



Local knowledge of bird species and socio-economic, cultural, and ecological functions of birds and their various disturbances in the rural ecosystem of the Cisokan Watershed, West Java

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Abstract. *In the past, the rural areas of West Java had rich various bird species. Local rural communities have Local Knowledge or Traditional Ecological Knowledge of birds because, in their daily lives, they are close to interacting with various birds in rural ecosystems. However, currently, the bird population in rural ecosystems in West Java has been declining due to various factors, including damage or loss of bird habitats, pesticide disturbances, and hunting of birds for trade both in villages and towns. This study aimed to elucidate local knowledge of the nomenclature and classification of birds of the villagers, the functions of socio-economic-culture and ecology of birds based on the village community, and various disturbances to bird species in the village area. Study was undertaken in Bojongsalam and Sukaresmi Village, Rongga District, West Bandung, Cisokan Watershed, West Java. The method used was the qualitative method with an ethnoornithological approach. The result of the study showed that the rural communities of the Upper Cisokan watershed still have quite deep local knowledge of various bird species. Bird species are important in socio-economic, cultural, and ecological functions. Disturbance to bird populations, among others, due to the construction of the Cisokan hydropower project, and intensively hunted by the rural people for trading both in villages and urban areas.*

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INTRODUCTION

In the past, rural areas of West Java had rich in bird species (Iskandar and Iskandar 2022). Many factors, including a lot of various appropriate bird habitats and a temporary stopover area for migratory birds from both the north hemisphere, such as Siberia, China, and Alaska, and from the south hemisphere, namely Australia and New Zealand had caused rural areas of West Java owned rich avifauna (Iskandar 2017b). Bird species that live in rural ecosystems have many ecological and socio-economic functions, including assisting natural plant

seed dispersal, agricultural pest control, environmental changes indicators, animal protein sources, pets, and animal trading commodities (Iskandar 2015, 2017b; Iskandar et al. 2019; Iskandar and Iskandar 2022).

Traditionally, rural people of West Java utilization of birds have been based on Local Knowledge (LK) or Traditional Ecological Knowledge (TEK), and beliefs (Iskandar 2018). TEK may be defined as “a cumulative body of knowledge, practice, and beliefs, evolving by adaptive process and handed down through generations by cultural transmission, about the relationships of living beings (including humans) with one another and with their environment” (Berkes 2012). Since rural people utilize various birds in rural ecosystems based on beliefs, the birds can be utilized by a sustainable system. For instance, some raptors, including the eagle of Accitripidae Family and the falcons of Falconidae Family were traditionally forbidden to be killed by people. In addition, some village sacred forests had been prohibited to disturb. As a result, some rural birds have been traditionally conserved by rural people (Iskandar 2014).

Nowadays, however, the bird population in the rural ecosystem of West Java has decreased. Many factors, including bird habitat destruction or habitat loss, intensive pesticide use, and a large number of poaching of bird species for trade in both villages and urban bird markets, have caused decreasing bird population in the rural ecosystem of West Java. For instance, it has been documented that a lot of birds in the rural ecosystem of Karangwangi Village, Cianjur (Iskandar et al. 2016), Citarum watershed villages (Iskandar et al. 2019), Upper Citarum, Bandung West Java (Hakim et al. 2020; Madani 2020), and Ciletuh Geopark areas of Sukabumi (Iskandar et al. 2021), and upper Cisokan, West Java (Permana et al. 2019) have been intensively hunted by local people. In addition, rural people's knowledge and perception of wild animals have changed due to modernization. For example, some traditional beliefs and prohibitions against killing rare or sacred animals have disappeared in rural communities (Permana et al. 2019).

Therefore, It is generally argued that changes in the socio-economic factors of West Java's rural people may cause biophysical factors, including bird species, and vice versa (Iskandar 2014). Recently some ecosystems of Bojongsalam and Sukaresmi Village, Rongga District, West Bandung, have been dramatically changed due to the establishment of the project of the Upper Cisokan Pumped Storage Hydroelectric Power Plant (UCPS PLTA) of the Electric Company (PLN). Consequently, some socio-economic local rural communities and biophysical aspects have changed (Choir et al. 2019). In general, studies on the knowledge of villagers about bird species in relation to various disturbances to the socio-economic changes of the villagers and the consequences of project activities such as the Hydroelectric Power plants are still rare. The three main objectives of this study must be answered. Firstly, how is the local knowledge of nomenclature and classification of birds of the villagers at the study site? Secondly, according to the village community in the study area, what are the functions of socio-economic-culture and ecology of birds? Thirdly, what are the various disturbances to bird species in the study area?

METHOD

Location and Research Time

The case studies were conducted on rural communities in Bojongsalam Village and Sukaresmi Village, Rongga District, West Bandung, Cisokan Watershed, West Java (Figure 1). The study was conducted from early February to early March 2022.

Data Collection Method

This study used a qualitative method with an ethnoornithological approach (Albuquerque et al. 2014; Pam 2017; Iskandar 2018). Some techniques, including observation, observation-participation, and semi-structured interviews, were employed in this study. Observation techniques are used to observe the diversity of bird species in their habitats, such as swidden fields (*huma*), wet-rice fields, mixed gardens, dry fields, mature forests (*leuweung geledegan*), and riverbanks. Participation observations were carried out, among others. By the way, researchers got involved and asked informants who happened to be during the

research when an informant made and installed traditional traps in gardens, forests, and swidden fields (Puri 1997).

In addition, researchers and informants are also involved in social activities, exploring forests, gardens, and swidden fields. Meanwhile, semi-structured interviews were conducted on purposively selected informants based on their competencies by considering the categorization of variations in gender, age, and occupation variations. The informants selected in this study were the village head and village officials; farmer; village leaders (*sesepuh*); bird keepers; and groups of bird hunters, such as net users, gun shooters, users of traditional jiret and pitangkep traps, as well as the use of plant sap adhesives (*dileugeut*), and catching birds in their nests using torch lights (*ngobor*) during the night.

