

Ecological Observations on Birds of southern Negros, Philippines

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Little work has been done on the ecology of Philippine birds. In contrast, taxonomic studies are extensive (see the bibliographies in Delacour and Mayr [1946], du Pont [1971], and Rabor [1977]), some of them providing ecological notes on various species. Papers that primarily report life history data include those by Rabor (1936a, 1936b, 1954, 1955, 1959), Gonzales (1968, 1969), and Alcalá and Carumbana (1975). Smythies (1960), in his "The Birds of Borneo," includes life history information on species with populations in the Philippines. The data on the movements and survival of Philippine birds amassed by the U.S. Army Migratory Animal Pathological Survey (MAPS) in Asia are summarized by McClure and Leelavit (1972) and by McClure (1974). There is a need for further studies of bird ecology in this country, especially because the tropical rain forests serving as habitats of birds are rapidly contracting in size as a result of deforestation.

This paper will report our observations on the relative abundance and aspects of reproduction of some birds in southern Negros during the period December 1976 through July 1978. Only part of the species reported by Rabor et al. (1970) on Negros could be studied.

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Study Areas

Our studies were conducted in three areas, two of which (Candugay and Kaladías) are near each other and have a similar vegetation type. The third one (Balinsasayao) is a tropical rain forest. Candugay was described in our earlier paper (Alcalá and Carumbana, 1975) as a wooded grassland area of about 900 hectares situated about 9 km north of Siaton and southwest of Cuernos de Negros, a 1903-meter mountain in southern Negros. Candugay is situated in a rain-shadow of this mountain and consequently receives rainfall only from May through November. The study area is traversed by creeks, along which grow fairly large trees.

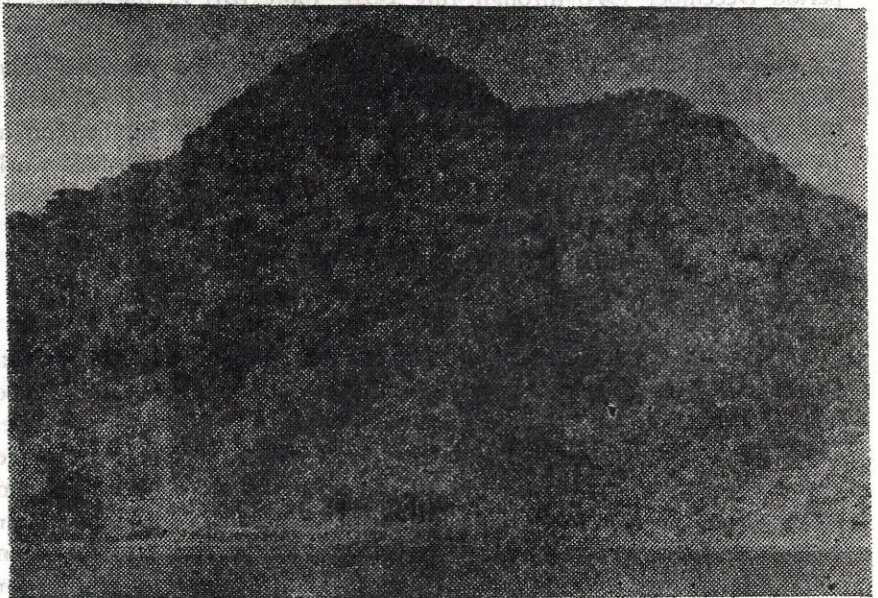
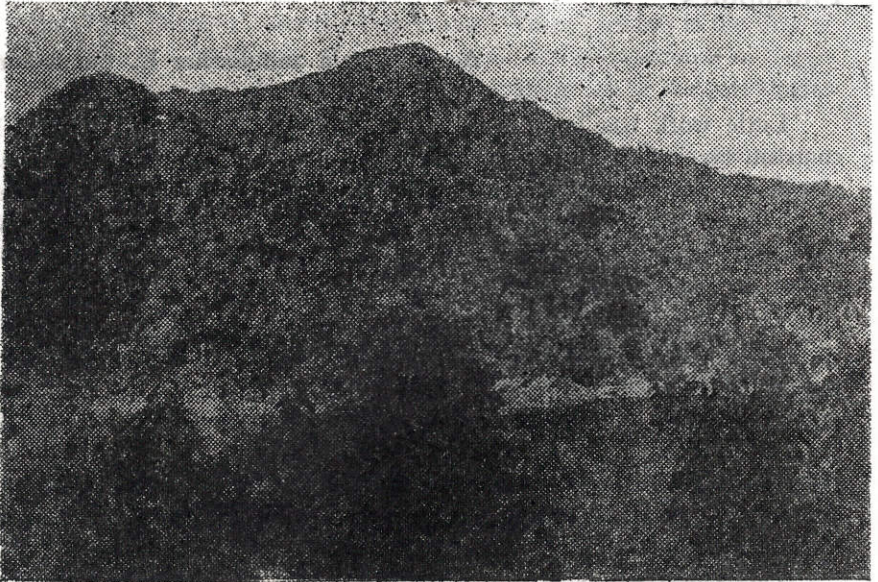


Figure 1. a (above): A view of the Balinsasayao area looking towards the highest mountain peak in the west; b (below): A close view of the forest at the southern edge of the bigger lake. Note the secondary forest near the water's edge. (Also see map on page 224.)

