

The Study of Current Situation and Residents' Cognition of Human-Wildlife Conflict Caused by North China Leopard in Heshun County, Shanxi Province

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Abstract: *In recent years, due to the rapid development of the economy, technology, and human society, the conflicts between humans and nature have become increasingly intense. Human - wildlife conflicts are one of the serious problems that humans need to solve. Especially in Heshun County, Shanxi province, it is the main habitat of the North China Leopard, a first - class national protective animal. Studies on the North China Leopard show that this species has caused residents to lose their property. Also, there are poaching phenomena where some humans intentionally harm leopards. Therefore, human - wildlife conflicts can be regarded as a serious problem in Heshun. To solve this problem, the efforts of local residents and the government's policies are both essential factors. Thus, this study aims to investigate the local residents' perspectives on leopard protection. From the investigation, it was found that almost every resident in Heshun, especially those living in nature reserves, knows that leopards are protected and cannot be hunted. However, they do not like the presence of leopards and prefer them to live far away from villages. Because leopards prey on their cattle, which reduces their income. In conclusion, it is essential to educate villagers about the publicity of leopards and the importance of protecting them to reduce the likelihood of poaching.*

Keywords: *Human-wildlife conflict, Realistic dilemma, Cognition research*

1. Introduction

1.1 Research Background

In recent years, conflicts between humans and nature have grown increasingly intense. This is due to the rapid development of the economy, technology, and human society. Among these conflicts, human-wildlife conflicts stand out as a serious issue that requires human intervention. For instance, wildlife can cause fatalities. A woman was killed by a tiger in Bandipur [1]. To address this specific issue, the local government trapped and captured the tiger after identifying it through camera trap images. However, ensuring that no more villagers are killed by tigers remains difficult. Bandipur is a national park that houses around 150 tigers. This means that tigers are not going to become extinct anytime soon. This underscores the ongoing conflict between humans and tigers.

1.2 Research Significance

The purpose of this effort is to uncover and categorize the current situation of human-wildlife conflicts between local residents and the North China Leopard in Heshun County, Shanxi Province. Additionally, it aims to provide insights into the cognition that residents should have about the North China Leopard, along with offering beneficial solutions to address these conflicts.

1.3 Research Questions

- 1) What are the current human-wildlife conflicts between local residents and the North China Leopard in Heshun County?
- 2) What is the relationship between resolving human-wildlife conflicts and protecting leopards?

2. Literature Review

2.1 *The definition of human-wildlife conflicts*

Past studies have defined human-wildlife conflicts on two levels. A report published by the United Nations Environment Programme in 2021 defined the first level as "when struggles arise from people and animals coming into contact." This refers to fights between humans and animals that can lead to the death of either party [2]. This definition was not created by the UN and has been widely used in research focusing on human-wildlife conflicts. Research that examined the criticism of human-wildlife conflicts from the perspective of capital hegemony, with reference to [3], used examples such as "Elephants attacking people," "Black bears hurting people," and "Tigers eating people" to question the underlying causes of human-wildlife conflicts in modern society.

However, this definition of human-wildlife conflicts is too simplistic. As a result, there aren't many fatal conflicts according to current research. The rapid development of human technology and economy plays a role. It's not easy for animals to kill humans anymore. Additionally, humans now have adequate protection to safeguard their safety. As a result, recent human-wildlife conflicts are primarily manifested through the loss of livestock and wild species due to natural disasters. This represents the second level definition of human-wildlife conflicts. Research on reducing human-bear conflicts has gathered data on livestock property damage caused by bears [4]. This data serves as a measure to assess the level of human-bear conflicts. This idea is also expressed in Cheng's research on the current situation and cognition of human-wildlife conflicts in the Qinghai area of Qilian Mountain National Park. In this research, Cheng found that the damage caused by wild animals primarily includes the destruction of crops, predation of livestock, and destruction of infrastructure. These conflicts mainly result in economic losses. Especially in recent years, these losses have shown an upward trend [5].

2.2 *Past studies of cognitive investigation*

Cognitive investigation was previously used in qualitative research that required understanding people's cognition level of a particular issue. Human-wildlife conflicts are an issue that necessitates human cognition for a better solution. The research purpose was to investigate the human perspective on human-wildlife conflicts. This perspective was used as a starting point to mitigate human-wildlife conflicts and to rationally plan and build Qilian Mountain National Park. In Cheng's view, human-wildlife conflicts can severely threaten the integrity of nature reserves. To implement successful conflict mitigation techniques, it is necessary to understand the conflict patterns, the species involved, and the attitudes of local residents living near protected area boundaries. A thorough analysis of the social components of human-animal conflicts is required. This is especially important because human attitudes and actions ultimately influence the direction and resolution of disputes.