Data Analysis Method

Qualitative data analysis was carried out from the time the data collection took place in the field until the end of the fieldwork. At the time of research in the field, researchers always check the data. The next stage is to summarize the data and synthesize data, as well as to sort the data into certain categories, patterns, themes, or groups that are relevant to the research problem (Newing 2011; Iskandar 2018; Iskandar and Iskandar 2021). The data has been categorized as interpreted by paying attention to the consistency of two perspectives, namely, the perspective of the informant (emic) and the analysis of the researcher (ethic) (Iskandar 2018). Then the data that has been grouped and interpreted is presented in the form of narratives, tables, and pictures. In order to identify the variety of birds known to the informants, MacKinnon et al. (1992) used the guidebook on bird species in the field from MacKinnon et al. (1992).

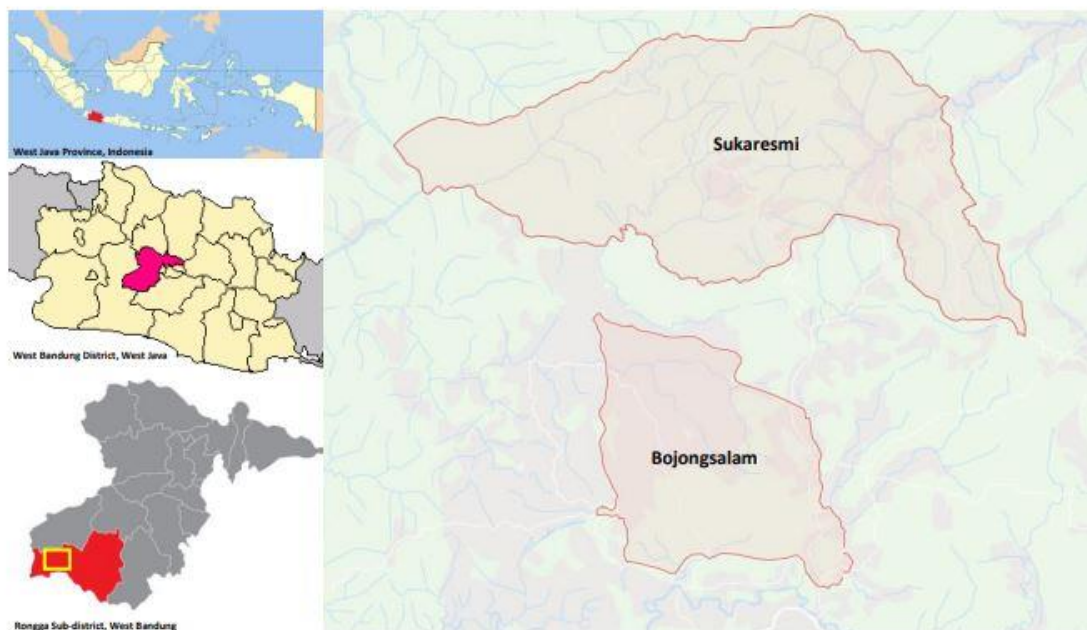


Figure 1 Map of research location in Bojongsalam and Sukaresmi Village, Upper Cisokan Watershed, West Java. Source: Pernana et al. (2019)

RESULT AND DISCUSSION

Local Knowledge of Bird Nomenclature

Based on interviews with informants in the villages of Bojongsalam and Sukaresmi, 74 species of birds were documented. The vernacular term bird in Sundanese is usually called *manuk*. According to the folk classification, based on the model of Berlin et al. (1973); Brown (2000), and Hunn and Brown (2011) rural

people recognize 3 levels of bird classification. At the highest level (unique beginner), village people can categorize between wild animals (*sato*) and various kinds of pets (*ingon-ingon*). The life form level is at the lower level, known as the bird group (*manuk*). At a lower level (generic) it is known as a group of birds, such as *manuk cangkurileung* (various races of *cangkurileung* or *cangkurileung-cangkurileungan*). Under specific/species, there are known varietal (bird races), as known 3 races of *cangkurileung*, namely *cangkurileung hejo* (the color of their feathers is more greenish), *cangkurileung kapas* (the color of their feathers is cleaner and whiter), and *cangkurileung batu* (the color of their feathers is dirtier) (Table 1).

Table 1 Classification of birds* based on rural people of Upper Cisokan Watershed, West Java

Level	Vernacular name	English common name	Rank
0	<i>Sato</i> and <i>ingong-ingon</i>	Wild animals and domesticated animals	Unique beginner
1	<i>Manuk</i>	Bird	Life form
2	<i>Cangkurileung-cangkurileungan</i>	Bulbuls Sooty-headed Bulbul	Generic
3	<i>Cangkurileng</i>		Specific/species
	<i>Cangkurileung hejo</i>	Greenish Sooty-headed Bulbul	Sub-varietal
	<i>Cangkurileung kapas</i>	Whites Sooty-headed Bulbul	
	<i>Cangkurileung batu</i>	Blackish Sooty-headed Bulbul	

*Adapted from Berlin et al. (1973) and Brown (2000)

Based on the folk classification, bird diversity in the Cisokan watershed village, West Java can be grouped into 4 groups based on body size, body feather color, habitat type, and living habits (Table 2). According to the bird's body size, rural residents distinguish small, medium, and large body sizes. Several species are included in the category of small body size, such as *piit* (*Lonchura leucogaster*), *manintin* (*Amandava amandava*), *mononot/sriti* (*Collocalia linchi*), and *ciblek* (*Prinia familiaris*). The species of birds in the category have medium size, including *anis macan* (*Zoothera* sp), *anis kembang* (*Zoothera interpres*), *anis cacing* (*Zoothera citrina*), and *anis bingbin* (*Cyornis banyumas*). While the species of birds categorized by the population, namely have large sizes, such as *kasintu/cangehgar* (*Gallus gallus*), *heulang ruyuk* (*Spilornis cheela*), and *heulang hideung* (*Ictinaetus malayensis*).

