

## Guarding crops against the ‘protected pest’

– Interactions among farmers, monkeys, and conservation staffs in a nature reserve of Guangxi, China

‘猴灾’背后保护工作人员、农民与猴的互动：以广西一保护区为例

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## Abstract

Human-wildlife conflict has become a global challenge. Crop damage by wildlife can cause significant economic loss and primates such as monkeys can cause particular problem to farmers. The monkey problem has already become intense in communities near white-headed langur national nature reserve of Guangxi, China, and involve not only farmers and monkeys, but also conservation staffs as they are regarded as the guards of monkeys. An understanding of the relationship among farmers, monkeys and conservation staffs is important to approach the monkey problem. I use interpretive multi-actors approach, which closely links to actor network theory, to investigate local perceptions and understandings towards crop damage by monkeys, interactions between monkeys, farmers and conservation staffs, as well as how farmer-monkey relations evolve. My findings have described farmers' rich understandings towards the extent of crop damage and crop foraging behaviour of monkeys. Mutual and interactive processes take place between farmers and monkeys, while farmers and conservation staffs interact concerning legitimizing compensation. My thesis further discusses factors that farmers' perceptions, the mutual learning and adjustment in farmer-monkey relations, and how their relations are influenced by conservation and other social change. Lastly, I discuss how the monkey problem has transfigured into a conservation problem, when 'unprotected pest' turns into 'protected pest'. These findings and analysis help us to better understand human perception in human-wildlife conflict scenario, farmer-monkey relations and the relationship between local community and protected areas. Moreover, it is a try to use actor network theory in studying human-animal interactions.

*Keywords:* crop damage, macaque, human-wildlife conflict, China, protected areas, actor network theory

## Abstract 2

人兽冲突已经成为全球性的挑战。野生动物取食农作物能造成严重的经济损失，而诸如猕猴等灵长类所造成的农作物损害被称为“猴灾”。在广西崇左白头叶猴国家级保护区周边，由猕猴造成的猴灾已经非常严重。这不仅牵涉到农民和猕猴，也事关保护区工作人员，因为他们被视为猕猴的守护者。了解农民，猕猴和保护工作人员之间的关系对妥善处理猴灾十分重要。本篇论文中，我使用深受行动者网络理论影响的多行动者方法，来深入了解当地人对猕猴取食农作物的感知和认识，农民、猕猴、保护工作人员之间的互动，以及农民与猕猴关系的演变过程。我的研究描述了农民对农作物受损类型和程度以及对猕猴取食农作物行为的了解，同时将猕猴拟人化的现象。我同时深入描述了农民与猕猴的双向互动过程。农民和猕猴从经验中熟悉对方活动的时间空间特征，以及农作物和环境，将其运用在农民的防控和猕猴的取食措施中。我也描述了保护工作人员与农民互动的各个方面，如保护者社区宣教，农民汇报索取赔偿，农民暗害猕猴的传闻，二者间将赔偿正当化和不正当化的言论，以及有关猕猴来历的‘谣言’。接着我讨论了如何解读农民对猴灾的感知，农民与猕猴相互学习和调整适应的过程，保护政策、城乡迁移、耕作方式改变对农民与猕猴关系的影响，以及猕猴的保护等级如何让猴灾成为一个保护问题。这些发现和讨论能帮助我们更好地理解人兽冲突背景下人的感知，农民与猕猴的关系，以及保护区与社区的关系。同时，它也是将行动者网络理论运用到人与动物的互动中的一次尝试。

关键词： 猴灾，猕猴，人兽冲突，广西，保护区-社区关系，行动者网络理论

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# 1 Introduction

## 1.1 Problem statement

With shrinking wildlife habitat and increasing competition over natural resources and landscapes, more interactions tend to take place between wildlife and humans. Those that have adverse effects to human or wildlife are called human-wildlife conflicts (Conover, 2002). Among these interactions, crop damage by wildlife is common for rural households with farming practices. Large mammals such as wild boars, primates, and elephants are often reported to feed on crops. The intensity and frequency of crop damage varies from crop type, seasonality (Fungo, 2011), location of the farm (Zhang and Watanabe, 2009), even the boldness of the animal (Honda and Lijima, 2016). Overall, it can cause significant economic loss for farmer (Ueda et al., 2018), increases the time and effort used by farmers to protect their fields (Fuentes, 2006), and certain crop feeding animals like elephant can even threaten farmer's life (Barua, 2014). Moreover, some crop damaging species, such as elephants (*Elephas maximus*) and takins (*Budorcas taxicolor*) are rare and endangered animals, which makes conservation force to intervene the interaction between locals and wildlife and avoid retaliatory killing. Strategies that aim to mediate or compensate crop damage by wildlife have been introduced, such as limiting access of animal and creating economic incentives for humans (Nyhus, 2016).

Primates, including velvet monkeys, baboons and macaques are commonly cited to forage on crops. They are regarded as particular problems for farmers, because of their high cooperation skills and adaptability that make crop protection particularly difficult (Hill, 2005). Macaques (in the genus *Macaca*) have been reported to cause significant crop loss in Asian countries and regions such as Japan, Nepal and Taiwan (Regmi et al., 2013, Knight, 2003, Chang and Guo, 2018).

In China, macaques, especially the species *Macaca Mulatta*, are widespread in mainly southern regions, and in history even in northern regions (Lu et al., 2018). Macaques feeding on crops, which might be unacceptable by farmers, is nothing unusual, as it has been existed for millennia. In 1983 primatologists have claimed that “macaques are agricultural pests throughout China” (Poirier and Hu, 1983). These years there is an increase in reporting crop damage by wildlife nationwide, including macaques. Conservation policies, such as wild animal protection law, international conservation conventions, nature reserves and forest rehabilitation initiatives are believed to cause an increase in wildlife population (Xie et al., 2004, Cai et al., 2008). Together with the large scale rural-to-urban migration in China, there is a lack of labour in the countryside to guard crops against macaques. As macaques are under second class state protection, it also appears as a dilemma of agricultural production and wildlife conservation.

Such dilemma displays explicitly in Guangxi, an autonomous region in the southwestern China, which is adjacent to Vitnam and other southeast Asia countries. The karst limestone landscape in the southwestern Guangxi is one of the ecological important regions. It harbors rich biodiversity, including some endangered primate species like cao vit gibbon and white-headed langur, but many of them face dramatic population decline (Li et al., 2007). Many nature reserves are set up to strictly protect their habitat and save these species, but the resulting recovery in macaque population has caused considerable crop loss to nearby farmers (Li et al., 2009). This not only harms the interest of farmers, but also impedes conservation, as farmers can overtly or covertly resist conservation regulations implemented by nature reserve administrations. White-headed langur national nature reserve (WNNR) in Chongzuo city also faces the problem of crop damage by wildlife, especially macaques. Just like what a conservation staff from this reserve states: “if crop damage by macaques is not being paid attention now, it can become the biggest problem between our nature reserve and nearby communities in the future” (MZ, Bapen, 190215).

## 1.2 Research importance

Lots of research and practices have been devoted to improve human-wildlife relations. Some researchers look into human-wildlife conflict from environmental perspective. They describe the extent and pattern of damage caused by wildlife, just like Naughton-Treves et al. (1998) describe the temporal patterns of crop raiding by primates. They identify the factors that affect the damage, like Saj et al. (2001) examine the connection between velvet monkey crop raiding and factors like distance

to the forest edge, types of crop damaged, and direct preventative measures. They also discuss the effectiveness of management strategies, like Ueda et al. (2018) study the effects of multiple damage control methods against a monkey troop's appearance in Japan.

Some researchers claim that the underlying social and cultural dimension of human-wildlife conflict have not been paid enough attention. It is pointed out that human perceptions may not strongly correlate with the actual damage wildlife cause, as large, visible and potentially dangerous animals like elephants can attract disproportionate concern than rodents and invertebrates, even though the latter cause more crop damage (Nyhus, 2016). Scholars further find out that the cultural and symbolic meanings of the animal can affect human perceptions towards the damage they cause. For example, Jerolmack (2008) argues that the cultural understanding of nature/culture relationships has made pigeons in the city to become 'rats': seeing as 'out of place' and problematic. Álvares et al. (2011)'s ethnographic work has revealed the double and antagonistic view of wolf among Iberian rural communities: as a totemic and benign animal, and a diabolic creature.

The cultural meaning of the animal can be multiple and divergent. It often involves conflicts among social groups. This can become explicit in the re-introduction of large predators worldwide. As wolves are returning in Norway and France, Skogen et al. (2008) describe two varieties of evolving narratives: rumours about the secret reintroduction of wolves among wolf adversaries and the national uniqueness image of sheep husbandry practices in pro-wolf camp. The return of wolf in Sweden has also received opposition, as hunters accuse protected wolves of being the 'pets' or 'property' of an urban-based conservationist middle class (Essen et al., 2017). Clashing interests and views about wildlife in human-wildlife conflict have made some scholars assert that "Conflicts involving wildlife are, in essence, often conflicts between human parties with differing wildlife management objectives" (Marshall et al., 2007).

Rather than approaching human-wildlife conflict from either environmental perspective or human perspective, (Setchell et al., 2017) promotes 'biosocial' conservation, which integrates biological and ethnographic methods to understand human-primate interactions. For example, in a doctoral thesis about crop raiding near a national park in Gabon, Fairet (2012) investigates vulnerability of local communities in biological, institutional and social aspects, by combining quantitative survey methods and ethnographic methods like participant observation and semi-structured interviews. Calling for an integration of biological and social methods can also be found from the wave of 'ethnoprimateology', which aims for the inclusion of anthropogenic factors in the study of primates and their interface with humans (Fuentes, 2012). It affirms humans and other primates are co-participants in shaping social and ecological space and recognizes their mutual interconnections. For example,

Fuentes (2010) displays how humans and long-tailed macaques are involved in daily rhythms of activity within the social and structural ecologies of a temple in Bali island.

