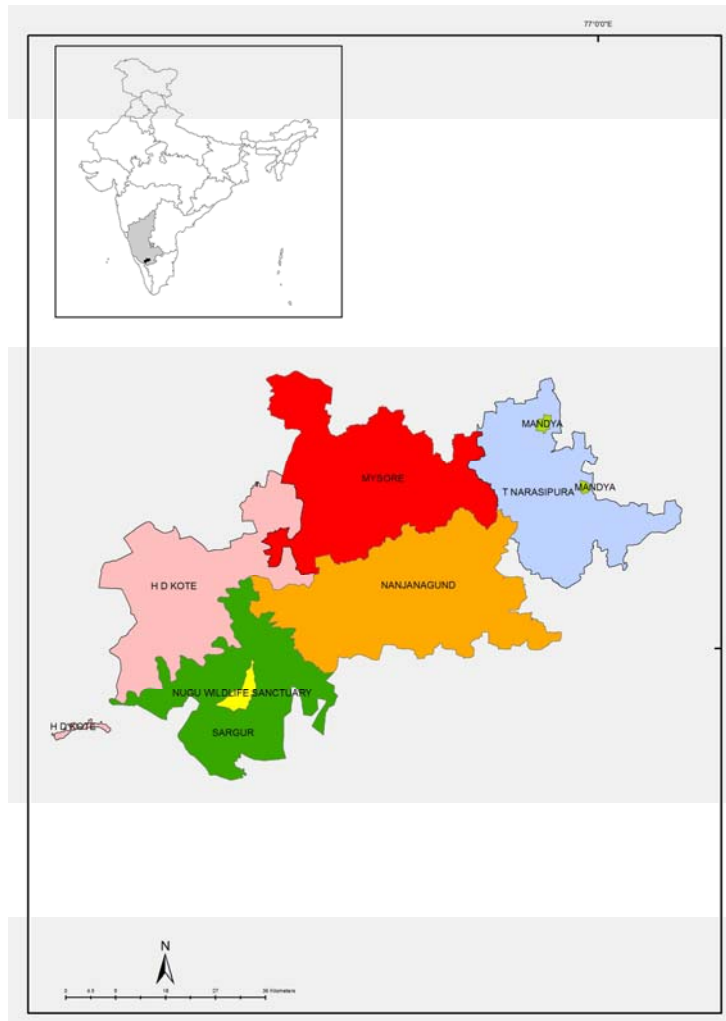
During the past few decades, the primary attention in such research has been directed towards large mammals found in the Protected Area Network. On the other hand, many critical species such as Indian fox, hyena, gray wolf, ratel, four-horned antelope, pangolin and many small mammals were not paid attention and the ecological status of such species is little known. Many of these species inhabit areas even outside the Protected Area Network, which needs to be assessed. Such reserve forests outside protected area and in the periphery of the protected area plays a very important role in the dispersal of the animals, as temporary shelters and refuge for the animals which have a larger range, permanent shelter for many small animals and place for the reestablishment for the swelling population of some species. Thus, it is necessary to document the role of such forest patches along the protected areas. We assessed the occurrence and abundance of large mammals, plant diversity and stand structure in the reserve forests of Mysore Forest Division. The significance of this study is also felt because the forests of Mysore forest division are the fringe forests of Nagarhole National Park and Bandipur National Park and acts as buffer zone to these forests.

Mysore district has many water bodies, some of them are situated in the middle of the townships and some are in the remote areas. Many of the tanks and their environs have attracted many bird species. These include the winter and summer migratory birds along with residential birds. The tanks in and around the towns are facing various threats including encroachment, land conversion for revenue purpose, recreational developments, used as debris dumping ground and as drainage releasing centers. These factors are affecting the bird communities of the tanks. With this background, a study of few water bodies was also taken up. Three water bodies including Kukkarahalli tank, Karanji tank and Lingambudhi tank in Mysore city have been considered for the biodiversity assessment project.

### **Study area**

Mysore district is situated in the southern part of the Deccan peninsula in Southern Karnataka. Geographically the district lies between  $11^{\circ} 48' - 12^{\circ} 22' N$  and  $76^{\circ} 15' - 77^{\circ} 08' E$ . The highest altitude in the district is about

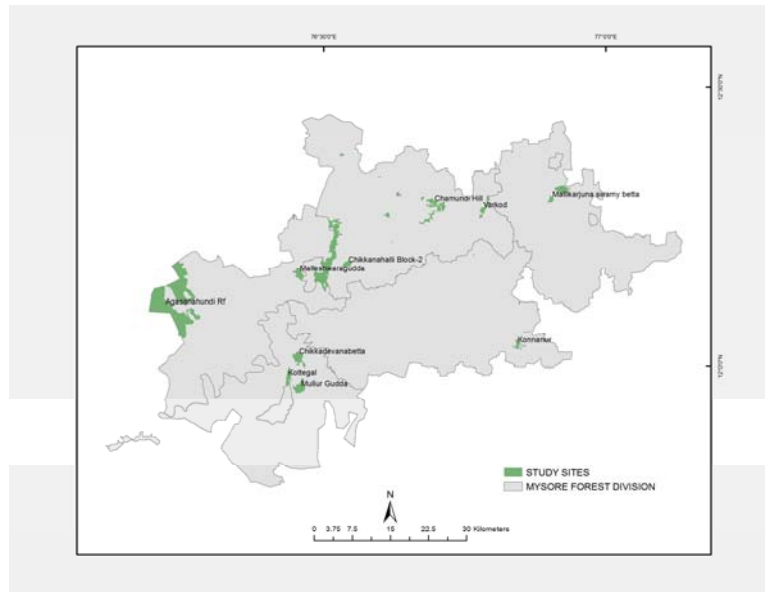
1074 m msl atop Chamundi hills, and the lowest altitude marked is 634 m msl at Talakadu. The area receives average rainfall of 700 mm. Mysore forest division include five forest ranges which includes Mysore, Sargur, H. D. Kote, Nanjangud and T. N. Pura (*Fig. 1.1*)



**Figure 1.1** Map of the Mysore forest division showing different forest ranges

For the purpose of the study we selected 12 reserve forests, of them some are bordered to protected areas. Further to find out the extent of movement of these animals we have chosen few forest patches in the entire division (Table 1.1 and *Fig. 1.2*). The selected reserve forests are Chikkadevammana betta, Chikkanahalli (Block I and II RF), Sollepura, Malleshwara Gudda,

Konnanur, Chamundi hill, Vadgal Ranganathswamy Betta, Mallikarjunaswamy Betta, Kottegal, Mullur Gudda and Varkodu.



**Figure 1.2 Reserve forests of Mysore forest division for mammals and plants**

Sollepura (Sollepura reserve forest) lies in H.D. Kote forest range and is adjacent to Nagarahole National park (*Fig. 1.3*). Being adjacent to Nagarahole one can expect high degree of wildlife movement. Forest has mixed vegetation type from scrub to bamboo forests to dry deciduous forests, and has quite a number of deciduous species of trees all around. As we scale down to the fringes of the forest it is completely open scrub and the vegetation growth is not more than 4 ft high except for some sporadic deciduous trees, this may be due to high anthropogenic disturbances. It was observed during our study period that most of the bamboos (*Bambusa arundinacea*) had flowered and many bird parties were feeding on bamboo seeds.

About 500 acres of land in this reserve forest has been used to relocate the tribes from Nagarahole. Unfortunately these people are given lands in the middle of the reserve forest instead of the periphery which appears like settlements in the forest. Another 400 acres of land is believed to be revenue land owned by private people and used for farming.

**Table 1.1 Reserve forests of Mysore forest division selected for mammals and plants.**

<b>No.</b>	<b>Range</b>	<b>Section</b>	<b>Forest</b>	<b>Area (ha)</b>
1	Sargur	Hunusehalli section	Chikkadevammana Betta (Section 4 area)	955.45
2	Mysore	Madahalli I and II	Chikkanahalli Block I RF	2019.52
3	Mysore	Madahalli I	Chikkanahalli Block II RF	286.26
4	H.D Kote	Agasanahundi section	Sollepura RF	4412.79
5	H.D Kote	Hampapura	Malleshwara Gudda (Cand Dland)	80.93
6	Nanjangud	Kavalande	Konnanur (Section 4)	142.08
7	Urban Area	Chamundi Hill	Chamundi Hill	613.51
8	T. N Pura	Bannur	Vadgal Ranganathswamy Betta (Section 4)	214.50
9	T. N Pura	Bannur	Mallikarjunaswamy Betta (Section 4)	101.76
10	Sargur	Sargur	Kottegal (Proposed Section 4 area adjacent to Nugu)	35.00
11	Sargur	Sargur	Mullur Gudda (Proposed Section 4 area adjacent to Nugu)	156.39
12	Mysore	Varakodu	Varakodu	318.45

Malleshwara Gudda also comes under H.D. Kote forest range and is surrounded by ten villages all around. Once contiguous Forests - Veeranahosalli and Metikuppe were upto Malleshwara gudda as per toposheets of survey of India 1910-1925. However, these forests now have disintegrated, shrunk and have been isolated; presently supporting few plants, birds and butterfly speices of once contiguous forest. Malleshwara Gudda is 24 km from Mysore and has a small temple of Sri. Malleshwara Swamy, hence the name Malleshwara gudda. Every Monday poojas are organized and is attended by the people of adjacent villages. However special poojas (“Honda pooja”) are conducted wherein the ceremony starts from morning and goes on till evening on certain auspicious days. During

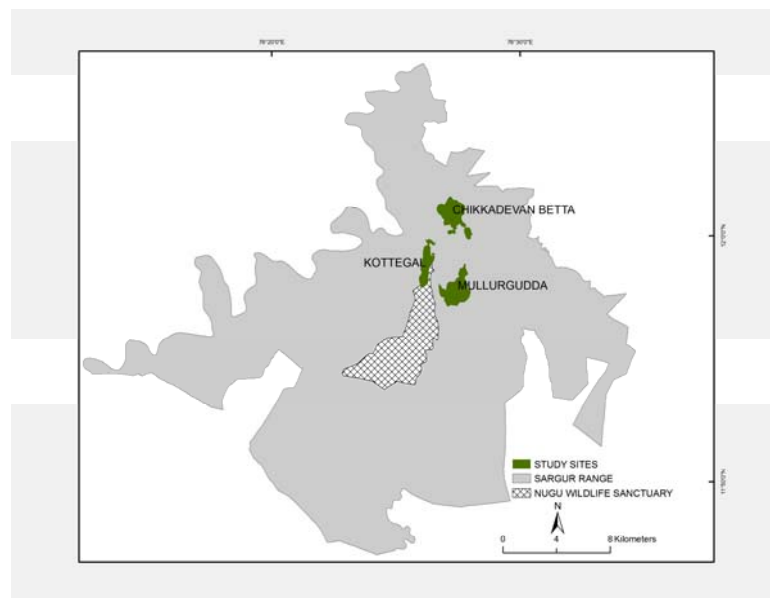
this time one can expect about 3000 people here. The forest is highly degraded and there are very few big trees which used to occur in scrub



**Figure 1.3** Study sites in H. D. Kote forest range

jungles, grass lands and lightly wooded deciduous area about five decades back. Rampant encroachment for agriculture, cattle grazing, and accommodating growing human population has reduced the vast thorn-scrub jungle to bare minimum. Most of the trees have marks of lopping and many have been felled. The area is mostly covered by plantation of *Acacia* species, *Cassia* species and *Bamboo* with many shrub species. Plants like, *Iphigenia indica*, *Buchnera hispida*, *Clerodendrum serrutum*, *Opilia amentacea*, have become extremely rare and very few of them are surviving here. A thin population of *Bridelia retusa*, *Ximenia americana* (nagare), *Milius tomentosa* (hesare), *Lagerstroemia parviflora*, *Ventilago maderasapatana*, and *Soyamida fabrifuga* exists here.

A quarry also exists adjacent to the forest where Kainite is extracted. The Hillock on either side of Maddur tank (Vadavinakatte) constitute the major catchment area as tank is situated at foothill. A proposal to set up a Coal based thermal power plant which was about to consume the entire residual forests has been scrapped, giving a sigh of relief.



**Figure 1.4** Study sites in Sargur forest range

Chikkadevammana betta (Sargur forest range) is a range of three small hillocks adjacent to each other (*Fig. 1.4*). On the middle hillock there is a temple of Chikkadevana swamy deity. The hill range is surrounded by six villages and a large number of people from as far as Bengaluru visit this temple on Mondays and Sundays believed to be auspicious days. People offer a large number of fowls and sheep to the goddess in fulfillment of their vows. The offerings are cooked behind the temple premises and the wastes disposed nearby, there by creating nuisance. Adjacent to this forest patch an active quarry exists wherein Kainite is extracted. Recently the hillock where the shrine is located was ripped all along to bring up an asphalted road and the clearance of the forest looks like it's been strip mined. However, before this, people were using the steps to reach the hill top. Mullur Gudda is adjacent to Chikkadevammana betta and Nugu dam. Compared to Chikadevammana betta, this forest is much degraded and is covered with very few stunted trees. This forest is completely open scrub with many shrub species. Kottegal is a small hillock with little undulation and its, forest being adjacent to the back waters of Nugu dam has a good shore line. The forest is covered with many herb and shrubs; hence the entire forest looks like an open scrub forest.

All these three forest reserves are under constant anthropogenic pressure, and are also subjected to frequent elephant raids. Hunting is present on the fringes of the reserve for food especially of wildboar (looked upon as pests as they raid crop lands and destroy crops) and Black Naped Hare. On some occasions fox hunting is resorted to as an offering to deities.

Vadkal Ranganatha swamy betta and Mallikarjuna swamy betta (Forest range- T Narasipura) are individual hillocks almost adjacent to each other (*Fig. 1.5*). Both the hillocks have shrines atop the hill and are named after the deities residing there.

Vadkal Ranganatha swamy betta is more prone to anthropogenic activities as there is major granite mining in and around the hillock. The mining areas are under revenue land and are leased for mining. However since the mining activity is active and lay's within the hillock it causes a major threat to the flora and fauna of the area. In case of Mallikarjuna swamy betta there are no such activities. The vegetation of both the hillocks is quite similar with open scrub forest having stunted trees.



**Figure 1.5** Study sites in T. Narasipura forest range

Konnanur (Forest range –Nanjangud) comprises a hillock and a large area of undulating plains (*Fig. 1.6*). The vast area in the plains is covered by grass and appears to be good grassland, however these are interspersed with Nilgiri plantations. The hillock is mostly open scrub jungle and stunted trees with rock formation of grey granite in some areas.



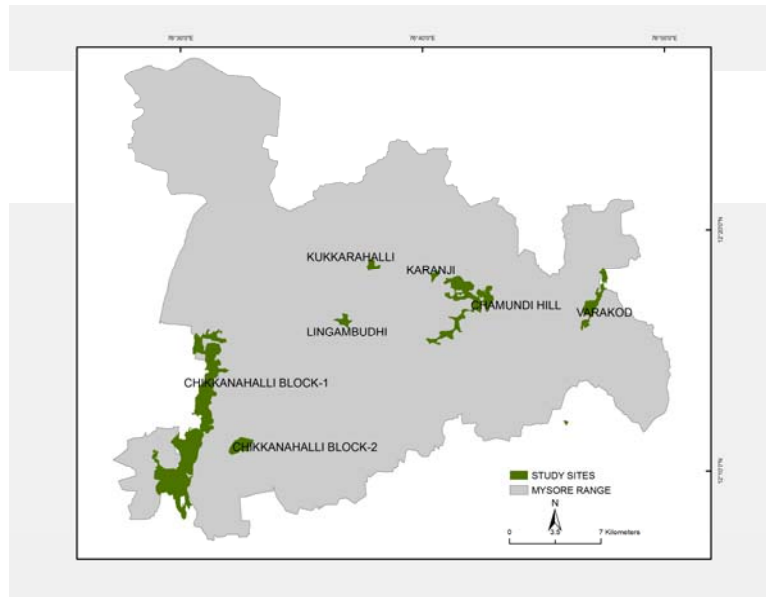
**Figure 1.6** Study sites in Nanjangud forest range

Chickkanahalli B-I and Chickkanahalli B-II forests (Forest range- Mysore) are typical open scrub forests, where Chickkanahalli B-I is mostly plains with little undulation (Fig. 1.7). A plot of 90 acres is covered by *Acacia* plantation. However, in case of Chickkanahalli B-II areas there are two hillocks which are covered mostly by *Agave americana*, *Capparis sepiaria* and *Carissa* species. Most of the trees here have stunted growth due to regular and incessant lopping.

Chamundi Hill Reserve Forest (12°15'34"–12°17'5"N 76°39'63"–76°42'02"E) comprises an isolated range of hillock, popularly known as Chamundi Hills, with a periphery of c. 11 km, situated on the south-east of Mysore city. The hillocks range in altitude from 861–944 msl, surrounding a plateau that is 1,024–1,057 m high. These are igneous rocks, of pink and gray granite, formed due to recent volcanic activity (0.8 billion years old), and are considered young when compared to the 2.3 billion years old peninsular Gneissic rocks of neighbouring Sargur–Kabbal durga. Gravelly red soil, rich in silica content, a rocky surface and, scanty precipitation of 762 mm (Kamath, 1988) support a tropical deciduous thorn-scrub type of vegetation in Chamundi Hills Reserve Forest. Being an overpowering geographical feature of the landscape, Chamundi Hill's influence on the



ecology of the region plays a crucial role in the microclimate of Mysore. The Karnataka state forest department protects the reserve forest (Misra *et al.*, 2007).



**Figure 1.7** Study sites in Mysore forest range

Atop Chamundi Hill are many Hindu temples, including the famous Chamundeshwari temple dating back to 400 A.D. A settlement of 145 houses and 124 tourist-related shops surround the temple. About 10,000 pilgrims visit the temple daily, peaking to 30,000 a day during the Dasara (*Navarathri* festival) holidays. The trees here are armed with thorns, stunted and slow growing. Vast areas are covered with bushes of *Pterolobium hexapetalum*, *Toddalia asiatica*, *Rhus mysorensis*, and *Ziziphus oenoplia* forming impenetrable undergrowth. Nine different micro-climatic regions of floristic importance with some species specificity are recorded here (Sadananda and Sampathkumara *in prep.*). These include, plants of the plains (*Syzygium cumini*, *Tamarindus indica*), foot hills (*Cochlospermum religiosum*, *Boswellia glabra*, *Commiphora caudata*), slopes (*Shorea talura*, *Garuga pinnata*), plateau (*Gmelina arborea*, *Pterocarpus marsupium*, *Santalum album*), valleys (*Mangifera indica*, *S. talura*), hill-tops (*Diospyros montana*, *Holarrhena pubescens*), ponds or pools (*Hygrophila schulli*, *Limnophila indica*), tanks (*Aponogeton natans*, *Centella asiatica*, *Eclipta alba*, *Bacopa monnieri*,

*Utricularia* spp.) and significant evergreen scrub at higher elevations (*Canthium dicoccum*, *Plecosperrum spinosum*) ( Rao and Razi, 1981).

In the forest, leaf fall begins with the arrival of summer. Herbs, shrubs and grasses dry up, converting the entire hill into a dry twigs and thorns country except for pockets of evergreen scrub, exposing many difficult-to-see (like White-throated Ground Thrush), winter migrants (like Indian Blue Robin, Blue Rockthrush, Blue capped Rockthrush, Pied Thrush) and breeding birds (like Bonelli's Eagle, Franklins Warbler). Mid-summer and pre-monsoon showers settle the dust. The entire area turns verdant with different shades of green by the end of the monsoon period. Retreating monsoon ensures greenery till the beginning of winter. The vegetation cycle is the main source for bird diversity. It is noteworthy that 11% of the 1,225 bird species reported from India (Islam and Rahmani, 2005) are found in Chamundi Hill Reserve Forest.

Globally-threatened and critically endangered Indian White-backed Vulture (*Gyps bengalensis*) (BirdLife International, 2001a) was sighted only once in the last four years. Two or three of them used to feed at garbage dumps in foothills of Chamundi Hills along with Egyptian Vultures (*Neophron percnopterus*). Sadly this is history now. Globally-threatened and vulnerable Yellow-throated Bulbul (*Pycnonotus xantholaemus*) (BirdLife International, 2001c), an endemic of southern peninsular India, used to be active in valleys and on slopes (Thejaswi, 2005), mostly in boulder-strewn vegetation. It is now altogether missing since August 2003. Globally-threatened and vulnerable Lesser Kestrel *Falco naumanni* (BirdLife International 2001b) is a rare winter visitor, sighted in the very low gradient slopes of the foothills joining the main land where large patches of grass are present. The presence of harrier (*Circus* sp.) roosts, occurrence of Amur Falcon (*F. amurensis*) and Lesser Kestrel was recorded (Thejaswi *et al.*, 2005) within 2–3 km from Chamundi Hill. Now only Lesser Kestrel frequents the Chamundi Hill's slope zone.

Many stone quarries and brick kilns operating in the last decade are now almost completely closed as the forest department erected a chain link fence around the reserve forest during 1998–2003, under the aegis of the Indo-Norwegian Chamundi Hill Conservation and Management Project. Several check-dams have been constructed all over the hilly area augmenting the water table. Plantations of many local varieties of plants

have come up. Further, the ever-expanding suburbs of Mysore are engulfing the buffer zone and foothills rapidly. The township atop Chamundi Hill is also expanding. Increased population pressure around the hill and atop is affecting the forest in many ways—forest fires, grazing, collection of flowers, medicinal plants and firewood are some of the problems that need to be contained immediately. The omnipresent problem of garbage, food leftover by tourists or pilgrims, augments trash generated by the township, creating unhealthy conditions. In addition, garbage contractors of Mysore City Corporation spread the garbage haphazardly over the foothills, in spite of an existing solid waste reclamation plant. All these become unwelcome feeding grounds for mynas (*Sturnidae*), crows (*Corvidae*), ibises (*Threskiornithidae*) and vultures (*Accipitridae*), which frequent the hill for feeding.

A proposal to install a ropeway to the hill has invoked public outrage—as it disturbs the zonal bio-diversity and destroys natural beauty. The proposed ropeway passes through once inhabited Yellow-throated Bulbul habitat. Environmental engineering students of Sri Jayachamarajendra College of Engineering, Mysore, and NGOs like Mysore Amateur Naturalists, Centre for Appropriate Rural Technology and, Mysore Science Forum, along with many concerned citizens of Mysore have taken up the issue, insisting on an environmental impact assessment by a competent and independent body, before the implementation of the project.

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# **Occurrence and abundance of large mammals in the Reserved Forests / Notified Forests of Mysore Forest Division, threat perceptions and mitigative measures**

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**Honnavalli N. Kumara and M. K. Saptha Girish**

## **Methods**

The forest patches are adjacent to the protected areas yet they are being exposed to high human activities. Thus we expected the abundance of many species to be low, hence we used multiple methods to find out the existence of mammal species, which included exploration, block counts and questionnaire method. We attempted the block count method in some of the study sites, but the quantity of data was negligible and the method was dropped.

The entire region was searched on foot randomly for both direct sightings of animals and their secondary signs during exploration. This information provided the occurrence of species in each forest patch. We also interacted with the local people and with highly experienced person from the forest department for each study site to find out the presence of various species and frequency of sightings during their patrolling in the forests. This gave us a fair amount of information on the presence and relative frequency of sightings of species in each study site.

## **Results and Discussion**

### ***Status of Reserve Forests***

All the study sites are facing high exploitation by local people for timber, fuel wood, stones (granite), soil and plants as medicine, which has resulted in forests being reduced to scrub with few trees. Nevertheless some of the study sites which are closer to the protected areas have relatively good forest with medium canopy. On the other hand places like Chamundi hill which had less vegetation in the recent past, has become one of the richest in tree diversity in Mysore forest division due to the afforestation programme and good protection provided by the department over the last

few decades. Malleshwara gudda has a temple at the top and due to the demand by local people a road was created. This has done enough damage to the vegetation, and the hill now looks almost barren. Grazing by livestock was observed in all the reserves with large herd size. Probably this has caused depletion of vegetation for wild ungulates and further hunting has also probably led to the loss of herbivore species in many of these reserves.

### ***Status of mammals***

**Primates:** The expected primates in Mysore forest division are Hanuman langur and bonnet macaque (Kumara *et al.*, 2010). However Hanuman langur was not recorded from any of the forests, where as bonnet macaque was recorded from six study sites (Table 2.1). Among all the reserves, Chamundi hill has good population of bonnet macaques with a population size of about 250 individuals in eight groups (Singh and Rao, 2004). Everyday the hill is visited by thousands of people, and usually they provide ample food to monkeys and probably this has influenced the high group size of bonnet macaques as well as good population size. These two species being considered common species do not have any special legal protection, and are also ignored in monitoring of the populations. However, recent study reveals that in most of their range the populations of both the species are in sharp decline (Kumara *et al.*, 2010). Thus these species cannot be ignored in the management and protection of the forests.

**Carnivores:** Among the large carnivore species we were able to find the information on tiger and leopard, where as wolves have almost disappeared from the district (Singh and Kumara, 2006). The forests of Sollepura are adjoining to Nagarhole forest, which is a protected area. As the forests are continuous between Sollepura and Nagarhole, frequent animal movement may be expected, and the reserve forest can act as buffer zone or marginal area. The Nagarhole forests harbour high density of prey and predator species, hence the presence of many such species was observed in Sollepura. Interviews revealed few sightings of tiger with three cubs in the study site in the last year. During our field study we have recorded about eleven tiger scats with cattle hair in it. Six leopard scats and fresh pug marks were also recorded. This reflects their frequent movement in the entire forest. Though the tiger is not found in other reserve forests, evidence for the occurrence of leopard was recorded in all reserves except Mallikarjuna Swamy Betta.

Leopard can survive preying on medium sized domestic livestock, small mammals, birds, dogs etc. and therefore this has been perceived as conflict (Athreya *et al.*, 2007). Leopard and human conflict is increasing in many states, however the reasons for conflict varies from area to area, such as loss of forest, depletion in the prey base and increased population size (Athreya *et al.*, 2007). In 2009 a leopard with two cubs were reported from Malleshwara gudda. Recently two litters were handed over to the Forest department from near by villages of Chammundi hill. Though there are no attempts made to understand the leopard in human dominated landscape of the Mysore forest division, it appears that some dynamics changes are happening in the source population in Bandipur and Nagarahole which may be playing a role in the movement of leopards even outside the park. In the near future the conflict level might also increase, in which case it is necessary to understand leopard movement even out side the protected area. Wild dogs are social living carnivores and they are typical forest dwelling animal. We have recorded them at Sollepura reserve forest, which further strengthens the value of the reserve forests. The Indian fox though a very small bodied animal is not considered a small carnivore. The fox has been regarded as a generalist species and is known to have wider distribution in the country. However, the habitat it chooses is very specific, and it lives in burrows. We have recorded the fox from the forests of Chikkanahalli, Sollepura and Varakodu. Sloth bears also occurs in Sollepura and Chikkadevammana betta.

