

Extreme levels of hunting of birds in a remote village of Hainan Island, China

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Summary

In China, many bird species are generally thought to be threatened mainly, or at least partly, by hunting. However, there have been few studies of bird hunting at a local scale. Bird hunting and trade in Nanmao, a remote mountainous village of Hainan Island, China, was investigated during March–July 2003 and September–October 2005. In total, 86 households were visited, of which 43% reported that they engaged in hunting of birds while 91% of households were seen to have hunted birds or hunting tools. This indicated that hunting by village people was widespread. Most hunters were male, and were between 12 and 68 years old. A total of 78 bird species were hunted, including 2 First Class and 19 Second Class national protected species. This extreme level of hunting has changed from a more moderate subsistence hunting tradition since about 1980, when local urban markets for wild meat started to develop. We outline a strategic plan designed to conserve birds, other wildlife and their forest habitats, whilst improving the livelihoods and preserving the minority tribal traditions of the people of Nanmao forest.

Introduction

The alarming loss of ecosystems and biodiversity owing to increasing human population and associated pressures on the environment can have severe consequences (Jackson *et al.* 2001; Lotze *et al.* 2006, Worm *et al.* 2006). Among them, overexploitation is widely regarded as a significant cause for the decline of many terrestrial vertebrate species. An unsustainable level of offtake is thought to be a primary threat for 37% of the 12% of birds threatened globally with extinction (Hilton-Taylor 2000, Baillie *et al.* 2004). Over-hunting and trade in wildlife are becoming two of the greatest threats to biodiversity in China (Li 2001, Zhou and Jiang 2004 a,b, Nijman 2010), particularly in cases where commercial exploitation and international trade play significant roles (Jiang, 2001, Gao and Ma, 2004, Zhou and Jiang 2004a, Zhang *et al.* 2008). In the China Red Data Book of Endangered Animals, 183 bird species were listed as Threatened (Zheng and Wang 1998), of which 34 species (18.6%) were thought to be threatened mainly by hunting. An additional 56 species (30.6%) were thought to be threatened at least partly by hunting (Zheng and Wang 1998). Hunting is generally thought to be a major threat to birds in China. There are, however, few studies of bird hunting at the local scale (e.g. Liang 1996) and those that exist are mostly concerned with the pet trade (e.g. Dai *et al.* 1996, Xu *et al.* 2002, Bi and He 2005) rather than hunting as a source of meat.

The economy of the island province of Hainan is less well developed than most others in mainland China, so the demand for pet birds is comparatively low. Thus the principal demand for wild birds is for food. This practice is an ancient tradition for subsistence among the tribal minorities on the island. Consequently local communities possess the skills to capitalise on demand for wild bird meat and are likely to play a key role in this trade. This study set out to document hunting of birds amongst one such minority group, the Miao (Hmong), in a remote mountainous area of Hainan Island by: a) determining the number and identity of species hunted and the prices obtained; and

b) documenting hunting methods. In view of our findings, we make some suggestions about how this threat may be mitigated to improve the long term conservation prospects for Hainan's forest birds.

Study area and methods

Nanmao village and the mountain forest nearby (19°00'N, 110°06'E) lies in the south-east of Hainan Island, China (for location of Nanmao, see Fig. 1 in Gong *et al.* 2006). The climate is seasonal with a rainy period lasting from April to October and a dry period from November to March. Annual rainfall averages 2,300 mm and the average annual temperature is 22°C. The area is characterised by natural secondary forest, with broad-leaved species predominating at 800–1,100 m. Areas of higher elevation, up to 1,270 m, are characterised by monsoon rainforest, interspersed with bamboo. The study village is situated on the mountainside at 430 m. Up to 800 m above the village there are cultivated fields and plantation forests consisting mainly of rubber *Hevea brasiliensis* and betel nut palm *Areca cathecu*, products of both being sold commercially.

The villagers have engaged in subsistence hunting for generations, but wildlife now provides them with a third commercial crop. Apart from birds, the villagers also hunted several globally threatened turtle species (Gong *et al.* 2005, 2006), as well as some mammals. At the time of these surveys, there were 86 households in the village and most practised hunting as part of the family economy (Gong *et al.* 2006).