Kaladias is essentially a grassland area, the predominant vegetation being *kogon* (*Imperata cylindrica*). It is situated on a ridge (450 to 600 meters above sea level) several kilometers east of Candugay, within the town of Zamboanguita.

Balinsasayao is about 30 km by road northwest of Dumaguete City; it has an area of probably not less than twenty-four square kilometers. It is separated from the Cuernos de Negros area by the Okoy River. Two moderately deep lakes having a total surface area of about 106.6 hectares mark its central portion. Except for the northern tip of the bigger lake, the two lakes are practically surrounded by a tropical rain forest (Fig. 1), portions of which have been periodically cleared by *kaingineros* (slash-and-burn farmers). This patch of forest represents the last remnant of the once luxuriant and extensive lowland rain forest of southeastern Negros Island. The lakes are about 850 meters above sea level. Mountain streams collecting water from the surrounding high mountain areas empty into the lakes. There are several ridges and three mountain peaks in the area, the tallest of which is about 1800 meters above sea level. The lowland dipterocarp forest has its highest limit at the level of the lakes, but it gradually gives way first to the submontane and next to the montane forests on the tallest peak. Rainfall is practically year round in the area, but the quantity varies, being minimal from February to March.

Methods

The investigators and the field assistants, who had previous training and experience in bird identification, made visual counts of adults and obtained data on nests and eggs. The Candugay and Kaladias areas were surveyed by the investigators and/or two assistants almost every weekend. Two assistants were resident at Balinsasayao to make observations for two or three days a week in the whole forested area. The investigators checked the data of these assistants about every two weeks, and also periodically conducted their own surveys of the area immediately surrounding the lakes.

The main method used was to walk slowly through the study areas, taking notes in the course of the survey. The Balinsasayao area, being thickly forested, required more time and effort to explore completely. The assistants often climbed trees to get data on the nests and eggs and to identify the owners of the nests. Notes were taken on nest construction, size, location, elevation from the ground, and presence or absence of eggs and hatchlings. If eggs were present, they were measured with a ruler and

their colors noted. Nests with eggs or young were regularly observed to determine the incubation and fledging periods as well as to detect predators.

Results and Discussion

Distribution and Relative Numbers of Bird Species.

A total of 135 species was identified in the Balinsasayao and Candugay study areas (Table 1). Fifty-one species were found in both areas, forty-eight in Balinsasayao only and thirty-six in Candugay only. (About sixty-four species were earlier observed in Balinsasayao, listed in Rabor et al., 1970.) Among those found in Balinsasayao only were the sunbirds (*Nectarinia*, *Aethopyga*), the Blue Shortwing (*Brachypteryx montana*), several species of pigeons (*Columbidae*), the kingfishers (*Halcyon*, *Ceyx*, *Palargopsis*), the graybirds (*Coracina*), the Celestial Blue Monarch (*Hypothymis coelestis*), the Mountain Leaf Warbler (*Phylloscopus trivirgatus*), the pittas (*Pitta*), the Striped-headed Creeper (*Rhabdornis mysticalis*), the tree-babblers (*Stachyris*), and the Mountain Whiteeye (*Zosterops montana*). Those found in Candugay only were marsh species, such as *Anas luzonica*, *Halcyon smyrnensis*, *Rallus torquatus*, and the open-country forms, such as *Anthus novaeseelandiae*, *Aplonis panayensis*, *Centropus toulou*, *Cisticola exilis*, *Copsychus saularis*, *Excalfactoria chinensis*, *Lalage nigra*, *Lonchura malacca*, *Megalurus palustris*, *Streptopelia bitorquata*, and *Streptopelia chinensis*.

Tropical regions are characterized by a high diversity of species for a number of reasons (see MacArthur, 1972). But within the tropics species diversity differs. The number of species we observed was decidedly greater in Balinsasayao than in Candugay. This is most probably related to the thickness of the tropical rain forest (the greater dimensionality of the environment, according to MacArthur, 1972) in Balinsasayao. Balinsasayao had distinctive species that were not found in Candugay (see Table 1), including some of the colorful species. It is worthwhile noting this fact since the Balinsasayao area is the only remaining sizeable patch of tropical rain forest in southeastern Negros which could support a number of forest species.

The relative abundance of the 135 species can only be generally assessed by the methods employed. Based on the number seen and frequency with which they were observed, the relative abundances of certain species are summarized in Table 2. The remaining species in the

two study areas (see Table 1) may be considered rare and/or secretive and therefore not generally encountered. There are of course other species of birds that have been reported from these two areas (see Rabor et al., 1970) which we were not able to observe and hence are not included in Table 1. The species observed in the two study areas were not abundant, with the possible exception of *Zosterops nigrorum*, *Geopelia striata*, *Lonchura malacca*, *Pycnonotus goiavier*, and *Treron vernans*.

Nesting Seasons.

A total of 126 nests (almost always with eggs) was observed in Balinsasayao and Kaladias during the period from December 26, 1976 to July 1978 (Table 3). The data for the fourteen species for which three or more nests were found during the period of observation are graphically shown in Figure 2. For these species the nesting season commenced in March and generally ended in July or August, although some extended their nesting seasons beyond August (up to November and December). We observed few nests of the rest of the species listed in Table 2. One probable reason is the difficulty of spotting the nests in the forests.