Small carnivores: A total of six small carnivore species were recorded during the present study and these include jungle cat, leopard cat, rusty spotted cat, small Indian civet, Asian palm civet and common mongoose (Table 2.1). Among them only leopard cat is not specialised enough to survive in all the forest types, whereas all other species were reported from diverse habitats ranging from dry scrub forests to evergreen forests in the state (Kumara and Singh, 2007). The evidence for the leopard cat was from Sollepura reserve forest. Karnataka had very few sight records of rusty spotted cats, and recently Kumara and Singh (2007) reported few sightings from Nugu, Bandipur, Sira of Tumkur district and Chamundi hills. The present record is an additional record for the species for the state. All these sightings reveal that rusty spotted cats has larger range of distribution and capability to adapt and survive in the human dominated landscape. However, it is necessary to map all the sight records and to undertake further investigation on the species. Although jungle cats are common and



do occur in small forest pockets throughout the country, but are rare to sight. As their population is not monitored and extensive hunting by local people for consumption, the status of this species is not properly understood. Our sighting of jungle cat with three kittens at Kaggalipura close to the Mallikarjun Swamy Betta is one of the rare sight records, and this indicates the existence of a breeding population in this landscape.

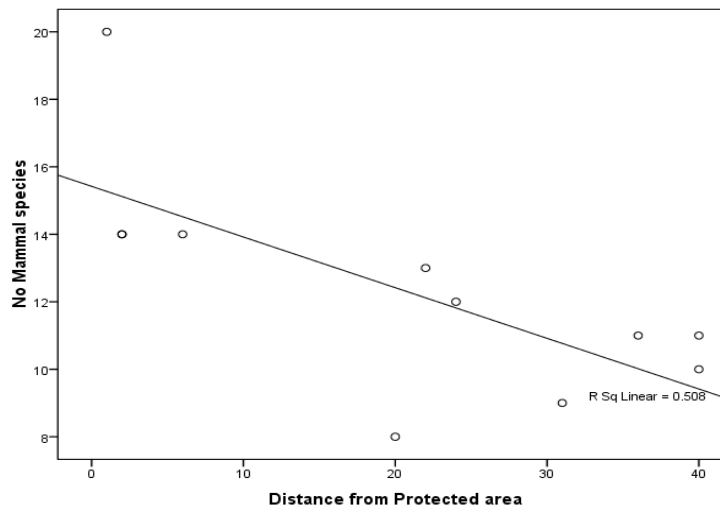
Large herbivores: Herbivore species require large quantity of grass and browsing areas to establish a good population. Due to high degradation of forest and increased livestock grazing they are probably driven away from the forests, further local hunting has eliminated them from many of the reserves. As Sollepura reserve is continuous with the protected area many herbivores are still reported viz. muntjac, sambar, chital and four-horned antelope. Nevertheless, chitals could do in some of the reserves including Chikkadevamma Betta, Vadgal Ranganathaswamy Betta, Chikkanahalli and Varakodu, but the recorded herd size was small (<8 animals). Three decades ago, four-horned antelopes were known to occur in many of the reserve forests including Chikkanahalli (Mewa Singh, personal comm.), however they have disappeared from all these forests. This raises the crucial question of how long this small population of herbivores will survive in these forests. We recorded few pellet groups of four-horned antelopes in Sollepura which shows some promise for this species in Nagarahole. Wild pigs were recorded from all the reserves, and are also known for crop raiding in the adjacent croplands. In Karnataka, blackbucks are reported to live in small and isolated populations except the good population in Mydanahalli in Tumkur district and Ranebennur in Haveri districts (Singh and Kumara, 2006). However, they have disappeared from many parts of the state. The presence of a small population of about 30 to 40 individuals in three to four herds occurring in Konnanur is of great importance. They live in open scrub forests and plains. If their habitat is protected, they may survive in the future.

Elephants in the Nilgiri plateau constitute one of the largest populations in the world. The Mysore forest division borders the protected areas of Nilgiri Biosphere, and elephants have been known to move out of the forest to raid crops. While indulging in these activities they often take shelter in closer reserve forests. Over the last decade the rate of crop raiding by elephants has been observed to increase by several folds. During the present study, we encountered elephants in Sollepuara, Chikkadevamma Betta and



irrespective of the species composition, the species richness is directly related to the nearest source population (Protected Areas). To test this, the closest distance of each reserve to the nearest protected area was measured (*Fig. 2.1*). Species richness was studied in relation to the data on distance from the nearest protected area.

We tested the distance of each study site and its species richness. Pearson correlation (2-tailed) shows decline in mammal species richness as the distance of the reserve forests increases from the protected area ( $r = -0.713$ ,  $df = 10$ ,  $p = 0.01$ ) (*Fig. 2.2*).



**Figure 2.2** Relation of mammal species' richness and distance from the protected areas

## Conclusions

The tendencies of people to think that if a species is often seen near human habitation and has a wide range of distribution. It is typical to regard the species as common and not to consider it as priority in conservation acts. Unfortunately this leads to the populations of such species not being monitored, and even their occurrence in all the forest patches is omitted to be recorded. Recently Kumara *et al.* (2010) have demonstrated change in population of the so called least concerned species and reported a sharp decline in population size of Hanuman langur and Bonnet macaques in the state. Tigers once common have become very rare and this has led to take extensive steps to manage and protect them. With this lesson it is not

necessary to wait until the so called least concerned species becoming a critically endangered one. Hence, the common species should remain as common in nature. It is necessary to take further steps to initiate the further documentation of all the species, including the ones regarded as common or least concern, and need to develop an appropriate management plan.

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Elephant herd



Indirect evidences of mammals in study area.

**a.** Pellets of black buck at Konnanur R.F., **b.** Droppings of Porcupine., **c.** Leopard pug mark., **d.** Tiger dropping at Sollepura., **e.** Wild dog droppings., **f.** Leopard droppings.





**a.** Jungle cat with kittens., **b.** Bonnet macaque., **c.** Common mongoose., **d.** Wild boar., **e.&f.** Forest department people scaring away elephants at Chikkadevammana betta.

# Evaluation of vegetation and utilization of plant resource in the Reserved Forests / Notified forests of Mysore Forest Division

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K. B. Sadananda, A. Shivaprakash, M. K. Saptha Girish and Honnavalli N. Kumara

## Methods

We have used quadrates to assess the density of plant species and trail walk was used to prepare the checklist of the species for each forest reserve. Eight plots of the size 25 m × 25 m were put in each reserve forests, and within each plot all the tree with stems having > 20 cm girth (girth at breast height) were considered for assessment. We recorded the species name and girth of all the stems. We calculated the density of trees in each forest. We walked on selected trails, covering all the habitat mosaic of the forest and listed the plant species. Plants were classified as trees, shrubs, herbs and climbers. This gave species richness for each forest.

## Results

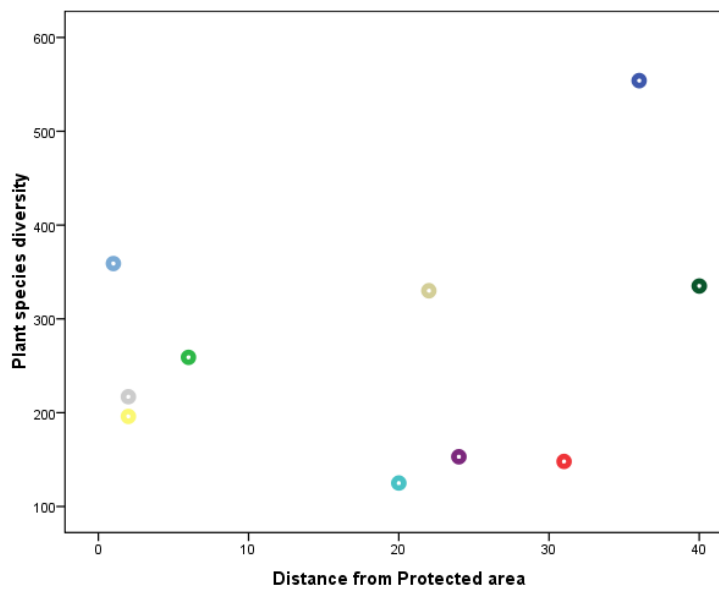
The diversity of plant species in different study sites are summarized in Table 3.1, Appendix I. Plant diversity differed significantly between the study sites ( $t = 6.462$ ,  $df = 9$ ,  $p = 0.001$ ). Chamundi hill shows the highest plant species, followed by Sollepura, Vadkal Ranganatha Swamy betta and Chikkanhalli. The other study sites had very less species diversity. Compared to tree species, the herb diversity is more in all the study sites except Malleshwara Gudda where the tree diversity is more than the herb diversity. The diversity of shrubs ( $t = 10.583$ ,  $df = 9$ ,  $p = 0.001$ ), herbs ( $t = 5.023$ ,  $df = 9$ ,  $p = 0.001$ ) and climbers ( $t = 7.022$ ,  $df = 9$ ,  $p = 0.001$ ) differed significantly between the forest reserves.

We analysed the relationship of plant species diversity with the nearest distance to the protected areas (*Fig. 3.1*). Pearson correlation (2-tailed) shows that the plant diversity and distance from the protected area are not related ( $r = 0.279$ ,  $df. = 10$ ,  $p = 0.436$ ).



**Table 3.1 Plant diversity in different forest reserves of Mysore forest division**

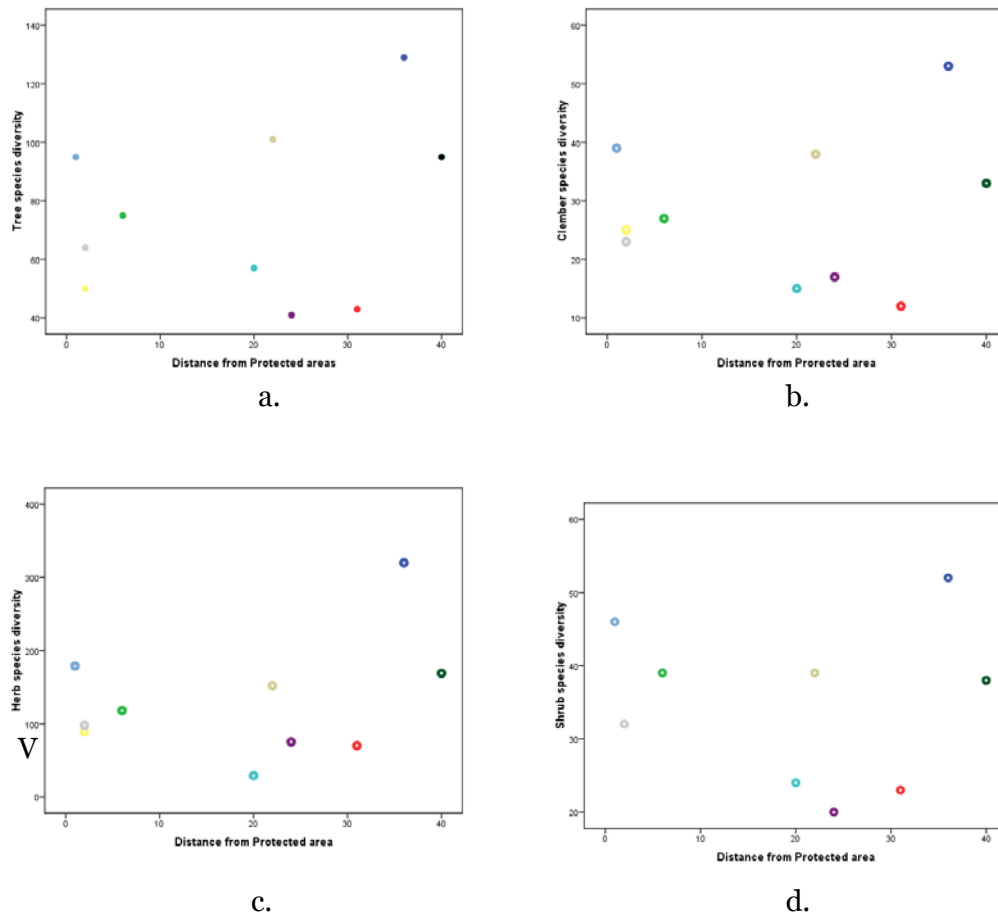
Study site	Diversity trees	Diversity shrubs	Diversity herbs	Diversity of climbers	Total species
Sollepura	95	46	179	39	359
Malleshwara Gudda	57	24	29	15	125
Kottegal	50	32	89	25	196
Mullur Gudda	64	32	98	23	217
Chikkadevammna betta	75	39	118	27	259
Vadkal Ranganatha Swamy betta	95	38	169	33	335
Mallikarjuna Swamy betta	43	23	70	12	148
Konnanur	41	20	75	17	153
Chikkanahalli	101	39	152	38	330
Chammundi hill	129	52	320	53	554



**Figure 3.1 Relation of plant species diversity in different Reserve Forests which are at different distance from protected area**

Similarly tree diversity ( $r = 0.282$ ,  $df = 10$ ,  $p = 0.430$ ), herb diversity ( $r = 0.324$ ,  $df = 10$ ,  $p = 0.361$ ) and climber diversity ( $r = 0.149$ ,  $df = 10$ ,  $p =$

0.681) in different reserve forests did not show any relation with the distance of protected area, except shrub species (*Fig. 3.2*). Shrub species diversity decreased as the distance from the protected area increased ( $r = -0.01$ ,  $df = 10$ ,  $p = .973$ ).



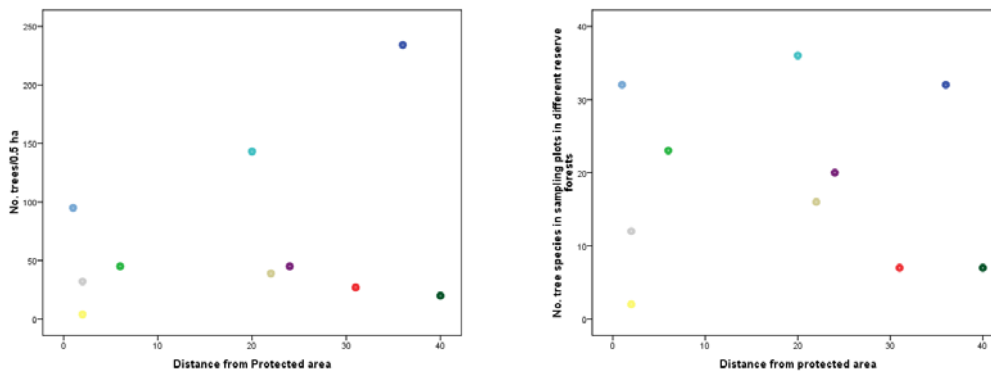
**Figure 3.2** Relation of species diversity in different reserve forests which are at different distance from protected area.  
**a.** trees species, **b.** shrub species, **c.** herb species, **d.** Climber species

Tree density and species richness in the sample plots show that Chamundi hill, Sollepura and Malleshwara Gudda have a much higher density and richness than the other reserve forests (Table 3.2). Surprisingly correlation analysis shows that the tree density ( $r = 0.230$ ,  $df = 10$ ,  $p = 0.523$ ) and species diversity ( $r = -0.026$ ,  $df = 10$ ,  $p = .943$ ) is not related to the distance of the reserve forests from protected area (*Fig. 3.3*). However, the

relation of species diversity is negatively related to the distance from protected area.

**Table 3.2. Density of trees in different study sites of Mysore forest division**

Study sites	No. of plots	No. of tree species	No. of trees > 20 cm	Tree density (trees /ha)
Sollepura	08	32	95	190
Malleshwara Gudda	08	36	143	286
Kottegal	08	02	04	8
Mullur Gudda	08	12	32	64
Chikkadevammana betta	08	23	89	178
Vadkal Ranganatha Swamy betta	08	07	20	40
Mallikarjuna Swamy betta	08	07	27	54
Konnanur	08	20	45	90
Chikkanahalli	08	16	39	78
Chammundi hill	08	32	234	468



**Figure 3.3 Tree density and species diversity in sampling plots in different reserve forests**

In general fire wood collection was rampant in most of the study sites, and grazing pressure was quite high except Chamundi hill where the fire wood collection was minimal and restricted to marginal areas. Hunting has been in practice in many of the study sites mainly for wild pigs and black naped hare, however, in some of the forests where chitals are present they have also been targeted for hunting.

## Discussion

The general vegetation in ten selected study sites in Mysore forest division varied from scrub forests to dry deciduous forests, with a more or less grassy savannah (Konnannur gudda in Nanjangud forest range). All the sites were degraded with a low percentage of tree species, except Sollepura, Chamundi hill and Chikkanahalli forests where still fairly decent tree vegetation is left. The species of plants in all the study sites indicates that these forests were earlier contiguous with that of Bandipur and Nagarahole. However, some of the plant species are of the drier forests of the Deccan Plateau and Eastern Ghats.

Unscrupulous cutting down of trees for fire wood or timber collection and cattle grazing have not only opened up the forest but also resulted in the drastic decrease of the native plant species. The areas are occupied by invasive aggressive species like lantana (*Lantana camara*), chromolaena (*Chromolaena odorata*), parthenium (*Parthenium hysterophorus*) etc. which because of their allelopathic character have suppressed the local species

Diversity of species highly varied between the study sites. Further we expected the influence of nearby protected areas on species diversity and tree density. The assumption was that the reserve forests being closer to the protected area will have higher diversity and density. However, the findings show that the picture is very opposite to this and the distance of reserve forest from protected area are not related. Further some of the plant species, especially species like *Bombax ceiba*, *Gardenia latifolia*, *Terminalia bellirica*, *Terminalia chebula*, *Miliusa velutina*, *Madhuca indica* (var. *latifolia*), *Gmelina arborea*, *Premna tomentosa*, *Naringi crenulata*, *Plecoserмум spinosum*, *Stereospermum colais* etc. seem to be relic species of an earlier healthy forest, which has now become degraded. The probable reason could be the exposure of each study sites for anthropogenic pressure and the management of each study sites was different. In the past, Chamundi hill had less vegetation and it was highly exploited. However the vegetation has recovered due to the steps taken to protect the hill by forest department, and good afforestation program.

We suggest afforestation measures either by planting saplings of plant species (in the first phase) which can withstand drought conditions or by broadcasting of seeds. The seeds could be *Ficus benghalensis*, *Ficus*

*pubescens*, *Chloroxylon swietenia*, *Boswellia glabra*, *Zizyphus Sp.*, *Tamarindus indica*, *Capparis sp.*, *Dolichandrone crispera*, *Cassia fistula*, *Butea monosperma*, *Azadirachta indica*, *Annona squamosa*, *Acacia* species, *Gardenia gummifera*, *Diospyros Montana*, *Euphorbia antiquorum*, *Feronia elephantum*, *Aegle marmelos* etc. In some areas like Konnanur gudda which is generally grassy savanaah with some shade trees and known to harbour a small population of blackbuck, and Chikkanahalli, Mullur gudda, Malleshwara gudda maintaing the grass with minimal planting of shade trees if necessary and improving on availability of water would be desirable. In fact giving adequate protection by way of stopping illegal grazing and entry into these forests for collection of firewood it self would help in the regeneration of native/local species (Chamundi hill is an example).



**a.** Bamboo flowering., **b.** Ground orchid *Habenaria plantaginea* is common in slopes of chamundi, Madapura, and Malleswaragudda **c.** Open scrub jungle., **d.** *Osbeckia zeylanica*., **e.** Vegetation sampling., **f.** Grassland at Konnanur reserve forest.





Anthropogenic activities: **a.** Kainite extraction near Malleshwaragudda., **b.** Clearing of grass bed at Nugu back waters., **c.** Chikkadevammana betta striped to form new asphalted road., **d.** Grazing and firewood collection., **e.&f.** Felling of trees.

# **Comparative study on biodiversity and management aspects of few major waterbodies in Mysore Forest Division**

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**M. K. Saptha Girish, A. Shivaprakash and Honnavalli N. Kumara**

## **Introduction**

Wetlands are among the world's most important, but most threatened, environmental resources. The need for their wise use and conservation stems from the recognition of the high value goods and services which these ecosystems provide to society. Historically, the pattern has been one of progressive wetland loss, especially in the developed world where a wide range of other land uses compete for wetland area. The largest threats today, however, are in the developing world where uncoupling of the traditional linkages between human communities and ecosystem functioning are likely to result in irretrievable losses.

Wetlands are fragile ecosystems and any minor change in their biotic or abiotic constituents will have adverse effect on its flora and fauna (Gibbs, 2000; Ramachandra and Rajashekara, 2000), and it is estimated that 50% of global wetlands have been lost in the last century (IUCN, 1999), the major reasons being urbanization, drainage, agriculture and water system regularization. In developing countries developmental activities is more concentrated in urban and their adjacent areas including agriculture and more natural vegetated areas (McGranahan and Satterthwaite, 2003). One of the major forces for biodiversity loss and biological homogenization in developing countries is alarming rate of urbanization (Pauchard *et al.*, 2006).

Lakes and tanks in urban regions are regarded as ecological security zones and true indicators of sustainable urban development which support a wide range of urban flora and fauna. In India lakes and tanks were not just water bodies but also had cultural heritage and were regarded as major water source for drinking and irrigation purposes. South India was considered to be rich in tanks with the Cholas, Hoysalas and Vijayanagar kings giving importance to irrigation and help constructing several tanks for various purposes.



India has an estimated wetland cover of 58.2 million hectares (Prasad *et al.*, 2002) which supports up to 20% of the known biodiversity (Deepa and Ramachandra, 1999). Healthy wetlands are essential in India for continued existence of India's diverse populations of animal and plant species of which large number of endemic species is wetland dependent and such thousands of wetlands are biologically important, yet only 25 wetlands are protected under the "Ramsar Convention" (Wetlands of India, 2009) and 466 are designated as Important Bird Areas (IBA) under Indian Bird Conservation Network (IBCN, 2009). The state of Karnataka has about 682 water bodies, and none of them are protected under Ramsar, while 36 have been designated as IBA by IBCN (IBCN, 2009), which includes Kukkarahalli Tank, Karanji tank and Lingambudhi tank of Mysore city.

### ***Kukkarahalli Tank***

Kukkarahalli tank is situated in the heart of Mysore city and has a long history; The study area lies between 12°18' N and 78° 38' E; 760 m MSL, Mysore (*Fig. 4.1*). The tank has a water spread area of ~0.3925 km<sup>2</sup> (17 ha) and has a volume of 4, 20,000 m<sup>3</sup>; maximum depth of the tank is about 8 m with an average depth of 6 m (Table 4.1). The western side of the tank has a horticulture seed centre, Academic Staff College and also an abandoned coffee garden. The northern end of the tank is marked by the marshy stretch, which is overgrown with water hyacinth (*Eichornia crassipes*) and other grass species (e.g. *Typha* species). Large plantations of teak (*Tectona grandis*), eucalyptus (*Eucalyptus grandis*) and acacia species, which are interspersed with bamboo (*Bambusa arundinasia*), Lantana (*Lantana camaera*) and many shrub/weed species (e.g., *Parthenium hysterophorus*, *Euphorbia* species) marks the well wooded eastern side of the tank. A boat jetty is also situated on the eastern side of the tank, which is used by fishermen. Nine species of fishes are harvested from the tank; the major varieties include *Catla catla*, *Cyprinus carpio*, *Labeo rohito* and *Cirrhina mrigal*. The fishermen employ the dragnet method for fishing and the amount of fish harvested from the tank varies seasonally, with greater harvests of up to 500 kg/day being reported during the summers when there is a general decline in the water level of the tank. The southern side of the tank is marked by a jogging track on the slope and a boat jetty. The tank also has a small island, which has a number of acacia trees that provide ideal roosting, nesting and breeding sites for many birds. The alkaline guano of birds, which falls on the island, does not allow any

undergrowth. This has resulted in erosion and breaching of the island at certain points.

History and Features of Kukkarahalli Tank: Dewan Poornaiah built Kukkarahalli tank in 1864, to meet the drinking water demand of the Mysore City and the tank came under the custody of the University of Mysore in 1960. The tank had a catchment area of ~4.5 km<sup>2</sup> with a 22 km long contour canal. Expansion of the city led to destruction of all feeder canals leading to the tank, as they became dumping grounds for building debris and other domestic wastes in the region. Instead of fresh water, sewage from residential layouts which came up in the catchment area, has become the main source of inflow into the tank. Increasing influx of sewage caused rampant growth of water hyacinth. The weed clearance was done in 1980, and a bund was constructed as a barrier which avoided direct inflow of sewage and trapped the suspended solids which has resulted in a marshy stretch (0.0425 km<sup>2</sup>). Though the bund has been built to check the direct inflow of sewage, still there is seepage of sewage water to the tank enhancing nutrients like phosphorus and nitrogen thus increasing eutrophication (Deepa and Ramachandra, 1999). However, restoration of Kukkarahalli tank was initiated during 2002 with financial support from the Asian Development Bank. Unfortunately when the restoration work was completed in 2004 a jogging/walking path was created all around the periphery of the tank with the removal of shrubs and trees on the bund and along the periphery of the lake. This has resulted in inaccessible areas of the tank becoming accessible to public.

### ***Karanji tank***

Karanji tank is situated in the eastern side of the Mysore city and lies between 12°18' N and 76° 40' E; 760 m MSL, Mysore (Table 4.1, Fig.4.1). The tank has a water spread area of 22 ha and has a volume of 12199.0 m<sup>3</sup>; maximum depth of the tank is about 7 m with an average depth of 6 m. The tank is surrounded by Regional Museum of Natural History, DFRL, Mysore milk dairy and a small residential area on the North, and Chamarajendra Zoological Garden on the West. The Chammundi hill and Race course is very close to the tank and is situated on the Southeast. A big residential layout (Siddaratha Layout), ATI and ANSIRD institutions are situated on the eastern side of the tank.

The foreshore line of the tank is planted with many ornamental and flowering plants like bottle brush, Hibiscus, Bougainvillea, Chinese arborvitae, Royal palm etc. On the North western and eastern part the tank has little marshy stretches and is covered by water hyacinth (*Eichhornia crassipes*), Water Lily and grass species (e.g. *Typha* species). The high ground all around the tank is wooded area intermixed with many species of trees like fig (*Ficus religiosa* and *Ficus bengalensis*), baubinia species (*Bauhinia variegata* and *Bauhinia purpurea*), cassia species (*Cassia fistula* and *Cassia siamea*), common poon (*Calophyllum inophyllum*), terminalia species (*Terminalia arjuna*), jacaranda (*Jacaranda mimosefolia*), sandal (*Santalum album*), rain tree (*Samanea saman*), niligiri (*Eucalyptus sps*), neem (*Azadirachta indica*) etc. Shrub species include bamboo (*Bambusa vulgaris*), *Euphorbia antiquorum* etc. The tank has five major types of fishes like Catla catla, Rohu, Common carp, Jilebi and Golden carp, the fishes are harvested once in a year with an average annual yield of 15,000 kg (App. 10 lakh rupees), and once harvested about one lakh fresh fingerlings are introduced into the tank annually.

