7.1 Woodpecker communities in sal forests – a synthesis

The present study has aimed at contributing towards a better understanding of the ecology of woodpeckers in the sal forest landscapes. First, it has demonstrated that the sal forest woodpecker community changes in structure and composition in response to forest management practices. Natural sal forests support a much higher biomass and diversity of woodpeckers compared to either old- or young managed sal. Further, this study has pointed out that plantations of exotic teak, which support very few woodpeckers, are decidedly not suitable for the native woodpecker assemblage in the sal-dominated landscapes.

In addition to this, an important point that has emerged from this research is that during the breeding season a substantial proportion of woodpeckers appear to move to natural sal areas. On the other hand, managed sal forests, although apparently deficient in resources important for breeding, are important in that they support a sizeable density of woodpeckers during the non-breeding season.

Having documented the patterns in abundance and richness across variously managed sal forests, this study looked into the potential habitat factors that shape these patterns. It has found strong indications that specific habitat parameters – mainly, tree basal area and snag density – have a strong influence on the abundance and diversity of picids in the sal forests. Notably, these factors are directly affected by forest management operations such as the current practice of harvesting dead trees. Snag density seems to be important during the breeding season; this is also evinced by the seasonal shift in abundance towards natural sal.
Delving further still, the present study also found that the susceptibility of different woodpecker species to changes in habitat features lies, to a certain extent, in their foraging preferences. For example, it was found that larger species prefer large-sized substrates for foraging; hence, removal of such trees is likely to affect their abundance. It was also observed that foraging behaviour among sal forest woodpeckers does not change with season. This further supports the idea that preference of woodpeckers for natural forests during the breeding season is based on the abundance of nesting resources, rather than foraging ones. On a more theoretical note, this study has found evidence that foraging differentiation is an important mechanism for coexistence of sympatric woodpecker species.

My study has also corroborated the view that woodpeckers can potentially serve as ecological indicators at two levels. Firstly, as a group, I found that woodpecker species richness strongly reflects the species richness of the breeding bird community. Secondly, I have identified certain picid species that associate with particular management regimes. Monitoring of these species can potentially help to rapidly assess the health of the forests.

The conservation implications of the above findings are significant. My study has generated useful baseline information regarding woodpecker richness, densities and community composition in sal forests. The study has also suggested that loss of old-growth native sal forest (having high basal areas and snag density) can lead to local extinctions of several woodpecker species, particularly larger ones. Given that such unmanaged patches are increasingly becoming rare in the landscape – now possibly restricted to protected areas – range contractions and local extinctions of these bird species are likely in the near future. The role of
woodpecker communities as surrogates for overall species richness implies that extinctions of woodpecker species due to habitat manipulation are likely to be accompanied by those even in the rest of the forest bird community.

Another practical outcome of my study is the evaluation of the call playback technique for surveying woodpeckers. It was found that playback-assisted surveys are more efficient in detecting woodpeckers than conventional visual-aural surveys, and can be useful for the rapid assessment of woodpecker communities at a landscape level as well as generating accurate local-level species lists.

7.2 Implications for forest management and conservation

The present study reiterates that selective logging of deadwood in sal forests, although considered ecologically 'benign', still renders them deficient in supporting the native woodpecker community. In order to conserve the original woodpecker assemblage, managers should ensure that the practice of snag removal is phased out or at least controlled.

Stands containing large trees are important for woodpeckers, especially the larger species, considering their foraging preferences. Management practices targeted at retention and protection of large trees in managed sal forests are bound to benefit woodpecker conservation.

Structural elements like large trees and snags, which are more abundant in undisturbed stands, apparently become more important in the breeding season. The conservation value of managed forests can be increased by either ensuring that they are either connected to unmanaged forests that provide these resources, or, to some extent, by retaining native patches in managed forests.
The policy of planting teak for afforestation should give way to efforts towards regeneration of sal and other native trees that are ecologically better suited to harbour the native avifauna. In areas that are already under teak plantations, underplanting of native tree species should be encouraged so that the vegetation can proceed to recover its natural character over time.

7.3 Directions for future research

The findings of the present research are, at the moment, applicable to the study area concerned. They need to be validated by studies at other locations, which will tell us whether the observed results hold true in general. Further, the determinants of woodpecker abundance and diversity need to be evaluated at a landscape level. This will help understand the distribution patterns of picids in the sal forest landscape and to see if the patterns seen at the small scale are borne out at the landscape level where several human-induced factors interact with one another such as fragmentation, low-level biomass extraction, selective logging and urbanisation. Also, some of the inferences made in the present study need to be confirmed by further evidence. The suggested shifts by woodpeckers towards natural forests during breeding season need to be backed by empirical studies, e.g. by radio-tagging woodpeckers and mapping their ranging patterns in breeding and non-breeding seasons, or colour-banding a large number of individuals and assess their seasonal movement. Radio-tracking would also yield vital information about home ranges of Indian woodpeckers, which is currently lacking. Knowledge of home range and territories would help in proper assessment of the conservation status of picids in India.
Apart from the above, several other important ecological aspects also remain to be studied. Research on the nesting ecology of sal forest woodpeckers is required to identify habitat features that are critical for reproduction and based on that recognize suitable forest areas having such resources. Knowledge of the nest site preferences of Indian woodpeckers will aid in conservation of species that are vulnerable (e.g. great slaty woodpecker).

Asian woodpeckers have been known to associate in mixed species flocks comprising of several picid species and other birds. Mixed flocking was observed during the present study too and appeared prevalent in the non-breeding season, suggesting that woodpecker species actually benefit from associating with one another. This ecological phenomenon is worthy of further investigation from the perspective of community ecology of picids.

The present study looked at patterns among species in their choice of foraging substrates. Further insight into foraging resource partitioning would require enumeration of food resources (i.e. arthropods), diet, and feeding manoeuvres. Also, further research to explore the relation between foraging behaviour and phylogeny will shed light on the evolution of this divergence.

It is hoped that with the maturation of avian ecology and conservation science in India, future studies would bridge the gaps in knowledge enlisted above.