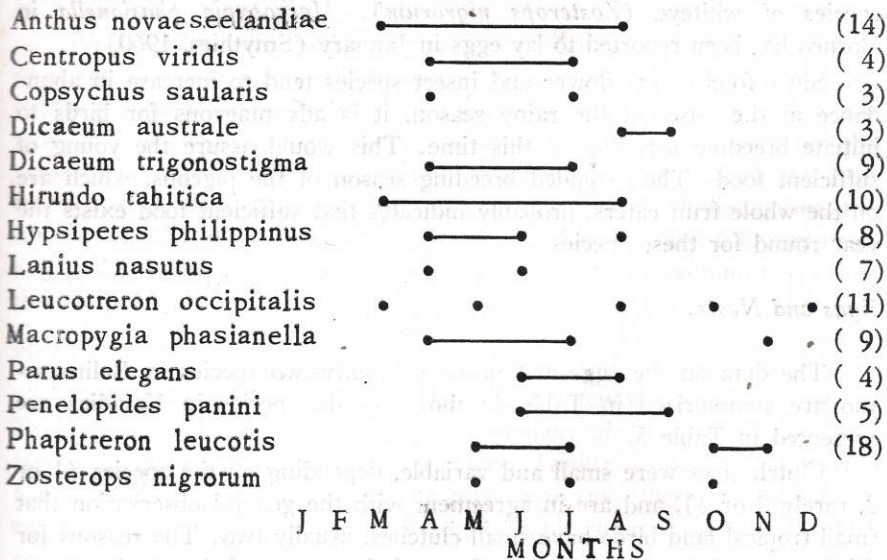


Figure 2. Nesting season of certain birds in Candugay and Balinsasayao. Data from Table 2. Numbers in parentheses are number of nests.

The pigeons *Leucotreron occipitalis*, *Macropygia phasianella*, and *Phapitreron leucotis* (all of which are rain forest species) built nests during a period of seven to ten months, although their nests were not found in successive months (Fig. 2). *Anthus novaeseelandiae* (a grassland species) and *Hirundo tahitica* (an open-country species) nested successively during the six months from March to August. The rest of the fourteen species nested during three or four months.

The nesting seasons of Philippine birds appear to begin during the dry months of January through March and to extend to the rainy months. Nests of the following species have been reported from various parts of the Philippines during the months of March through June (Ripley and Rabor, 1958; Rabor, 1954): *Ducula carola*, *Hypsipetes philippinus*, *Batrachostomus septimus*, *Gallinolumba luzonica*, *Coracina striata*, *Collocalia* spp., and *Cypsiurus parvus*. The egg-laying season of several species of game birds in southern Negros was found to extend to the months of October or December (Alcala and Carumbana, 1975). Gonzales (1968) found one egg of the Monkey-eating Eagle (*Pithecophaga jefferyi*) in November. Our recent data show nesting seasons extending to October through December for three species of pigeons (*Leucotreron occipitalis*, *Macropygia phasianella*, *Phapitreron leucotis*) and one species of whiteye (*Zosterops nigrorum*). *Macropygia phasianella* in Borneo has been reported to lay eggs in January (Smythies, 1960).

Since food plants flower and insect species tend to increase in abundance at the onset of the rainy season, it is advantageous for birds to initiate breeding activities at this time. This would assure the young of sufficient food. The extended breeding season of the pigeons, which are on the whole fruit eaters, probably indicates that sufficient food exists the year round for these species.

Eggs and Nests.

The data on the eggs and nests of twenty-two species in Balinsasayao are summarized in Table 4; those on six species in Kaladias are presented in Table 5.

Clutch sizes were small and variable, depending on the species (1 or 2, rarely 3 or 4), and are in agreement with the general observation that small tropical land birds have small clutches, usually two. The reasons for this are not clear, although predation and the nature of the species (e.g. whether it is a colonizer or not) have been suggested as possible explanations (see MacArthur, 1972).

The eggs of the tropical forest forms (pigeons) were white in color, but those of the open-area species were generally cream, bluish white, or light brown, with spots, blotches, or mottlings. These color patterns are probably mechanisms of concealment from predators.

Sizes of eggs were variable; the largest eggs were those of the Jungle Fowl, *Gallus gallus*; the smallest, those of *Hirundo tahitica*.

Except for three species (*Gallus gallus*, *Copsychus saularis*, and *Turnix suscitator*), which built nests on the ground, all of the twenty-eight species listed in Tables 4 and 5 built nests in situations above the ground. These species generally utilized forest trees of variable heights. The nests of the forest species ranged in height from 1 to 4 m (*Hypsipetes philippinus*) to 80 m (*Chrysocolaptes lucidus*).

The majority of the birds observed used various plant materials to build their nests. A few species simply nested among the grasses, which tended to conceal the eggs (e.g. *Anthus novaeseelandiae*, *Turnix suscitator*). Two forest species (*Chrysocolaptes lucidus* and *Penelopides panini*) utilized tree holes as nests. Some species (e.g. *Zosterops nigrorum*, *Nectarinia jugularis*) had well-constructed nests; others (e.g. the pigeons) had makeshift nests.

Incubation and Nestling Periods.