The tank has nine manmade islands which are covered by trees and thousands of birds use these islands as roosting and nesting ground. One of the islands has been converted into a Butterfly Park and many butterfly host plants have been planted here. About 35 species of butterflies have been reported from this park. A cement bridge connects this island to make way for the visitors to visit the butterfly park. Pedal and row Boats have been introduced for visitors and is maintained by private parties, however, boating is restricted and no body is allowed go near the islands where birds are nesting and roosting. Karanji has the credit of having the largest Aviary in the whole of Asia, it has a height of 40 m, width of 60 m and length of 80 m. Here birds like pea fowls, hornbills, black swans, sarus cranes etc, have been exhibited.

History and features of the tank: The tank is believed to be more than 100 years old built by the Wodeyars of Mysore and was built to meet the water resources for the local people. The tank was transferred to the custody of Chamrajendra Zoological Gardens in March 1976 from Public Works Department for development and maintenance. Once under the custody of Mysore Zoo number of steps like cleaning of tank, desilting, and diversion of effluent water entering the tank from various sources was the major objective. The tank was completely dry during 1988 due to various

anthropogenic activities, fast urbanization in the water spread and catchment area was the major reason. Construction of farm houses on the upstream side of the feeder channel, construction of barrages and storage tanks along the feeder channel encroaching of channel for cultivation and reduction of ground water table due to pumping of water from borewells were reasons for drying up of the tank.

During 1990 action was taken to clear the feeder channel with co-operation of different Government departments and the obstruction and encroached was cleared as a result the tank received inflow of surface runoff and the tank was full. During 2002, the encroached area by planet-X amusement park was cleared with the help of District administration, Revenue dept, Police, MUDA and Mysore City Corporation. New Under ground drainage lines were laid to divert the sewage from entering the tank. Today the tank receives good amount of surface runoff from Chamundi hills and storm water from Siddaratha layout. However, sewage from Siddartha layout still enters the tank, high level meetings are been held regularly to divert this, once this is done the tank will be completely free of pollutants.

### ***Lingambudhi Tank***

Lingambudhi tank is situated in Southwestern part of Mysore which is one of the fast developing parts of Mysore city. The study area lies between 12° 16' 20" N 76° 37' E and has 36 ha of water spread area with the total area of the tank being 96 ha, the tank has catchment area of 2189 ha (Table 4.1). The highest flood level of the tank is 727.09 m. with maximum depth of the tank 4.72 m. The western side of the tank is covered by well wooded area and the southern side has a bund protected by quality stone pitching, a road adjacent to the tank along the stone pitching leads to Lingambudhi village and connects the outer ring road. The forest department has planted and has raised many trees on the northern side of the tank and a small park is maintained at the main entrance of the tank. The fore shore vegetation comprises of a medicinal plant nursery on the eastern part and trees like teak (*Tectona grandis*), sandal (*Santalum album*), rain tree, Nilgiri (*Eucalyptus sps*), neem (*Azadirachta indica*), gooseberry, Singapore cheery, Acacia species, tamarind etc., along with shrub species like *Lantana camara*, *Vicoa indiana*, *Dodonaea viscoa*, *Euphorbia antiquorum*, *Chromotaena sps* interspersed with Bamboo (*Bamboosa arundinacea*) etc. The tank has several fishes which include *Catla catla*, *Cyrinus carpia* and *Cirrhina mrigal* as major species and are harvested,

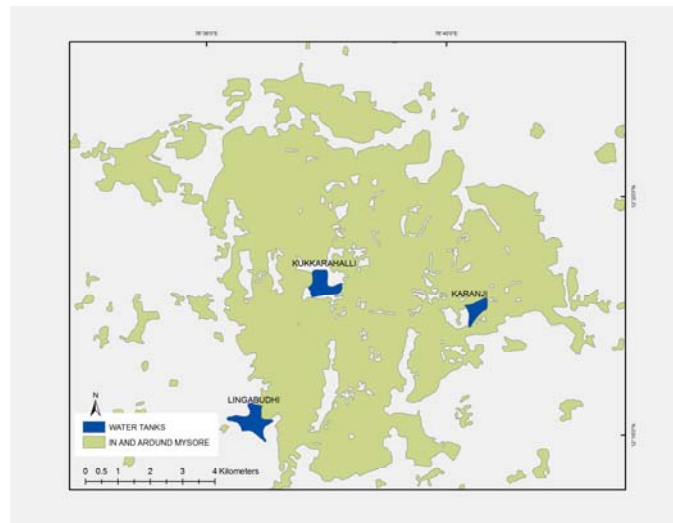
that is the only source of income and fishing rights has been contracted out to Fisheries Department. The tank has four manmade islands used by the silt of the lake which is covered by few tree cover which plays as major ground for roosting and breeding grounds for many bird species.

History and features of the tank: The tank was built in 1842 by Mysore Wodeyars (kings of Mysore State) for irrigation purpose however; the tank was used for various domestic purposes and was under constant threat from anthropogenic activity. The tank is under Irrigation department and the foreshore is maintained by the forest department. Tank surroundings were grown into a thicket by 1997-98, courtesy State forest departments' social forestry scheme. However, reduction in tree density was observed during 2002-03 due to ageing process and firewood collection. But, aforestation by the department thereafter in open grassland and the shoreline is carried out in the past five years defeated the vegetation denuding process, but resulting in reducing the habitat for wader's and terrestrial birds. Over the years the catchment areas have been constantly encroached and all the feeder channels are choked to a very large extent by the formation of new layouts all around the tank. Direct inflow of sewage from the residential areas is one of the major concerns of the tank, illegal dumping of waste debris and construction materials are seen all along. There is a brick factory on the foreshore area of the lake on lease, about 49 guntas of the foreshore is been encroached by private individuals and 3 acres and 21 guntas has been taken over by MUDA. The tank was declared as a "protected forest area" in 2003 through a government notification and handed over to the Forest Department for management.

Though some development work was initiated, the action plans and proposals for conservation of the Lingambudhi Tank wanted to attract the public to the Tank by means of recreation facility and involve them in the long term conservation activities. Hence, many facilities such as a jogging track, paragolas, and stone benches have been created. The number of people visiting the tank for walk, jogging or relaxing has increased drastically over the last few years. As there is no clear demarcation between the water area and the recreational areas, the visitors have been observed to stray into areas close to the shoreline or the water spread area.

**Table 4.1 Physical features of three tanks of Mysore city**

Sl. No.	Tank	Catchment area (ha)	Water spread area (ha)	Fore shore area (ha)	Tank capacity (ML)
1	Kukkarahalli	414	17	55	2533.3
2	Karanji	745	22	68	629.2
3	Lingambudhi	2189	36	60	1507.7



**Figure 4.1** Map showing three water tanks in Mysore city

## **Methods**

We conducted a systematic survey of birds in Kukkarahalli tank from September 1999 to September 2000 and from December 2006 to November 2007 and October 2009 to Mar 2010. We used the ‘total count method’ for water birds, and also used the point count method for the birds on the island. The encounter method was used by selecting two 1.2 km transects along the shore of the tank including the vegetated area to monitor the non-wetland birds. During 1999 and 2000, the transects were walked in the morning (between 06 h -10 h; N=21), afternoon (between 11 h – 14 h; N=11) and evening (between 16 h –18 h; N=5), and during 2006 and 2007 (between 06 h -10 h; N=20), afternoon (between 11 h – 14 h; N=5) and evening (between 16 h –18 h; N=5). The transect walks at

different times were carried out to ascertain different bird species utilizing the tank over the day.

For Karanji and Lingambudhi tank we could deploy encounter method by walking all along the shoreline and also used point transects to encounter birds present in the tank. With limited time we could not follow the line transects in these two tanks. Both these tanks were walked at least once in a month and diversity of the birds present is detailed. The birds were classified as P: Present, C: Common, r: Rare, R: Resident, B: Breeding, V: Visitor and Ab: Absent, based on their encounter rate.

## **Results**

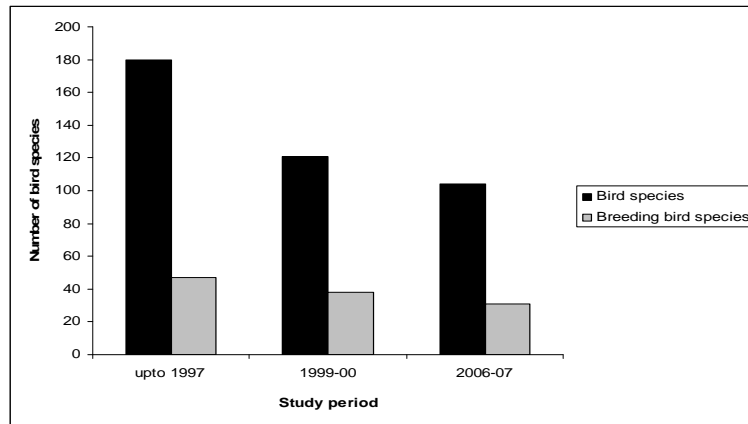
Since we have a long term data available for Kukkarahalli tank we present this tank as a case study for this work and compare it over different years with other similar data available with us. However, for other two tanks i.e. Karanji and Lingambudhi tank there is no similar data available and with limited time frame we restricted to preparation of checklists.

### ***A case study -Kukkarahalli***

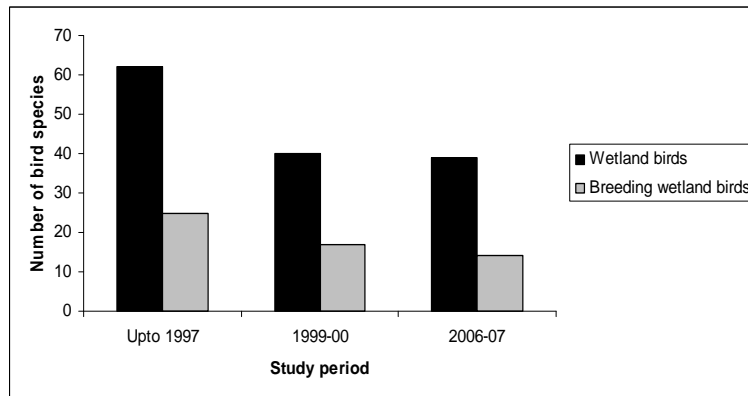
We collated the data from all the transects walked in each month to arrive at the number of species and number of hatchlings of certain water birds, and also abundance of three breeding birds that include spot-billed pelican *Pelecanus philippensis*, painted stork *Mycteria leucocephala* and black-headed ibis *Threskiornis melanocephalus* of which first two are listed in IUCN red list as near threatened species (IUCN, 2009; BirdLife International, 2009). Mysore Amateur Naturalists had come up with a check list of birds for Kukkarahalli tank in 1997 (Guruprasad, 1997) which is a compilation of observation made over a period of 10 years. We compared the data from the present studies with the check list from Guruprasad to ascertain population fluctuation and diversity of birds at Kukkarahalli tank over a period.

Occurrence and status of birds at Kukkarahalli tank over three study periods are provided in Appendix 1. A total of 180 bird species were reported before 1997 (Guruprasad, 1997), while we recorded 121 species in 1999-2000, 105 species in 2006-07 and 98 species in 2009-10 (Six months recordings). This marks the decline in the bird diversity of about 41% over a period of ten years from 1998 to 2006-07 (*Fig. 2*). Likewise number of species breeding in the tank between the study periods was significantly

varied and they have also declined by about 32% over a period of ten years. However, we have recorded few birds which have not been recorded earlier viz. serpent eagle *Spilornis cheela*, honey buzzard *Pernis ptilorhyncus* and wooly-necked stork *Ciconia episcopus*. These birds were not regular visitors; serpent eagle and wooly-necked stork were sighted only once while honey buzzard was sighted twice. However, these birds have been recorded in the fields and wooded areas on the outskirts of the city (Misra *et al.*, 2007).



**Figure 2** Number of bird species and breeding birds in Kukkarahalli tank between different study periods



**Figure 3** Number of wetland birds and wetland breeding birds in Kukkarahalli tank between different study periods

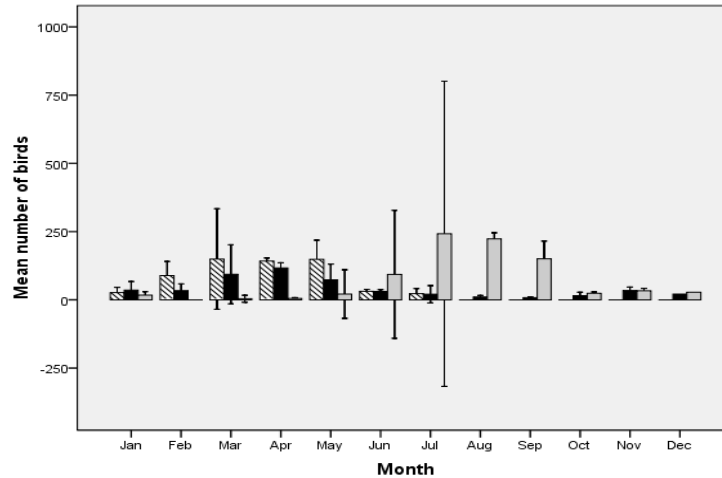


Since the tank harboured a large number of wetland birds, we separated the wetland birds and analyzed to see the changes in their diversity over the period. Guruprasad (1997) reported 62 species of wetland birds, 25 of them were known to breed in the tank, however we recorded 40 species in 1999-2000 with 17 species breeding in the tank and in 2006-07 the number of wetland bird reduced to 39 with 14 species breeding (*Fig. 3*). The number of wetland birds and the number of breeding birds in the tank between the three study periods was significantly different. This shows a decline of 37% of wetland bird species and 44% of wetland bird species breeding in the tank over ten years.

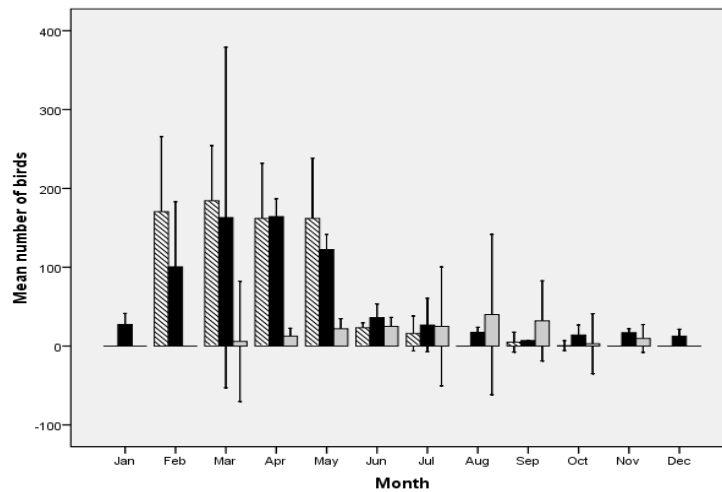
The data on population status were available on spot-billed pelican, black-headed ibis and painted stork for 1999-00 (*Fig. 4a*) and 2006-07 (*Fig. 4b*). painted storks and spot-billed pelicans were seen in large numbers during winter and summer seasons (January to May) of both the study period. In general spot-billed pelicans used to occupy the tall *Acacia* trees with thick branches on the western side of the island while the painted storks occupy the eastern side of the island on small acacia trees alongside the darter *Anhinga melanogaster* and little cormorant *Phalacrocorax niger*. Black-headed ibis start arriving at the tank in the month of March; however, large number of birds arrived at the end of June, and by that time painted storks had vacated their nests. Ibis were seen occupying the vacated nests of painted storks and rebuilt the left over nests during 1999-00. But during 2006-07, ibis started to arrive in March 2006 but were unable to settle down at their regular nesting area on the eastern side of the island, and tried to settle down on the western side of the island but were not successful, and they have disappeared from the tank. All the three species had successfully bred and raised the nestlings during 1999-00, where as during 2006-07 only painted storks were seen with fledglings while spot-billed pelicans and black-headed ibis did not breed in the tank (*Fig. 5*). Though spot-billed pelicans were observed to bring in the nesting materials and were in the process of building nest they abandoned it and never raised the nestlings during 2006-07. Even black-headed ibis were also seen abandoned the area and left the tank in the same period.

Development is almost invariably associated with a loss of many avian species seen before development, particularly habitat specialists (Marzluff, 2001; Yeoman and MacNally, 2005; Chace and Walsh, 2006; Clergeau, 2006; McKinney, 2006). Evans *et al.* (2009) also concluded that influence

of sequential human presence in urban areas decreases the breeding densities of birds. It is believed; many birds perceive humans as potential predators and respond in a way which leads to a reduction in use of resources, such as nesting sites or food (Schulz and Stock, 1993; Madsen, 1995, 1998; Gill, 1996, 2007; Beale and Monaghan, 2004; Finney, 2005; McKinney, 2006; Holm and Laursen, 2009).

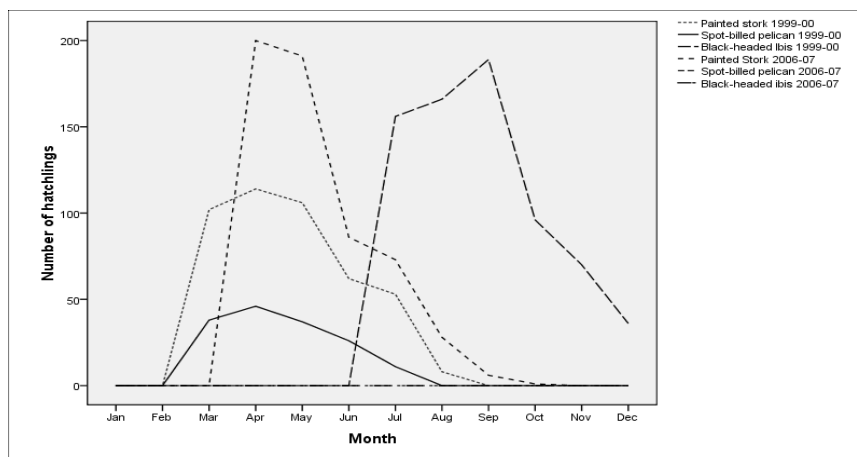


**Figure 4a** Number of painted storks, spot-billed pelican and black-headed ibis in different months of 1999-2000



**Figure 4b** Number of painted storks, spot-billed pelican and black-headed ibis in different months of 2006-2007

Kukkarahalli tank has lost not only many bird species but also many of them have stopped breeding at the tank including both wetland and non-wetland birds. Though some species have high capability to adapt and live in the human dominated area, many bird species are also very sensitive to change in the habitat and human presence. Even many generalist bird species once reported common have become rare e.g. house sparrow *Passer domesticus* all over the world (Daniels, 2008), common starling *Sturnus vulgaris* and song thrush *Turdus philomelos* in United Kingdom (Evans *et al.*, 2009). Hence to avoid the eventual local extinction of many bird species it is necessary to have them as common species or in a large numbers. Further, the three important near threatened bird species viz. painted storks, spot-billed pelican and black-headed ibis have bred here successfully (Guruprasad, 1997; Kannan and Manakadan, 2005), even during our study period 1999-2000, however we did not see spot-billed pelican and black-headed ibis breeding in the tank during 2006-2007. The recent developmental activities and un-scientific restoration have led to a considerable change in the ecosystem which in turn has affected the diversity, density and breeding activities of bird life in the tank.



**Figure 5** Number of hatchlings of painted storks, spot-billed pelican and black-headed ibis in different months of two study periods

In spite of having four sports grounds (three grounds under university jurisdiction) within 100 m from this tank, about 4 km long jogging path of about three to four meter width was created all around the tank under restoration work. Initially only 1.5 km stretch on the southern side bund of

the tank was open to public, however with the restoration work during 2002-2004 the tank is now completely open to public all around the periphery of the water body, and eventually the number of people using the tank has increased more than ten fold compared to the pre-restoration period. To develop such a long trail many trees were brought down especially the acacia trees and shrubs on the northern bund and around the periphery of the tank. During our post restoration study (2006-07), we observed that spot-billed pelicans brought in the nesting materials and were in the process of building nests. However, they abandoned the nest building and never raised the nestlings during that year. Black-headed ibis started to arrive in March 2006 but were unable to settle down at their regular nesting area. Probably this could be because the eastern side of the island is very close to the jogging path (~10 m away) and more than 1000 people use the path for walking and jogging in early mornings and evenings. This movement of people close to the nesting area probably has threatened the birds from settling and raising the nestlings. Further, in order to maintain the aesthetic value and keeping public interest, regular trimming of bushes and reeds has become a regular practice. This has resulted in reduction in the numbers of many bush nesters like warblers, munias, etc., and birds preferring reeds like purple swamp hen *Porphyrio porphyrio*, common moorhen *Gallinula chloropus*, common coot *Fulica atra* etc., Further many ground birds like the eurasian thick-knee *Burhinus oedicephalus*, yellow wattled lapwing *Vanellus malabaricus* which bred here earlier have totally abandoned the tank. On some occasions we have also witnessed people disturbing the nesting birds, destroying the nests and attempted to kill a snake in the tank. Such activities by people further threaten the very existence of bird life in the tank. Thus, the proper conservation and protection of the ecosystem is of utmost importance and also any further developmental activities should consider ecological value of the tank.

### ***Karanji tank***

Karanji tank hosts to about 135 species of birds while we could record 104 species during our study period. The tank has a good number of wetland birds, 40 species are wetland birds which is 38.5% of the 104 species recorded in six months. Among the 40 species of wetland birds 17 species are known to regularly breed in the tank. This includes spot-billed pelican *Pelecanus philippensis*, and painted stork *Mycteria leucocephala* which are listed in IUCN red list as near threatened. Unlike the painted stork and

black headed ibis, spot-billed pelicans have become residents and are found through out a study period. The remaining 23 species of wetland birds visit the tank to either roost or forage. totally 42 species of birds breed at Karanji tank including the wetland birds while 62 species use the tank as foraging and roosting ground.

### ***Lingambudhi tank***

A total of 213 species of birds have been recorded at Lingambudhi tank over a decade (Thejaswi *et al*, 2000). As this tank is considered as one of the flyway route adapted by the migratory birds from Central Asia and Eastern Europe a huge number of migratory birds are recorded here. Of the 213 species 70 species are migratory species and visit this tank regularly while 91 species are residents (which breed and forage) and another 37 species are local birds (which come here for foraging). However during our study we could report only 146 species of birds from the area. Of these 54 were wetland species i.e. 37% of all the wetland birds, among them 18 were migratory species. 44 species of birds breed in the tank of which 16 species are wetland and the remaining 28 are non wetland birds. Having a good shoreline this tank attracts a good number of waders, during our study period we could record 10 species of waders from the tank. A total of 102 species of bird species including the migratory birds use this tank only for roosting and foraging.

### **Discussion**

All the three tanks mentioned above are identified under IBA and host to some of the IUCN red listed birds, however they still face one similar problem that is the influx of sewage water. Placed well within the urban patch these tanks are constantly under pressure by various anthropogenic activities. However Kukkarahalli and Karanji tank are not dumping source any more and they have well defined boundary and are more or less completely fenced. But Lingambudhi situated on the developing area and comparatively far from city is more prone to dumping of building debris and other wastes. One other major problem is the low influx of the fresh water, storm water being one of the chief sources of water for all these tanks the feeder channels are clogged and are encroached. In case of Karanji tank efforts were put in by the Mysore zoo authority and with the help of various departments have cleared most of the encroached feeder channels from Chamundi hills and have diverted sewage from residential areas and effluent coming from Mysore milk dairy. Except for the sewage

which enters from the residential area of Siddartha layout for which efforts are put in to avoid this with high level meetings already in progress, now Karanji receives a good amount of fresh water during the rainy season as runoff. However, in case of Kukkarahalli and Lingambudhi tanks sewage has become the major source of water to the tank as they directly enter the tank. The feeder channels are still encroached or filled with silt and the storm water hardly reaches these tanks.

Karanji tank is a restricted area and people are not entertained without an entry fee, this has controlled the flow of local population and most of the time the tank is visited by tourists. However for morning joggers and walkers facilities are made to use the tank with a monthly fee. Unlike Karanji tank, Kukkarahalli and Lingambudhi tanks which are more exposed to public and this has a drastic effect on the tanks. Though Kukkarahalli has restriction of people using the walking path throughout the day, thousands of walkers and joggers use the path in the mornings and evenings which is enough to disturb the birds. At one juncture the island is so close to the jogging/walking path many breeding birds have stopped breeding here and the numbers of birds are declining over the years. Similar is the case at Lingambudhi, with large shoreline covered with grass, most of the visitors use this place for recreational purpose and picnicking. It is also observed these grass beds have become grounds for many cricket and football lovers.

All the three tanks were under taken for restoration work under the sponsorship of Asian Development Bank during 2002. Only Karanji tank has yielded good results with proper planning and management of funds. Today it's one of the role model for rejuvenation of a lake from the ecological point of view as well as for revenue generating which helps for its self sustenance.

It is unfortunate that such delicate and important urban ecosystems are used to bring up jogging/walking paths in-spite of having various other alternatives for these purposes. With these things in mind from an ecological point of view we suggest certain guidelines for the betterment of these tanks (i) Complete avoidance of sewage water into the tank (ii) Shifting of jogging/walking path from the shoreline of the tanks and complete ban of public during breeding season (iii) Fishing should be banned during breeding and brooding periods (iv) Any further

improvements to the tank should be done with the involvement of ecologists and conservationist (v) Regular trimming and clearing of reeds and bushes for the purpose of aesthetic value to be avoided.

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**a.** Island at Kukkarahalli Tank., **b.** Reeds being chopped for aesthetic value., **c.** Clearings of weeds., **d.** Grass and feeds being taken for cattle.



**a.** Painted stork nurseries., **b.** Purple swamphen in its habitat., **c.&d.** Spot billed pelicans at Karanji Tank., **e.** Pied kingfisher at Karanji Tank., **f.** Roosting sites of egrets.

# **Occurrence and abundance of Avifauna in the Reserved Forests/ Notified Forests of Mysore Forest Division, threat perceptions and mitigative measures**

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**M. K. Saptha Girish, Honnavalli N. Kumara and A. Shivaprakash**

Birds are ideal bio-indicators and useful models for studying a variety of environmental problems. As increasingly more attention is being given to conservation monitoring and ecological studies the importance of birds in an environment is being better understood (Urfi *et al.*, 2005).

