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Bird Richness and Egret Activity in the Subak Sempidi Rice Fields, Badung Bali: A Good Recommendations for Bird Watching Tourist Attractions

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Abstract

Research has been carried out on the presence of birds and the activity of egrets in the rice fields of Subak Sempidi Mengwi Badung Bali. The research was carried out in May 2022 and February 2023 at the location of the rice fields which are in the process of preparing land for planting rice. Bird observations were carried out using the Point Count method. Counting points were carried out at three sites of Sempidi rice fields. The observation site is determined on the land that is being processed to prepare paddy fields for planting rice. Identification of bird species was carried out directly, the birds found were photographed with a digital camera. Identification based on morphological characters. Data were analyzed by descriptive quantitative. Bird activity is described by ed libitum. Animals that become prey for birds are suspected based on animals identified at the bird

site carrying out feeding activities. The results showed that in the rice fields of Subak Sempidi, 21 species of birds were found belonging to 12 families. 15 species of all birds found are included in the threatened category based on the IUCN Redlist. Birds that were dominant in the period of land preparation for planting rice were egrets, namely cattle egret (*Bubulcus ibis*), little egret (*Egretta garzetta*), intermedia egret (*Egretta intermedia*), great white egret (*Egretta alba*) and Javan pond heron (*Ardeola speciosa*). The observed bird activities were flying in groups, catching prey, following farmers plowing the fields and agonistic behavior. The prey of these birds are insects, aquatic invertebrates, eels, dragonflies and frogs. The presence of flocks of egrets and their activities in the paddy fields is an attraction for bird watching tourism.

Keywords: Egrets, Bird Activities, Bird Watching, Rice Fields, Threatened Bird

Introduction

Subak Sempidi, which covers 127.78 hectares ^[7], is one of the rice farming areas in Badung Regency that applies a land processing cycle from land preparation, rice planting and harvesting, which cycle lasts 2-3 times every year. A good tillage activity for rice plants is perfect processing starting from plowing I and II, followed by harrowing and ending with leveling of the land. Land preparation for rice seed production is divided into three phases, namely: Inundation of the soil until it is saturated with water; Plowing of the soil to break up the lumps and at the same time turn over the soil; harrowing to destroy the soil and then puddling with water ^[5].

Weeds that grow a lot in the paddy rice planting area when the paddy fields are in the preparation stage for rice and rice planting have already grown, both grass group weeds and broad leaf weeds. Several weed species from the grass group include *Echinochloa crusgalli*, *Cyperus difformis*, *Cyperus rotundus*, *Cyperus iria*, *Digitaria ciliaris*, *Eleusine indica*, *Echinochloa colona*, *Fimbristylis miliacea*. And several species of broad leaf weeds including *Commelina benghalensis*, *Junsiea repens*, *Ageratum conyzoides*, *Spenochlea zeylanica*, *Ipomoea aquatica*, *Alternanthera caracasana* ^[5, 19].

The presence of weeds during the land preparation period leading up to the rice planting period attracted the presence of several insect species (among them grasshoppers, crickets, dragonflies, centipeda, butterflies, earthworms). As well as stagnant water (mud) on the land for planting preparation supports several groups of animals including eels, freshwater fish, worms and dragonflies. So, the presence of these weeds results in interactions between birds and animals that are food for birds, because insects, worms, crickets, dragonflies that interact with weeds are a food source for carnivore birds. This supports the concept of plant-mediated species interaction by Ohgushi (1992) ^[13], which is often referred to as the 3 trophic level interaction (Plant-herbivore-Pradator).

Some bird species that commonly visit rice fields to look for food include cattle egrets (*Bulbulcus ibis*), little egrets (*Egretta garzetta*), silver egrets (*Egretta intermedia*), great egrets (*Egretta alba*), yellow vented bulbul (*Pycnonotus aurigaster*), sparrows (*Passer montanus*), Scaly-breasted Munia (*Lonchura punctulata*), Javan pond heron (*Ardeola speciosa*), collared

kingfisher (*Todiramphus chloris*), chestnut munia (*Lonchura atricapilla*) [10, 16, 17, 20, 24]. Azman *et al.* (2019) [1] stated that rice fields make a major contribution to bird diversity, for example in the Malaysian Paninsular rice field, 129 species of birds have been recorded belonging to 50 families.