Relational thinking that rejects the concrete boundary between organisms and their environment, focuses on connections among actors and recognises non-human actors also contributes to a more holistic view in understanding human-animal relations. Ingold (2002) suggests that “every organism is not so much a discrete entity as a node in a field of relationships (P.3)”. Latour (2005) defines sociology as the “tracing of associations”, which include human and non-human actors, in an introduction to actor network theory. This has encouraged a more symmetrical consideration that treats human and animal as analytically equal actors that can “act and influence the actions of other actors” (Ghosal and Kjosavik, 2013). For example, Lescureux (2006) has described the interactive, dynamic and reciprocal relations between stockbreeders and wolves in Kyrgyzstan.

Given all theoretical angles listed above, research in crop damage by primates needs to consider both human and non-human actors. When the case concerns protected species and protected areas, conservation agency also involves, together with farmers and the problem animal. Different actors’ perceptions and understandings of animals foraging on crops are important, as it closely links to the conflictual situation and affect the outcome of mitigation strategies. Moreover, human actors can have different views on how primates should be treated and take on different strategies, while primates have an active role in adapting and shaping human responses. To better understand the social phenomena of primates feeding on crops, associations of actors need to be traced through describing every day interactions.

### 1.3 Research objective and questions

The research objective is to understand perceptions and interactions of different actors in the case of crop damage in WNNR. Here I assemble actors as farmers, monkeys and conservation staffs because of their high relevance and analytical convenience, but it should be noted that heterogeneity remains even in the same group of actors, which can be noticed in methodology part. Moreover, I have to overlook the perception of monkeys as it is not applicable. Considering all these, my research objective can be met by three research questions:

Question 1: How monkeys foraging crops is perceived and understood by farmers and conservation staffs?

This question looks into how farmers and conservation staffs perceive the characteristics of monkeys foraging crops, such as its severity, frequency, crop type,

locational and temporal pattern, trend etc. Moreover, values that actors hold are being investigated, such as the reason, responsibility and future strategies of crop damage.

Question 2: How do farmers and monkeys interact in the field?

This question focuses on the strategies that farmers take to guard their crops and the strategies monkeys take to 'raid' the crops. It has a special concern for the 'interaction', namely how actions of one side affect the action of the other.

Question 3: How do farmers and conservation staffs interact in a daily basis?

Interactions between farmers and conservation staffs include direct interactions between farmers and conservation staffs concerning wildlife damage, such as farmers reporting crop damage by wildlife to conservation staffs. It also includes measures that conservation staffs take to promote farmers' conservation behaviors, such as boundary marking and community outreach. Interactions can also be hidden, such as farmers moving the boundary marker and spreading rumors about conservation.

Question 4: How do farmer-monkey relations evolve overtime, in the effect of conservation and other factors?

Farmer-monkey relation is dynamic and can be affected by conservation regulations imposed by external agencies. It is worthwhile to know how farmers' perceptions and their interactions with monkeys has changed by the trend of wildlife conservation and other social change.

## 1.4 Thesis outline

My thesis will be developed as follows: chapter two introduces the thematic background, including the economic context, conservation history and species of primates of the study area. Chapter three introduces methodology, including the approach I choose, overview of the process and detailed process of data collection and analysis. Chapter four is the main body of the thesis that present findings in farmer perception, interaction between farmers and monkeys and interaction of farmers and conservation staffs. It is followed the discussion of the research findings which focuses on the interpretations of farmer perception, mutual learning and adjustment between farmers and monkeys, changes of farmer-monkey relations in effect of conservation and other social changes, as well as how monkey foraging crops transfigures into conservation problem which belongs to 'protected pest'.

## 2 Thematic background

The landscape of most regions in Guangxi, including the white-headed langur national nature reserve, features peak-clustered depression, where valleys are scattered in clustered limestone hills. These valleys are called ‘nong’ in the local language. Usually people settle in a relatively big valley, build houses and cultivate farmland. Nearby smaller valleys can also be cultivated. Surrounding limestone hills are usually too steep to cultivate, thus they are left for wild vegetations to grow and wildlife to reside. As farmland in nearby valley is distant from human settlements, it is more prone to wildlife presence.



*Figure 1 Karst peak-cluster depression illustrated by the view of a village in Nanning, Guangxi*



## 2.1 The sugar capital of China

People have also been long cultivating the valleys. The warm climate helps tropical and sub-tropical plants to grow, such as banana (*Musa Basjoo*), cassava (*Manihot esculenta*) and Eucalyptus trees (Genus *Eucalyptus*). Main cash crop in this area is sugarcane. Sugar industry is one of the most important industry of Chongzuo city, where the nature reserve locates, which is called ‘the sugar capital of China’ (in Chinese: zhong guo tang du). It is estimated that one fifth of the sugar consumed nationally comes from Chongzuo (Jiang, 2019). Farmers can migrate to the city and seek for non-farm work during the growing season of sugarcane, as it needs little care (LZ, Tuozhu, 0301). Impressed by the large size of sugarcane plantation, I hear lots of complaints from local farmers that they earn little money from sugarcane. Sugarcane price has dropped, prices for agriculture inputs and labor have increased, and the sugar factory can delay the payment to farmers for months (FCG5, Qunan, 190316). Moreover, it requires intense labor during harvest season. Many farmers are considering shifting to other cash crop, such as citrus fruits, macadamia nut and so on.

## 2.2 A fragmented nature reserve featuring endangered primates

The limestone vegetation of the hills shelters a range of rare and endangered species, notably kart-depended primates such as white-headed langur (Fauna and Flora International, 2002), which was considered as a sub-species of francois’ langur. With less than 1000 individuals that only habituate in several fragmented karst hills in Chongzuo city, the white-headed langur was chosen as one of the 25 most endangered primates in the world in 2002 (China Forestry, 2015). It was declared to be the only primate named by Chinese scholars<sup>1</sup>, the symbol of Guangxi and Chongzuo<sup>2</sup>, and the main reason of setting up the white-headed langur nature reserve.

During 1980s, to protect white-headed langur and many limestone species from habitat loss and hunting, Banli and Bapen rare species protection stations were built and later combined into one regional nature reserve. In 2012, the White-headed langur National Nature Reserve is set up, consisting 4 sub-regions: Banli, Tuozhu, Bapen and Daling (China Forestry, 2015). Such ‘fragmented’ national nature reserve is not common in China, as a conservation staff shares the comments by an expert in a review meeting: “this doesn’t look like a nature reserve at all” (MZ,

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<sup>1</sup> Now two more primate species are named by Chinese primatologists.

<sup>2</sup> The importance of white-headed langur can be also seen from local’s perception that “one langur’s life equals to three human lives”.

Bapen, 0215). The expert expects the nature reserve to be a large size of integral state-owned land which makes excluding human activities possible. However, All the land in WNNR is collective-owned, and WNNR administration obtains the right to manage the area by signing agreement with local communities. Moreover, though mainly hills are included in the nature reserve, farmland and human settlements also exist, which makes managing the access of nature reserve particularly hard. This conservation staff admits: “the Regulations of the P.R.China on Nature Reserves doesn’t fit in our nature reserve at all. We will be beaten by farmers if we ask them to present permission for entering nature reserve: that’s their land” (MZ, Bapen, 0215).

Limiting the use of natural resource in this nature reserve is also not easy. Both hills and valleys are collectively owned by local people, who have been living on the environment for generations, as a saying goes: “Those who live near the mountain living off the mountain (in Chinese: kao shan chi shan)”. Villagers recall that people used to go into the hills to collect firewood, trap animals, collect medical plants and so on (ZK, Qunan, 190315; HS, Pairu, 190307). These are either for subsistent use or money exchange. Since the establishment of nature reserve, these activities become forbidden, as it says in the Regulations of the P.R.China on Nature Reserves that “logging, herding, hunting, collecting plants, cultivating land...are forbidden in nature reserve” (State Council of P.R.China, 2017). The conservation staff shares how he managed to suppress the firewood trade in 2000s, by banning firewood acquisition points and confiscating a truck of firewood for months with the help of forest police (MZ, Bapen, 190215).

But it does not mean villagers do not benefit from the set up of nature reserve and other conservation initiatives. Conservation staffs describe how the nature reserve administration helps build village roads and sanitation facilities, support local festive celebrations and develop eco-tourism to bring income for locals (MZ, Bapen, 0215). Moreover, all the forest in the nature reserve is included in ecological public welfare forest, which can be understood as a national scheme for payment of ecosystem services that is called ecological compensation in China in the forest sector. Farmers can receive monetary payment if they protect their forest well.

### 2.2.1 Specific context of two sub-regions and hamlets

Featuring similar karst landscape, Bapen and Tuozhu region in WNNR are still different. Hills in Bapen region are more disconnected, with cultivated land scattering in between. It is more populated, with roads extending in all directions. Tuozhu region is the largest and most intact sub-region in this reserve, which features continuous hills that reserves water and harbors rich biodiversity. Moreover, there are less villages in the region, which locate at the periphery of the nature reserve. Such

difference makes crop damage by monkeys to be more intense and centralized in Bapen region.

Qunan hamlet is a community-based conservation area at the edge of Bapen region and is home to several groups of white-headed langurs. The setup of Qunan community-based conservation area was supported by a conservation NGO project in 2015, which aims for involving community members in conserving white-headed langur and the karst ecosystem. Before, wildlife in Qunan was managed by conservation staffs in Bapen region. Afterwards, conservation NGO involves in by supporting community patrolling team, as well as introducing nature education and sustainable agriculture to the community.

Pairu hamlet locates at the edge of Tuozhu region. There are francois' langurs and many other rare species. This hamlet is relatively small, with no more than 100 households. It has little farmland, compared to the large size of hills. Because of lowland and too much rainfall, almost only sugarcane can be planted, with lower yield comparing to nearby villages. Some maize, peanut and citrus fruit are also planted in small scale. Because of little land and little labor that sugarcane plantation requires, many young people migrated out for living.