The village was repeatedly visited over two periods (March–July 2003 and September–October 2005) in order to gather data on bird hunting. With the permission and assistance of the village headman, each household was visited and any birds found were identified. Hunters were also accompanied into the field when traps were visited and further information was gathered on hunted species not actually seen in the village.

Results

Hunting habits

All 86 households in the village were visited during the survey period. Only 37 households (43%) reported that they were engaging in hunting of birds but 78 of the households visited (90.6%) were seen to have hunted birds (e.g. eagle and pheasant feathers) or owned at least one type of hunting tool (see hunting methods section). This indicated that hunting by village people was widespread in the village and its nearby forest. Most hunters were male, with the eldest being 68 years old and the youngest being 12 years old in age. They went hunting when conditions permitted throughout the year, except during typhoons and heavy monsoon rains. They even hunted at night for some species, e.g. Collared Owlet *Glaucidium brodiei* and Greater Coucal *Centropus sinensis*. Although some bird species (i.e. thrushes, babblers) might be used as food in the village households, most (pheasants, eagles, owlets, coucals, pigeons and egrets) were sold by the hunters. Sales were sometimes made directly to visitors to the village, but the majority of birds were taken to local towns, where they would be sold in large batches to agents. These agents then sold the birds to market traders or directly to restaurants. Very few birds, e.g. mynahs, were sold mainly as pets, and most were sold for food.

Species hunted

Thirteen species were recorded in the village and a further 65 were confidently identified by hunters as targets, through identifying calls, visual identification in the forest, or visual identification of images in a bird identification guide (MacKinnon and Phillipps 1999) (Table 1).

Four of the species recorded directly were Galliformes, of which two were First Class protected species in China: Hainan Partridge *Arborophila ardens* and Hainan Peacock Pheasant *Polyplectron katsumatae* (Chang *et al.* 2008). Two others were Second Class protected species: Silver Pheasant