Several species of birds visiting paddy fields are insect eaters, worms, grasshoppers, fish which do not become pests for rice plants, instead they control insect pests or snails in paddy fields, their droppings can be used as fertilizer in paddy fields and can become a bird watching tourist attraction because the amount is quite a lot and the color of the fur is interesting. Several species of birds that fall into this category include cattle egret, little egret, intermedia egret, great egret, Javan pond heron. However, several species of birds found in rice fields are also a group of seed-eating birds which are pests for rice cultivation, including

the Scaly-breasted Munia, Eurasian Tree Sparrow and chestnut munia. Associated with the large contribution of bird diversity in rice fields. So, the aim of this study was to identify the bird species that were present and how they were active during the land preparation stage for planting rice in the Subak Sempidi rice field.

Materials and Methods

Site Research and Periods

The research was conducted in the Subak Sempidi Badung area, Bali, which covers 127.78 hectares. The observation locations are at coordinates 8°35'32.59" S and 115°10'59.97" E (Fig 1). Sampling was carried out at 3 site point counts. The research was conducted in the morning (06.00-10.00 am) and afternoon (17.00-18.00 pm) in May 2022 and February 2023.



Fig 1: Map of study Site

Research Procedure

Bird observations were carried out using the point count method [3]. Counting points were carried out at three sites of Sempidi rice fields. The observation site is determined on the land that is being processed to prepare paddy fields for planting rice. At each point the observation was carried out for 20 minutes with an observation distance of 25 meters to the left and right. The parameters observed at each point are the species and the number of individuals of each bird species.

Identification of bird species was carried out directly, the birds found were photographed with a digital camera. Identification of bird species based on morphological characters (including foot shape, feathers, plumage color, wings, wing color, beak). Identification refers to the book series of field guides for Java, Bali and Sumatran birds [9]. Furthermore, the data were analyzed by descriptive

quantitative. The abundance of each species was analyzed based on the number of individuals at each point count and bird activity was described. Animal species that become prey for birds are based on observations of animals identified at the bird site doing feeding activities.

Results and Discussion

Bird Richness in Rice Fields

The results of observations in the rice fields of Subak Sempidi found 21 species of birds, belonging to 12 families. The group of egrets from the Ardeidae family with larger body sizes is the most dominant in the rice planting preparation area. The dominant species are cattle egret, little egret, intermediate egret, great white egret and Javan Pond heron. This group of birds came to the fields of farmers who were plowing the fields in large numbers ranging from 73-206 individuals in one site (Table 1). The presence of these

egrets in large numbers in a habitat is due to the abundant availability of food in the rice planting preparation area. Azman *et al.* (2021) and Nurmira *et al.* (2014) ^[11], also found that the egret group of birds is quite large in the Malaysian Paninsular rice field. Unlike the report by Sidik *et al.* (2021) ^[18], the egret group of birds was not found in the rice fields of Kuningan Regency, West Java.

Several bird species that are the same as birds in the habitat of the Subak sempidi are also found in Subak Latu rice field Abiansema Badung by Suaskara (2016) ^[23], including Cattle egret, Javan pond heron, Collared kingfisher, Scarlet-Headed Flower pecker, Olive-backed sunbird, Yellow-

vented Bulbul and Sooty-headed bulbul, this is because there are similarities in the characteristics of the rice field habitat with the Subak Sempidi. Small bird species including the Scaly-breasted Munia, White-headed Munia, Eurasian Tree Sparrow, Scarlet-Headed Flower pecker were found in small numbers and scattered across several rice fields. These birds generally visit paddy fields that have overgrown rice with young fruit in large numbers, so that their presence in paddy fields becomes pests for rice farming. Several other researchers have also reported the presence of these birds in rice fields ^[10, 17, 18, 20, 24].

Table 1: The number of bird visits to the rice planting preparation area in Subak Sempidi