On the basis of the color of the bird's body feathers, according to the rural people, for example, it is known as the species of birds that have a dominant color, green, such as *cicak daun/hijau daun* (*Chloropsis sonnerati*); species of birds have black colors, such as *elang hitam/elang hideung* (*Ictinaetus malayensis*), and the purple/blue bird species, *anis bimbin* or *anis biru* (*Cyornis banyumas*). In addition, according to the rural community, bird species can be grouped based on the type of habitat, where the bird species live. For example, known 'forest bird' species, such as *walik kiara* or *punai kiara* (*Treron vernans*), *kasintu/cangehgar* (*Gallus gallus*), and *Elang/ Heulang Jawa* (*Nisaetus bartelsi*). The categories of 'paddy bird' species known by the rural community, such as *hayam-hayaman* (*Gallinago cinerea*), *tilil* (*Tringa hypoleucos*), *beker/mandar padi* (*Gallinago striatus*), and *kokondangan* (*Ixobrychus cinnamomeus*). In addition, there are also categories of bird species that are commonly found or live in various habitats, such as fields, rice fields, swidden-fields, and gardens, including *perkutut* (*Geopelia striata*) and *tikukur* (*Streptopelia chinensis*).

Meanwhile, based on their habits of life, the species of birds are grouped based on bird behavior, namely living in groups and not living in groups, but usually in pairs or even solitary. Various species of birds usually live in groups, including *piit* (*Lonchura leucogastroides*), *manintin* (*Amandava amandava*), and *manuk kaca mata/siki nangka* (*Zosterops palpebrosus*). In contrast, various species of birds are grouped by rural communities as unusual birds in groups, such as the *heulang ruyuk* (*Spilornis cheela*), *heulang hideung* (*Ictinaetus malayensis*), and *klaces* (*Arachnothera longirostra*) (Table 2).

Table 2 Local knowledge of rural community of Upper Cisokan Watershed, West Java on various bird species

Scientific name and Family name	Vernacular name	Body size	Feather color	Habitat type	Behavior
ACCIPITRIDAE					
<i>Haliaeetus leucogaster</i>	Heulang bodas	Big	White	Forest	Solitary or in pairs
<i>Icinaetus malayensis</i>	Heulang hideung	Big	Black	Forest	Solitary or in pairs
<i>Nisaetus bartelsi</i>	Heulang/Elang Jawa	Big	Gray	Forest	Solitary or in pair
<i>Spilornis cheela</i>	Heulang ruyuk	Big	Spot	Forest	Solitary or in pair
AEGITHINIDAE					
<i>Aegihina tiphia</i>	Cipeuw	Small	Green, White, Yellow	Many habitat	Solitary or in pair
ALCEDINIDAE					
<i>Alcedo meninting</i>	Manuk hurang	Small	Blue, Orange	Wet rice-field	Solitary or in pairs
<i>Halcyon cyanoventris</i>	Cakakak	Big	Blue	Wet rice-field	Solitary or in pairs
<i>Todiramphus chloris</i>	Cekahkeh/Cekakak sungai	Big	Blue, White	Wet rice-field	Solitary or in pairs
APODIDAE					
<i>Apus sp</i>	Kapinis	Small	Brown	Many habitats	In flock
<i>Collocalia linchi</i>	Mononot/Sriti	Small	Black, White	Many habitats	In flock
ARDEIDAE					
<i>Ixobrychus cinnamomeus</i>	Kokondangan	Big	Red brown	Wet rice-field, River	Solitary or in pairs
<i>Nycticorax nycticorax</i>	Kukuak/Kowak malam	Big	White, Black	Many habitats	Solitary or in pairs
CAMPEPHAGIDAE					
<i>Pericrocotus flammeus</i>	Murai api/Sepah	Small	Black, Blue, Red, Yellow	Forest, Garden, Talun	In flock
CHLOROPSEIDAE					
<i>Chloropsis sonnerati</i>	Cicak daun/Hejo daun	Big	Green	Forest	In flock
COLUMBIDAE					
<i>Streptopelia chinensis</i>	Tikukur	Big	Grey	Dry land, Wet- rice field, Swidden field	In flock
<i>Chalcophaps indica</i>	Limbukan	Big	Green, Gray	Forest	In flock
<i>Ducula aenea</i>	Walik kadanca	Big	Green, Brown, Gray	Forest	Solitary or in flock
<i>Geopelia striata</i>	Perkutut/Titiran	Medium	Grey, Brown, Black	Dry land, Wet- rice field, Swidden field, Garden	In flock
<i>Treron vernans</i>	Walik kiara/Punai	Big	Green, Yellow, Blue	Forest	Solitary or in pairs
CORVIDAE					
<i>Crypsirina temia</i>	Saeran ilong	Big	Black greenish	Many habitats	Solitary or in pair
CUCULIDAE					
<i>Cacomantis sepulcralis</i>	Uncuing	Big	Black	Forest, Garden- Talun	Solitary or in pairs
<i>Centropus bengalensis</i>	Dudut kolotok	Big	Red, Brown, Black	Forest	Solitary or in pairs
<i>Centropus sinensis</i>	Dudut candung	Big	Red Brown, Black	Forest	Solitary or in pairs