Table 1. Hunting and trade of bird species in Nanmao village, Hainan, China

| Species related to trade | China National Protection class | IUCN Red List category 2011 ^a | CITES Appendix listing 2011 ^b | Price (RMB) | No. recorded in village houses |
|---|---------------------------------|--|--|-------------|--------------------------------|
| a) recorded directly | | | | | |
| Hainan Partridge <i>Arborophila ardens</i> | I | Vulnerable | | 10~20 | 15 |
| Hainan Peacock Pheasant <i>Polyplectron katsumatae</i> | I | Endangered | 2 | 60 | 1 |
| Red Jungle fowl <i>Gallus gallus</i> | II | Least Concern | | ♂70/♀40 | 11 |
| Silver Pheasant <i>Lophura nycthemera</i> | II | Least Concern | | ♂100/♀70 | 2 |
| Black-browed Barbet <i>Megalaima oorti</i> | | Least Concern | | 5 | 4 |
| Greater Coucal <i>Centropus sinensis</i> | II | Least Concern | | 5 | 8 |
| Emerald Dove <i>Chalcophaps indica</i> | | Least Concern | | 5 | 29 |
| Mountain Scops Owl <i>Otus spilocephalus</i> | II | Least Concern | 2 | 5 | 1 |
| Grey Nightjar <i>Caprimulgus indicus</i> | | Least Concern | | | 2 |
| Black-eared Kite <i>Milvus lineatus</i> | II | Least Concern | | 200 | 2 |
| Besra Sparrowhawk <i>Accipiter virgatus</i> | II | Least Concern | | 100 | 1 |
| Crested Serpent-eagle <i>Spilornis cheela</i> | II | Least Concern | | | 3 |
| Fairy Pitta <i>Pitta nympha</i> | II | Vulnerable | 2 | 7 | 1 |
| b) reported by hunters | | | | | |
| Chinese Francolin <i>Francolinus pintadeanus</i> | | Least Concern | | 25~35 | |
| Rufous Woodpecker <i>Celeus brachyurus</i> | | Least Concern | | 50/kg | |
| Bay Woodpecker <i>Blythipicus pyrrhotis</i> | | Least Concern | | 50/kg | |
| Lesser Yellownape <i>Picus chlorolophus</i> | | Least Concern | | 50/kg | |
| Greater Yellownape <i>Picus flavinucha</i> | | Least Concern | | 50/kg | |
| Lesser Coucal <i>Centropus bengalensis</i> | II | Least Concern | | 5 | |
| Green-billed Malkoha <i>Phaenicophaeus tristis</i> | | Least Concern | | 50/kg | |
| Red-headed Trogon <i>Harpactes erythrocephalus</i> | | Least Concern | | 50/kg | |
| Oriental Turtle Dove <i>Streptopelia orientalis</i> | | Least Concern | | 9 | |
| Spotted Dove <i>Streptopelia chinensis</i> | | Least Concern | | 9 | |
| Barred Cuckoo Dove <i>Macropygia unchall</i> | II | Least Concern | 2 | 9 | |
| White-bellied Green Pigeon <i>Treron sieboldii</i> | II | Least Concern | | 8 | |
| Green Imperial Pigeon <i>Ducula aenea</i> | II | Least Concern | | 20 | |
| Mountain Imperial Pigeon <i>Ducula badia</i> | II | Least Concern | | 20 | |
| Eastern Grass Owl <i>Tyto longimembris</i> | II | Least Concern | | 15 | |
| Collared Scops Owl <i>Otus lettia</i> | II | Least Concern | | 6 | |
| Oriental Scops Owl <i>Otus sunia</i> | II | Least Concern | | 5 | |
| Collared Owlet <i>Glaucidium brodiei</i> | II | Least Concern | | 50/kg | |
| Asian Barred Owlet <i>Glaucidium cuculoides</i> | II | Least Concern | | 50/kg | |
| Blue-rumped Pitta <i>Pitta soror</i> | II | Least Concern | | 50/kg | |
| White Wagtail <i>Motacilla alba</i> | | Least Concern | | 50/kg | |
| Grey Wagtail <i>Motacilla cinerea</i> | | Least Concern | | 50/kg | |
| Grey-chinned Minivet <i>Pericrocotus solaris</i> | | Least Concern | | 50/kg | |
| Scarlet Minivet <i>Pericrocotus flammescus</i> | | Least Concern | | 50/kg | |
| Red-whiskered Bulbul <i>Pycnonotus jocosus</i> | | Least Concern | | 50/kg | |
| Light-vented Bulbul <i>Pycnonotus sinensis</i> | | Least Concern | | 50/kg | |
| Puff-throated Bulbul <i>Alophoixus pallidus</i> | | Least Concern | | 50/kg | |
| Chestnut Bulbul <i>Hemixos castanonotus</i> | | Least Concern | | 50/kg | |
| Mountain Bulbul <i>Hypsipetes mccllellandii</i> | | Least Concern | | 50/kg | |
| Black Bulbul <i>Hypsipetes leucocephalus</i> | | Least Concern | | 50/kg | |
| Orange-bellied Leafbird <i>Chloropsis hardwickii</i> | | Least Concern | | 50/kg | |
| Oriental Magpie Robin <i>Copsychus saularis</i> | | Least Concern | | 50/kg | |

Table 1. Continued.