2.3 *Reasons for choosing the North China leopard*

The North China Leopard, also known as the North China subspecies of leopards or the "Chinese leopard," is a unique subspecies that originates in China. It holds significance due to its exclusive presence in certain provinces and regions. Specifically, it is found in Hebei, Henan, Shanxi, southeastern Gansu, and southern Ningxia. Additionally, it is listed as a nationally key protected species on the IUCN Red List. Currently, academic research on the North China Leopard (NCL) primarily focuses on its biological and ecological aspects. This includes studies on seasonal variations in prey abundance and food composition, infrared camera monitoring of the NCL and its prey populations, and analyses of the distribution and ecological environment of the North China leopard. From May 2007 to April 2014, a total of 11 adults (3 females and 8 males, with a female-to-male ratio of 0.375) and 3 juveniles were recorded in a forest farm in Qingcheng, Jinzhong City, Shanxi Province. This area covered 68 square kilometers. Since 2017, a total of 132 North China leopards have been discovered. This indicates that the living conditions of the NCL appear to be improving. However, the NCL exemplifies some of the main issues in human-wildlife conflict. This is because the development and utilization of natural resources has become increasingly significant with Shanxi's rapid economic growth. In particular, the construction of infrastructure such as mines, roads, and railways has placed considerable pressure on the fragile ecosystem. Consequently, the protection of the NCL and its habitat is facing significant challenges.

The NCL's habitat is severely fragmented, primarily within 27 nature reserves. However, ecological connectivity among these reserves is inadequate. This is particularly detrimental to the long-term reproduction of the NCL population. At the same time, the contradiction between NCL protection and

economic development is prominent. The carrying capacity of land resources and the ecological environment is low. Additionally, the traditional resource-oriented industrialization strategy and the extensive, high-energy consumption, and high-emission economic development mode are objectively very unfavorable to the NCL's survival [6-8].

The solutions provided by Jia were to raise the awareness of wildlife protection, study the implementation of the NCL protection project, and develop a biodiversity protection network.

The studies focus on investigating how human - wildlife conflicts are related to people's protection awareness. However, human - wildlife conflicts include not only direct prosperity and safety disputes but also the danger of species extinction. Moreover, the existing solutions do not seem to have a strong impact. Species like the North China leopards are still in a threatened living condition.

However, there is no research on the local residents' perspective of the North China leopards [9]. This study focuses on the human - wildlife conflict between the North China leopard and local residents in Heshun County, Shanxi Province, China. China's rural infrastructure development is a typical rapid case. But this development has to compete for resources and living space with natural species. The North China leopards are facing such problems now. I want to find solutions to these problems through a cognitive investigation of local residents.

3. Methodology

3.1 Study Area

This study was conducted in Shanxi Province in northern China, specifically in Heshun County, Mafang and Hengling towns. The reason for choosing Heshun is that the North China Leopard is mainly active in the Tieqiaoshan Provincial Nature Reserve. The reserve spans the whole Heshun County and is located in Mafang and Hengling. The respondents in this study were mainly selected from these two areas. They are the closest towns to the leopards' habitat within the nature reserve.

Mafang town is located at the top of Taihang Mountain and at the head of Xiaohe River. It is in the northwest of Heshun and has a total area of 432 square kilometers, which is 1/5 of Heshun's regional area. Hengling town is located in Heshun County, 56 kilometers west. It is south of Zuoquan County, west of Yushe County and northwest of Yuji.

3.2 Data Collection

There were two field trips in Heshun County, one in Mafang town and one in Hengling town. The aims of the trips were to conduct interviews and observe the local ecological environment.

There are 15 interviewees from 8 different villages. 8 villages are in Hengling and 7 are in Mafang. The interviewed villages are Xigou, Shiguai, Longwang, and Xibaiyan in Hengling town; and Chengjiazhuang, Xiaonangou, and Dudui in Mafang town. Among the 13 interviewees, 2 are members of the leopard protection team that patrols the leopards' habitat. One of them is the secretary of a village committee, and the others are ordinary villagers. The interviewees are selected by a local guide. He has worked in the CFCA, which is an organization that has been protecting the NCL in Heshun for more than 10 years. He knows which residents are willing to be interviewed.

The interview questions are designed to ask about local residents' experiences and feelings on human-wildlife conflicts and existing solutions. Interviews are important for collecting residents' real views on the North China Leopard (NCL). So, the interview format is semi - structured, like a conversation. This encourages residents to be more willing to share their thoughts.

3.3 Data Analysis

The interview information needs to be categorized into different types and each type needs to be defined. Each specific definition should also include the matched evidence from the interview contents, field trips, and policy selection. A conceptual framework needs to be built from the relationships between each specific evidence. Each evidence needs to have a logical interpretation and causal relationships between evidences also need to be established. Arguments are drawn from these relationships.

4. Results & Discussion

4.1 Interview

Among the 15 interviewees, there are four people who provide very valuable information. Two of them are in the NCL protection team in Hehsun County. They know more about the current situation of NCL and NCL protection. The other two are relatively young. They have living experience in urban areas and have useful suggestions for existing conflicts. The other 11 interviewees are normal residents. Their answers and information can partly represent all the residents in the NCL - active area in Hehsun. All the information provided by the 15 interviewees can be divided into three topics: physical safety conflicts between humans and the North China Leopard, conflicts between residents' properties and the North China Leopard, and residents' cognition of North China Leopard protection.