Scientific name and Family name	Vernacular name	Body size	Feather color	Habitat type	Behavior
<i>Centropus sinensis</i>	<i>Dudut rackrak</i>	Big	Red Brown, Black	Forest	Solitary or in pairs
<i>Eudynamis scolopacea</i>	<i>Tuweuw</i>	Big	Black, Blue	Forest, Garden-Talun	Solitary or in pairs
<i>Surniculus lugubris</i>	<i>Kuwiwi/Kedasi hitam</i>	Big	Black	Many habitats	Solitary or in pairs
DICRURIDAE					
<i>Dicrurus macrocerceus</i>	<i>Saeran gunting</i>	Big	Black	Forest, Garden-talun	Solitary or in pairs
<i>Dicrurus remifer</i>	<i>Saeran rambay</i>	Big	Black	Forest, Garden-Talun	Solitary or in pairs
ESTRILDIDAE					
<i>Lonchura leucogatroides</i>	<i>Piit</i>	Small	Brown, White	Wet rice-field, Swidden field	Solitary or in pairs
FALCONIDAE					
<i>Falco moluccensis</i>	<i>Heulang alap-alap/Dadali</i>	Big	Spot	Forest	Solitary or in pairs
FRINGILIDAE					
<i>Amandava amandava</i>	<i>Manintin</i>	Small	Red	Wet rice-field, Swidden field, Dry land	In flock
LANIIDAE					
<i>Lanius schach</i>	<i>Toéd/Béntét kelabu</i>	Big	Gray, Brown	Many habitats	Solitary or in pairs
MEGALAMIDAE					
<i>Megalaima arimularis</i>	<i>Cangcarang</i>	Medium	Green	Forest	Solitary or in pairs
MUSCICAPIDAE					
<i>Cyornis banyumas</i>	<i>Anis bingbin</i>	Medium	Blue	Forest	Solitary or in pairs
NECTARINIIDAE					
<i>Aethopyga siparaja</i>	<i>Beureum/Kolibri sepah raja</i>	Small	Red, Blue	Forest, Garden-Talun	Solitary or in pairs
<i>Anthreptes singalensis</i>	<i>Beureum/Kolibri kelapa</i>	Small	Green	Forest, Garden-Talun	Solitary or in pairs
<i>Anthreptes sp</i>	<i>Beureum/Kolibri muncang</i>	Small	Green	Forest, Garden-Talun	Solitary or in pairs
<i>Arachnothera longirostra</i>	<i>Klacés</i>	Small	Green	Many habitats	Solitary or in pairs
<i>Leptocoma sperata</i>	<i>Beureum/Kolibri ninja</i>	Small	Green, Red, Blue	Forest, Garden-Talun	Solitary or in pairs
<i>Nectarinia/Cinnyis jugularis</i>	<i>Jéit/Sriganti</i>	Small	Green, Blue	Many habitats	Solitary or in pairs
PHASIANIDAE					
<i>Arborophila javanica</i>	<i>Puyuh gonggong</i>	Big	Red, Brown	Dry land, Swidden field	Solitary or in pairs
<i>Coturnix chinensis</i>	<i>Puyuh batu</i>	Small	Brown, Blue, Spot	Dry land	Solitary or in pairs
<i>Gallus gallus</i>	<i>Kasintu/Cangéghar</i>	Big	Red, Black	Forest	Solitary or in pairs
PICIDAE					
<i>Dendrocopos macei</i>	<i>Caladi kotok</i>	Small	Spot, Grey, Yellow	Forest	Solitary or in pairs
<i>Dinopium javanense</i>	<i>Caladi kundang</i>	Big	Yellow, White, Black, Red	Forest	Solitary or in pairs
PITTIDAE					
<i>Pitta guajana</i>	<i>Paok</i>	Big	Black, Yellow, Brown	Forest, Garden-Talun	Solitary or in pairs

Scientific name and Family name	Vernacular name	Body size	Feather color	Habitat type	Behavior
PSITTACIDAE					
<i>Loriculus pusillus</i>	<i>Sérénét/Serindit Jawa</i>	Small	Green, Yellow	Forest, Garden-Talun	In flock
PYCNONOTIDAE					
<i>Alophoixus bres</i>	<i>Korés</i>	Big	Brown, Green	Many habitats	Solitary or in pairs
<i>Pycnonotus aurigater</i>	<i>Cangkurileung hejo</i>	Medium	Green	Many habitats	In flock
<i>Pycnonotus aurigaster</i>	<i>Cangkurileung kapas</i>	Medium	White	Many habitats	In flock
<i>Pycnonotus aurigaster</i>	<i>Cangkurileung batu</i>	Medium	Green, Gray	Many habitats	In flock
<i>Pycnonotus goiavier</i>	<i>Jogjog/Merbah Cerucuk</i>	Medium	Brown, White	Many habitats	In flock
RALLIDAE					
<i>Amauornis phoenicurus</i>	<i>Karéó/Karéó padi</i>	Big	Black, White	Wet rice-Field, River	Solitary or in fair
<i>Galicrex cinerea</i>	<i>Hahayaman</i>	Big	Black, Gray	Wet rice-field	Solitary or in pairs
<i>Gallirallus striatus</i>	<i>Békér/Mandar padi</i>	Big	Redish, White stripe	Wet rice-field	In flock
SCOLOPACIDAE					
<i>Tring hypoleucos</i>	<i>Tilil</i>	Small	Brown, White	Forest	Solitary or in pairs
STRIGIDAE					
<i>Ketupa ketupu</i>	<i>Hingikik</i>	Big	Brown, Spot	Forest, Garden-Talun, Wet rice-field	Solitary or in pairs
<i>Otus bakkamoena</i>	<i>Bueuk</i>	Big	Grey	Many habitats	Solitary or in pairs
<i>Tyto alba</i>	<i>Koréak/Burung hantu putih</i>	Big	Brown, White	Many habitats	Solitary or in pairs
STURNIDAE					
<i>Aplonis panayensis</i>	<i>Geuri</i>	Medium	Black	Forest, Garden-Talun	In flock
<i>Acridotheres javanicus</i>	<i>Jalak/Kérek kerbau</i>	Big	Black	Wet rice-field	In flock
SYLVIIDAE					
<i>Prinia familiaris</i>	<i>Cinitnit/Ciblek, Prénjak</i>	Small	Brown	Garden-Talun, Swidden field, Wet rice-field	In flock
TURDIDAE					
<i>Copsychus saularis</i>	<i>Haur/Murai</i>	Medium	Black, White	Forest-Garden, Talun	Solitary or in pairs
<i>Myophoneus caeruleus</i>	<i>Ciung</i>	Big	Brownish black	Forest, Garden-talun	Solitary or in pairs
<i>Zoothera interpres</i>	<i>Anis kembang</i>	Medium	Red, Spot	Forest	Solitary or in pairs
<i>Zoothera citrina</i>	<i>Anis cacaing</i>	Medium	Red, Orange	Forest	Solitary or in pairs
<i>Zoothera sp</i>	<i>Anis macan</i>	Medium	Spot	Forest	Solitary or in pairs
<i>Zoothera sp</i>	<i>Anis bongkok</i>	Medium	Red	Forest	Solitary or in pairs
TURNICIDAE					
<i>Turnix suscitator</i>	<i>Puyuh bebencé</i>	Small	Brown, White	Dry land	Solitary or in pairs
ZOSTEROPIDAE					
<i>Zosterops palpebrosus</i>	<i>Kacamata/Siki nangka</i>	Small	Green yellow	Many habitat	Solitary or in pairs