We have limited observations on the incubation and nestling periods of eleven species of birds in Balinsasayao and Kaladias (Table 6). The incubation period seems to be thirteen to fifteen days for species in the tropical rain forest of Balinsasayao and twelve or thirteen days for the grassland species in Candugay. The mean nestling period for the rain forest species would appear to be twelve to fifteen days. One species, the Slender-billed Cuckoo Dove (*Macropygia phasianella*), had a longer nestling period of twenty-two days, but this might be the maximum period for this species.

Mortality of Eggs and Hatchlings.

The data on mortality of the eggs and hatchlings are presented in Tables 7, 8, and 9. For certain species, namely *Anthus novaeseelandiae*, *Hirundo tahitica*, *Hypsipetes philippinus*, *Lanius nasutus*, *Penelopides panini*, *Phapitreron leucotis*, and *Zosterops nigrorum*, there were sufficient eggs and/or hatchlings on which mortality rates could be computed. The rest of the species listed in these tables were represented by fewer than nine eggs or hatchlings.

The mortality rates of the eggs of the forest species varied from 40 to 100% (Table 7), which are high, as in our previous study (Alcala and

Carumbana, 1975). These are much higher than the mortality rates of the hatchlings (Table 8), which ranged from 0 to 20%. The predators of the eggs and hatchlings are not known. In one instance, the Crested Goshawk (*Accipiter trivirgatus*) was observed eating an egg of the Slender-billed Cuckoo Dove (*Macropygia phasianella*). Other species of hawks and the wild cats (*Viverra tangalunga*, *Paradoxurus philippinensis*, and *Felis minuta*) are suspected to prey upon bird eggs but have not been actually observed to do so.

There is an indication that the mortality rates of the eggs and hatchlings of the non-forest species listed in Table 9 are lower than those in the tropical rain forest. It is possible that fewer predators exist in the grassland areas in which these non-forest species breed.

Summary and Recommendations

Observations on some species of birds in three localities (two wooded-grassland areas and one tropical rain forest area) in southern Negros were made between December 1976 and July 1978. About 135 species of birds were observed, of which only about five species could be considered abundant. There were more species in the rain forests than in the wooded grasslands. In fact, some species were limited to the rain forests. The nesting season began at the end of the dry season or the beginning of the rainy season and extended through the rainy season for most species. The eggs had generally high mortality rates. After hatching, the survival rates improved. Predators of eggs probably included the hawks and the wild-cats, but practically no data were gathered. Clutch number was generally two, only occasionally three or four.

Our recommendations are as follows:

1. Open and closed seasons for bird hunting (if allowed at a later time) should be revised to accommodate new findings on nesting and/or egg-laying seasons.
2. The remaining forested areas of southern Negros Island should be closed to logging to protect the remaining wildlife (especially birds) in these forests. This move is necessary in order that the forest ecosystem can fill other human needs such as recreation and scientific studies.
3. More ecological research on the wildlife should be conducted in these forest reserves.
4. The Balinsasayao forest area should be declared a forest reserve and wildlife sanctuary for scientific studies and recreation.

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Table 1. A list of species of birds observed in the Lake Balinsasayao and Candugay study areas. Observations were made in Balinsasayao during a period of twelve months (December, 1976; January, March, October–December 1977; February–July 1978) for a total of 916 man-hours (monthly average, 76.3). Observations in Candugay were made in four months (August–November 1977) for an average of 48 man-hours per month.

Species	Balinsasayao only	Candugay only	Both Areas
1. <i>Accipiter soloensis</i>		x	
2. <i>Accipiter trivirgatus</i>			x
3. <i>Accipiter virgatus</i>			x
4. <i>Aceros leucocephalus</i>	x		
5. <i>Aethopyga flagrans</i>	x		
6. <i>Aethopyga siparaja bonita</i>	x		
7. <i>Aethopyga siparaja magnifica</i>	x		
8. <i>Alcedo atthis bengalensis</i>		x	
9. <i>Amaurornis phoenicurus</i>		x	
10. <i>Anas luzonica</i>		x	
11. <i>Anthus gustavi</i>			x
12. <i>Anthus hodgsoni</i>	x		
13. <i>Anthus novaeseelandiae</i>		x	
14. <i>Aplonis panayensis</i>		x	
15. <i>Artamus leucorhynchus</i>			x
16. <i>Brachypteryx montana</i>	x		
17. <i>Butastur indicus</i>	x		
18. <i>Butorides striatus</i>	x		
19. <i>Cacomantis merulinus</i>			x
20. <i>Caloenas nicobarica</i>	x		
21. <i>Capella megala</i>		x	
22. <i>Caprimulgus affinis</i>		x	
23. <i>Caprimulgus indicus jotaka</i>			x
24. <i>Caprimulgus macrurus</i>	x		
25. <i>Centropus toulou javanensis</i>		x	
26. <i>Centropus viridis</i>			x
27. <i>Ceyx argentatus</i>	x		
28. <i>Ceyx cyanopectus</i>	x		
29. <i>Ceyx lepidus</i>	x		