### 2.3 Primates in this region: langurs and macaques

Langurs and macaques living in this nature reserve can all be called monkeys generally by locals, but 'monkeys' (in Chinese: hou) are more frequently referred to macaques. Langurs can be called 'leaf monkeys' (in Chinese: ye hou) or 'dark gibbons' (in Chinese: wu yuan). They are good at climbing on limestone cliffs and forage mainly on leaves. There are two kinds of langurs in this nature reserve, white-headed langur and francois' langur, which are both first class state protected animals and well loved by tourists and locals. Lots of tourists visit the white-headed langur ecological park in the nature reserve to observe and photograph this "elegant and intelligent animal" (He, 2018). One more reason for locals to love langurs is that they never disturb crops. Farmers in Qunan describe how they live harmony with langurs: "Langurs are not afraid of us, and they also don't come down to the field. They just sit silently on the hills and see us working in the field (ZS-W, Qunan, 190215)". In a group discussion in Pairu, farmers also agree to protect langurs without hesitation: "Langurs should be under first class state protection. They never eat our crops (FCG4, Pairu, 190302)".

There are two species of macaques in this nature reserve, and the most dominant one is *Macaca Mulatta* (in Chinese: mi hou). Macaques in karst region mainly feed on fruits and leaves (Tang et al., 2017, Zhang and Watanabe, 2009), and they are also reported to feed on crops (Tang et al., 2017, Li et al., 2009). Unlike rare species

like langurs, macaques appear frequently in people's daily lives. Macaques used to be trained and performed in circus. Nowadays, many scenic parks have introduced macaques to attract visitors, such as Longhushan, a scenic park near the nature reserve. Visitors enjoy watching macaques coming close and begging them food, but they are also exposed to risks of being hurt by these monkeys.

Moreover, macaques have long existed in Chinese customs, folklores and idioms. Monkeys are one of the 12 Chinese zodiac animals and "bestows health, protection and success" (Ellwanger et al., 2015). There are many stories about monkeys, most famously Monkey King, a smart, skilful and rebellious 'hero' in the classic novel Journey to the West. However, the cultural image of monkeys is not always positive. Macaques are blamed as irascible, vociferous and damaging crops early since Song dynasty (Zhang, 2015).

## 3 Methodology

This section comprises the research design of the study and the record of research process. It introduces the methodological approaches that guide my whole research process, and detailly illustrates how the empirical material is collected, managed and analyzed. Lastly, I reflect on the choice of methodological approaches and research practices in the field.

### 3.1 Methodological approach

#### 3.1.1 Interpretive multi-actors approach

This research adopts an interpretive approach. It is inspired by constructivist epistemology, which assumes that meanings are created and re-created through our engagement with the surrounding world, and different individuals construct meaning of the same object or phenomenon in different ways (Moon and Blackman, 2014, Boonman-Berson, 2018). Such approach emphasizes ‘engagement’ in the lifeworld of participants, thus participant observation is crucial; it always focuses on meaning interpretation, thus I will increase the richness of narratives by using open-ended questions and try to use participants’ language to reveal its original meaning.

Moreover, I identify and trace the interactions of multiple actors in my research. Human actors are interviewed, direct interaction or its remains are observed, such as community outreach boards erected by conservation staffs. For the interactions between farmers and monkeys, it is hard to observe their direct interactions. Nevertheless, I observe the landscape where farmers and monkeys tend to interact, remaining crop after a monkey troop’s visit, and strategies farmers use to scare monkeys away.

### 3.1.2 Grounded theory and abduction analysis

Grounded theory is a qualitative research design first raised by Glaser and Strauss (1967). It emphasizes that theories should not be pre-given, but grounded in information acquired from participants (Creswell, 2014). Thus, it is more of an exploratory process, staying open to unforeseen ideas and even new topics of enquiry, to ensure the questions that we ask and the theories that we use best suit the local situation, rather than ‘imaging a dilemma that does not exist’ (O’Brien, 2006).

However, I feel aimless when I try to let theories emerge inductively, while entering the field without preconception is deemed to be impossible. Thus, neither induction and deduction, I adopt abduction analysis, which contains an interactive cycle of empirical data collection and analytical concepts construction (Timmermans and Tavory, 2012). Before entering the field, tentative research objectives and questions are drafted. The empirical material accumulated in the field helps me to explore and adjust analytical concepts, which can affect my interview questions and information obtained from participants. Only from this constant interaction between empirical material and analytical concepts can my analysis better fit the observations in the field.

## 3.2 Overview of the research process

My fieldwork focuses on the interactions between farmers, monkeys and conservation staffs in two sub-regions of WNNR in Guangxi autonomous region, China. From 13th of February to 28th of March, I visit Bapen and Tuozhu regions in the nature reserve, meet staffs in each reserve station and join their patrolling activities. With the help of reserve staffs, I visit Pairu hamlet in Tuozhu region and Qunan hamlet in Bapen region. I also discontinuously visit governmental officials, conservation NGOs and groups in Nanning, the capital of Guangxi.

Table 1 Time distribution and activity log in the field

Activity	Duration
Visit Bapen protection station	5 days
Visit WHL-NNR office	2 days
Visit Qunan hamlet	9 days
Visit Pairu hamlet	11 days
Visit Nanning	17 days

### 3.3 Data collection

#### 3.3.1 Site and participant selection

Crop damage by macaques is widely reported in nature reserves in Guangxi (Li et al., 2009). I choose WNNR mainly because my previous participation in a conservation project involving this nature reserve. I have a prior understanding in the region, including severity of the ‘monkey problem’. My good relations with conservation staffs also make field access easier for me.

With the advice from conservation staffs, I precedingly choose Qunan and Pairu for in-depth investigation. These hamlets receive significant crop loss from monkeys, have rangers to assist my inquiry, and can provide accommodation. At first, I intend to choose Qunan only as the field site, but because of seasonal unavailability (people in Qunan are busy harvesting citrus fruits and have no time to host me), I choose Pairu as a complimentary field site.

For participants in individual interview, I mainly use sampling for range, i.e. identifies sub-categories of the group being researched and ensure to interview a given number of participants from that category (Small, 2009). These categories are adjusted and complemented by other participants in the field. Snowball sampling has also been used, when I ask interviewee to introduce me relevant informants. Some interviews occurred by merely chance, when I meet people in the village and we start to chat, which later become an individual interview. Group interviews are mainly arranged by rangers, with the rest occurred naturally when I join outdoor gatherings.

The selections of field sites and participants do not follow a sampling logic, which predetermines the number of research units, assumes units have equal chance of selection and expect samples to be representative. Instead, it follows a case study logic, in which the number of units is determined by saturation, the chance of selection for each unit can differ, and the collection of units is not representative (Small, 2009). My research following a case study logic cannot make accurate statement about the distribution of crop damage by monkeys in the nature reserve, but it can grasp rich perceptions of actors and vivid interactive processes among actors, which can inspire wildlife management practices elsewhere.

#### 3.3.2 Direct and participant observation

Direct and participant observation are firstly used to enter the field, becoming familiar with the surroundings and building rapport with people. It is also used to

observe the direct and indirect interactions between conservation staffs, farmers and monkeys, even the landscape.

Table 2 detailed observations in the field

What I do in the field	For what information
Transect walk with farmer and children in Qunan and a ranger in Pairu	Observe the trace of crop damage by wildlife and the use of landscape
Participation in farming practices (e.g. cutting sugarcane, planting watermelon, feeding pigs and chicken and also foraging in the forest)	Observe and participate in the local natural resource use
Participation in conservation work (e.g. patrolling, community outreach, and monitor installation)	Observe the management over nature reserve, and farmer-conservation staff interaction

### 3.3.3 Interview

Group and individual interviews are both conducted during the fieldwork<sup>3</sup>. We have 2 group discussions consisted of solely farmers in Qunan, while in Pairu, 2 group discussions consist farmers and rangers, and 1 consist farmers, rangers and conservation staffs. These group discussions range from 4 people to 9 people. Interviews with individuals from sub-categories are listed in table 2. Among them, rangers are in the middle position between conservation staff and farmer, because they are farmers but work part-time for the nature reserve, such as patrolling and community outreach.

Table 3 Categories and numbers of individual interviewees in the field

Category	Interviewee
Governmental official	1 from Guangxi wildlife rescue center, involved in legislation of wildlife damage compensation
Conservation staff	2 from Bapen station, 2 from Tuozhu station, and 1 from nature reserve administration
Ranger	2 from Bapen station, 2 from Tuozhu station
Farmer	11 from Qunan, 6 from Pairu, and 1 from Bapen region

<sup>3</sup> Details of interviewee's information can be found in appendix.



Interviews are conducted in various ways. Some interviews turn out to be more formal, when participants are sitting by the desk, concentrated on questioning and answering, with interview guides and note-taking (sometimes note-taking can be absent). Some interviews are more casual, which usually takes place by the fire or by the table, with interview guide but other topics can pop up at any time. Some are even more unstructured and free-flowing, which usually appears during direct and participant observation. All the interviews, if not note-taken, are recorded. The researcher is active in the process, trying to be emotionally engaged and giving feedback in interviewees' answering. All interviews are conducted by the researcher and are in mandarin, though local people prefer to speak Zhuang or Cantonese. Since most locals can speak mandarin, it does not cause much trouble for data collection.

### 3.4 Data management and analysis

I mostly observe through my eyes and take pictures and videos with smartphone. Important incidents are noted down, if not recorded. From second week, I draft up aspects that I should observe and print them out in an observation form, but I never fill in the form. I also print out my interview guide for different categories of people, and I fill in part of those forms. The interviews are mostly recorded by phone, except once that I forget to turn on the recorder and one my phone is not with me. In these occasions, I take notes soon after ending the interview to recover the most information. These pictures, videos and records are stored in my smartphone. Fieldnotes in my notebook and interview notes in the interview forms are stored in a file. Interview transcripts (in Chinese) are partly written in my notebook in the field and all typed and named in my laptop afterwards. Interview records are copied to my laptop and named accordingly. I also make an index for locating these interview transcripts and records.