S. No	Species	Family	Common name	May 2022			February 2023		
				Site 1	Site 2	Site 3	Site 1	Site 2	Site 3
1	<i>Bulbulcus ibis</i>	Ardeidae	Cattle egret	60	35	39	110	60	46
2	<i>Egretta garzetta</i>	Ardeidae	Little egret	18	12	14	60	24	29
3	<i>Egretta intermedia</i>	Ardeidae	Intermediate egret	9	9	11	20	15	20
4	<i>Egretta alba</i>	Ardeidae	Great white egret	8	7	10	9	7	8
5	<i>Ardeola speciosa</i>	Ardeidae	Javan Pond heron	10	10	8	6	8	10
6	<i>Spilopelia chinensis</i>	Columbidae	Spotted Dove	2	1		1	1	1
7	<i>Geopelia striata</i>	Columbidae	Zebra dove	2	1	1			
8	<i>Pycnonotus goiaver</i>	Pycnonotidae	Yellow-vented Bulbul	2	2	1	1	2	2
9	<i>Pycnonotus aurigaster</i>	Pycnonotidae	Sooty-headed bulbul	1	1	2		2	
10	<i>Collocalia esculenta</i>	Apodidae	Glossy swiftlet	6	5		5	5	7
11	<i>Lonchura punctulata</i>	Estrildidae	Scaly-breasted Munia	7	5	9	5	5	8
12	<i>Lonchura maja</i>	Estrildidae	White-headed Munia	4	3	3	2	3	2
13	<i>Lonchura leucogastroides</i>	Estrildidae	Javan munia	2			1	1	
14	<i>Passer montanus</i>	Passeridae	Eurasian Tree Sparrow	5	5	8	5	5	8
15	<i>Todiramphus chloris</i>	Alcedinidae	Collared kingfisher	1	1			1	1
16	<i>Dicaeum concolor</i>	Dicaeidae	Flower pecker	2	1	2		2	2
17	<i>Dicaeum tricheileum</i>	Dicaeidae	Scarlet-Headed Flower pecker	2		2		2	
18	<i>Amaurornis phoenicurus</i>	Rallidae	White-breasted waterhen	1	1			1	
19	<i>Nectarinia jugularis</i>	Nectariniidae	Olive-backed sunbird	1	2	1		1	
20	<i>Acridotheres javanicus</i>	Sturnidae	Javan myna		2	2		2	
21	<i>Orthotomus ruficeps</i>	Cisticolidae	Ashy tailorbird						



Fig 2: Flock of egrets Ardeidae (*Bulbulcus ibis*, *Egretta garzetta*, *Egretta intermedia*, *Egretta alba*, *Ardeola speciosa*) in rice field mud after being plowed by farmers



Fig 3: Flock of egrets (*Bulbulcus ibis*, *Egretta garzetta*, *Egretta intermedia*, *Egretta alba*, *Ardeola speciosa*) in rice fields where weeds are still growing

In Fig 2 and Fig 3, can see large flocks of egrets with a dominant white-brown color in the preparation area. This flock of egrets often visits muddy fields after being plowed by farmers and land that is still overgrown with weeds.

Based on redlist data by the International Union for the Conservation of Nature and Natural Resources (IUCN), in Subak Sempidi rice fields there were 15 out of 21 species found which were categorized as threatened, namely 14 species included in the category of least concern (LC) and 1

species categorized as vulnerable (VU). The egret group (Ardeidae) is mostly included in the threatened category (Table 2). Of the 15 rare species, there are several whose global population trend has declined, namely the Sooty-headed bulbul, Collared kingfisher and Javan myna. This means that Subak Sempidi's rice fields contribute to the preservation of birds, especially birds in the status of conservation concern.

Table 2: Bird species included in the threatened category in the Subak Sempidi Rice Fields (based on IUCN redlist)

S. No	species	Family	Common name	Conservation Status
1	<i>Bubulcus ibis</i>	Ardeidae	Cattle egret	LC
2	<i>Egretta garzetta</i>	Ardeidae	Little egret	LC
3	<i>Egretta alba</i>	Ardeidae	Great white egret	LC
4	<i>Ardeola speciosa</i>	Ardeidae	Javan Pond heron	LC
5	<i>Geopelia striata</i>	Columbidae	Zebra dove	LC
6	<i>Pycnonotus aurigaster</i>	Pycnonotidae	Sooty-headed bulbul	LC, Decreasing
7	<i>Lonchura punctulata</i>	Estrildidae	Scaly-breasted Munia	LC
8	<i>Lonchura maja</i>	Estrildidae	White-headed Munia	LC
9	<i>Lonchura leucogastroides</i>	Estrildidae	Javan munia	LC
10	<i>Todiramphus chloris</i>	Alcedinidae	Collared kingfisher	LC, Decreasing
11	<i>Dicaeum concolor</i>	Dicaeidae	Nilgiri Flowerpecker	LC
12	<i>Amaurornis phoenicurus</i>	Rallidae	White-breasted waterhen	LC
13	<i>Nectarinia jugularis</i>	Nectariniidae	Olive-backed sunbird	LC
14	<i>Acridotheres javanicus</i>	Sturnidae	Javan myna	VU, Decreasing
15	<i>Orthotomus ruficeps</i>	Cisticolidae	Ashy tailorbird	LC

Bird Activity in Rice Field

The process of preparing the land for planting rice which includes plowing the land to break up the lumps and at the same time turning over the soil, harrowing the soil and then muddling it with water, causes the animals that are in the soil to appear including eels, frogs, worms, crickets and fish. Insects and dragonflies will also come out of hiding from weeds after the land is crushed. This is attractive to carnivorous birds scrambling to catch prey, as prey is easy to see. So many birds follow the farmers who are plowing the fields. Most of the presence of birds in the paddy field habitat is for feeding activities. Platt *et al.* (2021) [14] stated

that most birds use rice fields as a habitat for food rather than breeding. Insectivorous birds are the most common, followed by Omnivores, Carnivores, Granivores, Frugivores, and Nectarivores.