Scientific name and Family name	Vernacular name	Body size	Feather color	Habitat type	Behavior
UNIDENTIFIED	<i>Manuk Bayonah/Cedor</i>	Unidentified	Unidentified	Unidentified	Unidentified
UNIDENTIFIED	<i>Dutok</i>	Unidentified	Unidentified	Unidentified	Unidentified
UNIDENTIFIED	<i>Legug</i>	Unidentified	Unidentified	Unidentified	Unidentified
UNIDENTIFIED	<i>Tengtelang</i>	Unidentified	Unidentified	Unidentified	Unidentified

In general, the bird classification system which is perceived by rural communities in the Upper Cisokan Watershed, West Java, is based on morphology, such as body shape and color, and beak shape, and non-morphology, such as habitat type, behavior, namely living in groups and not in groups, almost similar to the results of studies on ethnic Sundanese. In other rural areas, and even across other ethnic groups globally in the world across cultures (Ellen 1993; Tidemann and Whiteside 2010; Ng'weno 2010; Ross and Revilla-Minaya 2011; Iskandar et al. 2016; Partasasmita et al. 2016).

Functions of Socio-economic-culture and Ecology

Based on the rural community of the Upper Cisokan Watershed, West Java, various species of birds have socio-economic, cultural, and ecological functions. Various types of birds have value for trade. Some birds are also believed as a sign of a culture. Thus, bird populations in their habitats are inseparable from the relationship between humans and nature, as we find below:

Socio-economic Function

According to the rural community of the upper Cisokan watershed, various bird species have a socio-economic function. For example, various bird species such as *perkutut* or *titiran* (*Geopelia striata*), *tikukur* (*Streptopelia chinensis*), *jogjog* (*Pycnonotus goiavier*), *cangkurileung* (*Pycnonotus aurigaster*), *walik kadanca* (*Ducula aenea*), *walik kiara* (*Treron vernans*), *puyuh* (*Turnix suscitator*), *piit* (*Lonchura leucogastroides*), *manuk beureum/kolibri*, *paok* (*Pitta guajana*), *saeran*, *toed* (*Lanius schach*), *prenjak/ciplek* (*Prinia familiaris*), *jalak/kerak* (*Acridotheres javanicus*), *burung anis macan* (*Geokichla dohertyi*), *anis kembang* (*Zootera interpres*), *anis bingbin* (*Cyornis rubeculoides*), *anis bongkok* (*Zootera erythronota*), *anis cacing* (*Geokichla citrina*), and *manuk haur* (*Copsychus saularis*), are considered by villagers as common cage birds (*diingu* or *dikukut*), slaughtered and consumed (*didahar*), and traded (*dijual*) (Figure 2).