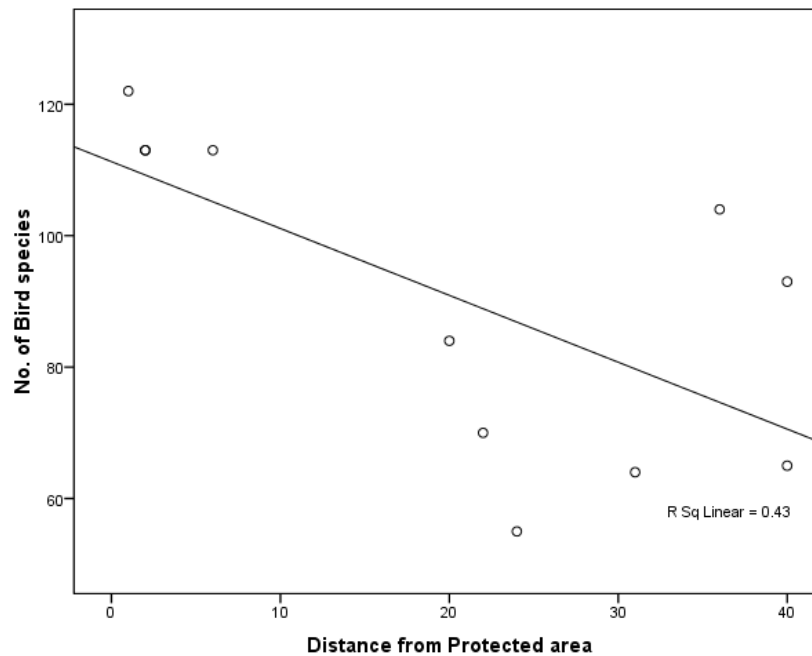
## **Methods**

Any small patch of greenery does attract atleast some species of birds. Mysore forest division though fragmented still holds a good number of birds all around. We used the 'encounter method' for understanding species diversity walking along the path used by the forest guards in a given forest patch and covered most of the forested area and also walking along the periphery of water bodies to detect water birds wherever possible. The point count was mainly used for the water birds and also in areas where we could see high bird activity (feeding parties and roosting sites).

## **Results and Discussion**

Over all a total of 162 species of birds belonging to 51 Families were recorded from the forest patches selected for the study. The highest number of bird diversity was recorded from Sollepura area with a total of 122 species recorded, while only 54 species of birds were recorded at Konnanur (Sec-4) area. We compared the species richness data of each study sites with that of distance of each site from the protected area, the correlation shows that the species richness is negatively correlated ( $r = -0.656$ ,  $df = 10$ ,  $p = 0.05$ ) with the distance of the study sites from the nearest protected area (*Fig. 5.1*).

**Raptors :** Raptors were the common representation from most of the forest patches. A total of 17 species of raptors were recorded from study sites and a maximum of 13 and 12 species were recorded in Sollepura region and Sargur



**Figure 5.1** Relation of birdspecies richness and distance of study site from the protected areas

respectively. Egyptian Vulture (*Neophron percnopterus*) one of the threatened species (IUCN, 2010) was reported from only two areas i.e. Sollepura and Chammundi hill area. Another threatened species of vulture that is white rumped vulture (*Gyps bengalensis*) was reported only from Chammundi hill which shows the rariety of this species. Bonellis Eagle (*Hieraaetus fasciatus*) represented three areas and were also seen nesting in Chikadevammana betta forest, they have also been reported to breed in Chammundi hills earlier. Open scrub jungle seems to be a hunting ground for most of the raptors as most of them were seen hovering looking for prey in the open forests. Though serpent eagle and honey buzzard are more of forested birds but were reported from 9 and 7 forest patches respectively. Four species of nocutrnal birds of prey like eurasian eagle owl (*Bubo bubo*), barn owl (*Tyto alba*), collared scops owl (*Otus bakkamoena*) and spotted owl (*Athene brama*) were reported from the study sites. However, the locally threatened eurasian eagle owl (*Bubo bubo*) is reported only from Chammundi hills and is also successfully breeding there.

Wetland Birds: With fewer wetland areas in the study site we could report only 24 species of wetland birds and most of them were reported from Nugu

back-water and Malleshwara Gudda along with 19 species of water birds recorded from Sollepura forests including the egrets, sand pipers, spotbilled ducks, herons and cormorants. Three bar headed geese (*Anser indicus*) were seen flying across the area and is reported as Vagrant. 24 species of water birds were recorded from Nugu back-waters area including the rare reef heron, while large cormorants were seen nesting in the area. However, long term continuous monitoring will definitely give a better picture of wetland birds as many of them are migratory.

Other birds: Other birds include the insectivores birds which were common in most of the study sites like bee eaters, indian roller, swallows, swifts, common hoopoe, asian paradise-flycatcher, small minivet and drongos. Common frugivores were also reported from most of the areas which include barbets, parakeets, koels etc. Some of the bird parties in Sollepura were seen feeding on the flowering of bamboo which had bloomed all over the area, the common birds in the party were the common rosefinch (*Carpodacus erythrinus*), indian silverbill (*Lonchura malabarica*), common mynas (*Acridotheres tristis*), jungle myna (*Acridotheres fuscus*), plump headed parakeets (*Psittacula cyanocephala*) and rose ringed parakeets (*Psittacula krameri*). This was also observed in Sargur range where we recorded the common birds like the common mynas (*Acridotheres tristis*), jungle myna (*Acridotheres fuscus*) and rose ringed parakeets (*Psittacula krameri*) were seen feeding on the horse gram in the area.

Rare birds: Some rare birds were also reported during our study period. Sirkeer malkoha (*Phaenicophaeus leschenaultia*) and the lesser whitethroat (*Sylvia curruca*) which are winter visitors are hard to sight were reported from the Sargur range. A lone rare Western reef egret mixed with little and median egret was reported from Nugu dam area. Malabar lark (*Galerida malabarica*) restricted to the Western Ghats is reported for the first time from this area as earlier representations show their distribution was limited to Karapura area.

Conclusion: In spite of the fact that all the study sites are disturbed by various anthropogenic activities, still a good number of bird species have been reported in the limited study period of time. In developing countries developmental activities are more concentrated in urban and their adjacent areas including agriculture and more natural vegetated areas (McGranahan and Satterthwaite, 2003) it becomes very important that such vegetated areas needs to be conserved for survival of any wildlife species. Evans *et al.* (2009)



says that influence of sequential human presence decreases the breeding densities of birds. It is believed; many birds perceive humans as potential predators and respond in a way which leads to a reduction in use of resources, such as nesting sites or food (Schulz and Stock, 1993; Madsen, 1995; Gill *et al.*, 1996; Gill, 2007). With fragmented patches supporting such a good number of avifauna in Mysore division, it becomes imperative to restrict the movement of humans in these areas and restore the degrading forests for future.

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**a.** Golden Oriole., **b.** Blue rock thrush., **C.** Black drango.,  
**d.** Wire tailed swallows., **e.** Sky Lark at nest., **f.** Indian Silver bill.





**a.** Egyptian vulture., **b.** Tawny eagle with its prey., **c.** Eurasian eagle owl ., **d.** Bonelli's hawk Eagle., **e.** Crested serpent eagle.

## Conclusions and conservation measures

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All the study sites being fragmented and surrounded by villages are highly exposed to anthropogenic activities. However inspite of this, there is a lot of wildlife left and thriving in these fragmented forests. It is high time now that proper strict conservational actions be taken to preserve these forest patches as they prove to be refuge zones for many mammals and birds.

Among all the study sites Chammundi hills is better conserved and protected. The metal fencing has worked well to a great extent and acted as an external shield. Thanks to some good protection and strict action one can see the change in its ever increasing vegetation growth and bird species over the years. Though same method of protection cannot be implied every where like in the areas of elephant movement, but can be tried in some places like Mallesawara gudda, Vadagal Ranganatha Swamy betta, Mallikarjunaswamy betta etc.

1. Our findings suggest that, the Sollepura reserve forest which is adjoining to Nagarhole harbour many large mammals and is continous with the protected area. This area should become part of buffer region of Nagarhole, so that management and protection can be properly enforced.
2. Bonnet macaques from Chamundi hill should not be relocated. Relocation is not a solution to solve the problem. High inflow of tourists has increased the business setup in the hill. Easy available food makes the animals more domesticated and aggressive. Further due to the loss of roadside trees all over the state in the last five years, the number of bonnet macaque groups has drastically declined. Sooner they will become vary rare, in this dismal scenario; the tiny forests become the home for such animals. Chamundi hill will be one such area which can hold large population of many species including bonnet macaques.
3. Leopards need do be monitored for their movement and feeding ecology, since their sighting rate has gone very high in the Mysore plateau. All the sightings of adults and cubs should be recorded and mapped. This will help in understanding them better in the human dominated landscape.

4. Blackbucks in Konnanur and porcupine in Mallikarjuna betta require adequate protection. If habitat is changed by introducing more trees the grasslands would reduce and the blackbuck may turn on to crops for food and end up in man animal conflict. This might result in gradual elimination of the blackbuck by local people. The preferred habitat of blackbuck is open grassland with little scrub forest and few shading trees. Hence we recommend retaining of small proportion of eucalyptus plantation, and no further planting at foothill.
5. Open scrub jungles are open with high visibility. Though birds of prey like the crested serpent eagle, honey buzzard, etc. are more of forest birds, they were seen using these areas very frequently as foraging grounds. Hence, conserving these open scrub jungles is of most important to sustain these birds.
6. Unless-until the firewood collection and hunting is controlled in all the forests, nothing can be achieved.
7. Unauthorised movement of people in these forests should be restricted. This would give more space to birds and animals as they feel threatened by human presence and stop breeding in their presence.
8. Some of the mining areas are on the periphery of reserve forests (e.g. Chikkadevannabetta and Malleshwara Gudda). Once the current mining licence is expired efforts can be put to stall further permission of mining. This helps the land to regenerate and can hold more wildlife in future.
9. In all the study sites where there are religious temples, strict action needs to be taken for proper disposal of wastes carried by the people in the name of god. Especially where there are offerings of animals and poultry birds.
10. Water recharge is very important in any given area and its very important to identify the areas where one can harvest water and tap the rain water. The rainwater flow can be channelised in the form of feeder canals and directed to recharge pits. Construction of check dams and bunds play an important role as water holes in summer and will also increase the water table.

11. Creating awareness among local people about the importance of such fragmented forests and the reason to conserve them should be of top priority.
12. A field guide having checklist of plants, mammals, birds, butterflies and other insects, description of common ones with sketch shall be brought out to educate the interested public and students. The treasure of wilderness provides people with a unique opportunity for nature study and environment and conservation education.



## Appendix I. Mammal status in different Reserve Forests of Mysore Forest Division

Sl No	Species	H.D. Kote Range		Sargur Range	T.N. Pura Range		Nanjan gud	Mysore		Urban	Status
		Sollepura	Malle Gudda	C. D. Betta Kottagal & M. gudda	Vadagal R.S. Betta	M. S. betta	Konnanur	Chickanahalli	Varakodu	C. hill	
1	Bonnet macaque <i>M. radiata</i>	P (1,6)	P (6)	P (1)	Ab	Ab	P (6)	P (6)	Ab	P (1)	LRlc
2	Tiger <i>Panthera tigris</i>	P (2,3,6)	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	EN
3	Leopard <i>P. pardus</i>	P (2,3,6)	P (2,3,6)	P (2,3,6)	P (2,3,6)	Ab	P (2,3,6)	P (2,3,6)	P (2,3,6)	P (2,3,6)	VU
4	Jungle cat <i>Felis chaus</i>	P (2,6)	N	P (2,6)	N	P (1,6)	P (6)	P (2,6)	N	N	LRnt
5	Leopard cat <i>F. bengalensis</i>	P (6)	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	LRnt
6	Rusty spotted cat <i>F. rubiginosa</i>	N	N	N	N	N	P (1)	N	N	P (6)	DD
7	Dhole <i>Cuon alpinus</i>	P (2,3,6)	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	VU
8	Golden jackal <i>Canis aureus</i>	P (2,6)	N	P (6)	P (6)	P (6)	P (6)	P (6)	P (2,6)	P (6)	LRlc
9	Indian Fox <i>Vulpes bengalensis</i>	P (6)	N	N	N	N	N	P (2,6)	P (6)	N	LRlc
10	Small Indian civet <i>Viverricula indica</i>	P (2,6)	P (2,6)	P (2,6)	P (2,6)	P (2,6)	Ab	P (2,6)	P (2,6)	P (1,2,6)	LRlc
11	Common palm civet <i>Paradoxurus hermophroditus</i>	P (2,6)	P (2,6)	P (2,6)	P (2,6)	P (2,6)	P (6)	P (2,6)	P (2,6)	P (1,2,4,6)	LRlc
12	Common mongoose <i>H. edwardsi</i>	P (1,2,6)	P (6)	P (1,2,6)	P (6)	P (6)	P (6)	P (6)	P (1,6)	P (1, 6)	LRlc

13	Muntjac <i>Muntiacus muntjak</i>	P (2,6)	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	LRlc
14	Sambar <i>Cervus unicolor</i>	P (2,6)	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	LRlc
15	Spotted deer <i>Axix axis</i>	P (2,6)	Ab	P (2,6)	P (2,6)	Ab	Ab	P (2,6)	P (6)	Ab	LRlc
16	Four horned antelope <i>Tetracerus quadricornis</i>	P (2,6)	Ab	Ab	Ab	Ab	Ab	Ab	Ab	Ab	EN
17	Black buck <i>Antilope cervicarpa</i>	Ab	Ab	Ab	Ab	Ab	Ab	Ab	P(2,3,5,6)	Ab	EN
18	Wild pig <i>Sus scrofa</i>	P (2, 6)	P (2, 6)	P (1,2,6)	P (2,6)	P (2,6)	P (6)	P (2,6)	P (6)	P (1,2,6)	LRlc
19	Elephant <i>Elephas maximus</i>	P (1,2,3,7)	Ab	P (1,2,3,7)	Ab	Ab	Ab	P (6)	Ab	Ab	EN
20	Porcupine <i>Hystrix indica</i>	N	N	P (2,6)	P (2,6)	P (2,6)	P (2,6)	N	P (2,6)	N	LRlc
21	Pangolin <i>Manis crassicaudata</i>	N	N	N	N	N	P (6)	N	N	P(6)	
22	Sloth bear <i>Melursus ursinus</i>	P (2,3,6)	Ab	P (6)	Ab	Ab	Ab	Ab	Ab	Ab	VU
23	Black-naped hare <i>Lepus nigricollis</i>	P (2,6)	P (2,6)	P (1,2,6)	P (1,2,6)	P (2,6)	P (2,6)	P (2,6)	P (1,2,6)	P (1,2,6)	LRlc

**P : Present; Ab - : Absent; N : No Information**

**1 : Sighted; 2 : Fecal deposit; 3 : Foot prints; 4 : Body parts; 5 : Roost sites; 6 : Local information; 7 : Crop damage**

**CR : Critically endangered; EN : Endangered; VU : Vulnerable; LRnt : Lower-risk near threatened; LRlc : Lower-risk least concern; DD : Data deficient**

## Appendix II. Plants status in different Reserve Forests of Mysore Forest Division

SPECIES SL NO.	FAMILY SL NO.	PLANTS species	CHAMUNDI BETTA	SOLLEPURA	CHIKKADEVAMMANA BETTA	CHIKKANAHALLI	KONANUR GUDDA	KOTHEGALA	M. SWARA GUDDA	MALLIKARJUNA SWAMY BETTA	MULLUR GUDDA	WADGAL R. S. BETTA
	1	ACANTHACEAE										
1		Andrographis echioides	y	Y	Y				y			
2		Andrographis serpyllifolia	y	Y		y	y	Y	y	y	y	y
3		Asystasia gangetica	y	Y		y			y			y
4		Barleria buxifolia	y	Y		y	y	Y	y		y	y
5		Barleria cristata	y	Y	Y				y			y
6		Barleria prionitis	y	Y	Y	y	y		y	y	y	y
7		Blepharis maderaspatensis	y	Y	Y	y	y	Y	y	y	y	y
8		Blepharis repens	y									y
9		Crossandra infundibuliformis	y									
10		Dipteracanthus patulus	y	Y		y	y		y			y
11		Hygrophyla auriculata	y									
12		Justicia betonica	y									
13		Justicia diffusa	y	Y	Y	y	y	Y	y	y	y	y
14		Justicia tranquebariensis	y	Y					y			
15		Lepidagathis prostrata	y	Y	Y	y			y	y	y	y
16		Peristrophe bicalyculata	y	Y		y			y			y
17		Rhaphidophora glabra	y									
18		Rostellulatia procumbens	y									
19		Rungia repens	y									
	2	AGAVACEAE										
20		Agave Americana	y	Y	Y	y	y	y	y	y	y	y
22		Furcraea foetida	y	Y	Y	y			y		y	y
	3	AIZOCEAE										
23		Trianthema portulacastrum	y									y
	4	AMARANTHACEAE										
24		Achyranthes aspera	y	Y	Y	y	y	Y	y	y	y	y
25		Aerva lanata	y	Y	Y	y	y	Y	y	y	y	y
26		Aerva monsoniae	y	Y		y			y			y
27		Allmania nodiflora	y	Y	Y	y	y		y		y	y
28		Alternanthera ficoidea	y	Y					y			y
29		Alternanthera pungens	y	Y		y			y			y
30		Amaranthus gracilis	y									
31		Alternanthera sessilis	y	Y	Y	y	y	Y	y	y	y	y
32		Amaranthus tricolor	y									
33		Amaranthus spinosus	y	Y		y			y			
34		Celosia argentea	y	Y	Y	y	y	Y	y	y	y	y
35		Digera muricata	y	Y	Y	y			y			y
36		Gomphrena celosioides	y	Y	Y	y	y	Y	y	y	y	y
37		Pupalia lappacea	y	Y		y			y			y



	5	ANACARDIACEAE											
38		Anacardium occidentale	y	Y	Y	y			y				y
39		Lannea coromandelica	y	Y	Y	y			y				y
40		Mangifera indica	y	Y	Y	y			y	y	y	y	y
41		Rhus mysorensis	y	Y	Y	y		y	y	y	y	y	y
	6	ANNONACEAE											
42		Annona reticulata	Y						y				
43		Annona squamosa	y	Y		y			y				y
44		Miliusa tomentosa		Y		y							
45		Polyalthia longifolia	y										
	7	APOCYNACEAE											
46		Carissa congesta	y	Y		y			y				y
47		Catharanthus pusillus	y	Y		y			y				y
48		Catharanthus roseus	y	Y					y				y
49		Holarrhena antidysenterica	y	Y		y			y				y
50		Ichnocarpus frutescens	y	Y	Y	y	y	y	y	y	y	y	y
51		Nerium indicum	y	Y	Y	y			y			y	y
52		Plumeria alba	y										
53		Plumeria rubra form auminata	y	Y	Y	y	y		y			y	y
54		Thevetia peruviana	y	Y		y			y				y
55		Wrightia tinctoria	y	Y	y	y	y	y	y	y	y	y	y
	8	APONOGETONACEAE											
56		Aponogeton natans	y										
	9	ARALIACEAE											
57		Schefflera venulosa	y										
	10	ARACEAE											
58		Colocasia esculenta	y										
59		Lemna perpusilla	y										
	11	ARECACEAE											
60		Cocos nucifera	y										
61		Phoenix sylvestris		Y		y			y				y
	12	ARISTOLOCHIACEAE											
62		Aristolochia indica	y	Y	y	y		y	y			y	y
	13	ASCLEPIADACEAE											
63		Asclepias curassavica	y		Y							y	y
64		Calatropis gigantea	y	Y	Y	y	y	y	y	y	y	y	y
65		Caralluma adscendens	y	Y	Y	y		y	y			y	y
66		Caralluma umbellata	y	Y	Y	y		y	y	y	y	y	y
67		Ceropegia candelabrum	y	Y	Y	y			y				y
68		Ceropegia juncea	y										
69		Cynanchum tunicatum	y	Y					y				
70		Daemia extensa	y	Y	Y	y	y	y	y	y	y	y	y
71		Dregea volubilis	y	Y	Y	y	y		y				y
72		Gymnema sylvestre	y	Y	Y	y	y	y	y	y	y	y	y
73		Leptadenia reticulata	y										y
74		Pentatropis capensis	y										
75		Sarcostemma acidum	y	Y	Y	y	y	y	y			y	y
76		Secamone emetica	y	Y	Y	y	y	y	y			y	y
77		Tylophora indica	y	Y	Y	y	y	y	y	y	y	y	y
	14	ASPARAGACEAE											
78		Asparagus racemosus	y	Y	y	y		y	y			y	y
	15	ASTERACEAE											
79		Acanthospermum hispidum	y	Y	y	y		y	y	y	y	y	y
80		Ageratum conyzoides	y	Y	y	y	y	y	y	y	y	y	y
81		Bidens pilosa	y	Y	y	y	y	y	y	y	y	y	y
82		Bidens humilis	y	Y		y			y				
83		Blainvillea acmella	y	Y	y	y			y				y
84		Blepharispermum subsessile	y										
85		Blumea mollis	y										
86		Chromolaena odorata	y	Y	y	y	y	y	y	y	y	y	y

87		<i>Conyza stricta</i>	y	Y		y			y				
88		<i>Crassocephalum crepidioides</i>	y										
89		<i>Echinops echinatus</i>	y	Y	y	y			y		y	y	
90		<i>Eclipta prostata</i>	y	Y		y			y				y
91		<i>Galinsoga ciliata</i>	y	Y	y	y	y	y	y	y	y	y	y
92		<i>Glossocardia bosvallea</i>	y	Y	y	y	y		y	y	y	y	y
93		<i>Lagascea mollis</i>	y	Y	y	y	y	y	y	y	y	y	y
94		<i>Parthenium hysterphorus</i>	y	Y	y	y	y	y	y	y	y	y	y
95		<i>Senecio tenuifolius</i>	y	Y		y			y				
96		<i>Sonchus arvensis</i>	y	Y		y			y				y
97		<i>Sphaeranthes indicus</i>	y	Y		y			y				y
98		<i>Spilanthes acmella</i>	y	Y	y	y			y		y	y	
99		<i>Synedrella nodiflora</i>	y	Y	y	y	y	y	y	y	y	y	y
100		<i>Tridax procumbens</i>	y	Y	y	y	y	y	y	y	y	y	y
101		<i>Vernonia cinerea</i>	y	Y	y	y	y	y	y	y	y	y	y
102		<i>Vernonia divergens</i>	y										
103		<i>Vicoa indica</i>	y	Y	y	y	y	y	y	y	y	y	y
104		<i>Xanthium strumarium</i>	y	Y	y	y		y	y		y		
	16	BIGNONACEAE											
105		<i>Bignonia magnifica</i>	y										y
106		<i>Dolichandrone crispa</i>	y	Y	y	y	y	y	y	y	y		
107		<i>Jacaranda mimosifolia</i>	y										
108		<i>Kigelia pinnata</i>	y										
109		<i>Millingtonia hortensis</i>	y	Y		y			y				y
110		<i>Spathodea campanulata</i>	y	Y		y			y				y
111		<i>Stereospermum personatum</i>	y	Y									
112		<i>Tabebuia argentea</i>											y
113		<i>Tecoma stans</i>	y	Y	y	y		y	y	y	y	y	y
	17	BOMBACACEAE											
114		<i>Bombax ceiba</i>	y		y								
	18	BORAGINACEAE											
115		<i>Trichodesma indicum</i>	y	Y	y	y	y	y	y	y	y	y	y
116		<i>Trichodesma zeylanicum</i>	y	Y	y	y			y				
	19	BRASSICACEAE											
117		<i>Brassica nigra</i>	y										
118		<i>Coronopus didymus</i>	y										
119		<i>Raphanus sativus</i>	y										
	20	BURSERACEAE											
120		<i>Boswellia glabra</i>	y	Y	y	y			y		y	y	
121		<i>Commiphora berryi</i>								y	y		
122		<i>Commiphora caudata</i>	y	Y	y	y			y				y
123		<i>Garuga pinnata</i>	y	Y	y	y			y				y
	21	BYTTNERIACEAE											
124		<i>Byttneria herbacea</i>	y	Y	y	y		y	y	y	y	y	y
	22	CACTACEAE											
125		<i>Opuntia coccinellifera</i>	y										
126		<i>Opuntia dillenii</i>		Y	y	y	y	y	y	y	y	y	y
	23	CAESALPINIOIDAE											
127		<i>Caesalpinia coriara</i>	y										
128		<i>Caesalpinia decapetala</i>	y										
129		<i>Caesalpinia pulcherrima</i>	y										
130		<i>Cassia absus</i>	y	Y	y	y			y	y	y	y	y
131		<i>Cassia auriculata</i>	y	Y	y	y	y	y	y	y	y	y	y
132		<i>Cassia fistula</i>	y	Y	y	y	y	y	y	y	y	y	y
133		<i>Cassia hirsuta</i>	y	Y	y				y	y	y	y	y
134		<i>Cassia javanica</i>											y
135		<i>Cassia mimosoides</i>	y	Y	y	y		y	y		y	y	y
136		<i>Cassia montana</i>	y	Y	y	y	y	y	y	y	y	y	y
137		<i>Cassia occidentalis</i>	y	Y	y	y	y	y	y	y	y	y	y
138		<i>Cassia pumila</i>	y										y

139		Cassia siamea	y	Y	y	y	y	y	y	y	y	y
140		Cassia spectabilis	y	Y	y	y	y	y	y	y	y	y
141		Cassia surattensis			y							
142		Cassia tora	y	Y	y			y	y		y	y
143		Delonix elata	y									y
144		Delonix regia	y		y						y	y
145		Hardwickia binata	y	Y	y	y		y	y		y	y
146		Peltophorum pterocarpum	y	Y		y			y	y		y
147		Pterolobium hexapetalum	y	Y	y	y		y	y		y	y
148		Tamarindus indica	y	Y	y	y	y	y	y	y	y	y
	24	CAMPANULACEAE										
149		Wahlebergia erecta	y									
	25	CANNACEAE										
150		Canna indica	y									
	26	CAPPARACEAE										
151		Cadaba fruticosa	y	Y	y	y		y	y	y	y	y
152		Capparis grandiflora	y	Y	y	y			y			
153		Capparis sepiaria	y	Y	y	y	y	y	y	y	y	y
154		Capparis zeylanica	y	Y	y	y	y	y	y	y	y	y
155		Capparis divericata										y
	27	CARYOPHILLACEAE										
156		Polycarpea corymbosa	y	Y	y	y	y	y	y	y	y	y
	28	CASUARINACEAE										
157		Casuarina equisetifolia	y	Y		y			y			y
	29	CELASTRACEAE										
158		Cassine glauca	y	Y	y	y		y	y		y	y
159		Celastrus paniculata	y	Y		y			y			y
160		Maytenus emarginata	y	Y		y		y	y	y	y	y
161		Gymnosporia montana	y	Y	y	y	y		y			
162		Pleurostylis wightii	y									y
	30	CERATOPHALLACEAE										
163		Ceratophyllum demersum	y									
	31	CLEOMACEAE										
164		Cleome gynandra	y									
165		Cleome monophylla	y									
166		Cleome viscosa	y	Y		y	y		y			y
	32	COCHLOSPERMACEAE										
167		Cochlospermum religiosum	y	Y		y			y			y
	33	COMBRETACEAE										
168		Anogeissus latifolia	y	Y	y	y		y	y		y	y
169		Terminalia bellerica	y	Y		y			y			
170		Terminalia chebula		Y	y	y		y	y		y	
171		Terminalia crenulata	y	Y	y	y		y	y		y	
172		Terminalia tomentosa										y
	34	COMMELINACEAE										
173		Commelina benghalensis	y	Y	y	y	y	y	y	y	y	y
174		Commelina hasskarlii	y	Y	y	y		y	y			
175		Cyanotis cristata	y									y
176		Cyanotis fasciculata	y									y
177		Cyanotis pilosa	y									
178		Cyanotis tuberosa	y									
	35	CONVOLVULACEAE										
179		Argyrea cuneata	y	Y	y	y	y	y	y	y	y	y
180		Argyrea elliptica	y						y			
181		Argyria hirsuta	y									y
182		Argyria speciosa	y	Y	y	y	y	y	y	y	y	
183		Evolvus alsinoides	y	Y	y	y	y	y	y	y	y	y
184		Ipomoea carica	y	Y		y			y			y
185		Ipomoea eriocarpa	y	Y	y	y		y	y		y	y
186		Ipomoea fistulosa	y									