The egret group of birds is most interesting to observe when they run to catch prey that appears after the land is crushed. Several species of birds were seen catching their prey in the mud, in the water and in weeds, some were flying after insects (Fig 4). On another occasion it was also observed that individual birds were carrying out agonistic/aggressive activities (fighting, kicking) towards other individuals (Fig 5).



Fig 4: Activity of catching egret prey in a rice field (A: *Egretta garzetta* catches prey in water, B: *Bubulcus ibis* catches prey in mud, C: *Egretta intermedia* catches insects in weeds, D: *Egretta* sp. flies to chase dragonflies)



Fig 5: Agonistic behavior of egrets in a rice field

Based on observations of animal species that become prey for egrets in their feeding area, recorded animals including earthworms, eels, dragonflies, grasshoppers, butterflies, crickets, water strider, snails and frogs (Fig 6). These animals come out of hiding due to land clearing, so they are easily preyed upon by birds. Riyaldi *et al.* (2022) ^[15] and Agrozine.id (2022) ^[2] also write that egrets in rice fields prey on insects, snails, rats, fish, frogs and some aquatic invertebrates. It was further stated that the presence of egrets in the fields brings benefits, namely as a pest control. This is because these birds often prey on mice and snails which are agricultural pests.



Fig 6: Several animals recorded in the area of egret feeding activity



Fig 7: Access to observation of egret activity from the Subak Sempidi Jogging Track

Bird Watching Tourist Attraction in the Rice Field

The presence of birds and bird activity, especially egrets in paddy fields, is very attractive for bird watching tourists. Visitors can see a large number of egrets with a dominant white color. This bird's activity can be observed at close range, easy to photograph and video. In addition, access to the Sempidi rice fields can be reached easily and a jogging track (Subak Sempidi Jogging Track) is available (Fig 7). The behavior of egrets is very interesting to observe, for example, birds flock to a site looking for food, many birds follow farmers who are plowing fields with tractors, these birds are very familiar with farmers, there are also birds jumping around to prey on food in the mud or moderate agonistic behavior.

Tourist attractions for observing egrets in rice fields have been developed in several locations including Petulu Ubud, Subak Sok Wayah Ubud and its surroundings and Subak Kembang Kuning and its surroundings. Tourists can observe egrets flying perch on trees around the rice fields, flying in groups across the rice fields, looking for food in clusters, following farmers plowing the fields with cows or tractors, jumping here and there while chasing their prey ^[6, 12, 21]. The following points need to be considered when observing birds; i.e., bird watching should not disturb those birds or any other animals. Avoid disturbing them during the breeding period or try not to go near their nest so that the parents who will lay eggs are not afraid; try to dress in colors that are not too flashy with the surrounding environment; If necessary, use the services of a professional field guide to get in-depth and correct information and insight ^[12].

Steven *et al.* (2015) ^[22] and Bird life International Middle East, (2015) ^[4] recommend that bird watching tourism can be developed as a nature-based photography activity that can provide income for photographer tourists. Bird watching tourism can be an educational tour, in which tourists gain knowledge, insight about the role of birds in their habitat and the conservation status of birds is also important knowledge for bird watchers. Thus, tourists are aware of the importance of preserving the diversity of fauna, flora and ecology. Bird watching or avi-tourism tourism has recently become a tourist trend, because it is a nature-based sub-tourism.

Conclusion

In the rice fields of Subak Sempidi, 21 species of birds were found belonging to 12 families. Birds that were dominant in the period of land preparation for planting rice were birds from the egret group, namely cattle egret (*Bubulcus ibis*), little egret (*Egretta garzetta*), Egretta intermedia (*Intermedia egret*) and Javan Pond heron (*Ardeola speciosa*). 15 species of all birds found are included in the rare category based on the IUCN Redlist. The observed bird activities were flying in groups, catching prey, following farmers plowing the fields and agonistic behavior. The presence of flocks of egrets, status conservation of the birds and their activities in the rice fields is an attraction for bird watching tourism.

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