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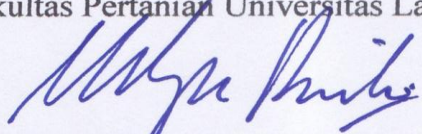
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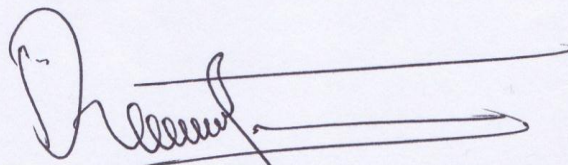
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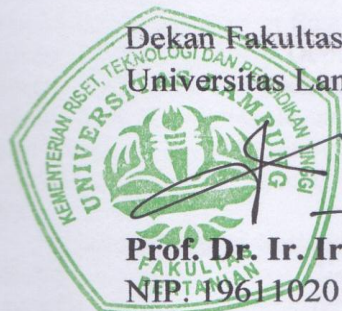
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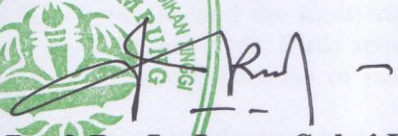


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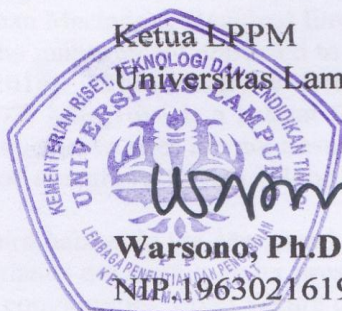
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ROLE OF BIRD SPECIES ON FOOD SECURE (STUDY CASE IN LAMPUNG MANGROVE CENTRE LAMPUNG PROVINCE INDONESIA)

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Abstract

Lampung Mangrove Centre in Margasari village Labuhan Maringgai Subdistrict Lampung Timur District, Lampung Province, Indonesia is one of model of mangrove forests management by the community. This location is a conservation site, which serves as the region as a center for nature and environmental education in the marine and coastal in Lampung Timur district. The purpose of this study was to determine the role of the birds on Food Secure in mangrove forest on May 2016 in Margasari village Labuhan Maringgai subdistrict Lampung Timur District, Lampung Province, Indonesia. The method used in this research was line transects.

The results showed 20 species of birds in Lampung Mangrove Centre and every birds have role to the environment, such as (1) the potential role as a pest of rice consist of *Lonchura punctulata*, *Passer montanus*, (2) role as pollinators : *Antheptes malacensis*, (3) predator role as agricultural pests : *Ardeola speciosa*, *Ardea purpurea*, *Egretta grazetta*, and *Bubulcus ibis*, (4) the role of controllers makrobenthos : *Ardea sumatrana*, (5) the role of population controllers of insect : *Halcyon pileata*, *Orthotomus ruficeps*, *Lalage nigra*, *Butorides striatus*, *Hirundo rustica*, *Collocalia esculenta*, (6) the role of controllers crustaceae and nemathode : *Charadrius alexandrinus*, *Tringa hypoleucos*, *Numenius madagascariensis* and (7) the role of controllers of fish : *Haliartus leucogaster*, *Egretta intermedia*, *Phalacrocorax sulcirostris*.

Key Words: birds, Lampung Mangrove Centre, line transect, role of food secure

PREFACE

Bird as a part of biodiversity have benefits to human survival. The direct benefits are as economic commodities, while the indirect birds benefit, that is to maintain the stability of the ecosystem or as bio-indicators of environmental (Prasetyo, 2002). Bird as one of the components of the ecosystem has a reciprocal relationship and interdependence with its environment. Based on the role and benefits of the birds in an ecosystem need to be preserved birds in an ecosystem should be maintained (Arumasari, 1989).

Mangrove forest ecosystem covering an site of 700 hectares in Lampung Mangrove Center, Margasari Village, Labuhan Maringgai Subdistrict, Lampung Timur District, Lampung Province Indonesia, is a common property resources between local authorities in East Lampung, Community of Labuhan Maringgai, Regional Environmental Agency (BLHD Lampung Timur), Forestry Department Lampung Timur, which the management entrusted to the University of Lampung (Kustanti, Nugroho, Nurrochmat and Okimoto, 2014; Dewi, 2016). The mangrove forests have resource changes physically, social, economic, and the multi-stakeholder since 1977. Mangrove is a habitat for many species of animals such as primates, reptiles, and birds. Birds species that live in the mangrove sites are not always the same as the types that live in the surrounding forest, because of nature characteristic of mangrove forests (Noor, Khazali, and Suryadiputra, 1999).