4.1.1 Physical safety conflicts between human and North China Leopard

1) Human physical safety

All interviewees said that there were no human injury or death events caused by NCL when asked "Did any vicious incident caused by NCL happen?". Consequently, NCL is not a potential crisis for local residents' daily life, so it will not cause residents' fear.

2) North China Leopard safety

One of the leopard protection teammates, hereinafter known as teammate A, provided information about the possibility of humans hunting the NCL. He said that part of his work is to walk around the boundary of Tieqiaoshan Nature Reserve as a guard. Sometimes, he will see used and unused traps in thick-grass areas. Once he saw an injured leopard in an infrared camera. In addition, he needs to check the infrared cameras used for NCL observation in his guarding area, and he found that a few of the cameras were destroyed. "Only people who want to do bad things will destroy the camera so as not to be recorded," said teammate A. Meanwhile, he also mentioned that there are some lengths of electrified wire netting in the forest.

Although teammate A only saw one injured leopard, there is the likelihood of more injured leopards. Not only because of the traps, but also because of the destroyed cameras. No one will know what happened without a monitoring instrument. Therefore, there may be more human hunting. Additionally, the electrified wire netting with high voltage will lead to a large number of animal deaths. As a result, traps, destroyed cameras, and electrified wire netting are potential catastrophes that may cause NCL injury and death.

4.1.2 Conflicts between residents estates and North China Leopard

The leading conflict between residents' property and the NCL is that the NCL will eat residents' cattle. Out of 15 interviewees, 14 answered that their cattle were eaten by the NCL when asked the question "Has it caused any problems in your life? What is it?". One interviewee even said she didn't like the NCL because it caused her income loss.

The primary reason why cattle predation is the most significant conflict is twofold. Firstly, it is the most frequently mentioned issue when residents respond to the question. Secondly, cattle sales are the primary economic source for residents. When cattle are preyed on by the North China Leopard (NCL), it leads to a decline in residents' income, which in turn results in a lower standard of living. A low standard of living indicates that local residents live in a less - developed region according to the Human Development Index. Consequently, the loss of local residents' cattle because of NCL may lead to local economic regression. Although NCL doesn't cause large-scale property loss, it is still a negative factor for local economic development.

All interviewees give certain answers. Residents living in Mafang and Hengling town all know that the NCL is a national protected animal, that hunting it is illegal, and that the NCL doesn't eat humans. Nevertheless, except for two teammates on the leopard protection team and two relatively young residents who have learned about leopards on the Internet, the other 11 normal residents don't know the details about this species, such as its appearance, its living habits, and its endangered condition. Therefore, there are fewer local residents with rich knowledge of the NCL than local residents without enough knowledge of it.

An information gap therefore exists because of lack of knowledge. This information gap shows why, although residents know that hunting NCL is illegal, poaching phenomena still exist. Some residents

don't know the important role that NCL plays in the ecological cycle and the importance of maintaining the balance of the ecological system, so they will poach. Then they will feel guilty just because of their illegal behavior. Thus, they choose to destroy cameras and take away memory cards in order to eliminate evidence of their crime, but they will not stop hunting.

4.2 Arguments

4.2.1 Analysis of Human Animal Conflict Relationship

The current conflict situation between local residents and the NCL can have a negative impact on Heshun's development. The conflicts mainly result in the injury and death of the NCL and human property loss. The human property loss may lead to a regression in local economic development. The Human Development Index, introduced by the UN to measure the degree of social development, has "having a decent standard of living" as one of the indicators to evaluate development. In addition, 11 out of 15 interviewees said that they found it much harder to support household expenses because of the loss of their cattle eaten by the NCL. There is compensation to pay some money back to residents, but it still cannot be exactly equal to the value of a cattle. The compensation cannot cover the loss.

4.2.2 Strategies for resolving conflicts between humans and animals

Protecting the North China Leopard (NCL) may intensify human-wildlife conflicts. As mentioned before, many residents don't want to coexist with NCL because of the economic losses it causes. This may make some people engage in poaching. It is both the cause and the manifestation of the worsening conflict between humans and wildlife. Currently, a practical solution to ease human-wildlife conflicts should focus on how to compensate villagers for the property they lose because of NCL.

5. Conclusion

The study finds that the human-animal conflict between local residents and the North China Leopard (NCL) in Heshun County mainly includes the following. Humans hurt or even kill NCL. NCL's predation on livestock leads to a decrease in residents' income and thus slows down local economic development. Also, the government's development plan causes ecological destruction of NCL's habitat and population isolation. Local residents' protection cognition of NCL is generally simple. Only a few people, who actively participate in NCL protection activities, their families, and young people who return home, know more about NCL and consciously avoid hurting it. This kind of avoidance is an active choice and they know the reason. However, other residents restrict their behavior just because they are afraid of breaking the law. The local residents' knowledge of the NCL needs to be deepened until they want to take the initiative to protect this endangered animal.

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