Effects of Characteristics of Paddy Field and Land Use of the Surroundings on the Frog Species in Paddy Field

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Key Words: Rana (Pelophylax) porosa brevipoda, Rana (Pelophylax) nigromaculata , Rana (Rugosa) rugosa, Hyla japonica, Rana (Aquarana) catesbeiana, Paddy field, Water management, Land use, Conservation of frog species

1. Introduction

Amphibian species are more threatened with extinction than birds or mammal species across the world. Habitat loss is considered as the main threat on the amphibian population. As wetland, which is crucial habitat for amphibian, is decreasing globally, paddy field is recognized as substitute habitat of wetland. Nineteen out of 42 frog species/subspecies in Japan utilize paddy field, so it is important to assess paddy field as habitat of frog species for their conservation. However, it has not yet been explored enough how each factor of rice field affects the frog use of paddy field. In this paper, first, I identify the frog species in the research fields and examine how factors of paddy fields affect the frog use of paddy fields and the larvae population.

2. Description of Research Field

The research fields are located at Takashima city in Shiga prefecture. In the city, wide area of paddy filed is still left and a large number of frogs are observed. I selected 11 paddy fields managed in different ways from 4 sites: Ymanaka Makino-cho in mountain side, Harie and Oota Sinasahi-cho close to Lake Biwa, and Hamabun Imazu-cho in urban area.

3. Methods

Walking around each paddy field, I recorded species name whenever I observed the figure or recognized the call to calculate the frequency of frog use of the paddy field. I also scooped up water with a net from 8 fixed points and counted the number of larvae to calculate the cumulative number of larvae. I measured water quality and recorded water management, availability of water surface, the depth of irrigation and drainage, the use of agrichemical, and perimeter of each paddy field. I used ArcGIS 9.2 to measure the area of paddy field, field, grass land, forest, urban use, water surface within 500m from each paddy field and calculated proportion of each land use.

I ran tree model and built regression tree to analyze the effects of each factor. In order to evaluate each regression tree, first, I converted dependent variable to arcsine value when dependent variable is proportion number, and when the paddy fields were divided into more than 3 groups, I applied one-way analysis of variance and Tukey multiple comparison, and when the paddy fields were divided into 2 groups, I applied t-test. If there was no significant difference among groups (significance level was set 0.05), I deleted the group and pruned the regression tree.

4. Results and Discussion

At the research fields, I identified *Rana porosa brevipoda, Rana nigromaculata, Rana rugosa, Hyla japonica, Rana catesbeiana*. The frequency of frog use of paddy field and cumulative number of leave were different among sites and also among paddy fields.

The first factor of paddy field and land use were different for different frog species and larvae. The first factor for *Rana porosa brevipod* was the length of perimeter(+) and the ratio of rice field(+), for *Rana nigromaculata* was water temperature (-), for *Rana rugosa* was depth of irrigation(-) and the ratio of rice field(-), for *Hyla japonica* was the depth of drainage(+) and the ratio of grass area(+), for *Rana catesbeiana* was the length of perimeter(+) and the ratio of forest area(-), and for larvae was dissolved oxygen(+) and the ratio of water surface(+). In this paper, I revealed some factors which affected the frog use of paddy field and larvae population, but the more detailed research is needed to analyze how each factor affects the frog or larvae activities. As few larvae survived “Nakabosi (drying paddy field out in June)”, for the frog conservation in the long run, it is crucial to manage water properly to protect the larvae.