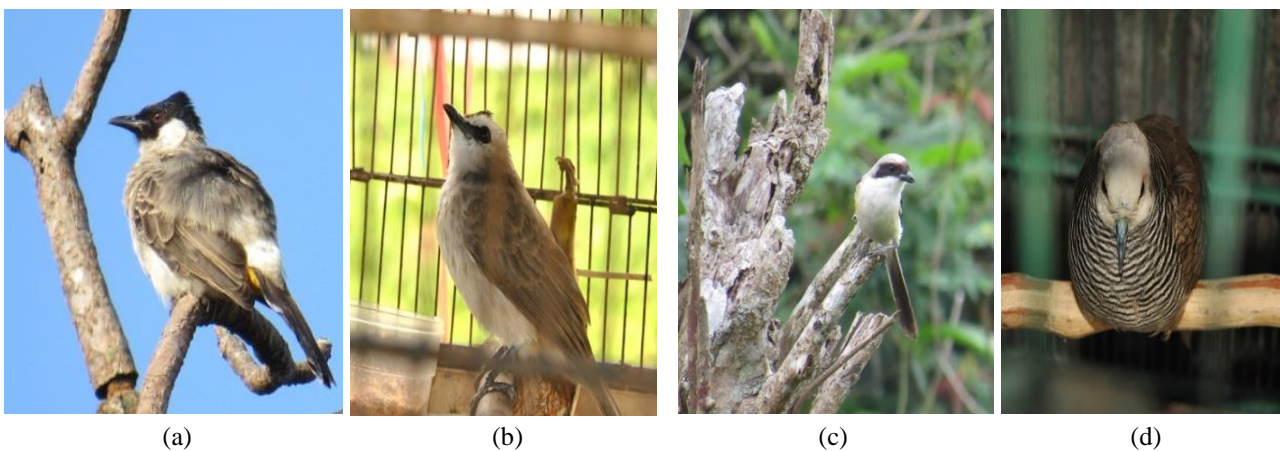


Figure 2 Several bird species, including; (a) *Cangkurileung* (*Pycnonotus aurigaster*), (b) *Jogjog* (*Pycnonotus goiavier*), (c) *Toed* (*Lanius schach*), (d) *Perkutut* (*Geopelia striata*) are commonly kept in the cages of a village community

Among the various bird species in the Upper Cisokan Watershed, such as *tikukur*, *perkutut*, *jogjog*, *cangkurileung*, and *toed* are the birds that are commonly kept (*diingu*) by the rural people. In addition, other bird species, including *manuk paok*, *prenjak*, *kerak*, and *anis* are commonly kept in cages. These birds have social functions, namely reason for entertainment by rural people to enjoy the beauty of their feathers, the uniqueness of their behavior, and the melodious chirping sound. In addition, these bird species are commonly slaughtered, used as food, and a source of animal protein in the household. Meanwhile, in order for the villagers to earn money, various bird species are also commonly traded.

For family food consumption, several bird species, including the *tikukur*, are usually slaughtered and consumed by the villagers. According to informants, *tikukur* bird meat has the most delicious culinary taste. In addition, other bird species, *kolibri* is also considered to have a good taste, as delicious as the meat of *tikukur*. These two species of birds and other species, including *piit*, *puyuh*, *walik kadanca*, *walik kiara*, and *toed* are also commonly slaughtered for consumption in the family. In fact, the *toed* bird, apart from being eaten by the flesh, is believed by the rural people to be able to act as a medicine so that children can speak smartly like a *toed* bird that sings a lot (*gacor*). People catch or hunt bird species by shooting them with air rifles, which are meant for species of birds for consumption. Meanwhile, catching birds alive by taking their young from their nests or catching them using various traditional traps is intended for the species of birds they catch to be kept and sold.

There are several ways for the rural people of the Upper Cisokan watershed to hunt birds in their village, such as by shooting birds using an air rifle (*ditembak*), directly catching bird species in their nests at night using torches (*ngobor*), catching using bird traps, such as *jiret*, and trap of *pitangkeb*, as well as using tree sap (*dileugeut*). The traditional *jiret* device resembles a fishing rod, the trap is made of a type of bamboo. The best bamboo to use for this tool is *bambu gombong* (*Gigantochloa verticilata*). *Jiret* trap is commonly used to catch birds, such as *tikukur*, *walik*, *anis*, *ciblek*, *manuk haur*, *ciung*, *kores*, and *perkutut*. While the *pitangkeb* trap is primarily used to catch hedgehogs, it can also be used to catch *tikukur*, *walik*, *anis*, and so on. This trap is rectangular in shape and can function to cover the ground if a bird enters the trap. In general, birds will come and eat bait in the form of worms, crickets, and seeds.

Then if there is a bird pulling the bait that is installed under the *pitangkreb*. Then, the *pitangkreb* will close automatically. In order for the birds that are trapped in the *pitangkreb* traps not to be squeezed by the *pitangkreb*, usually on the surface of the ground under the *pitangkreb*, an indentation is made in the ground. Meanwhile, to catch birds by *dileugeut*, the method is to use plant sap, such as rubber tree sap, jackfruit, and teureup attached to twigs or tree branches (Iskandar and Iskandar 2022). Around the place where the *leugeut* is installed, tame birds are usually kept, as a lure so that birds in nature come closer to the decoy birds. If a bird approaches and lands on a twig that has been affixed with wood sap (*leugeut*), then the bird is deceived, clinging to the *leugeut*, unable to fly anymore.

Many people of the Upper Cisokan Watershed sell various birds, usually through the urban bird market or people (*pengepul*) who come to look for birds in the village. Based on information obtained from informants, the price of *cangkurileung* and *jogjog* birds that are adults and have beautiful chirping sounds, the price ranges from Rp30,000.00–Rp50,000.00 in 2022. Meanwhile, *cangkurileung* and *jogjog* juvenil usually sell for around Rp10,000.00–Rp15,000.00. The price of the *perkutut/titiran* sells for around Rp100,000.00, *ciplek/prenjak* around Rp200,000.00. Other bird species, including *saeran*, sell for around Rp200,000.00, *anis bingbin* Rp700,000.00–1,000,000.00, *manuk haur* between Rp800,000.00–1,000,000.00, *toed* Rp200,000.00. However, for a *toed* that is tame and has a good song, it can be sold for up to Rp300,000.00–Rp400,000.00.

These species of birds are sometimes not for sale but are also intended for friends or neighbors in need. So, the bird is usually exchanged for a pack of cigarettes of a certain brand that is commonly consumed by rural communities. For example, *cangkurileung* and *jogjog* are often exchanged for a pack of cigarettes. In general, the results of this study are almost similar to the results of studies in other places, such as in

Karangwangi, South Cianjur, and the Outer Baduy area, Kanekes Village, South Banten, where species of birds in rural areas are usually used as food for consumption (*didahar*), kept (*diingu*), and traded (*dijual*) (Iskandar et al. 2016; Iskandar and Iskandar 2021).

