# A Geographical Study on Factors Influencing Wild Animal–related Damages: A Case of Nagano Prefecture, Japan

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# Abstract

In recent years, it can be seen that there is a remarkable increase in agriculture and forestry damages as well as personal injuries due to wildlife where 70% of it occurred by deer, wild boars and Japanese monkeys. The black bear and brown bear are also accounted for personal injuries in addition to agriculture and forestry damages. The ecology and physiology of these wild animals are different and the form of damages and the scale are also different for each animal. Therefore, depending on the type of wild animal, suitable countermeasures are also different. Japan introduced the idea of Wildlife Management in the 1970s. It carries out wildlife management by undertaking three study fields (1.Population management, 2.Habitat management and 3.Damage management). Studies on three fields have been conducted as independently but not investigating the mutual relationship between these three fields. In particular, studies on damage management, from the point of view of environmental improvement of village wild animals are less likely to appear, it has been emphasized that analysis of the Natural and Human environment at the micro scale related to appearance point of wild animals. However, the regional characteristics of factors where the wild animal's damage occurred have not been studied. Furthermore, these prior studies tend to stay at a static analysis of environment at a single point of time. Moreover, it is not yet been achieved to elucidate spatially about how the human activities that become a factor of habitat of wild animals. In addition, previous studies do not explain the national historical background.

Therefore, the objective of this study is to clarify geographically the factors of damage by wild animals in the long-term, annually and spatially analyzing to find the change of the natural environment and the human activities in a village. And this study targets Japanese deer and Japanese black bear by the distribution of wild animals causing damages, the ecological features and the characteristics of damage.

Furthermore, major occurrence factors of animal damages can be summarized by the following two points: 1. Feed which deer and bears can take exists in a village all throughout the year and 2. Due to the aging population or depopulation, deserted cultivated land and abandoned houses have increased and farmland is adjacent to forests and as a result, invasions pathways for wildlife exist in a village and its surrounding areas. The background of occurrence of these factors is related to human activities that are not done in the deep mountains or secondary forests anymore and they are done only in settlements. Therefore, it can be pointed out that the power of the village to counter the appearance of wildlife has been getting weaker. Moreover, where

human activities are reduced in the deep mountains and secondary forests and are mainly made in settlements, the following changes can be raised: no usage of coal and firewood due to energy innovations, decline of the forestry industry due to imported timber from foreign countries, decline of hunting, change of industries from apiculture to large scale fruit cultivation, and the achievement of an efficient and highly productive farming operation through improved technology.

However, this study shows that the patterns of damage factors by wild animals are different by features of a village. Accordingly villages are categorized into three types A, B and C. Village A is in a suburban village of an urban area, the amount of farm produce is large by large scale agriculture. Therefore there are many farm products which wild animals can get as a feed from the village. Moreover, since it is close to an urban area, its altitude is relatively low and the forest area is small. In addition, a secondary forest no longer functions as a buffer zone separating settlements and deep mountains. Since there is also no buffer zone between the habitats of wild animals and the life sphere of human beings damages by wild animals occurs. In village B, which is between village A and village C due to depopulation and an aging population, agriculture has declined and management of deserted cultivated land and measures against damage have been difficult. Therefore, the situation where wild animals can easily invade. Moreover, despite the decline of agriculture, there is still a large amount of farm products which wild animals can feed in a village, thus wild animals are attracted into the villages. As a result, damage is increasing. An underpopulated village such as village C is far from an urban area and is surrounded with forests. Moreover, depopulation and aging population are remarkable, the production of farm products are relatively low and the scale of agricultural damages are also low. However, due to depopulation and aging population, the counter force for wild animals in a village are weaker and fruit such as persimmons cultivated in gardens and fields for private use in a village are also get damaged. It can be pointed out that Village C used to be in the forefront of damage by wild animal, but as depopulation preceded, the forefront shifted to village B and village A. In this way, while village C was in the forefront of damages by wild animals it prevented expanding damages to village B and village A. However, under the present situation where the power of village C to counter damages by wild animals is weakening, it is significant for each village to take measures against damages by wild animals.

**Keywords**: black bear, characteristic of villages, deer, factors of damages by wild animals, human activity around the village, Iida city, Nagano prefecture, wildlife management