



Behaviour, ecology and conservation of  
Sri Lanka Magpie *Urocissa ornata*

Wagler, 1829 (Aves; Corvidae)

A thesis submitted for the  
Degree of Doctor of Philosophy to the Faculty of Science,  
University of Colombo

Chaminda Pradeep Ratnayake

November 2011

All rights reserved

## Abstract

Many tropical birds are vulnerable to extinction due to human-induced habitat loss and degradation. The risk of extinction in birds is determined by the ecological, behavioural and species-specific natural history traits. Therefore, predicting risk of extinction of tropical birds is a challenging task owing to the lack of required information on threatened species inhabiting tropical forests. In this context, study of behavioural traits required to understand the underlying mechanisms of impact consequent to habitat loss and degradation, have been largely ignored in many studies.

Sri Lanka is a tropical island with ~1% of the worlds' terrestrial threatened bird species including many endemics. None of the threatened endemic species behavioural, ecological and demographic data, essential to predict endangerment and to conserve them effectively, is known. This study focused on the Sri Lanka Magpie *Urocissa ornata* an endemic threatened forest bird, to determine how behavioural and ecological traits influence the reproductive success in turn population size - the first approximation of endangerment.

First, the study focused on magpie's cooperative breeding behaviour and how it influences the reproductive success. Firm evidence on cooperative breeding behaviour was obtained from an individually marked population. Magpies usually produce a single-brood and extremely rarely double brood within a single season. A clear positive correlation was observed between group size and reproductive success, where larger groups tend to produce more fledglings. Pairs without helpers/subordinates also reproduced successfully; indicating magpies are not obligate cooperative breeders. Nest sanitation activities such as faecal sac removal were found to be equally important as food provisioning for successful brood rearing. Parental investment strategies of magpies showed that the parents tend to compensate their investment in both provisioning and nest sanitation activities with the aid of helpers. Helpers reduced breeding-female investment on food provisioning and faecal-sac removal effort. Natural predation reduced nesting success by modulating the optimum group size. However, human interference can lead to relaxation of predation pressure thereby resulting in excess helpers which contributes to possible social disruption.

Secondly, the study focused on selection of nesting habitat and how it influenced the reproductive success of magpies. Magpies maintained 'year-round group territories' within which nest patches were placed in core areas that generally riparian forests with low tree densities. No breeding-territory relocation between seasons was observed. The only habitat characteristic associated with a successful nest was the nest placement within a selected tree. High nest placement had higher successful rates of fledging. No habitat or temporal (rainfall, temperature) characteristics were associated with the daily nest survival of the magpies. The daily nest survival was marginally higher in the unlogged forests than the logged or regenerating forests. The number of repeat nesting attempts per season increased with group size, thereby contributing to an increased annual reproductive success. Nest patches were frequently relocated within the season if the previous attempt failed. Breeders tend to use their prior experience with predation to place a nest close to a previously successful one to increase reproductive success.

Thirdly, this exclusive forest dwelling species' country-wide geographic range, population size and conservation status were re-assessed. Magpies showed a wide geographic distribution within the wet-zone and were found in low country, sub-montane and montane forests. Montane forests had low encounter rates and small group sizes. Foot hills of the sub-montane region were identified as the high priority conservation area, based on the larger population size spread in contiguous forest patches. A larger fragment of the total population occurred in the existing protected area system and nearly 60% in 'proposed reserves' and 'other-state forests' which are of lower conservation status. Re-assessment of conservation status showed that magpies should be retained in the IUCN 'vulnerable' category.

In conclusion, the study revealed that cooperatively breeding tropical birds such as magpies rely on proximate behavioural strategies to increase reproductive success. Habitat or temporal variables did not impact nestling survival and therefore had little effect on reproductive successes. The study of behavioural traits is an essential correlate of evaluating conservation status and predicting endangerment of tropical birds.