

## **IN230 Habitat associations of bird species and effectiveness of survey techniques in Wallacea forests**

**Tom Martin, University of Lancaster**

The Lambusango Forest on Buton Island, located within the biodiversity 'hotspot' of Wallacea, provides excellent opportunities for ornithological research, and a number of different projects are available here for undergraduate and postgraduate students.

Two key advantages make the Lambusango particularly suitable for university student projects. The first is that survey work here is relatively straightforward in comparison to many other areas of the tropics, and the second is that the forest possesses a large number of evolutionary distinct endemic species located in one of the least-studied ecological regions on Earth, providing a range of possibilities for producing original research with important conservation implications.

Being located on a fairly small island, and because of the unusual biogeography of the Wallacean region, the Lambusango has a relatively low avian species richness compared to forest ecosystems in other parts of the tropics. Around 80 species of birds are found in the forest, compared to >200 in the Honduran field site and >450 species in the Peruvian Amazon. This is an advantage for students coming out for a single season as it allows them to learn how to identify most of the resident species in a relatively short period of time. It also allows for the collection of high quality datasets which encompass the avifaunal community in its entirety, rather than requiring a focus on a smaller number of key indicator species. Further, while species richness in the forest is comparatively low, the avian community is still very diverse and of great conservation importance. Around 35 bird families can be found in the reserve, ranging from large hornbills to tiny sunbirds, and around 50% of all the species found are endemic to the Wallacean biodiversity hotspot. Very little research has been completed looking at the ecology of most of these species and how they respond to increasing anthropogenic pressures, providing opportunities for highly original dissertation projects.

The most accessible project available to students involves working within the ornithology team's long-running core study, which is looking at the habitat associations of the Lambusango's avifauna and examining how bird communities respond to increasing environmental disturbance. In past seasons this study has been conducted across a large number of widely-separated node camps scattered across the Lambusango Reserve, with each camp having different ecological histories and differentially disturbed

forest types. However this phase of the project is complete and the bird survey work is now being incorporated within a larger multi-taxa study looking at how a range of taxonomical groups respond to forest disturbance. This study is to be based in three sites; an area of high quality near-primary forest, an area of well-regenerated secondary forest that has not been significantly disturbed for 40 years, and a long axis of forest near the village of Labundo-bundo which represents a continuous disturbance gradient, with sites ranging from near-primary to highly disturbed secondary forest. The aim of this study is to compare the composition of bird communities at survey plots scattered throughout these three sites with a range of detailed habitat measurements gauging disturbance levels. This will allow students to examine a range of research questions, such as how bird communities – either as a whole or within different sub-groups such as endemic species, feeding guilds or specific families - respond to disturbance, what are the key habitat variables influencing avian richness or community composition, and what is the conservation value of different forest types for supporting the region's unique avifauna.

Bird communities are surveyed in this project using circular-plot fixed-radius point counts. This involves visiting each study plot and surveying all birds seen and heard within a 50m radius of the plot's centre over a 10-minute period. These point-counts are completed early in the morning, between 06:00 – 07:30, as this is the period where bird activity and vocalization is greatest, thus yielding the greatest number of contacts. There will be approximately 16 point-count plots at each of the three study areas, and each plot will be surveyed three times over the course of each season. As well as these point counts, an extensive 20m radius habitat structure survey will also be completed at each plot, measuring a range of variables including mean tree size, canopy and undergrowth density, and the presence of important indicator species. This data will help determine the ecological history of the study sites and allow students to relate composition of bird communities with habitat structure.

Students undertaking this project will first undergo a week of training, in which they will learn to identify the birds of the Lambusango by sight and by call, practise distance estimations, and learn to measure a range of key habitat variables. They will also participate in a series of informal seminars discussing methodologies, the ecological and biogeographical importance of Wallacean avifauna, and conservation issues in the Lambusango forest. They will spend the remainder of their fieldwork time conducting point counts and completing, with the assistance of other teams, an extensive habitat survey of the study sites. Upon completion, students will have produced two very large, high quality data sets which can be analyzed using either simple comparative statistics (ANOVA/Kruskal-Wallis Tests, General Linear Models etc) or, if desired, more complex multivariate analysis to compare bird community

compositions with habitat structure data. This will enable in-depth analysis of a range of important research questions relating to the conservation of Wallacean forest avifauna.