Following the case study logic, data analysis has started once I acquire the empirical data in the field. After data collection for the first day, I write reflexive memoir to summarize the findings and reconsider analytical concepts, which affects my questions for the next interview. After leaving the field, I read through all transcripts and try to extract key themes. With the help of my supervisor, I decide to focus on 'coping strategies of farmers' in the empirical data and look at concepts that can best explain those results. I only translate quotes that will be used in thesis into English. I clearly refer quotes and paraphrases to the empirical evidence, with a list of interviews in the appendix for people to check into.

### 3.5 Ethics

I have asked and acquired research permission from nature reserve administration. In terms of written consent for each interviewee, I consult nature reserve staffs and they convince me of no need to prepare, since they and farmers never hear of that and usually conducting research does not require written consent. Therefore I follow their advice. However, in each interview I introduce myself as a student and my purpose is to write a master thesis, and I do not force or deceive anyone to join my research. Moreover, I use anonymity in my thesis to protect my informants.

### 3.6 Discussions of the methodology

The biggest challenge for the interpretive multi-actors approach is to see the world from animal's perspective. We should admit that 'we – humans– can never really know what is going on in the mind of another, whether human or animal' (Boonman-Berson, 2018). However, we can still gain more understanding of human-wildlife relations through the symmetrical approach. Largely due to the time limits, I am not able to involve in the direct human-macaque interactions, which I think will deepen my understandings of the 'multi-sensory and affective learning process' (Boonman-Berson, 2018) between human and monkeys. Moreover, designating only three actors may neglect the active role of other elements that shape the situation, such as the landscape. It might also overlook the heterogeneity in each actor categories.

Conservation staffs and rangers play important roles in the case and participant selection. When I enter the field, conservation staffs suggest me field sites, introduce me to the village, while rangers help me arrange some focus group discussions and contact some informants. However, it is also likely that they suggest field sites that have better relations with them and are more 'reliable' in their eyes. The same applies to rangers when choosing informants for me. After several days of stay in the field, I tried to find informants on my own, which reduces their influence on informants to some extent.

My own performance also affects data collection. Sometimes I ask close-ended questions, which can be misleading, and impose my priori opinions in conversations, which can 'distort' the results and even hurt someone's feelings. Language barrier also exists, as I can only speak mandarin but not the local language. Luckily, I am easily accepted by children from both hamlets and they help me knowing local history and seeking interviewees.

## 4 Results

Here I present most findings from my fieldwork, which are divided into two sections: the first section focuses on the interactions between farmer and monkey, which includes farmers' perceptions of crop damage by monkeys, as well as their knowledge and practice in trying to mitigate it. The second section focuses on the interactions between farmers and conservation staffs, in which narratives and rumours are circulating to clarify the responsibilities and appeals of actors. It is worth noted that even though I present the interactions between actors separately, the interactions of either two actors cannot be regarded as separate with the third actor. For example, the interactions between farmers and monkeys are affected by the regulations practised by conservation staffs, while the extent of crop damage caused by monkeys can affect the interactions between farmers and conservation staffs.

### 4.1 Perceptions of farmers on monkeys damaging crops

#### 4.1.1 Perceptions of crop damage by monkeys

Crop damage by wildlife in the nature reserve is not an unusual phenomenon, nor it is conducted by single species. Farmers in two hamlets mostly complain about macaques and wild boars. But when asked if other wildlife also damage crops, they also mention squirrels, rodents, masked palm civets, musk deer, and birds. Different households can perceive the damage caused by certain animal differently. Some perceives squirrels can cause huge crop loss, while others insist their damage is little. However, there is consensus among households that macaques contribute significantly to their crop loss.

Interviews show that it is difficult for farmers to estimate the actual damage that monkeys cause. Extreme cases circulate within the village. Farmer ZX recalls that his 3 acres peanut were totally destroyed by monkeys in 2015 (ZX, Qunan, 190218). For sugarcane planted in remote valleys, the damage can be more severe. A remote

valley in Qunan has been rented out for some private investor to grow sugarcane, with estimated yield of 1300 tons, while 100 tons has been taken by monkeys. “At least 10 rows of sugarcane that are close to the forest edge has been destroyed by monkeys” (DS, Qunan, 190316).

When explaining the damage that monkeys cause, farmers usually mention the sizeable population of monkeys during single visits. They estimate there can be 50, 60, even over a hundred monkeys that visit the field. Farmers even express fear of monkeys: “sometimes we see a huge group of monkeys enter the field, and it feels like they turn the whole plot of land into yellow, like a troop. And among them there are stronger and larger-sized male monkeys, so we dare not to get close...” (ZX-W, Qunan, 190215). “They are almost the same size as a human and can eat a lot,” says a woman in a group discussion in Qunan (FCG1, Qunan, 190216).

What makes farmers even more upset is the huge waste that monkeys cause. Monkeys may visit the farm before crop gets ripe, such as peanuts or maize, and damage the crop. As one farmer puts it: “(peanut) sometimes is not ripe and haven’t formed the kernel in the shell yet. The monkey pulls out the whole plant, find it’s not edible, then pulls out another one, find it’s neither edible. In this way all peanuts in the whole plot of land can be pulled out by monkeys” (ZX-W, Qunan, 190215). For maize, it is the same story: “the monkey opens one corn cob, not ready, he discards it and opens another one, (thus) waste a lot” (FCG4, Pairu, 190302). Even when the crop is ripe, monkeys may not take the whole edible part. When they eat sugarcane, they just take half, usually the middle part of the stem, where it is tastier. They can also break the stem but not to eat it. When eating maize, they eat only half and desert it. When eating citrus fruits, they “have one bite, think the other one is sweeter, then desert this one and go for the other one” (FCG4, Pairu, 190302).

Besides the huge crop loss for farmers, the diet habit of monkeys also makes them the threat for farming. They are believed to feed on various crops, and farmers like to compare it to human eating habits, “they eat whatever that is edible for us” (ZX-W, Qunan, 190215). They are reported to feed on sugarcane, citrus fruit, watermelon, peanut, maize, sweet potato etc. Farmers also notice the diet preference of monkeys: “peanut and maize are their favourites” (TS, Qunan, 190316). These monkeys even ring strip the bark of eucalyptus trees (AX, Qunan, 190220)

While being upset, people in the field also express amazement over how monkeys forage crops, because they act just like human. When monkeys eat sugarcane, they grab the stem, peel the skin, chew the juice and spit out the residue, just like everyone else do (DG, Pairu, 190303). Ranger DG in Pairu shows me the scene of sugarcane residue left on the rocky stone. He suggests monkeys have stood on the rock and chew the sugarcane, as “who would squat on the rock rather than the flat ground to eat sugarcane?”. In a group discussion, a woman tells me “monkeys are even smarter than human” (FCG1, Qunan, 20190216), because after sugarcane stem has

been planted and covered by earth, the monkeys know exactly where they are and pull them out of the earth. Besides sugarcane, the way that monkeys raid peanuts can be also impressive. Monkeys pull out the peanut plant and lay it orderly aside the field, just like what humans do (MZ, Bapen, 190215)



*Figure 2 Sugarcane residue left on rock by monkeys in Pairu.*

Besides foraging like human, monkeys are believed to learn quickly and include non-familiar crop varieties into their food list. For example, watermelon and citrus fruit are recently planted in Qunan. Farmer ZX believe that monkeys did not know how to eat watermelon before, as “they just rotate the watermelon in hand but not know how to break it” (ZX, Qunan, 20190218). It is because once they hold the watermelon halfway up the hill and accidentally drop it, and it cracks after hitting the stone on the ground, that they realize watermelon can be broken in this way. Afterwards they use stone to open watermelon. Another farmer XG believe monkeys learn how to break the watermelon by seeing the crack on the fruit created by rats (XG, Qunan, 190316). Monkeys also don’t know how to eat citrus fruits before, as they don’t know how to peel the skin, which is bitter for them and deter them. People believe monkeys learn from them, when they feel thirsty working in the field and open citrus fruits, because now monkeys peel the skin just as human do (ZX-W, Qunan, 190215).

#### 4.1.2 Anthropomorphism: thief, enemy or friend?

Attributing human characteristics to monkey's crop foraging behavior is common among participants. Monkeys are described as 'thieves' that 'steal' farmer's crop. Some farmers joke that they will call 110 (the emergency call for police) when finding monkeys stealing crops (FCG4, Pairu, 190302). Others compare monkeys to enemies that invade their land and damage their property. One farmer likens monkeys as invaders when he disapproves sharing crop with monkeys: "It's like Vietnamese invaded us before, why we fought back? Couldn't we let them attacking us? Monkeys eat our crop, that's also invading us." (FCG4, Pairu, 190302) Another farmer compares the monkeys' crop foraging behavior to Japanese military strategy adopted in China during WWII (in Chinese: san guang zheng ce), because they damage all the crop along their paths (ZK, Qunan, 190215). Though monkeys are hated by many farmers that "everybody gnashes his teeth once talking about monkeys" (DG, Pairu, 190303), they can also be referred to as friends. As one farmer, who used to be a hunter, says about crop damage by monkeys: "it's like my friend coming to visit me. How can I not serve him a bowl of porridge?" (FCG4, Pairu, 190302).

## 4.2 Farmer-monkey interactions

### 4.2.1 Knowing where monkeys will raid

From everyday encounters, farmers have accumulated knowledge about the spatial movement patterns of monkeys. They find out that crops in distant valleys are more prone to be attacked by monkeys, and also more severe the damage. Farmers tell me that they have laid the land in fallow in valleys, because wildlife will leave no harvest for them. "Animals dare not to get close to the land near the village, only to steal some once and then. But it's different in the valley. They come down (from the hill) in groups and can finish the whole plot of corn in 2-3 hours" (HS, Pairu, 190309). If not set aside the land, farmers rent out the whole plots of land in the valley to private investors and grow sugarcane only, such as the case of Nongnai valley in Qunan. As one farmer comments: "If those land are distributed to us, we might one grow peanut here, one grow maize there, and one grow sugarcane there, then there will be no harvest for us" (DS, Qunan, 20190315)

Crop grown near the foot of the hill can also easily become the target for monkeys. Farmers have found that land near the foot of the hill tend to be damaged more than that in the middle of the valley. Farmer ZK explained to me: "monkeys dare not to go to land far from the foot of hill, those open land, because they are afraid of the risks of human presence" (ZK, Qunan, 190215). It seems to be an unwritten rule for

locals to not to grow monkey's favourite crops, such as peanut and maize, along the foot of the hill, as farmer ZX say: "Now everybody here knows we need to select land and crop to farm, to avoid damage by monkeys" (ZX, Qunan, 190216). However, as one farmer has mentioned, some farmers may have few lands that are near the foot of hill (XJ, Qunan, 190315). Considering the wide range diet of monkeys, it will be hard for those farmers to avoid crop damage.