Cultural Functions

In addition to having socio-economic functions, several bird species also have socio-cultural functions for rural people. For example, according to the rural people of the Upper Cisokan Watershed, several bird species, such as the *uncuing* (*Cacomantis sepulcralis*), *bueuk* (*Otus bakkamoena*), *kuwiwi* (*Surniculus lugubris*), and *tuweuw* (*Cuculus canorus*), *puyuh bébéncé* (*Turnix suscitator*) are culturally believed to be species. Birds that have a relationship with spirits or things that are supernatural. According to the rural people's belief that, the sound of the *uncuing* bird continuously in a village is usually used as a sign that someone will die soon or a disaster in the village. In addition, the presence of *bueuk* and the sound of the *kuwiwi* bird in a place is believed to be a sign of the presence of spirits in that place. In addition, if there is a *bueuk* bird flying on its back through a village while making a squeaky sound, it is usually believed by the population as a sign of an outbreak of disease.

The *tuweuw* bird is also believed by rural people to be the incarnation of ancestors (*karuhun*). So, based on the people's beliefs, the consequence is that some species of birds, such as *uncuing*, *bueuk*, *kuwiwi*, and *tuweuw* are birds that should not be disturbed. The reason is these species of birds are very scary and related to spirits. In addition, specifically, the *kuwiwi* and *tuweuw* birds are traditionally sacred. The reason is that the village's ancestors have mandated not to disturb the two types of birds. Another bird species that the locals have signaled is *puyuh bébéncé*. According to local beliefs, the sound of *puyuh bébéncé* at night is believed to be a sign of the arrival of thieves in the village. The population's beliefs, in general, are the same as the results of studies elsewhere in rural West Java (Iskandar 2018; Partasasmita et al. 2016; Mulyanto et al. 2020; Iskandar and Iskandar 2021, 2022).

Not only that, according to the belief of the people of the Upper Cisokan Watershed that the *caladi kundang* (*Dinopium javanense*) can be used as a medicine for shortness of breath, and is believed to be a sacred bird 'hud-hud' as stated in the text of the holy book Al-Quran. In the holy book of the Qur'an, for example, it is narrated that when Prophet Sulaiman sent a letter of invitation to Queen Bilqis to embrace the religion of monotheism by using the Hud-hud Bird. Then Queen Bilqis also sent a reply letter to Prophet Sulaiman through the bird. Therefore, the *caladi kundang* is seen as a Hud-hud Bird that has strength, so its blood can be used as an ingredient mixed with japoran oil to make amulets (*wafaq*) in the form of Arabic script so that a wish is granted. In addition, traditionally bird species can be used as a source of inspiration to make rhymes or jokes. Pantun or rhymes related to the *cangkurileung* describe someone who has no money, longing for someone, and the humor commonly used by young people who are in love. For example, an expression that use birds are as follows:

*cangkurileung anakna piit
ditalian ku tali calana
culang-cileung teu boga duit
cangkurileung-cangkurileung eunteup dina tangkal awi,
abdi nineung-abdi nineung kanu kamari
cangkurileung cangkurawok, heunceut hideung panjang baik
(ditujukan untuk perempuan) cangkurileung cangkurawok abdi nineung kanu rewok*

Based on this ethnoornithological study, it can be seen that, in general, in many global community groups across cultures in the world, birds have become part of people's daily lives. The melodious chirping of birds of various kinds is often a companion to the daily routine of farmers, fishermen, and herders (Ng'weno 2010).

Behind the chirping sound of birds, in their daily life, people always interact reciprocally with various species of birds based on their cultural perceptions. These cultural perceptions/views determine the use or treatment of various species of birds by humans (Iskandar 2017b; Iskandar 2018). The results of ethnoornithological studies in many societies in the world also show that bird diversity is seen as having various functions, namely, as a source of food, economy, culture, and ecology (Purnama and Indrawan 2010; Tidemann and Whiteside 2010; Forth 2010; Hunn 2011; Iskandar et al. 2016; Iskandar et al. 2019). For example, people in Kenya, East Africa, view the ostrich (*Struthio camelus*) as a source of food. Ostrich, apart from being used as a food source, is also commonly used in ceremonies (Ng'weno 2010). In the Citarum Watershed, West Java, besides being eaten, *puyuh* (*Turnix suscitator*) is associated with the myth of the presence of thieves at night (Iskandar and Iskandar 2021, 2022). As applies to many communities in West Java and the world in general, the Upper Cisokan people also view birds as having important socio-economic, cultural, and ecological functions.

Ecological Function

In addition to having socio-economic and cultural functions, some species of birds in the Upper Cisokan are perceived by rural people as having ecological functions, namely, functioning as plant seed dispersal, agricultural pest control, and plant-pollinator. Bird species are classified as plant seed dispersers because when they eat fruit seeds or droppings containing fruit seeds, they fall to the ground and grow into new plants (Tabur and Ayvaz 2010; Iskandar 2017a). For example, according to rural people, *tikukur* (*Streptopelia chinensis*) play a role in spreading the seeds of the *Katepos* Tree. *Cangkurileung* (*Pycnonotus aurigaster*) and *jogjog* (*Pycnonotus goiavier*) as dispersers of seeds of *cabe*, *cegek*, *papaya*, *katepos*, *kanyere*, *kiara*, and *kisalam*. While the species of birds that often come and eat the fruits of *caringin/beringin*, *kiara*, *darangdan*, *huni*, *hamerang*, *sobsi*, and *kanyere* trees, can play an important role in spreading the seeds of these plants.

