An Ecological study of the conservation of Herons in rice paddy area

- Based on the habitat use of the herons in Takashima City -

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1. Introduction

The herons are at the top of the food web in the rice paddy ecosystem and considered as indicator species of the biodiversity of the ecosystem. Because the herons are highly dependent on the rice paddies environment, as agriculture was modernized and the wetland and nesting areas are losing, the numbers of herons were decreased since 1960s. However, there are only a few studies about the effects of the management of the paddy field as well as the environmental factors of the paddy field to the habitat use of the herons. Therefore, this research investigates the relationship between the habitat use of the herons and the management of the paddy field as well as environmental factors for the purpose of the conservation of the herons in the future.

2. Study sites and research methods

This study was conducted in Takashima City, Shiga Prefecture where large numbers of herons are still observed. This survey was carried out in eight rice paddy field areas in Adogawa and three areas along three rivers for 26 times from May to October in 2010: The center of those sited are the colony of the herons. The research time was set between 11am and 6pm when the herons are most active. I conducted line senses survey with telescope (8times) as driving scooter at the speed of 20km/h. The observed species, the number of each species, perching places and the features of the surrounding environment were recorded. In addition, I conducted hearing to local farmers to gather further detailed information on the rice paddy field management.

Firstly, in order to analyze the regional differences of the habitats among herons, we divided the research period into four seasons (S1: from transplanting to before "Nakaboshi (the period of time to drain the rice paddy and keep it dry)", S2: Nakaboshi period S3: after Nakaboshi to harvest S4: after harvest) and use one-way analysis of variance for each season separately. Secondly, to investigate the difference among seasons and regions of each heron species habitat use, we use two-way analysis of variance for each area separately. In order to investigate the influence of the environmental factors (eg. water management at the paddy fields, the distance from the colony) on the number of each heron species, we construct generalized linear model (GLM).

3. Results and Discussion

Five species of herons were observed in Takashima City, and the statistical analysis showed seasonal and regional differences of habitat use among these herons. All the five species have been seen from transplanting period but rarely appeared after rice harvest .According to the habitat use difference, Ardea alba and Ardea cinerea tended to inhabit river area ,but the other species preferred paddy fields. The GLM model also showed that the amount of each species of herons were influenced by environmental factors differently: for Egretta intermedia, the positive factor was paddy fields flooded during winter; for Egretta garzetta, the positive factor were the delay of transplanting and the period after Nakaboshi to rice harvest; for Ardea albaand and Ardea cinerea, the positive factor was the delay of transplanting. What is more, the distance from the colony and the riparian forest were the negative factors for Bubulcus ibis. The results above indicated that the paddy field landscape pattern (paddy field-river-riparian forest),and paddy field managements, especially the management during transplanting period and the flood control during winter, were of significant importance to the herons' habitats use.