Lampung has a wetlands site which become one of the bird habitat in the Margasari village, Labuhan Maringgai Subdistrict, Lampung Timur District, Lampung Province. The wetlands are having under pressure a lot and conversion to rice paddies and ponds that affect the food secure surrounding the communities. Food Secure can be supported by the food chain involving the wildlife. One part of the food chain is the bird, the bird role in food secure needs to be known therefore this research must be conducted.

RESEARCH METHOD

Tools and materials

The research was conducted in Margasari village, Labuhan Maringgai Subdistrict, Lampung Timur District, Lampung Province, Indonesia, in May 2016. The tools that were used in this research such as Binocular, Nikon DSLR cameras, stationery, tallysheet, Study Guide Shorebirds of Howes (2003) and Field guide Birds of Sumatra, Java, Bali and Kalimantan of MacKinnon (2010). The material/object of the research were various of bird in site of the research.

Analysis method

The method that was used line transect method. This method was chosen because this method could be used to explore each habitat type based on the path contained in the research site. Observations and data retrieval were done along one kilometers of the transect with a width of 50 meters each. Observation was done twice in different times which are morning 06.00 AM to 09.00 AM and afternoon 03.00 PM to 06.00 PM. Field observations began with transects in mangrove site, in the seashore site and in the site around the pond. Transect method was used to record each bird meeting along the observation site during the observation time. Each new bird species was recorded in thally sheet. The same type was not recorded twice in one list (Alikodra, 1990; MacKinnon, Phillips and Ballen, 1998).

THE RESULTS AND DISCUSSION

Mangrove forest site are coastal sites that have a productive ecosystem and a transition area between terrestrial and marine environments. This site is generally covered by typical vegetations that are relatively tolerant to changes in salinity, and influenced by the tide. Mangrove forests serve as the protector of the coast that can reduce and prevent the erosion of the beach site (abrasion). These forests also play a role in supporting the animal life in the coastal sites and seas (Davies, Claridge, and Niranita, 1996).

Mangrove forests have unique characteristics compared by other forest formations. The uniqueness is evident from the forest habitats of life, as well as a diversity of flora, consist of *Avicennia*, *Rhizophora spp*, *Bruguiera spp*, and other plants that can survive in salinity of water sea and fauna that are crabs, fish and a type of molusca. The mangrove forest also has the function of economic, ecological, and social. Economic function in the mangrove forest that are a producer of household goods, producer of industrial use, and producing seeds. Ecological function are a protective shoreline, prevent the sea water intrusion and as a habitat for many species of birds (Kustanti 201; Davinsy, Kustanti and Hilmanto, 2015). The existence of mangrove forests can provide many benefits but the overuse especially economic use by the community would be decrease the ecosystems. According to (Priyanto, 2012; Yuliasamaya, Darmawan, and Hilmanto, 2014) mangrove ecosystem damage caused by the opening of the region to open the lands for ponds. The damage reached 48% (Watala, 2012; Yuliasamaya et al, 2014).

The results of the observation site had been found 20 species of birds that affect the food secure of community around the Margasari village, Labuhan Maringgai Subdistrict, Lampung Timur District of Lampung Province Indonesia. Birds could act as bio-indicators of the environment, the ecological benefits to the environment among other birds as controlling insects (especially potential as a pest), helps pollination and seed dispersers. Birds also have high economic value that can be used as a food ingredient (meat, eggs, nests). Bird also traded and maintained by the community, a beautiful bird feathers models widely used by designers to clothing design or other accessories (Darmawan, 2006). Identification of the important role of birds in Lampung Mangrove Centre described on the role of matrix bird species resilience food secure presented in Table 1.

Table 1. The role of the Bird Species Food Secure in Lampung Mangrove Centre May 2016.

No.	Species	Woof	Custom	Role in Ecosystems	Food Secure	
					Directly	Indirect
1	Bondol Peking (<i>Lonchura punctulata</i>)	Small grains, especially grains	Prefer visiting the farms, fields, gardens and shrubs.	Potentially a major pest of rice	√	
2	Burung Gereja	Heads of	Finding food on land and	Potentially a major	√	