If the land is near the foot of the hill, monkeys still need a 'path' to come down to the land. Here path refers to vegetation with trees but not solely grass, as people explain: "they rely on trees to jump into my land. They run very fast on trees. But if there's no trees but only grass at the foot of the hill, they will not come to my land, as they move really slow in grass" (FCG4, Pairu, 190302). Many farmers realize this and try to clear the boundary between farmland and the hill, such as by cutting trees, to stop monkeys coming to their land. However, vegetation at the foot of the hill belongs to the nature reserve and is not allowed to be removed, which creates conflict between agriculture protection and nature conservation. The nature reserve staff tells me that once he tries to stop a farmer from cutting trees by his land, near the foot of the hill, but was rejected by the farmer: "If I don't cut down this tree, monkeys will come down to my land. Will you compensate me for the loss?" (MZ, Bapen, 190215).

Even though farmers gain knowledge about spatial movement patterns of monkeys, it can still be uncertain which plot of land will monkey visit. One farmer talks with me in a sense of humour: "so it depends on luck. If you are lucky, you gain some harvest, but if you're not, your crop will be eaten by animals" (WR, Pairu, 190311). He further shares a story: "Around two or three years ago, there is a guy who owns some land. When the animal comes down, it only eats sugarcane in his land, and avoid the sugarcane in the nearby field. We don't know why. He should have harvested almost 20 tons sugarcane but only 5-6 tons in the end."

#### 4.2.2 Knowing when monkeys will raid

More than one farmer mention that monkeys were quite afraid of people back then. "Before the nature reserve set up, monkeys would flee far away once seeing people with shoulder poles<sup>4</sup>"(ZK, Qunan, 190215; MZ, Bapen, 190215). Nowadays, monkeys still dare not to come down to the field in the presence of human but come down and raid crop once people leave the field. People respond by guarding their field whenever they have time. Farmers know monkeys usually come down to raid the crop at dawn and at dusk, when people are absent from the field. So, some farmers spoke of visiting their fields quite early, to avoid monkeys coming down (ZX-

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<sup>4</sup> The farmer further explains that monkeys mistake shoulder pole as rifle.

W, Qunan, 190215). When the harvest season is close, the crop will be more prone to be raided by monkeys, as a farmer joke as “monkeys start squeezing the sugarcane earlier than the sugar factory” (FCG4, Pairu, 190302). That is when they guard their crop more frequently.

They also share other tips from daily observations: if you find monkeys appear on the hill near your field, you had better guard your field for 2-3 days, after when they will leave and search for another target. If you find them raiding your field today, they are likely to come tomorrow, so you have to guard there tomorrow. If you find them passing the hill nearby to somewhere else, they will not come back in a week (ZK, Qunan, 190215). Farmers also remind each other when seeing the monkeys are moving towards the direction of someone’s field (TS, Qunan, 190316).

#### 4.2.3 Raiding-guarding interactions

Usually monkeys will flee when seeing people coming. The same applies to when people clear their throats, clap their hands, or light firecrackers. “After all, they are afraid of us (human)”, farmer ZX says. He says sometimes monkeys will flee with some harvest in hand, such as watermelon and corn. Sometimes they are too scared to bring anything with them. Other farmers report some monkeys have less fear towards people. “Once they reach halfway up the mountain and ensure they are safe, they, mostly adult males, will shake the tree branch, as if to scare you and show their strength” (ZK, Qunan, 190215). Two farmers mention that “don’t get close to the foot of the hill when chasing monkeys; they may toss rocks on you” (ZX, Qunan, 190218; CS, Qunan, 190317). Farmer ZX expresses fear of chasing monkeys away in the field: “when seeing such large group of monkeys in the field, we feel the pressure as if the monkeys will rush over us and dare not to walk over”.

Farmers express that they are not able to guard their crops. They admit that they still do not know when the monkeys will come down. To many, the monkey raids give the impression that the monkeys are ‘playing guerrilla’ with them. “Sometimes we return home from the field at noon, assuming they have left, but they come back and raid our field” (ZK, Qunan, 190215). He adds that they act very quickly, as they can pull out 2 acres peanuts in around an hour, with roughly 100 individuals. Moreover, monkeys are seen to be very ‘clever’, as they have monkey guard for the whole group: “when they raid the crop, the monkey guard stays on a high tree and will shout once he finds human is coming, so that the monkeys down on the ground can flee” (FF, Pairu, 190311). Some monkeys are even accustomed of human presence when foraging on crops. A farmer near Qunan complains that “when we are here, monkeys are there eating our sugarcane. We are just 20-30 meters away” (NB, Bapen, 190227). Another farmer in Pairu also report that “monkeys are not afraid



of elders. When the elder people is harvesting maize at this side, they come down and eat maize at another side” (XF, Pairu, 190301).

Moreover, farmers feel they don't have enough time and energy in guarding crops. Usually one household owns dozens of acres of land, and those land are fragmented, which makes it inconvenient for people to move between different sites and guard their crops. Besides, valuable crop may require more labor input, which is draining people's energy in guarding crop that brings lower benefit. For example, people in Qunan have started planting citrus fruit several years ago. Farmers can benefit 10-20 thousand Yuan from 1-acre citrus fruit, while around 2500 Yuan from 1-acre sugarcane. The citrus fruit requires significant human labor in fertilization and deworming, thus farmers have no time to guard sugarcane from monkeys.



*Figure 3 Farmers in Qunan spraying for the citrus fruits, whose yield heavily depend on fertilizers and pesticides, thus requires lots of labour.*

The consequence of raiding-guarding interaction between monkeys and farmers can be simply put as “if you guard your field frequently, there will be more harvest left; if you don't guard your field, there will be none left” (NB, Bapen, 190227). However, sometimes one oversight in guarding can bring tragedy. A farmer shares a real story in her village: “There is a woman who plants some peanut near the foot of the hill. When it's near the harvest season, she gets up early every day to guard her peanut. Only one day she goes to the field a little late and find her peanut all

destroyed by monkeys” (DS, Qunan, 190316). Most farmers helplessly say that they will guard if they have time, but if there is no time, they can only let the monkeys eat as they like.

Farmers have tried out other strategies in guarding their field. Dogs are deployed to replace humans to watch out the field. Farmers may tie their dogs at the foot of the hill, under a hut to avoid exposure of sunlight. “It works,” a farmer tells me, “but it’s still burdensome for farmers because we need to carry porridge to the dog every day” (XJ, Qunan, 190316)



*Figure 4 A torn hut down the foot of the hill of Qunan, which was used to provide shade for guarding dog.*

Scarecrows, billboards and bands are also erected in the field to scare monkeys away. Those scarecrows resemble a human image. Smokes and newly-cut leaves can also help, farmers recall. A farmer in Qunan Hamlet shares that “find a clear ground, burn something to produce smoke, then they (monkeys) will come down less frequently” (BB, Qunan, 190315). Another farmer in Pairu Hamlet tells me that “if you see monkeys visiting the field, cut down some leaves of nearby trees, so that they dare not to come for a period of time” (WR, Pairu, 190311).

Setting up net and (or) plastic film are more commonly used in these hamlets, to guard crops near the foot of the hill. According to farmers, monkeys are afraid of new net and plastic film, because they are afraid of jaw traps. But once nets and

plastic films get older, monkeys are accustomed and dare to enter the field again. Plastic films, if applied more layers, are said to be effective. One farmer living near Qunan tells me his strategy in a sense of pride: “This year turns out to be perfect for me, as my sugarcane is well fenced by plastic films and none is taken by monkeys. When one layer is not enough, I apply the second layer, and if it is still not enough, then I apply the third layer. I fenced 3 layers in total” (NB, Bapen, 190227).



*Figure 5 Net used for farmers in Bapen to guard their sugarcane, because monkeys come down from the hill and pull out newly planted sugarcane from the earth.*



*Figure 6 Plastic film used to guard the sugarcane in Pairu. Fallen sugarcane are said to be foraged by squirrels.*

Noise has also been used in the field. Farmers used to play songs with a recorder, and have tried to change songs and voices, but it becomes ineffective after several days.

#### 4.2.4 Lethal control: trapping and poisoning

Hunting monkeys before the conservation regulation afforded them protective status was a common occurrence. Trapping monkeys has been carried out by local hunters, as one farmer in Pairu illustrates:

“Back then, we would often trap monkeys on the hill. We chopped wood as wide as that road (and go up the hill), surrounded the monkey troop, with 20 meters apart from each other. Once the monkeys try to come down, we would strike the wood to deter them. This would last for almost a week. Then we would bring a cage up to the hill, with soy beans inside. Soy bean is its favorite, and it was hungry, so it would enter. Once we caught 34 monkeys at another village in this way. These trapped monkeys were sold to some dealers as 70 yuan each” (WR, Qunan, 190311).

Jaw traps are placed in the mountains before the conservation regulation, to catch monkeys and other wild animals. They are also placed near the foot of the hill, intended for monkeys that damage crops. Most monkeys caught in this way are sold for money, with some served as meat when people are too poor to buy that from the street. Farmer WR tells me “monkey meat taste better than pork.” In a group meal with conservation staffs and farmers, an old hunter tells me that when monkeys are jaw trapped, they let out the voice of sobbing. “But by then, nobody thinks about conservation, as we are starving and people just feed on anything that we can catch” (FCG2, Pairu, 190301). By the table, another hunter tells me that he once jaw trapped a little monkey, pitied him and released him. Jaw traps are believed by many to deter monkeys, because “once one is caught by jaw traps, he dares not to come down for a year” (FCG3, Pairu, 190302). But other farmers say monkeys can sometimes avoid jaw traps: “they seem to know where the jaw trap is and avoid it” (HS, Pairu, 190309).