Species	Balinsasayao only	Candugay only	Both Areas
30. <i>Chalcophaps indica</i>			x
31. <i>Chrysocolaptes lucidus</i>	x		
32. <i>Cisticola exilis</i>		x	
33. <i>Collocalia esculenta marginata</i>			x
34. <i>Collocalia vestita mearnsi</i>			x
35. <i>Columba vitiensis</i>	x		
36. <i>Copsychus luzonensis</i>	x		
37. <i>Copsychus saularis mindanensis</i>		x	
38. <i>Coracina ostenta</i>	x		
39. <i>Coracina striata</i>	x		
40. <i>Corvus macrorhynchus</i>			x
41. <i>Cuculus fugax</i>			x
42. <i>Dendrocopos maculatus</i>			x
43. <i>Dicaeum australe</i>			x
44. <i>Dicaeum pygmaeum</i>			x
45. <i>Dicaeum trigonostigma</i>	x		
46. <i>Dicrurus balicassius</i>			x
47. <i>Ducula poliocephala</i>	x		
48. <i>Elanus caeruleus</i>			x
49. <i>Eudynamis scolopacea mindanensis</i>			x
50. <i>Eurystomus orientalis</i>			x
51. <i>Excalfactoria chinensis lineata</i>			x
52. <i>Gallicolumba luzonica</i>	x		
53. <i>Gallicrex cinerea</i>			x
54. <i>Gallus gallus</i>			x
55. <i>Geopelia striata</i>			x
56. <i>Gorsachius goisagi</i>	x		
57. <i>Halcyon chloris collaris</i>			x
58. <i>Halcyon coromanda</i>	x		
59. <i>Halcyon lindsayi moseleyi</i>	x		
60. <i>Halcyon smyrnensis gularis</i>			x
61. <i>Halcyon winchelli</i>	x		
62. <i>Haliastur indus</i>	x		
63. <i>Hemiprocne comata</i>	x		
64. <i>Hieraaetus kienerii formosus</i>			x
65. <i>Hirundo striolata</i>			x
66. <i>Hirundo tahitica</i>			x
67. <i>Hypothymis azurea</i>			x

Species	Balinasasayao only	Candugay only	Both Areas
68. Hypothymis coelestis	x		
69. Hypsipetes philippinus			x
70. Ixobrychus cinnamomeus		x	
71. Lalage nigra		x	
72. Lanius cristatus			x
73. Lanius schach nasutus		x	
74. Leucotreron leclancheri		x	
75. Leucotreron occipitalis	x		
76. Lonchura leucogaster	x		
77. Lonchura malacca		x	
78. Loriculus philippensis			x
79. Macropygia phasianella			x
80. Megalaema haemacephala			x
81. Megalurus palustris		x	
82. Megalurus timoriensis		x	
83. Merops philippinus		x	
84. Merops viridis americanus			x
85. Mirafra javanica philippinensis		x	
86. Monticola solitaria philippensis		x	
87. Motacilla cinerea melanope			x
88. Muscicapa griseisticta			x
89. Muscicapa narcissina		x	
90. Muscicapa panayensis	x		
91. Muscicapa rufigaster			x
92. Nectarinia jugularis			x
93. Nectarinia sperata	x		
94. Ninox philippensis centralis			x
95. Ninox scutulata	x		
96. Oriolus chinensis			x
97. Oriolus xanthonotus	x		
98. Orthotomus atrogularis			x
99. Otus bakkamoena nigrorum			x
100. Parus elegans			x
101. Pelargopsis capensis	x		
102. Penelopides panini			x
103. Pernis celebensis	x		
104. Pernis ptilorhynchus			x
105. Phapitreron amethystina	x		

Species	Balinasayaao only	Candugay only	Both Areas
106. Phapitreron leucotis			x
107. Phylloscopus borealis			x
108. Phylloscopus trivirgatus nigrorum	x		
109. Pitta sordida	x		
110. Pitta erythrogaster	x		
111. Poliolimnas cinereus		x	
112. Porzana fusca	x		
113. Ptilinopus leclancheri		x	
114. Pycnonotus goiavier		x	
115. Rallus striatus		x	
116. Rallus torquatus		x	
117. Rhabdornis mysticalis	x		
118. Rhipidura cyaniceps	x		
119. Rhipidura javanica		x	
120. Sarcops calvus		x	
121. Saxicola caprata		x	
122. Sitta frontalis	x		
123. Spilornis cheela			
124. Stachyris nigrorum	x		
125. Stachyris speciosa	x		
126. Streptopelia bitorquata		x	
127. Streptopelia chinensis tigrina		x	
128. Tanygnathus lucionensis	x		
129. Treron pompadora axillaris		x	
130. Treron vernans vernans		x	
131. Turdus poliocephalus nigrorum		x	
132. Turnix suscitator nigrescens		x	
133. Tyto capensis amauronata		x	
134. Zosterops montana	x		
135. Zosterops nigrorum		x	