	Erasia (<i>Passer montanus</i>)	grasses and grains	agricultural land.	pest of rice	
3	Burungmadu Kelapa (<i>Antheptes malacensis</i>)	Nectar and small fruits	Prefer visiting the bush beaches, mangrove forests, yards.	Pollinator	√
4	Blekok Sawah (<i>Ardeola speciosa</i>)	Ikan kecil, katak, serangga air dan berudu	Finding food in the fields or other sites that are watery and muddy.	Predator agricultural pests	√
5	Cangak Laut (<i>Ardea sumatrana</i>)	Generally, fish and crabs	Finding food in coastal	Controlling population makrobentos	√
6	Cangak Merah (<i>Ardea purpurea</i>)	Small fish, frogs, small reptiles and crustaceae	Prefer visiting the mangrove forests, fields, lakes, streams and ponds	Agricultural pest control, and bias are also potential pests in ponds	√
7	Cekakak Cina (<i>Halcyon pileata</i>)	Large insects, dragonflies, water beetles, grasshoppers and bees	Prefer mangroves, estuaries and river	Controlling a large insect population	√
8	Cerek Tilil (<i>Charadrius alexandrinus</i>)	Crustaceae and marine worms	Living and finding food on the beach, coastal muddy river near the beach.	Controlling populations of crustaceae and marine worms	√
9	Cinenen Kelabu (<i>Orthotomus ruficeps</i>)	small insect	Prefer visiting open spaces, beaches and mangrove bushes.	Controlling population of pests / insects.	√
10	Elanglaut Perut Putih (<i>Haliaeetus leucogaster</i>)	The main fish	Prefer flying around the beach to find a meal.	Controlling the fish population	√
11	Gajahan Timur (<i>Numenius madagascariensis</i>)	Crustaceans, marine worms and invertebrates	Live and feed in estuaries, muddy tidal site	Controlling the population of sea worm	√
12	Kapasan Kemiri (<i>Lalage nigra</i>)	Insects and insect larvae	Live in the open land and mangrove forests	Controlling population of pests / insects	√
13	Kokokan Laut (<i>Butorides striatus</i>)	Fish, insects, frogs, shrimp and larvae	Prefer the mangrove forest, dense vegetated site near waters	The controller in the forest insect population mangrove	√
14	Kuntul Kecil (<i>Egretta gazetta</i>)	Fish, frogs, crustaceans, aquatic insects and grasshoppers	Prefer visiting the rice paddies, muddy river banks and streams in the coastal	Predator agricultural pests, especially rice	√
15	Kuntul Kerbau (<i>Bubulcus ibis</i>)	Primarily flies on buffalo or	Prefer visiting a grassy meadow along with cows,	Predator agricultural pests	√

		cow, maggots, larvae, aquatic insects, fish and earthworms	buffalo		
16	Kuntul Perak (<i>Egretta intermedia</i>)	Fish, aquatic insects, frogs and grasshoppers	Finding food in the fields, mangrove forest, lake, swamp and muddy coastal site	Controlling aquatic insects and fish. The potential to become pests in ponds	√
17	Layang-Layang Asia (<i>Hirundo rustica</i>)	Small insects that fly	Circular flying in the air and prefers to perch on power cable	Controlling pests / insects	√
18	Pecuk Padi Hitam (<i>Phalacrocorax sulcirostris</i>)	primarily Fish	Prefer visiting the lakes, estuaries, ponds, and waterfront	Controlling fish populations, could potentially become pests in ponds	√
19	Trinil Pantai (<i>Tringa hypoleucos</i>)	Crustaceans, insects and other invertebrates	Prefer visiting the beach muddy rice fields, water flow	Controller shrimp population	√
20	Walet Sapi (<i>Collocalia esculenta</i>)	Small insects that fly	Prefer the open land and farmland	Controlling pests / insects fly mainly winged insects and small	√

Birds in site observation have seven influential role in food secure in Lampung Mangrove Centre. There were (1) Role Potential to be a pest of rice is *Lonchura punctulata* and *Passer Montanus*. Bird species that preys on the rice plant was quite much, pest birds attack began happening when rice seeds sown by eating the seed, when rice was young, and when the rice getting yellow and ready to be harvested (Prasetio, 2002). In addition to the birds that could make the lower rice of production it can be caused by seasonal weather conditions or unfavorable climate for rice farming.

Prolonged rainy season made the rice growth was not maximum enough. Besides continuous rainfall pest populations explode, the rice pests tend to evolve rapidly on wet land area. When rice began getting yellow *Lonchura punctulata* and *Passer Montanus* simultaneously will visit the rice fields and eat the rice seeds that will be harvested so that it can reduce production capacity. Prolonged rainy season made the rice growth was not maximum enough. Besides continuous rainfall pest populations explode, because the most of the rice pests tend to evolve rapidly on half-wet place. When rice began getting yellow color *Lonchura punctulata* and *Passer Montanus* simultaneously will visit the rice fields and eat the rice seeds that will be harvested therefore it can reduce production capacity.

(2) Birds that act as a pollinator is *Antheptes malacensis*. Birds are components of the ecosystem that has an important role in supporting the occurrence of an organism life cycle. This situation can be seen in the role of birds in the food chain and the net of life that make up the life system with other ecosystem components such as plants and insects. Bird benefits include ecological role that clearly can be seen and felt directly. That role is prefer to assist in the pollination of flowers (Darmawan, 2006).