Manuk kacamata (*Zosterops palpebrous*) and *dutok* are believed by rural people to play a role in dispersing fruit seeds. Similarly, the *walik kiara* (*Treron vernans*) and *walik kadanca* (*Ducula aenea*) are considered by the rural people as dispersers of the seeds of the *kiara*, *caringin*, *darangdan*, and *katepos* trees. While the *Cangcarang* Bird (*Megalaima armillaris*) can play a role in dispersing the seeds of the *huni* and *kiara* trees. In addition, various species of birds of prey are also considered by rural people to act as beneficial birds. This is because the species of wild birds like to eat animals that disturb or damage various species of plants in the fields, rice fields, and gardens of rural people. A variety of fruit-eating birds, such as *cangkurileung* and *jogjog*, apart from being known as fruit seed dispersers, are also considered by residents as pest control. The reason is, these bird species often eat caterpillars and grasshoppers, which are pests for agriculture. In addition, the *ciblek/cinitmit* (*Prinia familiaris*), *toed* (*Lanius schach*), *kerak* (*Acridotheres javanicus*), *geuri* (*Aplonis payanensis*), and *paok* (*Pitta guajana*) are considered to be ecologically beneficial because they like to eat caterpillars, grasshoppers, crickets and ant.

In addition, the *heulang ruyuk* (*Spilornis cheela*) often preys on mice, snakes, and squirrels. Similar to *heulang ruyuk*, *bueuk* (*Otus bakkamoena*) also likes to prey on rats and snakes. *Uncuing* (*Cacomantis sepulcralis*), *saeran gunting* (*Dicrurus macroceceus*), *saeran rambay* (*Dicrurus leucophaeus*), *caladi kundang* (*Dendrocopos macei*), *caladi kotok* (*Dendrocopos molluccensis*), *cipeuw* (*Aegithina tiphia*), *serenet* (*Loriculus pusillus*), *kokondangan* (*Ixobrychus cinnamomeus*), and *manuk siki nangka* (*Zosterops palpebrous*) often eat caterpillars. In addition, *beker* (*Gallirallus striatus*) and *kakareo* (*Amaurornis phoenicurus*), are known as birds that eat caterpillars, worms, and *anjing tanah* or *sesorok* (*gaang*). Meanwhile, other bird species, including *manuk kaca mata* (*Zosterops palpebrous*), all species of birds from the Nectariniidae Family, such as *kolibri* or *cuit* (*Cinnyris jugularis*), and *kalaces* (*Arachnothera affinis*) are considered ecologically beneficial because they can help pollinate various plant species.

Bird Disturbances

Along with the construction of the upper Cisokan hydropower project, the habitat and movement space for various wildlife, including various species of birds, have become increasingly narrow. For example, a forest area that was originally a habitat for various species of birds with the construction of an access road has resulted in habitat narrowing (Permana et al. 2019; Megantara et al. 2019). In addition, an access road makes it easier for hunters from outside to do their hunting. Market economic pressures have caused rural people to expand their swidden cultivation practices (*ngahuma* or *berladang*), with the average land tenure of fields or gardens through a profit-sharing system ranging from 3–12 gawang (1 gawang = 400 m²), both on land owned by Perhutani and private property. In addition to reducing bird habitat, market economic pressures also cause rural people to hunt various species of birds for sale because they are economically profitable.

Another change in the physical environment is the conversion of forest/garden land into a residential area. The results of the study by Permana et al. (2019) showed that Kampung Babakan Bandung in Sukaresmi Village before it was opened as a settlement around 2015, was originally Kampung Babakan Bandung, in the form of a mature and dense forest (Leuweung Hieum), a place for grazing livestock and habitat for wild animals, including bird species. Meanwhile, at first, Cangkuang Hamlet of Bojongsalam Village is a forest area/garden-talun which is only occupied by four heads of families (households), now, 35 families inhabit it. As a result, bird habitat narrowing is caused by the construction of access roads and expansion of farming practices. The change in the function of forest land into settlements has resulted in various species of birds losing their habitat.

Therefore, with these various habitat changes, it is unsurprising that the villagers now consider the *heulang ruyuk* (*Spilornis cheela*) and *heulang hideung* (*Icnaetus malayensis*) birds as pests. The reason is that wild bird likes to prey on pet chicken of rural people. In addition, now *tikukur* (*Streptopelia chinensis*), *perkutut* (*Geopelia striata*), and *piit* (*Lonchura leucogastroides*) are also considered pests because they like to eat rice in both wet-rice (*sawah*) and swidden field (*huma*). Another change is the change in the behavior of the younger generation in treating birds in rural areas. For example, in the past *manuk uncuing* (*Cacomantis sepulcralis*) was considered as 'sacred bird' that people should not disturb. Nowadays, however, this bird has commonly shot or killed because its sound is considered scary.

CONCLUSION

Based on this study, it can be concluded that the rural communities of the Upper Cisokan Watershed still have quite deep local knowledge of various species of birds. It revealed that the rural community has recognized 74 species of birds. The various birds are classified by rural people based on body size, body feather color, type of habitat where the birds live, and their behavior, particularly the living habits of birds in groups or not in groups. In addition, it can also be concluded that bird species have socio-economic, cultural, and ecological functions. Regarding population bird disturbances, the construction of the Cisokan hydropower project has caused habitat destruction and losses. Consequently, the bird population has rapidly decreased.

Moreover, the impact of the Cisokan hydropower project has also caused socio-economic and cultural changes in the rural community. For example, the construction of new roads has provided various benefits, such as causing more good access for transportation between urban and village areas. However, in addition to that, the increase in good transportation has also led to the rapid penetration of the market economic system into rural areas and resulted in rampant hunting of various species of birds for trading commodities. Consequently, various species of birds that are hunted intensively by the rural people, can threaten the extinction of bird species in nature. So, if the diversity of birds is extinct, it can also cause the function of various birds as socio-economic, cultural, and ecological to be extinct. Therefore, for the conservation of various bird species in rural areas, it is necessary to pay attention to the socio-cultural factors of rural communities.

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