Several other opportunities for additional research projects also exist within the Lambusango. These may however require additional equipment or staffing, so it would be best for students interested in these to contact the fieldwork organisers at the earliest opportunity.

To date, there has been almost no research completed looking at the effectiveness of ornithological survey techniques in the Wallacean region. This is important as the unusual structure of bird communities here may mean that certain methods which work well in other tropical ecosystems may not be suitable in the Wallacean region, while others may be more effective here than reported elsewhere. An opportunity exists to conduct a comparative study examining the relative effectiveness of two of the most commonly used ornithological survey techniques – point-counts and mist-netting. The effectiveness of each technique in monitoring bird communities as a whole, as well as different taxonomical groups, feeding guilds etc, could be examined and compared to results reported from elsewhere in the tropics. Any differences found could then be examined with consideration to the unusual species assemblages and community structure of the Lambusango's avifauna.

There is also potential for another methodological study looking at the relative effectiveness of manned and un-manned point-count surveys. Point-counts are usually conducted by a team of observers who visit each point in the field several times. However, it is possible that the presence of these observers could cause a significant amount of disturbance, and thus influence the frequency of contacts and the types of species detected by the counts. It could be hypothesised that remotely taped point-counts, using electronic tape recorders placed in the field prior to the beginning of the recording period and requiring no actual human presence, could provide a more accurate description of bird communities at any given point than manned counts. This has never been tested, however, and could represent an interesting and original dissertation project.

### **Suggested Reading**

Bibby, C.J., Burgess, N.D., Hill, D.A. and Mustoe, S.H. 2002. *Bird Census Techniques (Second edition)*. Academic Press, London.

Blake, J. G., & B. A. Loiselle. 2001. Bird assemblages in second-growth and old-growth forests, Costa Rica; perspectives from mist nets and point counts. *Auk* 118: 304—326.

Coates, B.J. and Bishop, K.D. 1997. *A guide to the birds of Wallacea*. Dove publications, Alderley.

Lee, T.M., Sodhi, N.S. and Prawiradilaga, D.M. 2007. The importance of protected areas for the forest and endemic avifauna of Sulawesi (Indonesia). *Ecological Applications* 17: 1727-1741.

Marsden, S.J. and Pilgrim, J.D. 2003. Factors influencing the abundance of parrots and hornbills in pristine and disturbed forests on New Britain, PNG. *Ibis* 145: 45-53.

Marsden, S.J. 1999. Estimation of parrot and hornbill densities using point count distance sampling method. *Ibis* 141: 377–390.

Sodhi, N.S., Koh, L.P., Prawiradilaga, D.M., Tinulele, I., Putra, D.D. and Han Tan Tong, T. 2005a. Land use and conservation value for forest birds in central Sulawesi. *Biological Conservation* 122: 547-558.

Sodhi, N.S., Koh, L.P., Brook, B. and Ng, P.K.L. 2004. Southeast Asian biodiversity: an impending disaster. *Trends in Ecology and Evolution* 19: 654–660.

Thiollay, J.M. and Rahman, Z. 2002. The raptor community of central Sulawesi: habitat selection and conservation. *Biological Conservation* 107: 111-122.

Trainor, C.R. 2007. Changes in bird species compositions on a remote and well-forested Wallacean island, South East Asia. *Biological Conservation* 140: 373–385.

Trevino, H.S., Skibiell, A.L., Karels, T.J., Dobson, K.F. 2007. Threats to avifauna on oceanic islands. *Conservation Biology* 21: 125 – 132.

Waltert, M., Mardiatuti, A. and Muhlenberg, M. 2005. Effects of deforestation and forest modification on understory birds in central Sulawesi, Indonesia. *Bird Conservation International* 15: 257–273.

Whitman, A. A., J. M. Hagan, & N. V. L. Brokaw. 1997. A comparison of two bird survey techniques used in a sub-tropical forest. *Condor* 99: 955—965.