187		<i>Ipomoea muricata</i>	y	Y	y	y		y	y	y	y	y
188		<i>Ipomoea obscura</i>	y	Y	y	y	y	y	y	y	y	y
189		<i>Ipomoea pes-tigridis</i>	y	Y		y			y			y
190		<i>Ipomoea repens</i>	y									y
191		<i>Ipomoea staphylina</i>	y	Y	y	y	y	y	y	y	y	y
192		<i>Jacquemontia paniculata</i> var <i>paniculata</i>		Y					y			
193		<i>Merremia tridentata</i>	y	Y	y	y		y	y			y
	36	CRASSULACEAE										
194		<i>Kalanchoe lancifolia</i>	y	Y		y			y			
195		<i>Kalanchoe floribunda</i>	y		y			y			y	
196		<i>Kalanchoe tubiflora</i>	y									
	37	CUCURBITACEAE										
197		<i>Coccinia indica</i>	y	Y		y			y			
198		<i>Corallocarpus epigaeus</i>	y	Y		y			y			
199		<i>Cucumis melo</i>	y	Y		y			y			
200		<i>Cucurbita maxima</i>	y	Y		y			y			
201		<i>Diplocyclos palmatus</i>	y	Y	y	y			y			y
202		<i>Legenaria leucantha</i>	y									
203		<i>Momordica charantia</i>	y									
204		<i>Trichosanthes anguina</i>	y									
	38	CUSCUTACEAE										
205		<i>Cuscuta hyalina</i>	y	Y		y			y			y
	39	CYPERACEAE										
206		<i>Bulbostylis barbata</i>	y	Y		y			y			y
207		<i>Cyperus articulatus</i>	y	Y					y			
208		<i>Cyperus alopecuroides</i>	y	Y		y			y			y
209		<i>Cyperus clarkei</i>	y						y			
210		<i>Cyperus corymbosus</i>	y	Y		y			y			y
211		<i>Cyperus exaltatus</i>	y	Y					y			
212		<i>Cyperus iria</i>	y						y			y
213		<i>Cyperus rotundus</i>	y	Y		y			y			y
214		<i>Cyperus tenuispica</i>	y	Y					y			y
215		<i>Cyperus triceps</i>	y			y			y			
216		<i>Eleocharis acutangula</i>	y	Y					y			
217		<i>Fimbristylis falcata</i>	y	Y		y			y			y
218		<i>Fimbristylis ovata</i>	y	Y					y			y
	40	DIOSCOREACEAE										
219		<i>Dioscorea oppositifolia</i>	y	Y		y			y			
220		<i>Dioscorea pentaphylla</i>		Y		y						
	41	DIPTEROCARPACEAE										
221		<i>Shorea roxburghii</i>	y									
	42	EBENACEAE										
222		<i>Diospyros montana</i>	y	Y	y	y		y	y	y	y	y
223		<i>Diospyros ebanum</i>	y	Y		y	y		y			
224		<i>Diocpyros melanoxylon</i>		y	y							
	43	EHRETIACEAE										
225		<i>Ehretia pubescens</i>	y	Y		y			y			y
226		<i>Carmona retusa</i>	y	Y	y	y		y	y		y	y
	44	ELATINACEAE										
227		<i>Bergia ammannioides</i>	y									
	45	ERYTHROXYLACEAE										
228		<i>Erythroxylum monogynum</i>	y	Y	y	y	y	y	y	y	y	y
	46	EUPHORBIACEAE										
229		<i>Acalypha indica</i>	y	Y	y	y		y	y			y
230		<i>Breynia vitis-ideaea</i>	y	Y	y	y		y	y		y	
230		<i>Bridelia retusa</i>	y	Y	y	y			y		y	y
231		<i>Bridelia roxburghiana</i>	y									
232		<i>Chamaesyce cristata</i>	y	Y		y			y			y
233		<i>Chamaesyce fimbriata</i>	y									

234		<i>Chamaesyce hirta</i>	y									y
235		<i>Chamaesyce prostrata</i>	y									y
236		<i>Chamaesyce thymifolia</i>	y									
237		<i>Codiaeum variegatum</i>	y									
238		<i>Croton bonplandium</i>	y	Y	y	y	y	y	y	y	y	y
239		<i>Euphorbia antiqorum</i>	y	Y	y	y	y	y	y	y	y	y
240		<i>Euphorbia heterophylla</i>	y	Y	y	y		y	y	y	y	y
241		<i>Euphorbia pulcherrima</i>	y		y							
242		<i>Euphorbia tirucalli</i>	y									
243		<i>Euphorbia nivula</i>		Y	y				y			y
244		<i>Jatropha curcas</i>	y									y
245		<i>Jatropha gossypifolia</i>	y	Y	y	y	y	y	y	y	y	y
246		<i>Kirganellia reticulata</i>	y	Y	y	y	y	y	y			y
247		<i>Manihot glaziovii</i>	y									y
248		<i>Phyllanthus amarus</i>	y	Y	y				y		y	y
249		<i>Phyllanthus emblica</i>	y	Y	y	y			y		y	y
250		<i>Phyllanthus indofischeri</i>				y						y
251		<i>Phyllanthus maderaspatensis</i>	y	Y	y	y	y		y	y	y	y
252		<i>Phyllanthus rheedii</i>	y									y
253		<i>Phyllanthus virgatus</i>	y									y
254		<i>Ricinus communis</i>	y	Y		y			y			y
255		<i>Sebastiania chamaelea</i>	y	Y	y	y	y	y		y	y	y
256		<i>Securanea leucopyrus</i>	y	Y	y	y	y	y	y	y	y	y
257		<i>Synadinium grantii</i>	y	Y	y	y	y	y	y	y	y	y
258		<i>Tragia involucrata</i>	y	Y		y			y			y
	47	FABACEAE										
259		<i>Abrus precatorius</i>	y	Y	y	y	y	y	y	y	y	y
260		<i>Aeschynomene aspera</i>	y									
261		<i>Aeschynomene indica</i>	y									y
262		<i>Alysicarpus glumaceus</i>	y									
263		<i>Alysicarpus monilifer</i>	y									y
264		<i>Alysicarpus vaginalis</i>	y	Y		y	y		y			y
265		<i>Atylosia albicans</i>	y	Y					y			y
266		<i>Atylosia scarabaeoides</i>	y	Y	y	y			y	y	y	y
267		<i>Butea monosperma</i>	y	Y	y	y			y	y	y	y
268		<i>Clitoria ternatea</i>	y	Y	y	y	y	y	y	y	y	y
269		<i>Crotalaria albida</i>	y		y							y
270		<i>Crotalaria berteroaana</i>	y									
271		<i>Crotalaria bifaria</i>	y									
272		<i>Crotalaria calycina</i>	y	Y					y			y
273		<i>Crotalaria laburnifolia</i>	y	Y					y			y
274		<i>Crotalaria orixensis</i>	y									
275		<i>Crotalaria pusilla</i>	y	Y	y			y	y		y	y
276		<i>Crotalaria ramosissima</i>	y									
277		<i>Crotalaria retusa</i>	y	Y		y	y		y	y		y
278		<i>Crotalaria verrucosa</i>	y	Y		y			y			y
279		<i>Dalbergia paniculata</i>	y	Y		y			y			y
280		<i>Dalbergia sissoo</i>	y	Y	y	y	y		y	y	y	y
281		<i>Derris scandens</i>	y	Y		y			y			y
282		<i>Erythrina indica</i>		Y								
283		<i>Erythrina suberosa</i>			y							
284		<i>Erythrina stricta</i>	y									
285		<i>Erythrina variegata</i>	y									y
286		<i>Glyiricidia sepium</i>	y	Y	y	y	y	y	y	y	y	y
287		<i>Glycine wightii</i>	y									
288		<i>Indigofera astragalina</i>	y	Y					y			y
289		<i>Indigofera cordifolia</i>	y	Y		y			y			y
290		<i>Indigofera linifolia</i>	y	Y	y	y	y	y	y	y	y	y
291		<i>Indigofera linnaei</i>	y	Y	y	y			y	y	y	
292		<i>Pongamia pinnata</i>	y	Y	y	y	y	y	y	y	y	y

293		Pseudarthria viscida	y	Y					y			
294		Pterocarpus marsupium	y	Y	y	y			y	y	y	y
295		Rhynchosia minima	y	Y	y	y			y	y	y	y
296		Rhynchosia rufescens	y	Y	y	y			y	y	y	y
297		Rhynchosia suaveolens	y	Y	y	y	y		y	y	y	y
298		Rothia indica	y									
299		Sesbania sesban	y	Y		y			y			y
300		Stylosanthes fruticosa	y	Y	y	y	y		y	y	y	y
301		Tephrosia hirta	y	Y	y	y			y	y	y	y
302		Tephrosia pumila	y	Y	y	y			y	y		y
303		Tephrosia purpurea	y	Y	y	y	y		y	y	y	y
304		Tephrosia tinctoria	y	Y	y	y			y	y		y
305		Teramnus labialis	y									
306		Vigna trilobata	y						y			y
307		Zornia gibbosa	y	Y		y						y
	48	FLACOURTIACEAE										
308		Flacourtia indica	y	Y	y	y	y		y		y	
	49	FLINDERSIACEAE										
309		Chloroxylon swietenia	y	Y	y	y	y		y	y	y	y
	50	GENTIANACEAE										
310		Enicostemma hyssopifolium	y									
311		Exacum pedunculatum	y									
312		Nymphoides indica	y									
	51	HELIOTROPIACEAE										
313		Heliotropium scabrum	y	Y		y			y			y
314		Heliotropium indicum	y	Y		y			y			y
	52	HYDROCHARITACEAE										
315		Ottelia alismoides	y									
	53	HYDROCOTYLACEAE										
316		Centella asiatica	y									y
	54	HYDROPHYLLACEAE										
317		Hydrolea zeylanica	y						y			
	55	HYPOXIDACEAE										
318		Curculigo orchioides	y	Y	y	y			y	y		y
	56	LALISMATAACEAE										
319		Limnophyton obtusifolium	y									
	57	LAMIACEAE										
320		Anisochlus carnosus	y		y							
321		Anisomelis indica	y	Y		y			y			y
322		Anisomelis malabarica	y	Y		y			y			
323		Coleus aromaticus	y									
324		Coleus barbatus		Y		y			y			
325		Coleus caninus	y		y				y			y
326		Coleus forskalaei	y									
327		Hyptis suaveolens	y	Y	y	y	y		y	y	y	y
328		Leucas aspera	y	Y	y	y	y		y	y	y	y
329		Leucas eriostoma	y									
330		Leucas martinicensis	y									
331		Ocimum americanum						y				
332		Ocimum basilicum	y		y							
333		Ocimum canum	y	Y	y				y	y		y
334		Ocimum gratissimum	y	Y		y			y			
335		Ocimum sanctum	y	Y	y	y	y		y	y	y	y
336		Orthosiphon diffusus	y	Y	y	y	y		y	y	y	y
337		Plectranthus mollis	y	Y		y			y			
	58	Lauraceae										
338		Cassytha filiformis	y	Y		y			y			
	59	Liliaceae										
339		Aloe vera	y									
340		Gloriosa superba	y	Y	y	y			y	y		y

341		<i>Iphigenia indica</i>	y	Y		y			y			y
342		<i>Sansevieria roxburghiana</i>	y	Y		y			y			y
343		<i>Scilla hyacinthina</i>	y	Y	y	y			y	y	y	y
344		<i>Urginea indica</i>	y	Y	y	y			y	y		y
	60	LOGANIACEAE										
345		<i>Strychnos potatorum</i>	y	Y	y	y	y	y	y		y	y
	61	LORANTHACEAE										
346		<i>Dindrophthoe trigona</i>	y	Y	y	y			y	y		y
347		<i>Elytranthe parasitica</i>	y									
348		<i>Taxillus cuneatus</i>	y									
349		<i>Viscum articulatum</i>	y	Y	y	y	y	y	y			y
350		<i>Viscum orientale</i>	y	Y		y			y			y
	62	LYTHRACEAE										
351		<i>Ammannia baccifera</i>	y									y
352		<i>Ammannia densiflora</i>	y									
353		<i>Ammannia multiflora</i>	y									
354		<i>Lawsonia inermis</i>	y									
	63	MAGNOLIACEAE										
355		<i>Michelia champaka</i>	y	Y	y	y			y		y	y
	64	MALVACEAE										
356		<i>Abutilon indicum</i>	y		y				y			y
357		<i>Abutilon pannosum</i>	y									
358		<i>Hibiscus furcatus</i>	y									y
359		<i>Hibiscus lobatus</i>	y	Y	y	y			y	y		y
360		<i>Hibiscus ovalifolius</i>	y	Y		y			y			
361		<i>Hibiscus rosa-sinensis</i>	y	Y	y	y			y			y
362		<i>Hibiscus sabdariffa</i>	y									
363		<i>Hibiscus vitifolius</i>	y									
364		<i>Malvastrum coramandalianum</i>	y	Y	y	y			y	y	y	y
365		<i>Pavonia odorata</i>	y	Y		y	y		y			
366		<i>Pavonia Zeylanica</i>	y	Y	y	y			y	y	y	y
367		<i>Sida acuta</i>	y	Y	y	y	y	y	y	y	y	y
368		<i>Sida alba</i>	y									
369		<i>Sida cordata</i>	y			y						y
370		<i>Sida cordifolia</i>	y	Y					y			y
371		<i>Sida mysorensis</i>	y									y
372		<i>Sida rhombifolia</i>	y	Y	y	y			y			y
373		<i>Thespesia populnea</i>	y	Y		y			y			y
374		<i>Urena lobata</i>	y	Y		y			y			y
	65	MARTYNIACEAE										
375		<i>Martynia annua</i>	y									y
	66	MELASTOMATACEAE										
376		<i>Osbeckia zeylanica</i>										y
	67	MELIACEAE										
377		<i>Azadirachta indica</i>	y	Y	y	y	y	y	y	y	y	y
378		<i>Cipadessa baccifera</i>	y	Y		y			y			y
379		<i>Melia dubea</i>					y					
380		<i>Soymida febrifuga</i>	y	Y		y			y			
	68	MENISPERMACEAE										
381		<i>Cissampelis pareira</i>	y	Y		y			y			y
382		<i>Cocculus hirsutus</i>	y	Y	y	y	y	y	y	y	y	y
383		<i>Pachygone zeylanica</i>	y	Y	y	y			y	y	y	y
384		<i>Tinospora cordifolia</i>	y	Y	y	y	y	y	y	y	y	y
	69	MOLLUGINACEAE										
385		<i>Mollugo nudicaulis</i>	y	Y		y			y			y
386		<i>Mollugo pentaphylla</i>	y	Y	y	y	y	y	y	y	y	y
	70	MORACEAE										
387		<i>Artocarpus heterophyllus</i>	y	y		y			y			
388		<i>Ficus amplissima</i>	y									

389		<i>Ficus arnottiana</i>	y		y							y
390		<i>Ficus benghalensis</i>	y	Y	y	y	y	y	y	y	y	y
391		<i>Ficus drupacea</i>	y									
392		<i>Ficus microcarpa</i>	y		y							y
393		<i>Ficus mollis</i>	y									
394		<i>Ficus racemosa</i>	y	Y	y	y		y	y	y	y	y
395		<i>Ficus religiosa</i>	y	Y	y	y		y	y	y	y	y
396		<i>Ficus tinctoria</i>	y									
397		<i>Ficus virens</i>	y		y			y		y	y	
398		<i>Plecospermum spinosum</i>	y	Y	y	y		y	y		y	y
399		<i>Streblus asper</i>	y	Y		y			y			y
	71	MIMOSOIDAE										
400		<i>Acacia auriculiformis</i>	y	Y		y	y	y	y	y	y	y
401		<i>Acacia catechu</i>					y					y
402		<i>Acacia chundra</i>	y	Y		y		y	y	y	y	y
403		<i>Acacia farnesiana</i>	y									y
404		<i>Acacia ferruginea</i>	y	Y	y	y	y		y	y	y	y
405		<i>Acacia leucophloea</i>	y	Y	y	y	y	y	y	y	y	y
406		<i>Acacia nilotica</i>	y	Y	y	y		y	y	y	y	y
407		<i>Acacia nilotica var cupressoides</i>						y				
408		<i>Acacia pennata</i>	y	Y	y	y		y	y		y	y
409		<i>Acacia suma</i>	y	Y		y	y		y			y
410		<i>Albizia amara</i>	y	Y	y	y	y	y	y	y	y	y
411		<i>Albizia lebbek</i>	y	Y	y	y	y	y	y	y	y	y
412		<i>Albizia odoratissima</i>	y	Y		y			y			
413		<i>Dichrostachys cinerea</i>	y	Y	y	y	y	y	y	y	y	y
414		<i>Leucaena leucocephala</i>	y									y
415		<i>Mimosa pudica</i>	y		y			y		y	y	y
416		<i>Pithecellobium dulce</i>	y	Y		y			y			
417		<i>Prosopis cineraria</i>	y	Y	y	y			y		y	y
418		<i>Samanea saman</i>	y	Y		y			y			
	72	MORINGACEAE										
419		<i>Moringa oleifera</i>										
	73	MYRTACEAE										
420		<i>Eucalyptis citriodora</i>	y	Y	y	y			y			
421		<i>Eucalyptis tereticornis</i>						y		y	y	
422		<i>Psidium guajava</i>	y	Y	y	y			y			
423		<i>Syzygium cumini</i>	y	Y	y	y		y	y	y	y	
	74	NAJADACEAE										
424		<i>Najas indica</i>	y									
	75	NELUMBONACEAE										
425		<i>Nelumbo nucifera</i>	y									
	76	NYCTAGINACEAE										
426		<i>Boerhavia chinensis</i>	y	Y		y	y		y			y
427		<i>Boerhavia diffusa</i>	y	Y	y	y	y	y	y	y	y	y
428		<i>Bougainvillea spectabilis</i>	y									y
429		<i>Mirabilis jalapa</i>	y	Y		y			y			y
	77	NYCTANTHACEAE										
430		<i>Nyctanthes arbor-tristis</i>	y									
	78	NYMPHAEACEAE										
431		<i>Nymphaea nouchali</i>	y									
432		<i>Nymphaea stellata</i>	y									
	79	OLACACEAE										
433		<i>Ximenia americana</i>		Y		y			y			
	80	OLEACEAE										
434		<i>Jasminum auriculatum</i>	y									
435		<i>Jasminum rigidum</i>			y			y		y	y	y
436		<i>Jasminum rottlerianum</i>	y	Y		y	y		y			y
437		<i>Jasminum grandiflorum</i>	y									



438		Schrebera swietenoides		Y																
	81	ONAGRACEAE																		
439		Ludwigia adscendens	y																	
440		Ludwigia perennis	y																	
	82	OPILIACEAE																		
441		Cansjera rheedii	y	Y		y						y								
442		Opilia amentacea	y										y							
	83	ORCHIDACEAE																		
443		Habenaria plantaginea	y										y							
444		Vanda testacea	y																	
	84	OXALIDACEAE																		
445		Oxalis corniculata	y	Y	y	y				y	y	y	y	y	y	y	y	y	y	y
	85	PAPAVERACEAE																		
446		Argemone mexicana	y	Y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y
	86	PASSIFLORACEAE																		
447		Passiflora foetida	y	Y	y	y	y	y	y	y	y							y	y	
	87	PEDALIACEAE																		
448		Sesamum indicum	y																	
	88	PERIPLOCACEAE																		
449		Cryptolepis buchmani	y	Y	y	y	y	y	y	y	y							y	y	
450		Decalepis hamiltonii	y																	
451		Hemidesmus indicus	y	Y	y	y	y	y	y	y	y							y	y	
	89	PLUMBAGINACEAE																		
452		Plumbago zeylanica	y	Y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y
	90	POACEAE																		
453		Apluda mutica	y																	
454		Aristida hystrix	y	Y		y	y				y									
455		Bambusa bambos	y	Y	y					y	y	y	y	y	y	y	y	y	y	y
456		Chloris barbata	y	Y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y
457		Chrysopogon verticillatus	y			y	y				y									
458		Cymbopogon caesius	y																	y
459		Cymbopogon flexuosus	y		y					y		y	y	y						
460		Cynodon dactylon	y		y					y		y	y	y	y	y	y	y	y	y
461		Dactyloctenium aegyptium	y																	
462		Dandrocalumus strictus					y													
463		Digitaria ciliaris	y	Y	y		y	y	y	y	y	y	y	y	y	y	y	y		
464		Echinochloa colona	y	Y		y					y									
465		Eleusine indica	y					y			y									y
466		Eragrostiella bifaria	y	Y	y	y	y				y	y	y	y	y	y	y	y	y	y
467		Hackelochloa granularis	y	Y							y									y
468		Hetropogon contortus	y	Y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y
469		Lophopogon tridentatus	y																	y
470		Panicum trypheron	y		y					y										
471		Paspalum paspaloides	y	Y	y						y	y	y							
472		Pennisetum polystachyon	y	Y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y
473		Rhynchelytrum repens	y	Y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y	y
474		Sehima nervosum	y	Y							y									
475		Setaria verticillata	y			y					y									
476		Sporobolus fertilis		Y	y					y	y									y
477		Sporobolus piliferus	y		y					y		y	y							
478		Thelepogon elegans	y																	y
479		Themeda triandra		Y	y		y				y									y
	91	POLYGALACEAE																		
480		Polygala arvensis	y	Y							y									
481		Polygala elongata	y	Y	y	y				y	y								y	y
482		Polygala erioptera	y	Y		y					y									
	92	POLYGONACEAE																		
483		Polygonum barbatum	y																	
484		Polygonum glabrum	y																	y
	93	PONTEDERACEAE																		

485		Eichhornia crassipes	y										
486		Monochoria vaginalis	y										
	94	PORTULACACEAE											
487		Portulaca oleracea	y	Y	y	y	y	y	y	y	y	y	y
488		Portulaca quadrifida	y										
	95	POTAMOGETONACEAE											
489		Potamogeton nodosus	y										
490		Potamogeton pectinatus	y										
	96	PROTEACEAE											
491		Grevillea robusta	y	Y		y			y				y
	97	RHAMNACEAE											
492		Scutia circumscissa	y	Y	y	y	y	y	y	y	y	y	y
493		Ventilago madraspatana	y	Y		y			y				y
494		Ziziphus mauritiana	y	Y	y	y	y	y	y	y	y	y	y
495		Ziziphus oenoplia	y	Y	y	y	y	y	y	y	y	y	y
496		Ziziphus xylopyrus	y	Y	y	y			y			y	y
	98	RUBIACEAE											
497		Borreria articularis	y	Y	y	y			y	y			y
498		Borreria stricta	y	Y	y	y	y	y	y	y	y	y	y
499		Canthium dicoccum	y	Y	y	y		y	y	y	y	y	y
500		Canthium parviflorum	y	Y	y	y	y	y	y	y	y	y	y
501		Dentella repens	y	Y		y			y				y
502		Gardenia latifolia	y	Y	y	y	y	y	y	y	y	y	y
503		Ixora arborea	y	Y	y	y	y	y	y			y	y
504		Morinda tomentosa	y	Y	y	y	y	y	y	y	y	y	y
505		Oldenlandia affinis	y	Y	y	y	y		y	y	y	y	y
506		Oldenlandia corymbosa	y	Y	y	y		y	y	y	y	y	y
507		Oldenlandia herbacea	y	Y					y				y
508		Oldenlandia umbellata	y	Y		y	y		y				y
509		Tarrena asiatica	y	Y	y	y	y	y	y	y	y	y	y
510		Thecagonium biflorum	y										
511		Wendlandia thyrsoidea	y										y
512		Xeromphis spinosa	y										
	99	RUTACEAE											
513		Aegle marmelos	y	Y	y	y		y	y				y
514		Atalantia monophylla	y	Y	y	y		y	y			y	y
515		Feronia limonia	y	Y	y	y		y	y				y
516		Murraya koenigii	y										
517		Naringi crenulata	y	Y									
518		Pleiospermum alatum	y										
519		Ruta graveolens	y										
520		Toddalia asiatica	y	Y	y	y	y	y	y	y	y	y	y
	100	SALVADORACEAE											
521		Azima tetraantha	y	Y	y	y	y		y				
	101	SANTALACEAE											
521		Osyris quadripartita	y										
522		Santalum album	y	Y	y	y		y	y	y	y	y	y
	102	SAPINDACEAE											
523		Cardiospermum halicacabum	y	Y	y	y	y	y	y	y	y	y	y
524		Dodonaea viscosa	y	Y	y		y	y	y	y	y	y	y
525		Sapindus laurifolius	y										
	103	SAPOTACEAE											
526		Madhuca indica	y	Y					y				y
527		Madhuca latifolia			y	y		y				y	
528		Manilkara achras	y										
	104	SCROPHULARIACEAE											
529		Bacopa monnieri	y										y
530		Buchnera hispida				y							
531		Limnophila indica	y										
532		Lindernia oppositifolia	y										