Table 2. Relative abundance of certain bird species in Balinsasayao and Candugay

Species	Average number seen/month	Proportion of time observed
A. Balinsasayao		
1. <i>Aceros leucocephalus</i>	3.75	7 mo. out of 12
2. <i>Cacomantis merulinus</i>	1.25	5 mo. out of 12
3. <i>Chrysocolaptes lucidus</i>	1.83	10 mo. out of 12
4. <i>Columba vitiensis</i>	3.33	10 mo. out of 12
5. <i>Coracina ostenta</i>	3.25	8 mo. out of 12
6. <i>Dendrocopus maculatus</i>	1.92	6 mo. out of 12
7. <i>Dicurus balicassius</i>	2.33	5 mo. out of 12
8. <i>Ducula poliocephala</i>	3.00	12 mo. out of 12
9. <i>Hypsipetes philippinus</i>	4.91	12 mo. out of 12
10. <i>Leucotreron occipitalis</i>	3.17	12 mo. out of 12
11. <i>Macropygia phasianella</i>	2.67	10 mo. out of 12
12. <i>Penelopides panini</i>	2.00	9 mo. out of 12
13. <i>Phapitreron amethystina</i>	2.33	9 mo. out of 12
14. <i>Phapitreron leucotis</i>	4.91	12 mo. out of 12
15. <i>Spilornis cheela</i>	1.50	10 mo. out of 12
16. <i>Zosterops nigrorum</i>	11.80	9 mo. out of 12
B. Candugay		
1. <i>Amaurornis phoenicurus</i>	1.50	3 mo. out of 4
2. <i>Anas luzonica</i>	1.00	2 mo. out of 4
3. <i>Anthus novaeseelandiae</i>	2.50	4 mo. out of 4
4. <i>Artamus leucorhynchus</i>	2.50	3 mo. out of 4
5. <i>Capella megala</i>	2.20	4 mo. out of 4
6. <i>Chalcophaps indica</i>	2.25	4 mo. out of 4
7. <i>Corvus macrorhynchus</i>	2.75	2 mo. out of 4
8. <i>Dicurus balicassius</i>	1.75	3 mo. out of 4
9. <i>Elanus caeruleus</i>	1.25	4 mo. out of 4
10. <i>Geopelia striata</i>	9.25	4 mo. out of 4
11. <i>Halcyon chloris</i>	1.00	2 mo. out of 4
12. <i>Hirundo striolata</i>	4.75	2 mo. out of 4
13. <i>Hypothymis azurea</i>	1.00	3 mo. out of 4
14. <i>Hypsipetes philippinus</i>	4.25	4 mo. out of 4
15. <i>Lalage nigra</i>	2.75	4 mo. out of 4

Species	Average number seen/month	Proportion of time observed
16. <i>Lanius cristatus</i>	3.75	4 mo. out of 4
17. <i>Lonchura malacca</i>	10.00	4 mo. out of 4
18. <i>Macropygia phasianella</i>	1.00	3 mo. out of 4
19. <i>Megalaema haemacephala</i>	1.75	3 mo. out of 4
20. <i>Megalurus timoriensis</i>	1.25	3 mo. out of 4
21. <i>Merops philippinus</i>	1.00	2 mo. out of 4
22. <i>Nectarinia jugularis</i>	2.25	3 mo. out of 4
23. <i>Oriolus chinensis</i>	4.75	4 mo. out of 4
24. <i>Phapitreron leucotis</i>	1.50	3 mo. out of 4
25. <i>Poliolimaas cinereus</i>	1.50	2 mo. out of 4
26. <i>Pycnonotus goiavier</i>	12.00	4 mo. out of 4
27. <i>Rhipidura javanica</i>	5.00	4 mo. out of 4
28. <i>Sarcops calvus</i>	2.25	3 mo. out of 4
29. <i>Saxicola caprata</i>	1.75	3 mo. out of 4
30. <i>Streptopelia bitorquata</i>	8.00	4 mo. out of 4
31. <i>Streptopelia chinensis</i>	5.50	3 mo. out of 4
32. <i>Treron vernans</i>	43.00	4 mo. out of 4
33. <i>Turnix suscitator</i>	1.50	3 mo. out of 4

Table 3. Data on the nesting seasons of certain birds in Balinsasayao and Kaladias. Observations were made from December 1976 through 1978 in Balinsasayao with about 3860 man-hours (monthly average 193); from March to September 1977 in Kaladias, Zamboanguita; nests either with eggs or hatchlings

Species	Months	Number of nests seen
A. Balinsasayao		
1. <i>Amaurornis phoenicurus</i>	July	1
2. <i>Brachypteryx montana</i>	April	1
3. <i>Centropus viridis</i>	April - July	4
4. <i>Chaetura gigantea</i>	May	1
5. <i>Chalcophaps indica</i>	June	1
6. <i>Chrysocolaptes lucidus</i>	October	1
7. <i>Collocalia esculenta</i>	July	2
8. <i>Coracina ostenta</i>	July, September	2
9. <i>Corvus macrorhynchus</i>	June	1
10. <i>Dicaeum australe</i>	August, September	3
11. <i>Dicaeum trigonostigma</i>	April - July	9
12. <i>Ducula poliocephala</i>	June	1
13. <i>Gallus gallus</i>	June	1
14. <i>Hirundo tahitica</i>	March - August	10
15. <i>Hypsipetes philippinus</i>	April - June, August	8
16. <i>Leucotreron occipitalis</i>	March, May, August, October, December	11
17. <i>Macropygia phasianella</i>	April - July, November	9
18. <i>Nectarinia jugularis</i>	June	1
19. <i>Parus elegans</i>	June - August	4
20. <i>Penelopides panini</i>	June - September	5
21. <i>Phapitreron leucotis</i>	May - July, October- November	18
22. <i>Ptilinopus leclancheri</i>	May	1
23. <i>Zosterops nigrorum</i>	May, July, October	5
	TOTAL	100
B. Kaladias		
1. <i>Anthus novaeseelandiae</i>	March - August	14
2. <i>Copsychus saularis</i>	April, July	3
3. <i>Lanius nasutus</i>	April, June	7
4. <i>Turnix suscitator</i>	April, August	2
	TOTAL	26