Poisoning monkeys is a more recent phenomenon. Farmers may soak corn in pesticides or inject fruits with pesticides, then put them by the field. This strategy is non-selective, as mice and squirrels can also come and die from it. Farmers tell me it is slower for monkeys to die from the poison thus they will not die by the field, but after they climb up to the hill. Poisoning can also become ineffective after rain-fall (WR, Pairu, 190311).

### 4.3 Interactions between farmers and conservation staffs

#### 4.3.1 Community outreach

Lethal control towards monkeys has been regulated under the wildlife protection law. Macaques are under second class state protection and cannot be hunted without a special hunting and catching license. Those who illegally hunt macaques can be sentenced to not more than five years of fixed-term imprisonment or criminal detention and may in addition be sentenced to a fine, according to Article 341 in the criminal law of China (1997). For farmers this means they can be caught and sent to the jail if they are found hunting monkeys. Moreover, jaw traps are forbidden under the wildlife protected law.

The area in question has been set up as national nature reserve from 2003. All the wildlife, including monkeys, are primarily managed by the nature reserve by patrolling, monitoring, community outreach etc. One nature reserve staff explains how he presents conservation regulations to villagers: “I don’t read for them these articles of wildlife protection law. I just count numbers for them: how many years

they would spend in jail if they hunt state protected animals or logging precious trees” (MZ, Bapen, 190215). Another nature reserve staff communicates with villagers in another way: “community outreach is not to panic people, but to kindly remind them these regulations and to explain patiently” (LZ, Pairu, 190301).



Figure 7 Community outreach board erected by the nature reserve, which includes range of the nature reserve, key protected species, conservation regulations and illegal case examples.

#### 4.3.2 Reporting to authorities

It is written in the wildlife protection law (2016) that “should relevant units or individuals receive loss from protecting national key protected animal, they can request compensation from local management authority” (State Council of P.R.China, 2018). However, implementation measures for this province have not been released in practice yet. A governmental officer shares that legislation is now in process, and the law school in the capital city has been delegated to draw up the measure draft.

The absence of working compensation schemes may be a reason for why farmers turn to the nature reserve or local government for solutions. The nature reserve staff in Bapen region tells me that he used to receive an abundance of reports about crop damage by monkeys. Some of them blame the nature reserve and ask for compensation. “They (farmers) were angrily shouting at me in the phone: your monkeys have destroyed my land!” (MZ, Bapen, 190215). He can only comfort them, explain

there is no compensation because implementation measures have not been released, and encourage them to use any methods that do not hurt the animal to protect their crops. Once, he tells, there's a farmer calling him at midnight, asking for compensation and threatening to poison the monkeys. He reminds the farmer the cost of violating the law and explain to me that "he said it just to vent his anger."

A ranger in Qunan recalls how once a farmer reported to him the watermelon loss from monkeys. "Once I received reports from a villager and I went to see his watermelon land that has heavily been destroyed. He was asking me: you always tell us to protect these animals. We have protected them well, while our crop has been damaged. We protect them, but who to protect our crop?" (ZK, Qunan, 190218). The ranger admits that he really did not know what to answer at that moment, but only to report to higher authority and wait for solutions.

Farmers are also suggested by rangers and nature reserve staff to report to local government. "Not our nature reserve, but only the government, can provide you compensation" (MZ, Bapen, 190215). They did try that. Farmers have reported to the village head, which are asked to report to higher levels. There is even a farmer that reports to the county people's congress. However, in interviews, it becomes clear that there is still no compensation for them.

Most farmers now choose to not to report, because they know "it's of no use", as there will be no compensation for them. Some of them suspect that there is a compensation fund but has been corrupted by higher level authorities. Some of them additionally worry that if they report the damage, their land can be expropriated by the nature reserve.

But not everyone thinks they should report the damage and receive compensation. ZX is a member of hamlet committee, a so-called leader in Qunan. He thinks farmers can adjust themselves to reduce the loss, such as avoiding growing corn and peanut neat the foot of the hill, and guarding crops frequently. He also suffers crop loss from monkey raiding, for example, 10-15 percent in 2 acres sugarcane this year, but he perceives it as insignificant: "it's fine that they eat a little." All of his peanuts in 3 acres land in 2015 was destroyed by monkeys, but he only blames himself having no time to guard them.

It is interesting to see the distinct attitudes people hold towards monkeys and other agricultural pests, such as squirrels, civets and rats. Almost everyone agrees that it is legitimate to request compensation from the state because of crop damage by monkeys, while few people accept the legitimacy of asking compensation for other pest mammals. When I point this out, some people argue that because other pest mammals cause much less harm than monkeys. This can surely be a reason, but it is worth noting that farmers still choose not to report the significant crop damage, because the problem animal is not as strictly protected as the monkey. As one farmer states: "if the sugarcane is close to the river or the village, then rats can damage a

lot, and nobody declares compensation. But the monkey is protected, so farmers want someone to compensate them” (TB, Bapen, 190227). Such clear divide between protected and ‘unprotected’ animal is also shown in a group discussion, when one farmer declares that rats also cause much damage, and another farmer cuts him off: “you cannot mention rats. Rats are not protected” (FCG4, Pairu, 190302).

#### 4.3.3 Trapping and poisoning in private

Nowadays trapping and poisoning become illegal, but since there is no compensation from the government for the crop loss, trapping and poisoning monkeys become some farmers’ choices. One farmer in nearby village assures me that there are farmers using jaw traps and poison to safeguard their crops. He sees it as quite legitimate: “these monkeys eat crops but there’s no compensation, of course they need to use jaw traps” (NB, Bapen, 190227). Conservation staffs from two regions are all aware that there are farmers using trapping or poisoning in private, but saying it is hard to eradicate or police: “nobody is accounted for, as you don’t know who put the jaw traps and poison” (MZ, Bapen, 190215). The conservation staff shares that villagers used to report him a crop-feeding monkey that has been trapped and ask him to take it away. “It must be them who put jaw traps, but nobody will admit”.

However, two farmers in Qunan express that hurting monkeys never come to their mind. One says: “I agree that the state protect these animals, as long as they don’t damage our crops. But if you ask me to poison these monkeys, we won’t do that” (BB, Qunan, 190315).

#### 4.3.4 (de) legitimizing compensation

Many farmers draw obvious connections between monkey protection and crop loss from monkeys. They think the trapping and hunting ban has made monkeys less scared of people and cause more damage. A farmer says: “monkeys out of nature reserve dare not to come down to the field at all, because jaw traps are waiting for them” (FCG4, Pairu, 190302). Another farmer in the same discussion even ascertain that monkeys come down because they know they are protected: “Now they eat our crops deliberately, as if saying ‘what can you do to me? I have superiors protecting me.’” Monkeys can reproduce quickly, and farmers and conservation staff all agree that years of protection over the species and habitat has facilitated population increase. Farmers assume that monkeys become too many after protection, and that there are not enough fruits for them in the mountains, and there is competition among monkey troops, which all lead to more severe crop damage by monkeys.



Conservation staff MZ says before 2007, they used to trap monkeys, almost every other year. This has ceased in the past 12 years.

Since protecting monkeys has contributed to crop loss of farmers, farmers claim that “whoever requires us to protect the monkeys should compensate us” (FCG4, Pairu, 190302). Some farmers further declare that monkeys belong to the state, thus the state should compensate for the loss. A farmer gives an example: “If your cow has trampled someone’s land, you should compensate, right? This is the same” (NB, Bapen, 190227). These arguments are shared by several nature reserve staffs and governmental officials, as one echoes that “wildlife is state-owned asset. Protecting wildlife benefit our country. Who benefits, who compensates” (QG, Nanning, 190321).

As there is still no compensation, many farmers blame the conservation authority for protecting only monkeys but not people. “If I catch a monkey, the police would arrive in half an hour; if it eats my crop, I wait for years and nobody will come and have a look” (FCG4, Pairu, 190302). Another farmer says: “it feels like their lives are more precious than ours” (FCG5, Qunan, 190316).

Blaming farmer behavior has been used as a counter-argument to delegitimize compensation. Some conservation staffs claim that it is because farmers cultivate land up to the hill and encroach on the monkey’s habitat that crop damage by monkeys becomes a problem in the first place: “Land up the hill is monkey’s homeland. You have cultivated so high up till monkey’s door that they have no room to turn around. How can they resist eating your crop?” (LZ-RS, Tuozhu, 190301). Another ranger adds: “Monkeys only eat crops that grow near the foot of the hill, where it’s recently cultivated. It is like a revenge because you have invaded their land, you know?” (XF, Pairu, 190301).

In certain circumstance, habitat loss is an important driving factor of escalating human-wildlife conflict. For example, Jin (2008) argues the severe human-elephant conflict in Yunnan (China) result in large scale habit loss and fragmentation, when forest is transformed into rubber plantation. However, some conservation staff and farmers do not think it applies to crop damage by monkeys in this nature reserve. They admit there were habitat loss in 1980s, but that was before the setup of the nature reserve thus cannot be called illegal. Conservation staff NF tells me: “cultivating new land happened mostly during 1980 and 1981, when collective land was distributed to private households” (NF, Chongzuo, 190305). In the late 1980s cultivating new land is even encouraged by the government. It’s recorded in Fusui<sup>5</sup> Chronicles (1986-2005) that local government encourages farmers to cultivate new land for sugarcane in 1987 (Fusui Chronicles Committee, 2018). Since 2000s, farmers gradually abandon land in remote valleys and the vegetation is recovering. NF

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<sup>5</sup> Fusui is a county of Chongzuo, where Bapen region of the nature reserve locates.

explains to me: “Farmers are no longer grow crop in areas where transportation is inconvenient. Moreover, most young people give up farming and migrate to the city, and the remaining old people cannot grow that much anymore” (NF, Chongzuo, 190305). One farmer even expresses that people are not willing to plant existed land these days, let alone the newly cultivated land<sup>6</sup> (FCG4, Pairu, 190302).