533		<i>Lindernia parviflora</i>	y										
534		<i>Micrargeria wightii</i>	y		y								
535		<i>Sopubia delphinifolia</i>	y	Y	y	y	y	y	y	y	y	y	y
536		<i>Striga asiatica</i>	y	Y		y	y	y	y			y	y
537		<i>Striga densiflora</i>	y										
	105	SIMAROUBACEAE											
538		<i>Ailanthus excelsa</i>	y	Y	y	y	y	y	y				y
	106	SOLANACEAE											
539		<i>Capsicum annum</i>	y										
540		<i>Datura innoxia</i>	y										
541		<i>Datura metel</i>	y	Y	y	y	y	y	y				y
542		<i>Lycopersicum esculentum</i>	y										
543		<i>Physalis minima</i>	y	Y		y			y				y
544		<i>Solanum erianthum</i>	y										
545		<i>Solanum melongena</i>	y										
546		<i>Solanum nigrum</i>	y										y
547		<i>Solanum seafortianum</i>	y	Y	y	y			y			y	
548		<i>Solanum sisymbriifolium</i>	y										
549		<i>Solanum torvum</i>	y	Y	y	y	y	y	y				y
550		<i>Withania somnifera</i>	y										
	107	STERCULIACEAE											
551		<i>Eriolaena candollei</i>	y	Y									
552		<i>Firmiana colorata</i>	y										
553		<i>Guazuma ulmifolia</i>	y										
554		<i>Melhania incana</i>	y										
555		<i>Melochia cochorifolia</i>	y										
556		<i>Sterculia urens</i>				y			y			y	
557		<i>Waltheria indica</i>	y										y
	108	THUNBERGIACEAE											
558		<i>Thunbergia alata</i>	y										
559		<i>Thunbergia fragrans</i>	y										
	109	TILIACEAE											
560		<i>Corchorus tridens</i>	y	Y	y				y				y
561		<i>Corchorus trilocularis</i>	y										
562		<i>Grewia laevigata</i>	y	Y	y	y		y	y		y	y	
563		<i>Grewia tiliifolia</i>	y	Y		y			y				
564		<i>Grewia villosa</i>	y	Y	y	y			y			y	
565		<i>Muntingia calabura</i>	y	Y		y	y		y				y
566		<i>Triumfetta pilosa</i>	y		y			y				y	y
567		<i>Triumfetta rhomboidea</i>	y	Y		y	y		y				y
	110	TYPHACEAE											
568		<i>Typha angustata</i>	y										
	111	ULMACEAE											
569		<i>Holoptelea integrifolia</i>	y	Y	y	y	y	y	y	y	y	y	y
	112	URTICACEAE											
570		<i>Girardina zeylanica</i>	y										
571		<i>Leportea interrupta</i>	y										
572		<i>Pilea microphylla</i>	y										
	113	VERBENACEAE											
573		<i>Clerodendrum inerme</i>	y										
574		<i>Clerodendrum philippinum</i>	y			y							
575		<i>Clerodendrum serrutum</i>		Y		y			y			y	
576		<i>Duranta repens</i>	y			y							
577		<i>Gmelina arborea</i>	y	Y	y	y	y	y	y	y	y	y	y
578		<i>Gmelina asiatica</i>	y	Y	y	y	y	y	y	y	y	y	y
579		<i>Lantana camara</i>	y	Y		y	y	y	y	y	y	y	y
580		<i>Phyla nodiflora</i>	y										y
581		<i>Premna latifolia</i>	y			y							
582		<i>Premna tomentosa</i>	y	Y	y	y		y	y	y	y	y	y
583		<i>Priva cordifolia</i>	y	Y	y	y	y		y				y

584		Stachytarpheta jamaicensis		Y		y	y	y	y	y	y	y
585		Stachytarpheta mutabilis	y		y							
586		Tectona grandis	y	Y	y	y	y		y		y	y
587		Vitex altissima	y	Y		y			y	y	y	y
588		Vitex negundo	y	Y		y			y			y
	114	VIOLACEAE										
589		Hybanthus enneaspermus	y	Y	y	y	y	y	y	y	y	y
	115	VITACEAE										
590		Cissus pallida	y	Y	y	y	y	y	y		y	y
591		Cissus quardrangula	y		y							y
592		Cissus vitiginea	y									
	116	ZYGOPHYLLACEAE										
593		Tribulus terrestris	y	Y	y	y	y	y	y	y	y	y



### Appendix III. Comparative checklist of birds at Kukkarahalli tank over different study periods

Species	Upto 1997 (MAN)	1999-2000	2006-2007	2009-2010
<b>Family: Podicipitidae</b> 1. Little Grebe ( <i>Tachybaptus ruficollis</i> )	VC/r/B	VC/r/ Ro/Fo /B	VC/r/ Ro/Fo /B	VC/r/ Ro/Fo /B
<b>Family: Pelecanidae</b> 2. Spot-billed Pelican ( <i>Pelecanus philippensis</i> )	C/V/B	C/V/ Ro/Fo/B	C/V/Ro/F	C/V/Ro/F
<b>Family: Phalacrocoracidae</b> 3. Little Cormorant ( <i>Phalacrocorax niger</i> ) 4. Indian Cormorant ( <i>Phalacrocorax fuscicollis</i> ) 5. Large Cormorant ( <i>Phalacrocorax carbo</i> )	C/r/B R/V/B C/r/B	C/r/Ro/Fo/B C/V/Ro/Fo/B C/r/Ro/Fo/B	C/r/Ro/Fo/B C/V/Ro/Fo/B C/r/Ro/Fo/B	C/r/Ro/Fo/B C/V/Ro/Fo/B C/r/Ro/Fo/B
<b>Family: Anhingidae</b> 6. Darter ( <i>Anhinga melanogaster</i> )	C/r/B	C/r/Ro/Fo/B	C/r/ Ro/Fo/B	C/r/ Ro/Fo/B
<b>Family: Ardeidae</b> 7. Grey Heron ( <i>Ardea cinerea</i> ) 8. Purple Heron ( <i>Ardea purpurea</i> ) 9. Indian Pond Heron ( <i>Ardeola grayii</i> ) 10. Cattle Egret ( <i>Bubulcus ibis</i> ) 11. Great Egret ( <i>Casmerodius albus</i> ) 12. Intermediate Egret ( <i>Mesophoyx intermedia</i> ) 13. Little Egret ( <i>Egretta garzetta</i> ) 14. Black Crowned Night Heron ( <i>Nycticorax nycticorax</i> ) 15. Cinnamon Bittern ( <i>Ixobrychus cinnamomeus</i> ) 16. Yellow Bittern ( <i>Ixobrychus sinensis</i> )	C/r/B VC/r/B C/r VC/r C/r C/r C/r VC/r/B R/r R/r	C/r/Ro/Fo C/r/ Ro/Fo/B C/r/Ro/Fo VC/r/Ro/Fo R/V/Fo R/V/Fo C/r/Ro/Fo VC/r/Fo/B R/V/Ro/Fo R/V/Ro/Fo	C/r/Ro/Fo C/r/ Ro/Fo C/r/Ro/Fo VC/r/Ro/Fo R/V/Fo R/V/Fo C/r/Ro/Fo VC/r/ Fo/B R/V/Ro/Fo R/V/Ro/Fo	C/r/Ro/Fo C/r/ Ro/Fo C/r/Ro/Fo VC/r/Ro/Fo R/V/Fo R/V/Fo C/r/Ro/Fo VC/r/ Fo/B R/V/Ro/Fo R/V/Ro/Fo
<b>Family: Ciconiidae</b> 17. Painted Stork ( <i>Mycteria leucocephala</i> ) 18. Asian Open Bill ( <i>Anastomus oscitans</i> ) 19. Woolly-Necked Stork ( <i>Ciconia episcopus</i> )	C/V/B VR/V/B NR	C/V/Ro/ Fo/B VR/V/Ro VR/V	C/V/Ro/ Fo/B VR/V/Ro AB	C/V/Ro/ Fo/B AB AB

<b>Family: Threskiornithidae</b>				
20. Lesser Adjutant Stork ( <i>Leptoptiles javanicus</i> )	UC/V	AB	AB	AB
21. Blackheaded Ibis ( <i>Threskiornis melanocephalous</i> )	C/V/B	C/V/Ro/Fo/B	C/V/Ro/Fo	C/V/Ro/Fo
22. Black Ibis ( <i>Pseudibis papillosa</i> )	C/V/B	C/V/Fo	C/V/Fo	C/V/Fo
23. Glossy Ibis ( <i>Plegadis falcinellus</i> )	C/V	C/V/Ro	C/V/Ro	C/V/Ro
24. Eurasian Spoonbill ( <i>Platalea leucorodia</i> )	UC/V/B	VR/V/Ro	VR/V/Ro	AB
<b>Family: Anatidae</b>				
25. Lesser Whistling-Duck ( <i>Dendrocygna javanica</i> )	VC/r/V/B	C/V/Ro/Fo	C/V/Ro/Fo	C/V/Ro/Fo
26. Northern Pintail ( <i>Anas acuta</i> )	UC/W	AB	AB	AB
27. Common Teal ( <i>Anas crecca</i> )	R/W	AB	AB	AB
28. Spot-billed Duck ( <i>Anas poecilorhyncha</i> )	VC/r/B	VC/r/Ro/Fo/B	VC/r/Ro/Fo/B	VC/r/Ro/Fo/B
29. Gargeny ( <i>Anas querquedula</i> )	VC/W	C/W/Ro/Fo	C/W/Ro/Fo	C/W/Ro/Fo
30. Northern Shoveller ( <i>Anas clypeata</i> )	UC/W	AB	AB	AB
31. Common Pochard ( <i>Aythya ferina</i> )	R/W	AB	AB	AB
32. Cotton Pigmy Goose ( <i>Nettapus coromandelianus</i> )	UC/W	AB	AB	AB
33. Comb Duck ( <i>Sarkidioris melanotos</i> )	VR/W	AB	AB	AB
<b>Family: Accipitridae</b>				
34. Black Shouldered Kite ( <i>Elanus caeruleus</i> )	R/V	AB	AB	AB
35. Black Kite ( <i>Milvus migrans</i> )	UC/r/B	C/r/Fo/Ro/B	C/r/Fo/Ro/B	C/r/Fo/Ro/B
36. Brahminy Kite ( <i>Haliastur ndus</i> )	UC/r/B	C/r/Fo/Ro/B	C/r/Fo/Ro/B	C/r/Fo/Ro/B
37. Shikra ( <i>Accipiter badius</i> )	C/V	C/V/Fo	C/V/Fo	C/V/Fo
38. Besra ( <i>Accipiter virgatus</i> )	UC/V	R/V	AB	AB
39. Twany Eagle ( <i>Aquila rapax</i> )	R/V	AB	AB	AB
40. White Rumped Vulture ( <i>Gyps bengalensis</i> )	UC/V	AB	AB	AB
41. Egyptian Vulture ( <i>Neophron percnopterus</i> )	UC/V	AB	AB	AB
42. Eurasian Marsh Harrier ( <i>Circus aeruginosus</i> )	C/W	C/V/Fo	C/V/Fo	C/V/Fo
43. Crested Serpent Eagle ( <i>Spilornis cheela</i> )	NR	NR	VR	AB
44. Oriental Honey Buzzard ( <i>Pernis ptilorhyncus</i> )	NR	NR	VR	AB
<b>Family: Phasianidae</b>				
45. Grey Francolin ( <i>Francolinus pondicerianus</i> )	C/r/B	C/r/Fo/Ro/B	C/r/ Fo/Ro/B	C/r/ Fo/Ro/B
46. Common Quail ( <i>Coturnix coturnix</i> )	R/r	AB	AB	AB
<b>Family: Turnicidae</b>				
47. Yellow Legged Button Quail ( <i>Turnix tanki</i> )	UC	AB	AB	AB

<b>Family: Rallidae</b>				
48. Baillon's Crake ( <i>Porzana pusilla</i> )	VR/W	VR/W/Fo	VR/W/Fo	AB
49. Ruddy Breasted Crake ( <i>Porzana fusca</i> )	VR/W	AB	AB	AB
50. White-breasted Waterhen ( <i>Amaurornis phoenicurus</i> )	C/r/B	C/r/Fo/Ro/B	C/r/Fo/Ro/B	C/r/Fo/Ro/B
51. Watercock ( <i>Gallicrex cinerea</i> )	VR	AB	AB	AB
52. Common Moorhen ( <i>Gallinula chloropus</i> )	VC/r/B	VC/r/ Fo/Ro/B	VC/r/ Fo/Ro/B	VC/r/ Fo/Ro/B
53. Common Coot ( <i>Fulica atra</i> )	VC/r/B	VC/r/ Fo/Ro/B	VC/r/ Fo/Ro/B	VC/r/ Fo/Ro/B
54. Purple Swamphen ( <i>Porphyrio porphyrio</i> )	VC/r/B	VC/r/ Fo/Ro/B	VC/r/ Fo/Ro/B	VC/r/ Fo/Ro/B
<b>Family: Jacanidae</b>				
55. Pheasant-tailed Jacana ( <i>Hydrophasianus chirurgus</i> )	C/r/V/B	AB	AB	AB
56. Bronze-winged Jacana ( <i>Metopidius indicus</i> )	C/r/B	C/r/Fo/Ro/B	C/r/Fo/Ro/B	C/r/Fo/Ro/B
<b>Family: Charadriidae</b>				
57. Red-Wattled Lapwing ( <i>Vanellus indicus</i> )	VC/r/B	VC/r/Fo/Ro	VC/r/Fo/Ro	VC/r/Fo/Ro
58. Yellow-Wattled Lapwing ( <i>Vanellus malabaricus</i> )	C/r/B	AB	AB	AB
59. Little Ringed Plover ( <i>Charadrius dubius</i> )	R/W	AB	AB	AB
60. Kentish Plover ( <i>Charadrius alexandrinus</i> )	R/W	AB	AB	AB
<b>Family: Scolopacidae</b>				
61. Common Redshank ( <i>Tringa totanus</i> )	R/W	AB	AB	AB
62. Marsh Sandpiper ( <i>Tringa stagnatilis</i> )	UC/W	UC/W/Fo/Ro	UC/W//Fo/Ro	UC/W//Fo/Ro
63. Common Greenshank ( <i>Tringa nebularia</i> )	UC/W	AB	AB	AB
64. Green Sandpiper ( <i>Tringa ochropus</i> )	C/W	C/W//Fo/Ro	AB	AB
65. Wood Sandpiper ( <i>Tringa glareola</i> )	C/W	C/W/Fo/Ro	C/W/Fo/Ro	AB
66. Common Sandpiper ( <i>Actitis hypoleucos</i> )	C/W	C/W/Fo/Ro	C/W/Fo/Ro	C/W/Fo/Ro
67. Pintail Snipe ( <i>Gallinago stenura</i> )	UC/W	AB	AB	AB
68. Common Snipe ( <i>Gallinago gallinago</i> )	R/W	AB	AB	AB
69. Jack Snipe ( <i>Gallinago minimus</i> )	VR/W	AB	AB	AB
70. Little Stint ( <i>Calidris minuta</i> )	VR/W	AB	AB	AB
<b>Family: Rostratulidae</b>				
71. Greater Painted Snipe ( <i>Rostratula benghalensis</i> )	UC/W	AB	AB	AB
<b>Family: Recurvirostridae</b>				
72. Black-winged Stilt ( <i>Himantopus himantopus</i> )	C/V	C/V/Fo/Ro	C/V/Fo/Ro	C/V/Fo/Ro
<b>Family: Burhinidae</b>				
73. Eurasian Thick-knee ( <i>Burhinus oedicephalus</i> )	VC/r/B	VC/r/Fo/Ro/B	AB	AB



<b>Family: Laridae</b>				
74. Brownheaded Gull ( <i>Larus brunnicephalus</i> )	VR/W	AB	AB	AB
75. Whiskered Tern ( <i>Chlidonias hybrida</i> )	VR/W	AB	AB	AB
76. River Tern ( <i>Sterna aurantia</i> )	R/W	AB	R/W/Fo	R/W/Fo
77. Blackbellied Tern ( <i>Sterna acuticauda</i> )	VR/W	AB	AB	AB
<b>Family: Columbidae</b>				
78. Rock Pigeon ( <i>Columba livia</i> )	UC/V	VC/Fo	VC/Fo	VC/Fo
79. Eurasian Collared Dove ( <i>Streptopelia decaocto</i> )	C/r	AB	AB	AB
80. Spotted Dove ( <i>Streptopelia chinensis</i> )	C/r/B	C/r/Fo/Ro/B	C/r/Fo/Ro/B	C/r/Fo/Ro/B
81. Laughing Dove ( <i>Streptopelia senegalensis</i> )	NR	VR/V	AB	AB
<b>Family: Psittacidae</b>				
82. Rose-ringed Parakeet ( <i>Psittacula krameri</i> )	C/r	C/r/Fo/Ro/B	C/r/Fo/Ro/B	C/r/Fo/Ro/B
<b>Family: Cuculidae</b>				
83. Pied Cuckoo ( <i>Clamtor jacobinus</i> )	UC/V	AB	AB	AB
84. Indian Cuckoo ( <i>Cuculus micropterus</i> )	UC/V	AB	AB	AB
85. Asian Koel ( <i>Eudynamys scolopacea</i> )	C/r/B	C/r/Fo/Ro/B	C/r/Fo/Ro/B	C/r/Fo/Ro/B
86. Greater Coucal ( <i>Centropus sinensis</i> )	VC/r	VC/r/Fo/Ro	VC/r/Fo/Ro	VC/r/Fo/Ro
<b>Family: Strigidae</b>				
87. Barn Owl ( <i>Tyto alba</i> )	UC/V	UC/V	AB	AB
88. Collared Scops Owl ( <i>Otus bakkamoena</i> )	VR	VR/V/Ro	AB	AB
89. Spotted Owlet ( <i>Athene brama</i> )	VC/r	VC/r/Fo/Ro/B	VC/r/Fo/Ro/B	VC/r/Fo/Ro/B
<b>Family: Apodidae</b>				
90. House Swift ( <i>Apus affinis</i> )	C/V	C/V/Fo	C/V/Fo	C/V/Fo
91. Asian Palm Swift ( <i>Cypsiurus balasiensis</i> )	UC/V	UC/V/Fo	UC/V	UC/V
<b>Family: Alcedinidae</b>				
92. Common Kingfisher ( <i>Alcedo atthis</i> )	C/r/B	C/r/Fo	C/r/Fo	C/r/Fo
93. White-Throated Kingfisher ( <i>Halcyon smyrnensis</i> )	C/	C/r/Fo	C/r/Fo	C/r/Fo
94. Pied Kingfisher ( <i>Ceryle rudis</i> )	UC/V	UC/V/Fo	UC/V/Fo	AB
95. Black Capped Kingfisher ( <i>Hylcyon pileata</i> )	VR	AB	AB	AB
<b>Family: Meropidae</b>				
96. Green Bee-eater ( <i>Merops orientalis</i> )	C/r	C/V/Fo	C/V/Fo	C/V/Fo
97. Blue-tailed Bee-eater ( <i>Merops philippinus</i> )	R/W	UC/W/Fo	AB	AB
98. Chestnut-headed Bee-eater ( <i>Merops leschenaulti</i> )	R/V	R/V	AB	AB

<b>Family: Coraciidae</b> 99. Indian Roller ( <i>Coracias benghalensis</i> )	C/r/B	UC/V/Fo	UC/V/Fo	AB
<b>Family: Upupidae</b> 100. Common Hoopoe ( <i>Upupa epops</i> )	VC/r/B	UC/V/Fo	UC/V/Fo	UC/V/Fo
<b>Family: Bucerotidae</b> 101. Indian Grey Hornbill ( <i>Ocyrceros birostris</i> )	C/r/B	C/r/Fo/Ro	C/r/Fo/Ro	C/r/Fo/Ro
<b>Family: Capitonidae</b> 102. Brown headed Barbet ( <i>Megalania zeylanica</i> ) 103. White Cheeked Barbet ( <i>Megalaima viridis</i> ) 104. Coppersmith Barbet ( <i>Megalaima haemacephala</i> )	R/V VC/r/B VC/r/B	AB VC/r/Fo/Ro/B VC/r/Fo/Ro/B	AB VC/r/Fo/Ro/B VC/r/Fo/Ro/B	AB VC/r/Fo/Ro/B VC/r/Fo/Ro/B
<b>Family: Picidae</b> 105. Black-Rumped woodpecker ( <i>Dinopium benghalense</i> ) 106. White-Naped Woodpecker ( <i>Chrysocolaptes festivus</i> )	C/r UC/V	UC/V/Fo VR/V/Fo	AB AB	UC/V/Fo AB
<b>Family: Pittidae</b> 107. Indian Pitta ( <i>Pitta brachyuran</i> )	CU/W	R/V	AB	AB
<b>Family: Alaudidae</b> 108. Singing Bush lark ( <i>Mirafractantillans</i> ) 109. Indian Bush Lark ( <i>Mirafracta erythroptera</i> ) 110. Black Crowned Sparrow Lark ( <i>Eremopetrix grisea</i> ) 111. Rufoustailed Lark ( <i>Ammomanes phoenicurus</i> ) 112. Crested lark ( <i>Galerida cristata</i> ) 113. Oriental skylark ( <i>Aluda gulgula</i> )	R/V VR/V C/V C/V UC/V R/V	AB AB C/V/Fo/Ro C/V/Fo/Ro AB AB	AB AB C/V/Fo/Ro C/V/Fo/Ro AB AB	AB AB AB C/V/Fo/Ro AB AB
<b>Family: Caprimulgidae</b> 114. Indian Nightjar ( <i>Caprimugus asiaticus</i> )	R/r	R	R	R
<b>Family: Hirundinidae</b> 115. Barn Swallow ( <i>Hirundo rustica</i> ) 116. Wire-tailed Swallow ( <i>Hirundo smithii</i> ) 117. Red-rumped Swallow ( <i>Hirundo daurica</i> )	UC/V R/V UC/V	C/V/Fo R/V/Fo UC/V/Fo	C/V/Fo AB UC/V/Fo	C/V/Fo AB UC/V/Fo
<b>Family: Laniidae</b> 118. Great Grey shrike ( <i>Lanius excubitor</i> ) 119. Baybacked shrike ( <i>Lanius vittatus</i> ) 120. Long-Tailed shrike ( <i>Lanius schach</i> )	UC/V UC/V UC/V	AB UC/V/Fo/Ro AB	AB UC/V/Fo/Ro AB	AB UC/V/Fo/Ro AB

121. Brown shrike ( <i>Lanius cristatus</i> )	UC/V	AB	AB	AB
<b>Family: Oriolidae</b>				
122. Eurasian Golden Oriole ( <i>Oriolus oriolus</i> )	UC/V	UC/V/Fo	UC/V/Fo	AB
<b>Family: Dicruridae</b>				
123. Black Drongo ( <i>Dicrurus macrocercus</i> )	C/r	C/r/Fo/Ro	C/r/Fo/Ro	C/r/Fo/Ro
124. Ashy Drongo ( <i>Dicrurus leucophaeus</i> )	UC/V	UC/V/Fo/Ro	UC/V/Fo/Ro	UC/V/Fo/Ro
125. White-bellied Drongo ( <i>Dicrurus caerulescens</i> )	VR/V	VR/V/Fo	AB	VR/V/Fo
<b>Family: Artamidae</b>				
126. Ashy Swallow-Shrike ( <i>Artamus fuscus</i> )	R/V	AB	AB	AB
<b>Family: Sturnidae</b>				
127. Chestnut-Tailed Starling ( <i>Sturnus malabaricus</i> )	UC/V	UC/V/Ro	UC/V/Ro	UC/V/Ro
128. Brahminy Starling ( <i>Sturnus pagodarum</i> )	UC/V	UC/V/Ro	UC/V/Ro	UC/V/Ro
129. Rosy Starling ( <i>Sturnus roseus</i> )	R/V	R/V/Ro	R/V/Ro	R/V/Ro
130. Common Myna ( <i>Acridotheres tristis</i> )	C/r	C/r/Fo/Ro/B	C/r/Fo/Ro/B	C/r/Fo/Ro/B
131. Jungle Myna ( <i>Acridotheres fuscus</i> )	C/r	C/r/Fo/Ro/B	C/r/Fo/Ro/B	C/r/Fo/Ro/B
<b>Family: Corvidae</b>				
132. House Crow ( <i>Corvus splendens</i> )	VC/V	VC/r/Fo/Ro	VC/r/Fo/Ro	VC/r/Fo/Ro
133. Large-Billed Crow ( <i>Corvus macrorhynchos</i> )	VC/r/B	VC/r/Fo/Ro	VC/r/Fo/Ro	VC/r/Fo/Ro
<b>Family: Campephagidae</b>				
134. Common Woodshrike ( <i>Tephrodornis pondicerianus</i> )	R/V	AB	AB	AB
135. Large cuckoo Shrike ( <i>Coracina novaehollandiae</i> )	R/V	AB	AB	AB
136. Black Winged Cuckooshrike ( <i>Coracina melaschistos</i> )	R/V	AB	AB	AB
137. Black Headed Cuckooshrike ( <i>Coracina melanoptera</i> )	R/V	R/V/Fo	R/V/Fo	AB
138. Small Minivet ( <i>Pericrocotus cinnamomeus</i> )	UC/V	UC/V/Fo	R/V/Fo	R/V/Fo
<b>Family: Irenidae</b>				
139. Common Iora ( <i>Aegithina tiphia</i> )	UC/V	UC/V/Fo	AB	AB
140. Blue-winged Leafbird ( <i>Chloropsis cochinchinensis</i> )	R/V	AB	AB	AB
<b>Family: Pycnonotidae</b>				
141. Red-whiskered Bulbul ( <i>Pycnonotus jocosus</i> )	UC/r	UC/r/Fo	UC/r/Fo	UC/r/Fo
142. Red-vented Bulbul ( <i>Pycnonotus cafer</i> )	C/r/B	C/r/Fo/Ro/B	C/r/ Fo/Ro/B	C/r/ Fo/Ro/B