Table 4. Data on eggs and nests of certain birds in Balinsasayao

Species	Clutch size	Color of eggs	Size of eggs (mm)	Elevation of nests (m)	Diameter of nests (mm)	Depth of nests (mm)	Nest materials	Nesting site
1. <i>Amauornis phoenicurus</i>	3	-	-	1	111	60	dried reeds	among grasses at bank of lake
2. <i>Brachypteryx montana</i>	3	-	15 x 11	1	65	30	dried moss & fibers	forked branches of forest tree
3. <i>Centropus viridis</i>	2 or 3	-	40 x 26	-	-	-	dried reeds	among tall reeds farther from bank of lake
4. <i>Chaetura gigantea</i>	3	-	-	-	-	-	nest too high for observation	hole in trunk of dead palm tree
5. <i>Chalcophaps indica</i>	1	-	-	-	-	-	dried twigs	forked branches of forest tree
6. <i>Chrysocolaptes lucidus</i>	3	-	-	80	-	-	nest too high for observation	hole in branch of dipterocarp tree
7. <i>Collocalia esculenta</i>	2 or 3	-	-	8.5	93	39	dried moss & fibers	rock
8. <i>Coracina ostenta</i>	2	-	-	20	50	30	nest too high for observation	forked branches of dipterocarp tree

Species	Clutch size	Color of eggs	Size of eggs (mm)	Elevation of nests (m)	Diameter of nests (mm)	Depth of nests (mm)	Nest materials	Nesting site
9. <i>Corvus macrorhynchus</i>	3	-	-	45	-	-	dried twigs	forked branches of dipterocarp tree
10. <i>Dicaeum australe</i>	1	-	-	7-11	25-42	14-54	dried moss & flowers of reeds	tree fern
11. <i>Dicaeum trigonostigma</i>	usually 2; sometimes 1 or 3	white	15 x 10	3-9	23-30	35-45	dried moss, leaves, twigs, & roots of plants	tree ferns & forked branches of forest trees
12. <i>Gallus gallus</i>	4	white	43 x 35	on the ground	150	25	dried leaves	on ground
13. <i>Hirundo tahitica</i>	usually 3; sometimes 2 or 4	cream with brown & not-ting at bigger end	11 x 9	3-5	40-100	10-35	mud & plant fibers; chicken feathers	floating logs

Species	Clutch size	Color of eggs	Size of eggs (mm)	Elevation of nests (m)	Diameter of nests (mm)	Depth of nests (mm)	Nest materials	Nesting site
14. <i>Hypsipetes philippinus</i>	usually 2 or 3; sometimes 4	white with spots	25 x 20	1-4	60-100	35-75	dried leaves & twigs; vines	tree ferns & various species of forest trees
15. <i>Leucotreron occipitalis</i>	usually 1; sometimes 2	white	31 x 20-21	5-22	75-150	20-40	dried twigs	various species of forest trees, usually beside the lake
16. <i>Macropygia phasianella</i>	usually 1; sometimes 2	white	34-38 x 22-25	6-10	111-175	20-49	dried leaves & twigs	usually on leaf axils of tree ferns; forked branches of forest trees
17. <i>Nectarinia jugularis</i>	2	-	-	47	60	50	dried fine plant materials; cotton, spider web	usually hung in forest tree
18. <i>Parus elegans</i>	1 or 2 or 3	white	14 x 11	4-10	35-62	30-45	dried moss & fibers	tree ferns & various species of forest trees

Species	Clutch size	Color of eggs	Size of eggs (mm)	Elevation of nests (m)	Diameter of nests (mm)	Depth of nests (mm)	Nest materials	Nesting site
19. <i>Penelopides panini</i>	usually 3; some times 1 or 2	-	-	21-76	60-150	160-400	nest too high for observation	hole in dipterocarp tree
20. <i>Phapitreron leucotis</i>	usually 2; some times 1 or 3	white	22.5-25x15	3-20	60-112	10-29	dried tendrils, twigs, vines	tree ferns & forked branches of various species of forest trees
21. <i>Ptilinopus leclancheri</i>	1	-	-	11	75	-	dried small twigs	terminal part of forest tree
22. <i>Zosterops nigrorum</i>	usually 2; some times 3 or 1	white	17x12	10-30	47	36	dried grass, fibers, & other root materials	forked branches of forest trees hanging over lake

Table 5. Data on eggs and nests of certain birds in Kaladias

Species	Clutch size	Color of eggs	Average size of eggs (mm)	Average external dia. of nest (mm)	Average internal dia. of nest (mm)	Description of nest	Nesting site
1. <i>Anthus novaeseelandiae</i>	Usually 2 or 3; sometimes 1	Cream to light brown with dark brown spots & blotches more concentrated on larger end	20.66 x 15	110	70	Usually cup-shaped, made of leaf bases of cogon	Usually concealed in cogon patches with few shrubs
2. <i>Copsychus saularis</i>	Usually 3; sometimes 1	Cream or bluish white with brown spots & blotches more on larger end	19 x 13	100	70	Usually cup-shaped (deep), lined with plant fibers, opening to side	On ground, at base of cogon growth, sometimes on bank of dry stream
3. <i>Hypsipetes philippinus</i>	2	—	—	—	—	—	—
4. <i>Lanius nasutus</i>	Usually 2 or 3; sometimes 4	Cream or light blue with brown spots more on larger end	22.5 x 18	120	80	Usually cup-shaped, made of cogon, cogon flowers, & plant fibers supported by tops of grass	Usually concealed among tall cogon