Contributing crop damage by monkeys to habitat loss is regarded by farmers as an evidence of valuing animals more than humans, as one farmer complains: “so it’s not monkey’s fault, but our fault” (FCG4, Pairu, 190302), and one farmer even joke that “so we had better not to report our crop loss to the authorities, because we might be caught because of ‘occupying monkey’s land’” (FCG3, Pairu, 190302).

#### 4.3.5 Rumors<sup>7</sup>

Rumors are also spreading among farmers in this region. In Qunan village, two farmers separately tell me that the nature reserve has released some monkeys on the hill deliberately. Another group of farmers assure this idea in my other interview and add that these monkeys are from a different variety originally from Vietnam. Farmers from another village in Bapen region believe that the nature reserve staff has released two trucks of monkeys to their hills for developing tourism.

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<sup>6</sup> Not all farmers in these two hamlets, but only farmers in Pairu, show less enthusiasm in farming maybe because land in Pairu only suits sugarcane, and sugarcane price is not promising. Farmers in Qunan, show higher enthusiasm in growing citrus fruits, though it’s quite labor-intensive, because it brings higher income. In this circumstance, cultivating new land still exist. Conservation staffs in Bapen region (near Qunan) tell that farmers can covertly move boundary marker of the nature reserve, so that they can cultivate more land.

<sup>7</sup> There are discussions about so-called ‘rumors’ as knowledge presentation, but my limited understanding cannot bring more observation and discussion here.

## 5 Discussion

Here I will present my analysis and interpretations of research findings by linking them to research questions, concepts and existed literature.

### 5.1 Interpreting farmers' perceptions towards crop damage by monkeys

Understanding perceptions of local people toward living with wildlife is now considered a prerequisite to designing and implementing effective management schemes (Mormile and Hill, 2017). Research from other scholars and my empirical findings all suggest that farmer's perception can be affected by the visibility of the animal. Hill (2005) and Treves (2006) have documented that animals with larger body size and group size can be more easily noticed by farmers. Treves (2006) also suggests that farmers tend to have lower tolerance towards crop damage that has huge damage per incident. This can be verified by the narratives from farmers in WNNR, as they frequently mention the large troops of monkeys and severe damage monkeys can cause in a single visit. When it comes to smaller mammals that also feed on little crop per visit, such as squirrels and birds, many farmers perceive their damage is little.

Moreover, extreme cases are easier to be remembered and circulated among farmers. It is hard for farmers to estimate an average crop loss, but they can clearly recall the most impressive (i.e. severe) crop damage by monkeys, some of them happened in nearby villages. Similarly, Dickman (2010) also notices that a 'hyper-awareness' risk can emerge at the community level where rare and devastating events can have a significant and widespread effect on risk perceptions among community members.

Farmer's perception of crop damage can also be affected by their perceived reason of it. Dickman (2010) mentions that people can perceive higher risk if they

perceive the risk is imposed to them from outside. Farmers in WNNR also perceive the crop damage comes from the hunting ban since the set-up of nature reserve, which can make farmers easier to notice crop damage by protected animals rather than less protected ones.

Some scholars indicate that farmers' narratives of monkeys can be exaggerated. Knight (2003) suggests that monkey stories told in rural Japan are better understood as 'tall stories that serve as sources of entertainment rather than serious reports of actual incidents'. Fungo (2011) suggests that farmers may overestimate the crop loss intentionally because of lacking compensation. Such argument correlates to that of conservation staffs, as they suggest farmers can overestimate crop loss by monkeys and owe crop damage by other animals to monkeys.

Since perception can be affected by so many factors and thus be 'distorted', should we treat it as a 'bias'? In fact, the word use of 'distortion' and 'bias' reflects the epistemology of objectivism, which assumes there is a certain actual cost 'out there', independent of subjective perception and can be discovered, or at least, approached (Moon and Blackman, 2014). While for alternative epistemology, such as constructivism, there is no 'actual cost' that exist independently of the subject that perceives it, as the reality is created from the interplay between subject and object (Moon and Blackman, 2014). Similarly, Hammersley and Gomm (1997) mention the problematic use of 'bias' to refer to systematic error, as well as other questionable concepts, such as 'truth' and 'objectivity'. Thus, perceptions of farmers can be seen as bias, but also manifestation of rich meanings in a constructed reality.

## 5.2 Farmer-monkey interactions: mutual adjustment and learning

Boonman-Berson (2018) argues that the interaction between human and animals is a mutual process that involves mutual adjustment and mutual learning. It involves both doing and knowing, as knowledge is directly linked with practice. Such mutual adjustment and learning can be seen from the everyday interactions between farmers and monkeys. Farmer's knowing of monkey's dietary preferences, as well as when and where will monkeys raid, is knowledge accumulated from past experiences of himself or others interacting with monkeys. Such knowledge also directly links to farmer's coping strategies, such as changing crop type and location, clearing forest edge, and guarding accordingly. In response of these, monkeys learn to eat new crop varieties, as well as knowing when and where to raid, which are closely link to their raiding strategies, such as playing guerilla. Other scholars have also documented knowledge and practice in dealing with crop damage by monkeys, such as knowing

the distance to farmland-forest boundary is important (Zhang and Watanabe, 2009, Fungo, 2011) and changing crop types (Fungo, 2011). The knowledge and strategies of monkeys are also recorded, such as learning to eat new crop varieties (Zhang and Watanabe, 2009, Hill, 2017) and adapt to mitigation measures (Knight, 2003, Hill, 2005) and raid in an organized way (Knight, 2003)

Such mutual processes can also be found between stockbreeders and wolves in Kyrgyzstan, and between farmers and hyenas in Ethiopia. Lescureux (2006) has illustrated how the presence of wolf affect the choice of pasture and seasonal herding patterns of stockbreeders, as well as the defending strategies they adopt, such as rifles, firecrackers and hunting. Wolves, on the other side, are also fully aware the 'location and rhythms of human activities' and choose the weakest and least protected prey and the den site accordingly. Baynes-Rock (2013) also notices that hyenas adapt to living with humans by becoming almost entirely nocturnal and choosing not to engender conflict.

### 5.3 Changes in farmer-monkey relations

The interactions between farmers and monkeys are mutual and dynamic, meaning it might change as a result of changes involving actors and the environment they dwell in. One noticeable change is the decrease of human presence in forest and farmland. As almost all direct natural resource use in this nature reserve has been banned, farmers admit that very few people go to the mountains anymore, and "many routes become unrecognizable now" (FCG3, Pairu, 190302). Though farmers are allowed to collect firewood for subsistence use, the energy transition to coal and natural gas further decreases people's visit to the forest. The rural-urban migration widespread in China also lead to less farmers in this nature reserve, especially in Pairu, where almost all youngsters have left farming. Moreover, farmers show up less in their farmland because of the spread of agricultural machinery and supplies. For places like Pairu that mainly grows sugarcane, people seek non-farm jobs after planting and harvesting sugarcane. Such change leads to monkeys less afraid to enter farmland and damage crops. This can be also found in rural Japan, where the decrease of traditional resource utilization has changed the rural land use and the agriculture population is declining and aging, thus makes farmland more vulnerable for monkey attacks (Zhang and Watanabe, 2009, Sprague, 2002).

Moreover, the increase of monkey raiding pushes farmers abandoning their land and moving to the city. Some scholars suggest leaving land fallow as a strategy of mitigating crop damage by monkeys (Zhang and Watanabe, 2009, Guinness and Taylor, 2014), while others suggest it can contribute to depopulation in rural

areas and leave remaining farmland more prone to monkey attacks, thus trigger a vicious cycle (Sprague, 2002).

Another change in farmer-monkey relations comes from the cease of population control by conservation authorities and the restriction of lethal control by farmers. Similar to farmers in this nature reserve attributing crop loss by monkeys to the restriction of lethal control, some farmers in rural Japan also attribute the monkey problem to the post-war hunting ban (Knight, 2003). As Knight states, “The post-war state, through its interference in hunting, is deemed to have destabilized the village relationship with monkeys and provided the conditions for the monkey problem to arise”. When it comes to living with predators, herdsman in Kyrgyzstan also thinks the reduction of hunting leads to wolves becoming less afraid of people and being closer to human settlement (Lescureux, 2006).

#### 5.4 How monkey problem transfigures into a conservation problem

The monkey problem in this nature reserve, i.e. crop damage by monkeys, features mutual and dynamic interactions between farmers and monkeys. However, it should not only be considered as a problem between farmer and monkey, but also a problem between farmer and conservation staff, as farmers perceive their defending strategies being restricted by conservation authorities and their crop losses are because of the conservation policies imposed on them. Similarly, Hill (2005) points out that tension can arise between rural populations and conservation agencies when the animals causing crop damage are protected species, because farmers’ crop protection strategies are restricted.

When the monkey problem transfigures into a conservation problem, monkeys are seen as the property of conservation authorities, either the state or the nature reserve. In a conservation problem, animals are commonly seen to be associated with one party, as Pooley et al. (2016) states: “...animals being portrayed as the possessions, responsibilities or allies of one or other of the parties involved in a conservation conflict”. For example, in a national park of Guinea-Bissau, sometimes people refer to chimpanzees as the children of people that involve in chimpanzee conservation, who are perceived as ‘benefiting from and defending chimpanzees at the expense of other people subjected to the national park legislation’ (Sousa et al., 2017). What contrasts this is the ownership of ‘unprotected’ agricultural pests: they are still seen as free wildlife thus belong to no one. For example, a conservation staff states that “squirrels are not much protected...nobody to manage them” (TB, Bapen, 190227).