<b>Family: Muscicapinae Sub-Family: Timaliinae</b> 143. Yellow-Billed Babbler ( <i>Turdoides affinis</i> )	UC/V	UC/V/Fo/Ro	UC/V/Fo/Ro	UC/V/Fo/Ro
<b>Family: Muscicapinae</b> 144. Asian Brown Flycatcher ( <i>Muscicapa dauurica</i> ) 145. Red Throated Flycatcher ( <i>Ficedula parva</i> ) 146. Tickell's blue Flycatcher ( <i>Cyornis tickelliae</i> ) 147. White-Throated Fantail ( <i>Rhipidura albicollis</i> )	VR/V VR/V R/V R/V	AB AB R/V/ Fo/Ro R/V/ Fo/Ro	AB AB R/V/Fo/Ro R/V/Fo/Ro	AB AB R/V/Fo/Ro R/V/Fo/Ro
<b>Family: Monarchinae</b> 148. Asian Paradise-Flycatcher ( <i>Terpsiphone paradisi</i> )	UC/V	UC/V/Fo/Ro/B	UC/V/Fo/Ro/B	UC/V/Fo/Ro/B
<b>Family: Sylviinae</b> 149. Zitting Cisticola ( <i>Cisticola juncidis</i> ) 150. Plain Prinia ( <i>Prinia inornata</i> ) 151. Ashy Prinia ( <i>Prinia socialis</i> ) 152. Common Tailorbird ( <i>Orthotomus sutorius</i> ) 153. Clamorous Reed-Warbler ( <i>Acrocephalus stentoreus</i> ) 154. Blyth's Reed-Warbler ( <i>Acrocephalus dumetorum</i> ) 155. Booted Warbler ( <i>Hippolis caligata</i> ) 156. Common Chiffchaff ( <i>Phylloscopus collybita</i> ) 157. Greenish Warbler ( <i>Phylloscopus trochiloides</i> )	R/V C/V C/r/B C/r/B UC/V UC/V C/V C/W UC/V	AB UC/V/Fo/Ro C/r/Fo/Ro/B C/r/Fo/Ro/B UC/V/Fo/Ro UC/V/Fo/Ro UC/V/Fo/Ro AB UC/V/Fo/Ro	AB UC/V/Fo/Ro C/r/Fo/Ro/B C/r/Fo/Ro/B AB UC/V/Fo/Ro UC/V/Fo/Ro AB AB	AB UC/V/Fo/Ro C/r/Fo/Ro/B C/r/Fo/Ro/B UC/V/Fo/Ro UC/V/Fo/Ro UC/V/Fo/Ro AB AB
<b>Family: Turdinae</b> 158. Oriental Magpie-Robin ( <i>Copsychus saularis</i> ) 159. Pied Bushchat ( <i>Saxicoloides caprata</i> ) 160. Indian Robin ( <i>Saxicoloides fulicata</i> )	C/r/B C/r/B C/r/B	C/r/Fo/Ro/B C/r/Fo/Ro C/r/Fo/Ro	C/r/Fo/Ro/B C/r/Fo/Ro C/r/Fo/Ro	C/r/Fo/Ro/B C/r/Fo/Ro C/r/Fo/Ro
<b>Family: Paridae</b> 161. Great Tit ( <i>Parus major</i> )	C/V	C/V/Fo/Ro	C/V/Fo/Ro	C/V/Fo/Ro
<b>Family: Motacillidae</b> 162. Tree Pipit ( <i>Anthus hodgsoni</i> ) 163. Paddy Field Pipit ( <i>Anthus rufulus</i> ) 164. Twany Pipit ( <i>Anthus campestris</i> ) 165. Forest Wagtail ( <i>Dendronanthus indicus</i> ) 166. Citrine Wagtail ( <i>Motacilla citreola</i> ) 167. Yellow Wagtail ( <i>Motacilla flava</i> )	UC/V C/V C/W R/W C/W R/W	AB C/V/Fo AB AB AB R/V/Fo	AB C/V/Fo AB AB AB R/V/Fo	AB C/V/Fo AB AB AB R/V/Fo

168. Grey Wagtail ( <i>Motacilla cinerea</i> )	C/W	R/V/Fo	R/V/Fo	R/V/Fo
169. White Wagtail ( <i>Motacilla alba</i> )	UC/W	UC/W/Fo	AB	AB
170. White-Browed Wagtail ( <i>Motacilla maderaspatensis</i> )	C/r/W	C/r/Fo/Ro	C/r/Fo/Ro	C/r/Fo/Ro
<b>Family: Dicaeidae</b>				
171. Thickbilled Flowerpecker ( <i>Dicaeum agile</i> )	C/V	C/V/Fo/Ro	C/V/Fo/Ro	C/V/Fo/Ro
172. Pale-Billed Flowerpecker ( <i>Dicaeum erythrohynchos</i> )	C/V	C/r/Fo/Ro	C/r/Fo/Ro	C/r/Fo/Ro
<b>Family: Nectariniidae</b>				
173. Purple-rumped Sunbird ( <i>Nectarinia zeylonica</i> )	C/r/B	C/r/Fo/Ro/B	C/r/Fo/Ro/B	C/r/Fo/Ro/B
174. Purple Sunbird ( <i>Nectarinia asiatica</i> )	C/r/B	UC/V/Fo/Ro	UC/V/Fo/Ro	UC/V/Fo/Ro
<b>Family: Zosteropidae</b>				
175. Oriental White Eye ( <i>Zosterops palpebrosa</i> )	R/V	AB	AB	AB
<b>Family: Passerinae</b>				
176. House Sparrow ( <i>Passer domesticus</i> )	C/r/B	C/r/Fo/Ro/B	UC/r/Ro/Fo	UC/r/Ro/Fo
<b>Family: Ploceinae</b>				
177. Baya Weaver ( <i>Ploceus philippinus</i> )	UC/r/B	UC/V/Fo	UC/V/Fo	UC/V/Fo
178. Streaked Weaver ( <i>Ploceus manyar</i> )	C/r/B	AB	AB	AB
<b>Family: Estrildidae</b>				
179. Red Avadavat ( <i>Amandava amandava</i> )	R/V	AB	AB	AB
180. Indian Silverbill ( <i>Lonchura malabarica</i> )	UC/V	AB	AB	AB
181. White-Rumped Munia ( <i>Lonchura striata</i> )	UC/V	AB	AB	AB
182. Scaly-Breasted Munia ( <i>Lonchura punctulata</i> )	C/V/B	C/V/Fo/Ro/B	C/V/Fo/Ro/B	C/V/Fo/Ro/B
183. Blackheaded Munia ( <i>Lonchura malacca</i> )	C/r/B	UC/V/Fo	UC/V/Fo	UC/V/Fo
<b>Total</b>	<b>183</b>	<b>121</b>	<b>105</b>	<b>98</b>

VC: Very common (found throughout our transects and during the entire study period), C: Common (> 75% sightings),  
Un: Uncommon (< 50% sightings), R: Rare (< 25% sightings), VR: Very rare (< than five individual sightings)  
r: Resident, W: winter visitor, V: Visitor, Ro: Roost, Fo: Forage, B: Breed

## Appendix IV. Comparison of status of birds in Karanji, Kukkarahalli and Lingambudhi tanks

Species	Karanji tank	Kukkarahalli	Lingambudhi
<b>Family: Podicipitidae</b>			
1. Little Grebe ( <i>Tachybaptus ruficollis</i> )	P/C/R/B	P/C/R/B	P/C/R/B
<b>Family: Pelecanidae</b>			
2. Spot-billed Pelican ( <i>Pelecanus philippensis</i> )	P/C/R/B	P/C/R/B	P/C/V
<b>Family: Phalacrocoracidae</b>			
3. Little Cormorant ( <i>Phalacrocorax niger</i> )	P/C/R/B	P/C/R/B	V
4. Indian Cormorant ( <i>Phalacrocorax fuscicollis</i> )	P/C/R/B	P/C/R/B	Ab
5. Large Cormorant ( <i>Phalacrocorax carbo</i> )	P/C/R/B	P/C/R/B	V
<b>Family: Anhingidae</b>			
6. Darter ( <i>Anhinga melanogaster</i> )	P/C/R/B	P/C/R/B	Ab
<b>Family: Ardeidae</b>			
7. Grey Heron ( <i>Ardea cinerea</i> )	P/C/R/B	P/C/R/B	P/C/R/B (increased numbers)
8. Purple Heron ( <i>Ardea purpurea</i> )	P/C/R/B	P/C/R/B	P/C/R/B (increased numbers)
9. Indian Pond Heron ( <i>Ardeola grayii</i> )	P/C/R/B (very few breeds)	P/C/R	P/C
10. Cattle Egret ( <i>Bubulcus ibis</i> )	P/C/R/B (very few breeds)	P/C/R/B (very few breeds)	P/C
11. Great Egret ( <i>Casmerodius albus</i> )	P/C/R/B (very few breeds)	P/r/V	V
12. Intermediate Egret ( <i>Mesophoyx intermedia</i> )	P/C/R/B (very few breeds)	P/r/V/B* (very few breeds)	V
13. Little Egret ( <i>Egretta garzetta</i> )	P/C/R/B	P/C/R/B	V
14. Black Crowned Night Heron ( <i>Nycticorax nycticorax</i> )	P/C/R/B	P/C/R/B	V
15. Cinnamon Bittern ( <i>Ixobrychus cinnamomeus</i> )	Ab	Ab	Ab
16. Yellow Bittern ( <i>Ixobrychus sinensis</i> )	Ab	P/r/V	r/V
<b>Family: Ciconiidae</b>			
17. Painted Stork ( <i>Mycteria leucocephala</i> )	P/C/R/B	P/C/V/B	P/C/V
18. Asian Open Bill ( <i>Anastomus oscitans</i> )	P/C/V/B (7-8 pair breeds)	P/r/V/	P/C/V
19. Woolly-Necked Stork ( <i>Ciconia episcopus</i> )	Ab	Ab	P/r/Va
<b>Family: Threskiornithidae</b>			
20. Lesser Adjutant Stork ( <i>Leptoptiles javanicus</i> )	Ab	Ab	Ab
21. Blackheaded Ibis ( <i>Threskiornis melanocephalous</i> )	P/C/V/B	P/C/V/B	P/C/V
22. Black Ibis ( <i>Pseudibis papillosa</i> )	P/C/V	P/C/V	P/C/V
23. Glossy Ibis ( <i>Plegadis falcinellus</i> )	P/C/V	P/C/V	P/C/V
24. Eurasian Spoonbill ( <i>Platalea leucorodia</i> )	V/B (2-3 pairr very few breeds)	P/r/V (1-2 pair breeds but not regularly)	Ab

<b>Family: Anatidae</b>			
25. Lesser Whistling-Duck ( <i>Dendrocygna javanica</i> )	P/C/V	P/C/V	P/C/V
26. Northern Pintail ( <i>Anas acuta</i> )	Ab	P/r/V (very few visits very rarely)	P/C/V
27. Common Teal ( <i>Anas crecca</i> )	V	Ab	P/C/V
28. Spot-billed Duck ( <i>Anas poecilorhyncha</i> )	P/C/R/B	P/C/V/B	P/C/V/B
29. Gargeny ( <i>Anas querquedula</i> )	P/C/V	P/C/V	P/C/V
30. Northern Shoveller ( <i>Anas clypeata</i> )	P/C/V	P/C/V	P/C/V
31. Common Pochard ( <i>Aythya ferina</i> )	Ab	Ab	r/V (just two visits in last decade)
32. Cotton Pigmy Goose ( <i>Nettapus coromandelianus</i> )	Ab	Ab	r/V (just two visits in last decade)
<b>Family: Accipitridae</b>			
33. Black Shouldered Kite ( <i>Elanus caeruleus</i> )	Ab	Ab	P/r
34. Black Kite ( <i>Milvus migrans</i> )	P/C/R	P/C/R	P/C/R
35. Brahminy Kite ( <i>Haliastur indus</i> )	P/C/R	P/C/R	P/C/R
36. Shikra ( <i>Accipiter badius</i> )	P/C/R	P/C/R	P/C/R
37. Twany Eagle ( <i>Aquila rapax</i> )	Ab	Ab	P/C/R
38. Egyptian Vulture ( <i>Neophron percnopterus</i> )	Ab	Ab	Ab
39. Eurasian Marsh Harrier ( <i>Circus aeruginosus</i> )	P/C/R	P/C/R	P/C/R
40. Crested Serpent Eagle ( <i>Spilornis cheela</i> )	Ab	Va	Ab
41. Oriental Honey Buzzard ( <i>Pernis ptilorhyncus</i> )	Ab	P/C/V	Ab
<b>Family: Phasianidae</b>			
42. Grey Francolin ( <i>Francolinus pondicerianus</i> )	P/C/R	P/C/R	P/C/R
43. Common Quail ( <i>Coturnix coturnix</i> )	Ab	Ab	P/C/R
<b>Family: Rallidae</b>			
44. Baillon's Crake ( <i>Porzana pusilla</i> )	Ab	P/C/R	P/C/V
45. Ruddy Breasted Crake ( <i>Porzana fusca</i> )	Ab	Ab	P/C/V
46. White-breasted Waterhen ( <i>Amaurornis phoenicurus</i> )	P/C/R/B	P/C/R/B	P/C/R/B
47. Common Moorhen ( <i>Gallinula chloropus</i> )	P/C/R/B	P/C/R/B	P/C/R/B
48. Common Coot ( <i>Fulica atra</i> )	P/C/R/B	P/C/R/B	P/C/R/B
49. Purple Swamphen ( <i>Porphyrio porphyrio</i> )	P/C/R/B	P/C/R/B	P/C/R/B
<b>Family: Jacanidae</b>			
50. Pheasant-tailed Jacana ( <i>Hydrophasianus chirurgus</i> )	P/C/R/B	P/C/V	P/C/V
51. Bronze-winged Jacana ( <i>Metopidius indicus</i> )	P/C/R	P/C/R	P/C/V
<b>Family: Charadriidae</b>			
52. Red-Wattled Lapwing ( <i>Vanellus indicus</i> )	P/C/R	P/C/R	P/C/R/B
53. Yellow-Wattled Lapwing ( <i>Vanellus malabaricus</i> )	Ab	Ab	P/C/R/B
54. Little Ringed Plover ( <i>Charadrius dubius</i> )	Ab	Ab	P/C/V
55. Kentish Plover ( <i>Charadrius alexandrinus</i> )	Ab	Ab	r/V

<b>Family: Scolopacidae</b>			
56. Common Redshank ( <i>Tringa totanus</i> )	Ab	Ab	r/V
57. Marsh Sandpiper ( <i>Tringa stagnatilis</i> )	P/C/V	P/C/V	P/C/V
58. Common Greenshank ( <i>Tringa nebularia</i> )	Ab	Ab	P/C/V
59. Green Sandpiper ( <i>Tringa ochropus</i> )	P/C/V	P/C/V	P/C/V
60. Wood Sandpiper ( <i>Tringa glareola</i> )	P/C/V	P/C/V	P/C/V
61. Common Sandpiper ( <i>Actitis hypoleucos</i> )	P/C/V	P/C/V	P/C/V
62. Pintail Snipe ( <i>Gallinago stenura</i> )	Ab	Ab	P/r/V
63. Common Snipe ( <i>Gallinago gallinago</i> )	Ab	Ab	P/r/V
64. Little Stint ( <i>Calidris minuta</i> )	Ab	Ab	P/r/V
65. Temmincks Stint ( <i>Calidris temminckii</i> )	Ab	Ab	P/r/V
66. Ruff ( <i>Philomachus pugnax</i> )	Ab	Ab	P/r/V
67. Black-tailed Godwit ( <i>Limosa limosa</i> )	Ab	Ab	P/r/V
<b>Family: Rostratulidae</b>			
68. Greater Painted Snipe ( <i>Rostratula benghalensis</i> )	Ab	Ab	P/r/V
<b>Family: Recurvirostridae</b>			
69. Black-winged Stilt ( <i>Himantopus himantopus</i> )	P/r/V	P/r/V	P/r/V
<b>Family: Burhinidae</b>			
70. Eurasian Thick-knee ( <i>Burhinus oedicnemus</i> )	Ab	Ab	P/C/R
<b>Family: Laridae</b>			
71. River Tern ( <i>Sterna aurantia</i> )	P/r/V	P/r/V	Va
<b>Family: Columbidae</b>			
72. Rock Pigeon ( <i>Columba livia</i> )	P/C/R/B	P/C/R/B	P/C/R/B
73. Eurasian Collared Dove ( <i>Streptopelia decaocto</i> )	Ab	P/C/R/B	P/C/R/B
74. Spotted Dove ( <i>Streptopelia chinensis</i> )	P/C/R/B	P/C/R/B	P/C/R/B
75. Laughing Dove ( <i>Streptopelia senegalensis</i> )	P/C/R/B	P/C/R/B	P/C/R/B
<b>Family: Psittacidae</b>			
76. Rose-ringed Parakeet ( <i>Psittacula krameri</i> )	P/C/R/B	P/C/R	P/C/R
<b>Family: Cuculidae</b>			
77. Pied Cuckoo ( <i>Clamtor jacobinus</i> )	Ab	Ab	P/C/V
78. Asian Koel ( <i>Eudynamis scolopacea</i> )	P/C/R/B	P/C/R/B	P/C/R/B
79. Greater Coucal ( <i>Centropus sinensis</i> )	P/C/R/B	P/C/R/B	P/C/R/B
<b>Family: Strigidae</b>			
80. Collared Scops Owl ( <i>Otus bakkamoena</i> )	Ab	P/r/V	Ab
81. Spotted Owlet ( <i>Athene brama</i> )	P/C/R/B	P/C/R/B	P/C/R/B
<b>Family: Apodidae</b>			
82. House Swift ( <i>Apus affinis</i> )	P/C/R	P/C/R	P/C/R
83. Asian Palm Swift ( <i>Cypsiurus balasiensis</i> )	Ab	Ab	P/C/V
<b>Family: Alcedinidae</b>			
84. Common Kingfisher ( <i>Alcedo atthis</i> )	P/C/R	P/C/R	Ab
85. White-Throated Kingfisher ( <i>Halcyon smyrnensis</i> )	P/C/R	P/C/R	P/C/R
86. Pied Kingfisher ( <i>Ceryle rudis</i> )	P/C/V	Ab	Ab
<b>Family: Meropidae</b>			
87. Green Bee-eater ( <i>Merops orientalis</i> )	P/C/V	P/C/V	P/C/V
88. Blue-tailed Bee-eater ( <i>Merops philippinus</i> )	P/C/V	P/C/V	P/C/V
89. Chestnut-headed Bee-eater ( <i>Merops leschenaulti</i> )	Ab	Ab	Ab ( Ab* recent trend)



<b>Family: Coraciidae</b>			
90. Indian Roller ( <i>Coracias benghalensis</i> )	Ab	Ab	P/C/R (significantly reduced)
<b>Family: Upupidae</b>			
91. Common Hoopoe ( <i>Upupa epops</i> )	P/C/V	P/r/V	P/C/R/B
<b>Family: Bucerotidae</b>			
92. Indian Grey Hornbill ( <i>Ocyrocus birostris</i> )	P/C/R/B	P/C/R	P/C/R/B* (significantly reduced)
<b>Family: Capitonidae</b>			
93. White Cheeked Barbet ( <i>Megalaima viridis</i> )	P/C/R/B	P/C/R/B	P/C/R/B
94. Copper Smith Barbet ( <i>Megalaima haemacephala</i> )	P/C/R/B	P/C/R/B	P/C/R/B
<b>Family: Picidae</b>			
95. Black-Rumped woodpecker ( <i>Dinopium benghalense</i> )	Ab	P/C/r	P/C/r
96. White-Naped Woodpecker ( <i>Chrysocolaptes festivus</i> )	Ab	Ab	Va (Ab* recent trend)
<b>Family: Pittidae</b>			
97. Indian Pitta ( <i>Pitta brachyuran</i> )	Ab	Ab	Ab
<b>Family: Alaudidae</b>			
98. Indian Bush Lark ( <i>Mirafr erythroptera</i> )	Ab	Ab	V (1-2 sighting in the part 5 years)
99. Oriental skylark ( <i>Aluda gulgula</i> )	Ab	Ab	V (earlier present now not found)
<b>Family: Hirundinidae</b>			
100. Barn Swallow ( <i>Hirundo rustica</i> )	P/C/V	P/C/V	P/C/V
101. Red-rumped Swallow ( <i>Hirundo daurica</i> )	P/C/R	P/C/R	P/C/R/B breeds in nearby houses
<b>Family: Laniidae</b>			
102. Baybacked shrike ( <i>Lanius vittatus</i> )	Ab	P/C/V	P/C/V
103. Long-Tailed shrike ( <i>Lanius schach</i> )	Ab	Ab	V (resident turned visitor)
104. Brown shrike ( <i>Lanius cristatus</i> )	P/C/V	P/C/V	P/C/V
<b>Family: Oriolidae</b>			
105. Eurasian Golden Oriole ( <i>Oriolus oriolus</i> )	P/C/V	P/C/V	P/C/V
<b>Family: Dicruridae</b>			
106. Black Drongo ( <i>Dicrurus macrocercus</i> )	P/C/V	P/C/V	P/C/V
107. Ashy Drongo ( <i>Dicrurus leucophaeus</i> )	P/r/V	P/r/V	P/r/V
108. White-bellied Drongo ( <i>Dicrurus caerulescens</i> )	Ab	Ab	V
<b>Family: Sturnidae</b>			
109. Chestnut-Tailed Starling ( <i>Sturnus malabaricus</i> )	P/C/V	P/C/V	P/C/V
110. Brahminy Starling ( <i>Sturnus pagodarum</i> )	P/C/V	P/C/V	P/C/R/B (but drastic reduction)
111. Rosy Starling ( <i>Sturnus roseus</i> )	P/C/V	P/C/V	P/C/V
112. Common Myna ( <i>Acridotheres tristis</i> )	P/C/R/B	P/C/R/B	P/C/R/B
113. Jungle Myna ( <i>Acridotheres fuscus</i> )	P/C/R/B	P/C/R/B	P/C/R/B
<b>Family: Corvidae</b>			
114. House Crow ( <i>Corvus splendens</i> )	P/C/R/B	P/C/R/B	P/C/R/B
115. Large-Billed Crow ( <i>Corvus macrorhynchos</i> )	P/C/R/B	P/C/R/B	P/C/R/B

<b>Family: Campephagidae</b>			
116. Common Woodshrike ( <i>Tephrodornis pondicerianus</i> )	Ab	Ab	V
117. Black Headed Cuckooshrike ( <i>Coracina melanoptera</i> )	P/C/V	P/C/V	P/C/V
118. Small Minivet ( <i>Pericrocotus cinnamomeus</i> )	P/C/V	P/C/V	P/C/V
<b>Family: Irenidae</b>			
119. Common Iora ( <i>Aegithina tiphia</i> )	P/r/V	P/r/V	P/r/V
120. Blue-winged Leafbird ( <i>Chloropsis cochinchinensis</i> )	P/C/V	Ab	P/C/V
<b>Family: Pycnonotidae</b>			
121. Red-whiskered Bulbul ( <i>Pycnonotus jocosus</i> )	P/C/R/B	P/C/R/B	P/C/R/B
122. Red-vented Bulbul ( <i>Pycnonotus cafer</i> )	P/C/R/B	P/C/R/B	P/C/R/B
<b>Family: Muscicapinae Sub-Family: Timaliinae</b>			
123. Yellow-Billed Babbler ( <i>Turdoides affinis</i> )	P/r/V	P/C/R/B	P/C/R/B
<b>Family: Muscicapinae</b>			
124. Asian Brown Flycatcher ( <i>Muscicapa dauurica</i> )	Ab	P/r/V	P/r/V
125. Red Throated Flycatcher ( <i>Ficedula parva</i> )	Ab	Ab	Ab
126. Tickell's blue Flycatcher ( <i>Cyornis tickelliae</i> )	P/r/R/B	P/r/R/B	P/r/R/B
127. White-Throated Fantail ( <i>Rhipidura albicollis</i> )	P/r/R/B	P/r/R/B	P/r/R/B
<b>Family: Monarchinae</b>			
128. Asian Paradise-Flycatcher ( <i>Terpsiphone paradisi</i> )	P/r/V	P/r/V	P/r/V
<b>Family: Sylviinae</b>			
129. Zitting Cisticola ( <i>Cisticola juncidis</i> )	Ab	Ab	P/C/R/B
130. Plain Prinia ( <i>Prinia inornata</i> )	Ab	Ab	P/C/R
131. Ashy Prinia ( <i>Prinia socialis</i> )	P/C/R/B	P/C/R/B	P/C/R/B
132. Common Tailorbird ( <i>Orthotomus sutorius</i> )	P/C/R/B	P/C/R/B	P/C/R/B
133. Clamorous Reed-Warbler ( <i>Acrocephalus stentoreus</i> )	P/C/V	P/C/V	P/C/V
134. Blyth's Reed-Warbler ( <i>Acrocephalus dumetorum</i> )	P/C/V	P/C/V	P/C/V
135. Booted Warbler ( <i>Hippolis caligata</i> )	P/C/V	P/C/V	P/C/V
136. Greenish Warbler ( <i>Phylloscopus trochiloides</i> )	P/r/V	P/r/V	P/r/V
<b>Family: Turdinae</b>			
137. Oriental Magpie-Robin ( <i>Copsychus saularis</i> )	P/C/R/B	P/C/R/B	P/C/R/B
138. Pied Bushchat ( <i>Saxicoloides caprata</i> )	P/C/R/B	P/C/R/B	P/C/R/B
139. Indian Robin ( <i>Saxicoloides fulicata</i> )	P/C/R/B	P/C/R	P/C/R/B
<b>Family: Paridae</b>			
140. Great Tit ( <i>Parus major</i> )	P/C/R/B	P/C/R/B	P/C/R/B
<b>Family: Motacillidae</b>			
141. Tree Pipit ( <i>Anthus hodgsoni</i> )	P/r/V	Ab	P/r/V
142. Paddy Field Pipit ( <i>Anthus rufulus</i> )	P/C/V	P/C/V	P/C/R/B
143. Twany Pipit ( <i>Anthus campestris</i> )	Ab	Ab	P/r/V
144. Forest Wagtail ( <i>Dendronanthus indicus</i> )	Ab	P/C/V	Ab
145. Yellow Wagtail ( <i>Motacilla flava</i> )	P/r/V	P/C/V	P/C/V
146. Grey Wagtail ( <i>Motacilla cinerea</i> )	Ab	P/r/V	P/r/V

147. White Wagtail ( <i>Motacilla alba</i> )	P/r/V	Ab	P/r/V
148. White-Browed Wagtail ( <i>Motacilla maderaspatensis</i> )	P/C/R/B	P/C/R/B	P/C/R/B
<b>Family: Dicaeidae</b>			
149. Thickbilled Flowerpecker ( <i>Dicaeum agile</i> )	Ab	Ab	Va (Ab in recent past)
150. Pale-Billed Flowerpecker ( <i>Dicaeum erythrohynchos</i> )	P/C/R/B	P/C/R/B	P/C/R/B
<b>Family: Nectariniidae</b>			
152. Purple-rumped Sunbird ( <i>Nectarinia zeylonica</i> )	P/C/R/B	P/C/R/B	P/C/R/B
153. Purple Sunbird ( <i>Nectarinia asiatica</i> )	P/C/R/B	P/C/R/B	P/C/R/B
<b>Family: Passerinae</b>			
154. House Sparrow ( <i>Passer domesticus</i> )	Ab	P/C/R/B* (*not in lake area but in surroundings)	P/C/R/B* (*not in lake area but in surroundings)
<b>Family: Ploceinae</b>			
155. Baya Weaver ( <i>Ploceus philippinus</i> )	Ab	P/C/V	P/C/R/B
156. Streaked Weaver ( <i>Ploceus manyar</i> )	Ab	Ab	P/C/R/B
<b>Family: Estrildidae</b>			
157. Red Avadavat ( <i>Amandava amandava</i> )	Ab	Ab	P/C/R/B
158. Indian Silverbill ( <i>Lonchura malabarica</i> )	Ab	P/C/R/B	P/C/R/B
159. White-Rumped Munia ( <i>Lonchura striata</i> )	Ab	Ab	P/r/V
160. Scaly-Breasted Munia ( <i>Lonchura punctulata</i> )	P/C/R/B	P/C/R/B	P/C/R/B
161. Blackheaded Munia ( <i>Lonchura malacca</i> )	P/C/R/B	P/C/R/B	P/C/R/B
<b>Total</b>	<b>104</b>	<b>114</b>	<b>146</b>