Species	Clutch size	Color of eggs	Average size of eggs (mm)	Average external dia. of nest (mm)	Average internal dia. of nest (mm)	Description of nest	Nesting site
5. <i>Streptopelia bitorquata</i>	2	—	—	—	—	—	Bamboo tree
6. <i>Turnix suscitator</i>	1 or 2	Speckled brown	25 x 20	100	80	Usually cup-shaped, covered with dried cogon	On ground, usually concealed halfway among tall cogon; one nest found on top of eroded side of small hill

Table 6. Data on the incubation and nestling periods of certain species of birds in Balinsasayao and Kaladias

Species	Incubation period (days)	Nestling period (days)
A. Balinsasayao		
1. <i>Chrysocolaptes lucidus</i>	-	8 ? *
2. <i>Dicaeum trigonostigma</i>	7 - 14	10 - 21
3. <i>Leucotreron occipitalis</i>	14	12 - 15 (mean, 14)
4. <i>Macropygia phasianella</i>	15	22
5. <i>Phapitreron leucotis</i>	-	9 - 15 (mean, 13)
6. <i>Penelopides panini</i>	-	14
7. <i>Zosterops nigrorum</i>	6 ? *	9 - 16 (mean, 12.25)
B. Kaladias		
1. <i>Anthus novaeseelandiae</i>	7 - 20 (mean, 12.2)	11 - 24 (mean, 15.2)
2. <i>Copsychus saularis</i>	10 - 15 (mean, 12.5)	14 - 17 (mean, 15.0)
3. <i>Lanius nasutus</i>	7 - 18 (mean, 13.0)	13 - 20 (mean, 16.6)
4. <i>Streptopelia bitorquata</i>	6 ? *	15

* Nestlings observed after hatching.

Table 7. Data on the mortality of eggs of certain birds in Balinsasayao

Species	Number of eggs observed	Number of eggs hatched	Mortality rate of eggs to hatching stage (%)
1. <i>Brachypteryx montana</i>	3	0	100.0
2. <i>Coracina ostenta</i>	2	0 (eaten by unknown predators)	100.0
3. <i>Dicaeum australe</i>	2	0 (one lost to predator; the other dropped from tree due to strong wind)	100.0
4. <i>Dicaeum trigonostigma</i>	3	3	0.0
5. <i>Hirundo tahitica</i>	20	12 (5 lost to predators; 3 abandoned unhatched)	40.0
6. <i>Hypsipetes philippinus</i>	9	3 (6 lost to predators)	66.7
7. <i>Leucotreron occipitalis</i>	5	2 (3 lost to predators)	60.0
8. <i>Macropygia phasianella</i>	5	1 (4 lost to predators)	80.0
9. <i>Nectarinia jugularis</i>	2	(eaten by predators)	100.0
10. <i>Parus elegans</i>	1	(nest destroyed by strong wind)	100.0
11. <i>Phapitreron leucotis</i>	19	5 (14 lost to predators)	73.7
12. <i>Zosterops nigrorum</i>	4	1 (3 lost)	75.0

Table 8. Data on the mortality of nestlings of certain birds in Balinsasayao

Species	Number of nestlings	Number of nestlings successfully fledged	Mortality rate (%)
1. <i>Amaurornis phoenicurus</i>	3	3	0
2. <i>Centropus viridis</i>	3	3	0
3. <i>Chaetura gigantea</i>	3	3	0
4. <i>Chalcophaps indica</i>	1	1	0
5. <i>Chrysocolaptes lucidus</i>	3	3	0
6. <i>Cottocalia esculenta</i>	5	5	0
7. <i>Corvus macrorhynchos</i>	3	3	0
8. <i>Dicaeum australe</i>	4	4	0
9. <i>Hirundo tahitica</i>	9	9	0
10. <i>Hypsipetes philippinus</i>	10	10	0
11. <i>Leucotreron occipitalis</i>	6	5 (one trapped & killed)	16.7
12. <i>Macropygia phasianella</i>	6	6	0
13. <i>Parus elegans</i>	5	5	0
14. <i>Penelopides panini</i>	9	9	0
15. <i>Phapitreron leucotis</i>	12	12	0
16. <i>Ptilinopus leclancheri</i>	1	1	0
17. <i>Zosterops nigrorum</i>	10	8 (2 lost)	20.0

Table 9. Data on the mortality of eggs and nestlings of certain birds in Kaladias

Species	Total number of eggs	No. of eggs hatched	Mortality rate to hatching stage	No. of young successfully fledged	Mortality rate to fledging stage
1. <i>Anthus novaeseelandiae</i>	32	27	16.0	25	22.0
2. <i>Copsychus saularis</i>	7	7	0.0	7	0.0
3. <i>Hypsipetes philippinus</i>	2	2	0.0	2	0.0
4. <i>Lanius nasutus</i>	20	18	10.0	13	35.0
5. <i>Streptopelia bitorquata</i>	2	2	0.0	2	0.0
6. <i>Turnix suscitator</i>	3	3	0.0	3	0.0