Since animals are seen as the property of one party, it becomes the responsibility of that party to provide solution for the damage the animal cause. Similar case can be found in another national reserve of China, as local residents attribute crop damage by the wild pig to hunting restrictions in the nature reserve and frequently mention that the government should offer financial compensation to local people, particularly for crop losses (Ellwanger et al., 2015). Sometimes the problem animal becomes a ‘bargaining chip’ for locals to claim crop loss compensation from parties that local people think to receive benefits from conservation (Sousa et al., 2017). It is worth noted that if the problem animal is unprotected, almost no farmer will claim for compensation in WNNR. Just like what a conservation staff replies when asked if crop damage by rats should be compensated: “rats are pests and they are everywhere, who to blame?” (MZ, Bapen, 190215).

Here I borrow a concept from Knight (2000), ‘protected pest’, to describe animals like monkeys that are locally seen as pests but receive (inter)national protection, to replace the ‘protected problem animal’ used in paragraphs above. Similarly, ‘unprotected pest’ refers to crop damaging animals like squirrels and rats that receive less or little protection from the state. Other than the difference in ownership of the animal and responsible actors in crop damage events, there is also difference between protected and unprotected pests on mitigation strategies farmers choose. For some farmers, they are not willing, but have to use only non-lethal methods towards protected pest because of conservation regulations. As one farmer complains: “I have to give up the trapped animal because here is nature reserve” (FCG4, Pairu, 190302). While other farmers clearly show that they are not willing to hurt crop foraging animals, not because of being threatened by conservation regulations.

However, for unprotected pest, farmers can deal with it on their own, usually with a combination of lethal and non-lethal methods. Contrary to that general understanding that giving farmers freedom to choose lethal methods will lead to the eradication of the problem animal, I argue it might not be true, because lethal methods may sound powerful but is not a ‘silver bullet’. Farmers admit that jaw traps do not always work, as animals learn to avoid, and poison can become ineffective after rainfall. Moreover, pests that are not well protected are usually of low economic value, thus farmers have no economic incentive to overkill them. Partly ineffective though, using lethal methods can still bring farmers satisfaction as they gain more control over the situation.

It begins to sound promising to loosen the conservation regulation on monkeys in order to mitigate their competition with farmers over crops and relieve tense relationship between farmers and conservation staffs. However, conservation staffs, rangers and farmers all express little belief of the possibility and positive outcome of introducing lethal methods on monkeys and especially allowing farmers to take

on lethal strategies. A conservation staff states: “We dare not to think about it (culling monkeys because of crop damage). It never comes to our (conservation staffs’) mind” (MZ, Bapen, 190215), and his worry mainly comes from animal welfare concerns. When asked if farmers should be allowed to use lethal methods, people all think that “it (wildlife management) will be messed up”, because it is hard to regulate. Farmers may kill animals for money in the name of crop protection, such as wild pig that damages crop and has high economic value. If it is not well regulated, other rare and precious species that do not disturb crops will also be affected.

*Table 4 Comparisons of ‘protected pest’ and ‘unprotected pest’*

	Protected pest	Unprotected pest
Ownership	Property of the conservation authority	Belongs to no one
Responsibility	Conservation authority to provide solutions and compensation	No one to blame
Mitigation strategies	Farmers should follow conservation regulations; Usually non-lethal methods	Farmers can follow their own will; Usually lethal and non-lethal methods
Possible consequence	Population growth of the pest; pest becomes less fear of people	Low possibility of the pest to die out; Lethal methods may affect other, especially protected animals
Characteristics	Conservation problem	Not a conservation problem



## 6 Conclusion

Here I conclude my thesis by stating main findings, discuss the contributions to the field and limitations of the study, and provide some suggestions for further study and policies.

### 6.1 Main findings and discussions

My findings have described how farmers perceive crop damage by monkeys, while also mention many other ‘agricultural pests’. Anthropomorphism has been captured in farmers’ narratives about crop-raiding monkeys. Moreover, I have documented interactions between farmers and monkeys in good detail, especially the mutual adjustment and mutual learning processes. Farmers have known the dietary preferences and habits of monkeys, when and where monkeys like to raid, and how to guard and protect their crops. Such affective learning comes from past experiences of himself or others interacting with monkeys and is closely linked in various coping strategies that farmers take. At the same time, monkeys learn to eat new crop varieties, as well as knowing when and where to raid, which are closely link to their raiding strategies.

My findings also describe how conservation staffs and farmers interact concerning crop damage by monkeys. Conservation staffs exercise their management and control over wildlife and the nature reserve by regularly patrolling, monitoring, and community outreach. Some farmers report to conservation authority once exposed to crop damage and claim for compensation, while others give up, thinking it is of none use. Hidden trapping and poisoning exist and are aware by conservation staffs, but they claim the difficulty of identifying doers. Moreover, there are claims that legitimate or delegitimate compensation to farmers. Some argue conservation regulations make crops more prone to be raided and see wildlife as a state-owned prop-

erty. Farmers are also seen as altering wildlife habitat that causes crop damage. Rumors about the secret release of monkeys by conservation authority have also been recorded.

Based on these findings, my thesis discusses factors that affect the perceptions of farmers on crop damage by monkeys, such as the visibility of the animal, extreme cases and their perceived reasons of crop damage. The mutual and dynamic interactions between farmers and monkeys are also discussed, and can also be found in rural Japan, which all resembles the interactions between predators and pastoralists elsewhere. Less presence of human in forest and farmland, as well as the hunting ban, have been picked as noticeable factors that change farmer-monkey relations. At last I have discussed how the monkey problem transfigures into conservation problem, when monkeys are treated as ‘protected pest’ rather than unprotected pest, resulting in different perceived ownership of the animal, responsibility of actors, mitigation strategies and possible consequences.

## 6.2 Contributions to the field and limitations

When it comes to farmers’ perceptions towards crop damage by monkeys, my findings well describe the rich and complex perceptions of farmers on crop damage. It also well reveals farmers’ perspectives by mostly adopting farmers’ expressions.

In terms of human-monkey relations, my findings emphasize the mutuality between farmers and monkeys, which draws a more symmetric picture of human-monkey relations, than the numerous single-sided accounts of farmers’ responses or strategies in crop damage issues on one side, and crop damaging behaviors of animals on another. It is also a good trying of using theories that recognize non-human animals as actors, such as actor-network-theory. My findings also describe detailed interactions between conservation staffs and farmers.

There are also some limitations of the study. Weak construction of theories can be a major problem. I appreciate the rich and insightful empirical materials I have gathered, but I have trouble in searching for good concept to generalize it, especially about social interactions. Another methodology limitation is a lack of monkey’s perspective and direct observation of interactions between farmers and monkeys. In discussing the conservation’s effect in farmer-monkey relations, more close investigation into conservation institutions is needed.

### 6.3 Suggestions for future studies

Considering the contributions and limitations of my study, I will suggest further studies in:

- 1) Monkey's lifeworld in crop foraging events. How they perceive crops and humans, and how they interact in their social group.
- 2) More close investigation about the role of conservation in farmer-monkey relations, such as consider the effect of laws and institutions, and the difference in and out of nature reserve.
- 3) Exploring and investigating other factors that affect farmer-monkey relations, such as migration, energy transition etc.

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## 8 Appendix

*Table 5 List of group and individual interviews*

Date	Site	Categories of person	Anonymity person	File name
190215	Bapen	Conservation staff	MZ	Audio215MZ; Anote215MZ
190215	Qunan	Farmers	ZX-W	Audio215ZXW; Anote215ZXW
190215	Qunan	Farmer	ZK	Audio215ZK, Anote215ZK
190216	Qunan	Farmers	FCG1	Audio216WG; Anote216WG
190218	Qunan	Ranger	ZK	Audio218ZK Anote218ZK
190218	Qunan	Farmer	ZX	Audio218ZX Anote218ZX
190220	Qunan	Farmer	AX	Anote220AX
190227	Bapen	Ranger	HD	Audio227HD; Anote227HD



190228	Bapen	Conservation staff	TB	Audio228TB; Anote228TB
190228	Bapen	Farmer	NB	Audio228NB; Anote228NB
190301	Chongzuo	Conservation staff	LZ	Audio31LZ; Anote31-34LZ
190301	Chongzuo	Conservation staffs	LZ-RS	Audio31LZ-RS; Anote31LZ-RS
190301	Pairu	Farmer	HS	Audio31HS; Anote31HS
190301	Pairu	Ranger	XF	Audio31XF Anote31XF
190301	Pairu	Farmers and conservation staffs	FCG2	Audio31FCG2; Anote31FCG2
190301	Pairu	Farmers	XF-DG	Audio31XF-DG; Anote31XF-DG
190302	Pairu	Farmers	FCG3	Audio32FCG2; Anote32FCG2

190302	Pairu	Farmers	FCG4	Audio32FCG3; Anote32FCG3
190303	Pairu	Ranger	DG	Audio33-39DG Anote33-39DG
190303	Pairu	Farmers	LE-HS	Audio33LE-HS; Anote33LE-HS
190305	Chongzuo	Conservation staff	NF	Audio35NF; Anote35NF
190309	Pairu	Farmer	HS	Audio39HS; Anote39HS
190311	Pairu	Farmer	WR	Audio311WR; zzAnote311WR
190311	Pairu	Conservation staff	HD	Audio311HD; Anote311HD
190311	Pairu	Farmer	WS	Audio311WS; Anote311WS
190311	Pairu	Farmer	FF	Audio311FF; Anote311FF
190315	Qunan	Farmer	XJ	Anote315XJ

190315	Qunan	Farmer	BB	Anote315BB
190315	Qunan	Farmer	DS	Anote315DS
190316	Qunan	Farmer	XG	Anote316XG
190316	Qunan	Farmer	PS	Anote316PS
190316	Qunan	Farmer	TS	Anote316TS
190316	Qunan	Farmers	FCG5	Anote316FCG5
190316	Qunan	Farmer	CS	Anote316CS
19032	Nanning	Governmental official	QG	Audio321QG

Example interview questions for conservation staffs, farmers and governmental officials