P: Present, C: Common, r: Rare, R: Resident, B: Breeding, V: Visitor, Ab: Absent

## Appendix V. Checklist of birds in different study sites

Species	H.D. Kote Range		Sargur Range	T.N. Pura Range		Nanjangud	Mysore			Urban
	Sollepura	Malleshwara Gudda	C. devenna betta (Sec-4), Kottigeal Mullur gudda	Vadagal R.S. Betta (Sec-4)	Mallikarjuna swamy betta	Konnatur (Sec-4)	Chickanhalli B-I RF	Chickanhalli B-II RF	Varakodu	Chammundi hill
<b>Family: Podicipitidae</b>										
1. Little Grebe ( <i>Tachybaptus ruficollis</i> )	P/C/R	P/C/R	P/C/R	P/C/R	-	-	-	-	-	-
<b>Family: Phalacrocoracidae</b>										
2. Little Cormorant ( <i>Phalacrocorax niger</i> )	P/C/R	P/C/R	P/C/R	-	-	-	-	-	-	-
3. Indian Cormorant ( <i>Phalacrocorax fuscicollis</i> )	-	-	-	-	-	-	-	-	-	-
4. Large Cormorant ( <i>Phalacrocorax carbo</i> )	P/C/R	-	P/C/R	-	-	-	-	-	-	-
<b>Family: Anhingidae</b>										
5. Darter ( <i>Anhingamelanogaster</i> )	P/r/R	-	P/C/R	-	-	-	-	-	-	-
<b>Family: Ardeidae</b>										
6. Grey Heron ( <i>Ardea cinerea</i> )	P/C/R	P/C/R	P/C/R	-	-	-	-	-	-	-
7. Purple Heron ( <i>Ardea purpurea</i> )	-	P/C/R	P/C/R	-	-	-	-	-	-	-
8. Indian Pond Heron ( <i>Ardeola grayii</i> )	P/C/R	P/C/R	P/C/R	-	-	P/C/R	-	-	-	P/C/R
9. Cattle Egret ( <i>Bubulcus ibis</i> )	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R
10. Great Egret ( <i>Casmerodius albus</i> )	-	-	P/r/R	-	-	-	-	-	-	-
11. Intermediate Egret ( <i>Mesophoyx intermedia</i> )	P/r	-	P/r	-	-	-	-	-	-	-
12. Little Egret ( <i>Egretta garzetta</i> )	P/C/R	P/C/R	P/C/R	-	-	-	-	-	-	P/C/R
13. Western Reef Egret ( <i>Egretta gularis</i> )	-	-	P/r/V	-	-	-	-	-	-	-
14. Black Crowned Night Heron ( <i>Nycticorax nycticorax</i> )	P/C/R	P/C/R	P/C/R	-	-	-	-	-	-	-
<b>Family: Threskiornithidae</b>										
15. Blackheaded Ibis ( <i>Threskiornis melanocephalous</i> )	-	P/C/V	P/C/V	-	-	-	-	-	-	P/C/V
16. Black Ibis ( <i>Pseuidbis papillosa</i> )	P/C/V	P/C/V	P/C/V	-	-	-	-	-	P/C/V	P/C/V

<b>Family: Anatidae</b>											
17. Lesser Whistling-Duck ( <i>Dendrocygna javanica</i> )	P/C /V	-	-	-	-	-	-	-	-	-	-
18. Spot-billed Duck ( <i>Anas poecilorhyncha</i> )	P/C /R	P/C /R	P/C/R	-	-	-	-	-	-	-	-
19. Barheaded goose ( <i>Anser indicus</i> )	P/r/ Va*	-	-	-	-	-	-	-	-	-	-
<b>Family: Accipitridae</b>											
20. Black Shouldered Kite ( <i>Elanus caeruleus</i> )	P/C /R	P/C /R	P/C/R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R
21. Black Kite ( <i>Milvus migrans</i> )	P/C /R	P/C /R	P/C/R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R
22. Brahminy Kite ( <i>Haliastur indus</i> )	P/C /R	P/C /R	P/C/R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R
23. Shikra ( <i>Accipiter badius</i> )	P/C /R	P/C /R	P/C/R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R
24. Besra ( <i>Accipiter virgatus</i> )	P/r/ V	-	-	-	-	-	-	-	-	-	-
25. Twany Eagle ( <i>Aquila rapax</i> )	P/C /R	P/C /R	-	-	-	-	-	-	P/C /R	P/C /R	-
26. White Rumped Vulture ( <i>Gyps bengalensis</i> )	-	-	-	-	-	-	-	-	-	P/r/ R	-
27. Egyptian Vulture ( <i>Neophron percnopterus</i> )	P/r	-	-	-	-	-	-	-	-	P/r/ R	-
28. Eurasian Marsh Harrier ( <i>Circus aeruginosus</i> )	-	-	P/C/V	-	-	-	-	-	-	-	-
29. Crested Serpent Eagle ( <i>Spilornis cheela</i> )	P/C /R	P/C /R	P/C/R	P/C /R	P/C /R	-	P/C /R	P/C /R	P/C /R	P/C /V	-
30. Oriental Honey Buzzard ( <i>Pernis ptilorhynchus</i> )	P/r/ R	P/r/ R	P/r/R	-	-	-	P/C /R	-	P/C /R	P/C /V	-
31. Short-toed snake eagle ( <i>Circaetus gallicus</i> )	P/C /R	P/C /R	P/C/R	P/C /R	P/C /R	P/C /R	-	-	P/C /R	P/C /R	-
32. Pallid Harrier ( <i>Circus macrourus</i> )	P/r/ V	-	-	-	-	-	-	-	-	-	-
33. Booted Eagle ( <i>Hieraaetus pennatus</i> )	P/C /R	-	P/C/R	-	-	-	-	-	P/C /R	P/C /V	-
34. Bonellis Eagle ( <i>Hieraaetus fasciatus</i> )	-	-	P/C/V	-	-	-	-	-	P/C /R	P/C /R	-
35. White-eyed buzzard ( <i>Butastur teesa</i> )	P/C /R	-	P/C/R	P/C /R	P/C /R	P/C /R	-	-	P/C /R	P/C /R	-
36. Common Kestrel ( <i>Falco tinnunculus</i> )	P/C /R	P/C /R	P/C/R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /V	-
<b>Family: Phasianidae</b>											
37. Grey Francolin ( <i>Francolinus pondicerianus</i> )	P/C /R	P/C /R	P/C/R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R
38. Common Quail ( <i>Coturnix coturnix</i> )	P/C /R	P/C /R	-	-	-	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R
39. Grey jungle fowl ( <i>Gallus sonneratii</i> )	P/C /R	-	P/C/R	-	-	-	P/C /R	P/C /R	P/C /R	-	-
40. Indian peafowl ( <i>Pavo cristatus</i> )	P/C /R	P/C /R	P/C/R	-	-	-	P/C /R	P/C /R	P/C /R	-	-
<b>Family: Turnicidae</b>											
41. Barred Button Quail ( <i>Turnix suscitator</i> )	P/C /R	-	-	-	-	-	-	-	P/C /R	P/C /R	-
42. Yellow Legged Button Quail ( <i>Turnix tanki</i> )	P/C /R	P/C /R	-	-	-	-	-	-	-	-	-
<b>Family: Rallidae</b>											
43. White-breasted Waterhen ( <i>Amaurornis phoenicurus</i> )	P/C /R	P/C /R	P/C/R	-	-	-	-	-	-	-	-

44. Common Coot ( <i>Fulica atra</i> )	P/C /R	-	P/C/R	-	-	-	-	-	-	-
45. Purple Swamphen ( <i>Porphyrio porphyrio</i> )	P/C /R	P/C /R	P/C/R	-	-	-	-	-	-	-
<b>Family: Jacanidae</b>										
46. Pheasant-tailed Jacana ( <i>Hydrophasianus chirurgus</i> )	-	-	P/C/R	-	-	-	-	-	-	-
47. Bronze-winged Jacana ( <i>Metopidius indicus</i> )	-	-	P/C/R	-	-	-	-	-	-	-
<b>Family: Charadriidae</b>										
48. Red-Wattled Lapwing ( <i>Vanellus indicus</i> )	P/C /R	P/C /R	P/C/R	-	-	-	-	-	-	P/C /R
<b>Family: Scolopacidae</b>										
49. Common Redshank ( <i>Tringa totanus</i> )	-	-	-	-	-	-	-	-	-	-
50. Marsh Sandpiper ( <i>Tringa stagnatilis</i> )	P/C /R	-	-	-	-	-	-	-	-	-
51. Common Greenshank ( <i>Tringa nebularia</i> )	-	-	-	-	-	-	-	-	-	-
52. Green Sandpiper ( <i>Tringa ochropus</i> )	-	-	-	-	-	-	-	-	-	-
53. Wood Sandpiper ( <i>Tringa glareola</i> )	P/C /V	-	-	-	-	-	-	-	-	P/C /R
54. Common Sandpiper ( <i>Actitis hypoleucos</i> )	P/C /R	P/C /R	P/C/R	-	-	-	-	-	-	P/C /R
<b>Family: Recurvirostridae</b>										
55. Black-winged Stilt ( <i>Himantopus himantopus</i> )	-	-	P/C/V	-	-	-	-	-	-	-
<b>Family: Burhinidae</b>										
56. River Tern ( <i>Sterna aurantia</i> )	-	-	P/C/V	-	-	-	-	-	-	-
<b>Family: Columbidae</b>										
57. Rock Pigeon ( <i>Columba livia</i> )	P/C /R	P/C /R	P/C/R	P/C /R	P/C /R	-	P/C /R	P/C /R	P/C /R	P/C /R
58. Eurasian Collared Dove ( <i>Streptopelia decaocto</i> )	P/C /R	P/C /R	P/C/R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R
59. Spotted Dove ( <i>Streptopelia chinensis</i> )	P/C /R	P/C /R	P/C/R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R
60. Laughing Dove ( <i>Streptopelia senegalensis</i> )	P/C /R	P/C /R	P/C/R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R
<b>Family: Psittacidae</b>										
61. Plump headed parakeet ( <i>Psittacula cyanocephala</i> )	P/C /R	-	-	-	-	-	-	-	-	-
62. Rose-ringed Parakeet ( <i>Psittacula krameri</i> )	P/C /R	P/C /R	P/C/R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R
<b>Family: Cuculidae</b>										
63. Pied Cuckoo ( <i>Clamtor jacobinus</i> )	P/C /V	-	-	-	-	-	-	-	-	-
64. Common hawk cuckoo ( <i>Hierococcyx varius</i> )	P/C /R	P/C /R	P/C/R	-	-	-	P/C /R	P/C /R	P/C /R	P/C /R
65. Indian Cuckoo ( <i>Cuculus micropterus</i> )	-	-	-	-	-	-	-	-	P/C /R	P/r/ V
66. Asian Koel ( <i>Eudynamys scolopacea</i> )	P/C /R	P/C /R	P/C/R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R
67. Greater Coucal ( <i>Centropus sinensis</i> )	P/C /R	P/C /R	P/C/R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R
68. Small Green-billed Malkoha ( <i>Phaenicophaeus viridirostris</i> )	-	-	-	-	-	-	-	-	-	P/r/ V

69. Sirkeer malkoha ( <i>Phaenicophaeus leschenaultia</i> )	-	-	P/r/V	-	-	-	-	-	-	-	-
<b>Family: Strigidae</b>											
70. Barn Owl ( <i>Tyto alba</i> )	-	-	P/C/R	-	-	-	-	-	-	-	P/C/R
71. Collared Scops Owl ( <i>Otus bakkamoena</i> )	P/C/R	-	-	-	-	-	-	-	-	-	P/C/R
72. Spotted Owlet ( <i>Athene brama</i> )	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R
73. Eurasian Eagle Owl ( <i>Bubo bubo</i> )	-	-	-	-	-	-	-	-	-	P/C/R	P/C/R
<b>Family: Apodidae</b>											
74. House Swift ( <i>Apus affinis</i> )	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R
75. Asian Palm Swift ( <i>Cypsiurus balasiensis</i> )	P/C/R	-	-	-	-	P/C/R	-	-	-	P/C/R	P/C/R
<b>Family: Alcedinidae</b>											
76. Common Kingfisher ( <i>Alcedo atthis</i> )	P/C/R	-	-	-	-	-	-	-	-	-	-
77. White-Throated Kingfisher ( <i>Halcyon smyrnensis</i> )	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R
78. Pied Kingfisher ( <i>Ceryle rudis</i> )	P/C/R	-	-	-	-	-	-	-	-	-	-
<b>Family: Meropidae</b>											
79. Green Bee-eater ( <i>Merops orientalis</i> )	P/C/V	P/C/V	P/C/V	P/C/V	P/C/V	P/C/V	P/C/V	P/C/V	P/C/V	P/C/V	P/C/V
80. Blue-tailed Bee-eater ( <i>Merops philippinus</i> )	P/C/V	P/C/V	P/C/V	P/C/V	P/C/V	P/C/V	P/C/V	P/C/V	P/C/V	P/C/V	P/C/V
81. Chestnut-headed Bee-eater ( <i>Merops leschenaulti</i> )	-	P/C/V	-	-	-	-	-	-	-	-	P/C/V
<b>Family: Coraciidae</b>											
82. Indian Roller ( <i>Coracias benghalensis</i> )	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	P/C/V
<b>Family: Upupidae</b>											
83. Common Hoopoe ( <i>Upupa epops</i> )	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	P/C/V
<b>Family: Bucerotidae</b>											
84. Indian Grey Hornbill ( <i>Ocyrceros birostris</i> )	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	-	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R
<b>Family: Capitonidae</b>											
85. White Cheeked Barbet ( <i>Megalaima viridis</i> )	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R
86. Coppersmith Barbet ( <i>Megalaima haemacephala</i> )	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R
<b>Family: Picidae</b>											
87. Black-Rumped woodpecker ( <i>Dinopium benghalense</i> )	P/r/R	-	-	-	-	-	-	-	-	-	P/r/V
<b>Family: Pittidae</b>											
88. Indian Pitta ( <i>Pitta brachyuran</i> )	-	-	-	-	-	-	-	-	-	-	P/r/V
<b>Family: Alaudidae</b>											
89. Singing Bush lark ( <i>Mirafracantillans</i> )	P/C/R	P/C/R	-	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R
90. Indian Bush Lark ( <i>Miraфра erythroptera</i> )	P/C/R	P/C/R	-	-	-	-	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R
91. Black Crowned Sparrow Lark ( <i>Eremopetrix grisea</i> )	-	P/C/R	-	-	-	-	P/C/R	P/C/R	P/C/R	P/C/R	P/C/R
92. Rufous-winged lark ( <i>Miraфра assamica</i> )	-	-	-	P/r/R	P/r/R	-	-	-	-	P/C/R	-

93. Rufous-tailed Lark ( <i>Ammomanes phoenicurus</i> )	P/C /R	P/C /R	P/C/R	P/C /R	P/C /R	P/C /R	-	-	P/C /R	P/r/ V
94. Crested lark ( <i>Galerida cristata</i> )	-	-	P/r/V	-	-	P/r/ V	-	-	P/C /R	-
95. Malabar lark ( <i>Galerida malabarica</i> )	-	-	P/r/V* *	-	-	-	-	-	-	-
96. Syke's lark ( <i>Galerida deva</i> )	-	-	P/r/V	-	-	-	-	-	-	-
97. Oriental skylark ( <i>Aluda gulgula</i> )	-	-		-	-	-	-	-	P/C /R	-
<b>Family: Caprimulgidae</b>										
98. Indian Nightjar ( <i>Caprimugus asiaticus</i> )	P/C /R	P/C /R	-	-	-	-	-	-	P/C /R	P/C /R
<b>Family: Hirundinidae</b>										
99. Barn Swallow ( <i>Hirundo rustica</i> )	-	P/C /R	-	-	-	-	-	-	-	-
100. Wire-tailed Swallow ( <i>Hirundo smithii</i> )	-	P/C /V	P/C/V	-	-	-	P/C /V	P/C /V	P/C /R	P/C /V
101. Red-rumped Swallow ( <i>Hirundo daurica</i> )	P/C /R	P/C /R	P/C/R	P/C /R	P/C /R	P/C /R	-	-	P/C /R	P/C /R
102. Dusky crag martin ( <i>Hirundo concolor</i> )	-	-	-	-	P/r/ V	-	-	-	-	-
<b>Family: Laniidae</b>										
103. Baybacked Shrike ( <i>Lanius vittatus</i> )	P/C /R	P/C /R	-	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R
104. Long-tailed Shrike ( <i>Lanius schach</i> )	P/C /R	P/C /R	P/C/R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R
105. Brown Shrike ( <i>Lanius cristatus</i> )	P/r/ V	-	P/r/V	-	-	-	-	-	-	-
<b>Family: Oriolidae</b>										
106. Eurasian Golden Oriole ( <i>Oriolus oriolus</i> )	P/C /V	P/C /V	-	P/C /V	P/C /V	-	-	-	P/C /V	P/C /V
107. Black-hooded Oriole ( <i>Oriolus xanthornus</i> )	P/C /V	-	-	-	-	-	-	-	-	-
<b>Family: Dicruridae</b>										
108. Black Drongo ( <i>Dicrurus macrocercus</i> )	P/C /R	P/C /R	P/C/R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R
109. Ashy Drongo ( <i>Dicrurus leucophaeus</i> )	P/C /R	P/C /R	P/C/R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R
110. White-bellied Drongo ( <i>Dicrurus caeruleus</i> )	P/C /V	-	P/C/V	-	-	-	-	-	-	-
<b>Family: Sturnidae</b>										
111. Chestnut-Tailed Starling ( <i>Sturnus malabaricus</i> )	P/C /V	P/C /V	-	-	-	-	P/r/ V	P/r/ V	-	-
112. Brahminy Starling ( <i>Sturnus pagodarum</i> )	-	P/C /V	-	-	-	-	-	-	P/C /V	P/C /V
113. Rosy Starling ( <i>Sturnus roseus</i> )	P/C /V	-	P/C/V	P/C /V	P/C /V	-	P/C /V	P/C /V	P/C /V	P/C /V
114. Common Myna ( <i>Acridotheres tristis</i> )	P/C /R	P/C /R	P/C/R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R
115. Jungle Myna ( <i>Acridotheres fuscus</i> )	P/C /R	P/C /R	P/C/R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R
<b>Family: Corvidae</b>										
116. House Crow ( <i>Corvus splendens</i> )	P/C /R	P/C /R	P/C/R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R
117. Large-Billed Crow ( <i>Corvus macrorhynchos</i> )	P/C /R	P/C /R	P/C/R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R
118. Rufous treepie ( <i>Dendrocitta vagabunda</i> )	P/C /R		P/C/R	-	-	-	-	-	P/C /R	-



<b>Family: Campephagidae</b>										
119. Common Woodshrike ( <i>Tephrodoris pondicerianus</i> )	P/r/ R	-	P/r/R	-	-	-	-	-	P/r/ R	P/r/ V
120. Black Headed Cuckooshrike ( <i>Coracina melanoptera</i> )	P/C /V	-	-	-	-	-	-	-	-	-
121. Small Minivet ( <i>Pericrocotus cinnamomeus</i> )	P/C /R	-	P/C/R	P/C /R	P/C /R	P/C /R	P/C /V	P/C /V	P/C /R	P/C /V
<b>Family: Irenidae</b>										
122. Common Iora ( <i>Aegithina tiphia</i> )	P/C /R	-	P/C/R	-	-	-	P/C /V	P/C /V	P/r/ R	P/C /V
123. Blue-winged Leafbird ( <i>Chloropsis cochinchinensis</i> )	P/C /V	-	-	-	-	-	-	-		P/r/ V
<b>Family: Pycnonotidae</b>										
124. Red-whiskered Bulbul ( <i>Pycnonotus jocosus</i> )	P/C /R	P/C /R	P/C/R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R
125. Red-vented Bulbul ( <i>Pycnonotus cafer</i> )	P/C /R	P/C /R	P/C/R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R
126. White-browed Bulbul ( <i>Pycnonotus lutelus</i> )	-	-	P/C/R	P/C /R	P/C /R	-	P/C /R	P/C /R	P/C /R	P/C /V
<b>Family: Muscicapinae</b>										
<b>Sub-Family: Timaliinae</b>										
127. Jungle Babbler ( <i>Turdoides striatus</i> )	P/C /R	-	P/C/R	P/C /R	P/C /R	-	P/C /R	P/C /R	P/C /R	P/C /R
128. Yellow-eyed babbler ( <i>Chrysomma sinense</i> )	-	-	P/C/R	-	-	P/C /R	-	-	P/C /R	-
129. Twany bellied babbler ( <i>Dumetia hyperythra</i> )	-	-	P/C/R	-	-	-	-	-	-	-
130. Large Grey Babbler ( <i>Turdoides malcolmi</i> )	-	-	P/C/R	-	-	-	-	-	-	P/C /R
131. Yellow-Billed Babbler ( <i>Turdoides affinis</i> )	P/C /R	-	P/C/R	-	-	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R
<b>Family: Muscicapinae</b>										
132. Tickell's blue Flycatcher ( <i>Cyornis tickelliae</i> )	P/C /V	-	P/C/V	-	-	-	-	-	-	P/r/ V
133. White-Throated Fantail ( <i>Rhipidura albicollis</i> )	P/C /R	-	P/C/R	-	-	-	P/C /V	P/C /V	P/C /V	P/C /V
<b>Family: Monarchinae</b>										
134. Asian Paradise-Flycatcher ( <i>Terpsiphone paradisi</i> )	P/C /R	P/C /R	P/C/R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R
<b>Family: Sylviinae</b>										
135. Plain Prinia ( <i>Prinia inornata</i> )	P/C /R	P/C /R	P/C/R	-	-	-	P/C /R	P/C /R	P/C /R	P/C /R
136. Ashy Prinia ( <i>Prinia socialis</i> )	P/C /R	P/C /R	P/C/R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R
137. Grey-breasted prinia ( <i>Prinia hodgsonii</i> )			P/r/R	-	P/r/ R		-	-	-	-
138. Common Tailorbird ( <i>Orthotomus sutorius</i> )	P/C /R	P/C /R	P/C/R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R
139. Clamorous Reed-Warbler ( <i>Acrocephalus stentoreus</i> )	-	-	-	-	-	-	-	-	-	-
140. Blyth's Reed-Warbler ( <i>Acrocephalus dumetorum</i> )	P/r/ V	-	-	-	-	-	-	-	-	-
141. Booted Warbler ( <i>Hippolis caligata</i> )	P/C /R	P/C /R	P/C/R	P/C /R	P/C /R	-	P/C /R	P/C /R	P/C /R	P/C /R
142. Lesser whitethroat ( <i>Sylvia curruca</i> )	-	-	P/r/V	-	-	-	-	-	-	-
<b>Family: Turdinae</b>										
143. Oriental Magpie-Robin ( <i>Copsychus saularis</i> )	P/C /R	P/C /R	P/C/R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R

144. Pied Bushchat ( <i>Saxicoloides caprata</i> )	P/C /R	P/C /R	P/C/R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R
145. Indian Robin ( <i>Saxicoloides fulicata</i> )	P/C /R	P/C /R	P/C/R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R
146. Blue Rock Thrush ( <i>Monticola solitarius</i> )	-	-	P/C/V								P/C /V
<b>Family: Paridae</b>											
147. Great Tit ( <i>Parus major</i> )	P/C /R	-	P/C/R	-	-	-	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R
<b>Family: Motacillidae</b>											
148. Paddy Field Pipit ( <i>Anthus rufulus</i> )	-	-	-	P/C /R	P/C /R	-	-	-	-	-	P/C /R
149. Twany Pipit ( <i>Anthus campestris</i> )	P/r/ V	-	-	-	-	-	-	-	-	-	-
150. Richards Pipit ( <i>Anthus richardi</i> )	-	-	P/C/R	-	-	-	-	-	-	-	-
151. Forest Wagtail ( <i>Dendronanthus indicus</i> )	P/r/ V	-	-	-	-	-	-	-	-	-	-
152. Yellow Wagtail ( <i>Motacilla flava</i> )	P/C /V	-	P/C/V	-	-	-	-	-	-	-	P/C /V
153. Grey Wagtail ( <i>Motacilla cinerea</i> )	P/C /R	-	-	-	-	-	-	-	-	-	-
154. White Wagtail ( <i>Motacilla alba</i> )	-	-	P/r/V	-	-	-	-	-	-	-	-
155. White-Browed Wagtail ( <i>Motacilla maderaspatensis</i> )	P/C /R	P/C /R	P/C/R	P/C /R	P/C /R	-	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R
<b>Family: Dicaeidae</b>											
156. Thickbilled Flowerpecker ( <i>Dicaeum agile</i> )	P/C /R	P/C /R	-	-	-	-	P/C /R	-	P/C /R	P/C /R	P/C /R
157. Pale-Billed Flowerpecker ( <i>Dicaeum erythrohynchos</i> )	P/C /R	-	P/C/R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R
<b>Family: Nectariniidae</b>											
158. Purple-rumped Sunbird ( <i>Nectarinia zeylonica</i> )	P/C /R	P/C /R	P/C/R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R
159. Purple Sunbird ( <i>Nectarinia asiatica</i> )	P/C /R	P/C /R	P/C/R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R
<b>Family: Passerinae</b>											
160. House Sparrow ( <i>Passer domesticus</i> )	P/C /R	P/C /R	P/C/R	P/C /R	P/C /R	-	P/C /R	-	P/C /R	P/C /R	P/C /R
<b>Family: Ploceinae</b>											
161. Baya Weaver ( <i>Ploceus philippinus</i> )	P/C /R	P/C /R	P/C/R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R
<b>Family: Estrildidae</b>											
162. Red Avadavat ( <i>Amandava amandava</i> )	P/C /R	-	-	-	-	-	-	-	-	-	P/C /R
163. Indian Silverbill ( <i>Lonchura malabarica</i> )	P/C /R	-	-	-	-	-	P/C /R	-	P/C /R	-	-
164. White-Rumped Munia ( <i>Lonchura striata</i> )	P/C /R	-	P/C/R	P/C /R	P/C /R	-	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R
165. Scaly-Breasted Munia ( <i>Lonchura punctulata</i> )	P/C /R	P/C /R	P/C/R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R
166. Blackheaded Munia ( <i>Lonchura malacca</i> )	P/C /R	P/C /R	P/C/R	-	-	-	P/C /R	P/C /R	P/C /R	P/C /R	P/C /R
167. Common Rosefinch ( <i>Carpodacus erythrinus</i> )	P/C /R	-	P/C/R	P/C /R	-	-	P/C /V	P/C /V	P/C /R	P/C /R	-
<b>Total</b>	<b>122</b>	<b>84</b>	<b>113</b>	<b>65</b>	<b>64</b>	<b>55</b>	<b>70</b>	<b>66</b>	<b>93</b>	<b>104</b>	

P: Present, C: Common, r: Rare, R: Resident, V: Visitor, Va\*: Vagrant