(3) The role of agricultural pest predators that were *Ardeola speciosa*, *Ardea purpurea*, *Egretta grazetta* and *Bubulcus ibis*. Birds act as a controller pests that attack agricultural crops. Food in Indonesia has a very important position, especially the main food, because it relates to the issues of political, economic, social and cultural. Most main foods derived from cereals population consisting of rice, corn and wheat and the largest as main food is rice. Therefore, the bird is often used as an alternative to handling problems crop pests.

Predator is a free-living organism by eating, killing or prey or other organisms. Predator has some characteristics which are: predators can prey on all levels of the development of prey, egg, larva, nimva, pupa and imago, predators kill their prey for themselves, the predator has a larger body size than the prey. Birds usually prey on pests with chewing all the body parts of their prey.

(4) The role of birds as a control population of Macro-benthos was *Ardea sumatrana*. Macro-benthos were invertebrates that cannot be seen by direct eye and live surrounding the rocks at the bottom of the water. Besides, macro-

benthos also defined as invertebrate animals that live in or on the sediment or other large-sized substrates and can be seen with the eye with the size of 0.595 mm. The existence of benthos animals in the waters, is influenced by various environmental factors such as biotic and a-biotic.

Biotic factors which affect the benthos lives including the phytoplankton as a producer that is one of the main food source for benthos animals. Salinity will affect the deployment of benthos because marine organisms could be adapted only adapt by a few changes condition. Macro-benthos affect salinity adaptations are generally related to its ability to change the osmotic pressure in the body of the benthos to suitable environment. *Ardea sumatrana* eats macro-benthos to control the population so that the adaptations associated salinity on waters can be stabilized.

(5) Bird as insects pest control that were *Halcyon pileata*, *Orthotomus ruficeps*, *Lalage nigra*, *Butorides striatus*, *Hirundo rustica*, and *Collocalia esculenta*. Birds act as insect pest controller as predators or natural enemies. Birds will eat insect pests that attack crops. Mangrove forests in coastal is thicker than the mangrove forests in the river, but the river mangrove is longer to make landfall along rivers to the extent that does not affect the salinity on plant species of mangrove.

The mangrove function for the energy supply to the mangrove beach can be seen from its role in the process of decomposition releases mineral elements such as nitrogen, phosphore, and other essential nutrients element. These minerals are key element of fertility in the transfer of energy and food chain. Detritus plants or organic detritus is a source of food for the organisms, such as various types of zooplankton, shrimp, fish, crabs, molusca, nematodes, and amphipoda (Bismark and Savitri, 2010).

(6) Crustaceae controller and nematode populations were *Charadrius alexandrinus*, *Tringa hypoleucos*, *Numenius madagascariensis* and (7) Fish populations controller were *Haliaeetus leucogaster*, *Egretta intermedia*, *Phalacrocorax sulcirostris*.

Lampung mangrove Centre continues to make changes to better development, with the goal that has the most important duty is prosperous the human around the site. The importance of food needs for country is sustainable of food. Sites with high economic growth and good, but the circumstances of low food secure, starving everywhere could not be considered as a region grows and development. The need for efforts to eradicate pests using environmentally friendly methods could be a solution to solve the problems of food secure, reducing the use of chemicals that cause negative impacts on the environment that can inhibit the growth of food production. Therefore, the development and fulfillment of needs and food availability becomes absolutely necessary for achieving development and national food secure.

B. Distribution Patterns of Point Bird in LMC

The distribution pattern of 20 species of birds in the line transect location in Lampung Mangrove Centre described on the role of matrix species of birds the food secure presented in Figure 1.



Figure 1. The Map of bird species found at research site role of bird species on food secure in Margasari village Labuhan Maringgai subdistrict Lampung Timur District, Lampung Province, Indonesia (Hilmanto, 2015).

CONCLUSION

The seven important roles of birds species the food secure had been found from 20 species in LMC Lampung Province, May 2016. There are: (1) the role potentially becomes the rice pest was *Lonchura punctulata* and *Passer montanus*. (2) the role as predators was *Anthreptes malacensis* (3) The role as farm pest predators were *Ardeola speciosa*, *Ardea purpurea*, *Egretta grazetta* and *Bubulcus ibis*. (4) the bird role as macro-benthos population controller was *Ardea sumatrana*. (5) the role as insect pest controller were *Halcyon pileata*, *Orthotomus ruficeps*, *Lalage nigra*, *Butorides*

striatus, *Hirundo rustica*), and *Collocalia esculenta*. (6) the role as crustaceae and nematode population controller was *Charadrius alexandrinus* (7) the role as fish population controller were *Haliaeetus leucogaster*, *Egretta intermedia* and *Phalacrocorax sulcirostris*.

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