| Species related to trade | China National Protection class | IUCN Red List category 2011 ^a | CITES Appendix listing 2011 ^b | Price (RMB) | No. recorded in village houses |
|--|---------------------------------|--|--|-------------|--------------------------------|
| White-rumped Shama <i>Copsychus malabaricus</i> | | Least Concern | | 50/kg | |
| White-crowned Forktail <i>Enicurus leschenaulti</i> | | Least Concern | | 50/kg | |
| Common Blackbird <i>Turdus merula</i> | | Least Concern | | 50/kg | |
| Japanese Thrush <i>Turdus cardis</i> | | Least Concern | | 50/kg | |
| Yellow-browed Warbler <i>Phylloscopus inornatus</i> | | Least Concern | | 50/kg | |
| Asian Brown Flycatcher <i>Muscicapa dauurica</i> | | Least Concern | | 50/kg | |
| Hainan Blue Flycatcher <i>Cyornis hainanus</i> | | Least Concern | | 50/kg | |
| White-throated Fantail <i>Rhipidura albicollis</i> | | Least Concern | | 50/kg | |
| Black-naped Monarch <i>Hypothymis azurea</i> | | Least Concern | | 50/kg | |
| Lesser Necklaced Laughingthrush <i>Garrulax monileger</i> | | Least Concern | | 50/kg | |
| Greater Necklaced Laughingthrush <i>Garrulax pectoralis</i> | | Least Concern | | 50/kg | |
| Black-throated Laughingthrush <i>Garrulax chinensis</i> | | Least Concern | | 50/kg | 1 |
| Grey Laughingthrush <i>Garrulax maesi</i> | | Least Concern | | 50/kg | |
| Hwamei <i>Garrulax canorus</i> | | Least Concern 2 | | 50/kg | |
| Large Scimitar Babbler <i>Pomatorhinus hypoleucos</i> | | Least Concern | | 50/kg | |
| Streak-breasted Scimitar Babbler <i>Pomatorhinus ruficollis</i> | | Least Concern | | 50/kg | |
| Rufous-capped Babbler <i>Stachyris ruficeps</i> | | Least Concern | | 50/kg | |
| Grey-cheeked Fulvetta <i>Alcippe morrisonia</i> | | Least Concern | | 50/kg | |
| White-bellied Erpornis <i>Erpornis zantholeuca</i> | | Least Concern | | 50/kg | |
| Great Tit <i>Parus major</i> | | Least Concern | | 50/kg | |
| Rufous-faced Warbler <i>Abroscopus albugularis</i> | | Least Concern | | 50/kg | |
| Grey-headed Parrotbill <i>Paradoxornis gularis</i> | | Least Concern | | 50/kg | |
| White-rumped Munia <i>Lonchura striata</i> | | Least Concern | | 50/kg | |
| Scaly-breasted Munia <i>Lonchura punctulata</i> | | Least Concern | | 50/kg | |
| Fork-tailed Sunbird <i>Aethopyga christinae</i> | | Least Concern | | 50/kg | |
| Japanese White-eye <i>Zosterops japonicus</i> | | Least Concern | | 50/kg | |
| Long-tailed Shrike <i>Lanius schach</i> | | Least Concern | | 50/kg | |
| Ashy Drongo <i>Dicrurus leucophaeus</i> | | Least Concern | | 50/kg | |
| Bronzed Drongo <i>Dicrurus aeneus</i> | | Least Concern | | 50/kg | |
| Greater Racket-tailed Drongo <i>Dicrurus paradiseus</i> | | Least Concern | | 50/kg | |
| Yellow-breasted Magpie <i>Cissa hypoleuca</i> | | Least Concern | | 3 | |
| Grey Treepie <i>Dendrocitta formosae</i> | | Least Concern | | 3 | |
| Crested Myna <i>Acridotheres cristatellus</i> | | Least Concern | | 3 | |

^aIUCN Red List categories 2011: <http://www.iucnredlist.org> (accessed on 6 July 2011);^bCITES Appendix listing 2011: <http://www.cites.org/eng/app/index.shtml> (accessed on 6 July 2011).

Lophura nycthemera and Red Junglefowl *Gallus gallus*. A further six Second Class protected species were recorded, including three diurnal raptors and an owl. All these species were usually sold dead as they had been leg-trapped and had died before being retrieved from traps.

Many of the hunters claimed that after the outbreak of SARS in 2003 (Wang et al. 2003), the trade in some species of mammals (e.g. masked palm civet *Paguma larvata*) collapsed, further increasing the demand for birds, with larger species such as pheasants, raptors and pigeons being especially popular.

Hunting methods

People in the village used several kinds of hunting tools, including shotguns, air-rifles, metal leg traps, pinchers, bamboo leg hold traps, bamboo cages, pitfalls and electric devices. All of the above hunting tools were purchased by hunters in local towns. Additional traps were manufactured in the villages from local materials. Shotguns were long-barrelled (1.5 m) muzzle-loaders, firing steel or lead shot with a diameter of 2–3 mm or 6–8 mm. The smaller shot was used for small birds and mammals, while the larger shot was reserved for the largest birds and mammals. Shot cost 6 RMB/kg at the time of the survey (\$100 was equivalent to about 650 RMB). Air-rifle pellets were mushroom-shaped and 5 mm in length. They were sold for 4.5 RMB/120–150 pellets and were used exclusively for killing small birds. Both shot and pellets were sold in the general store in the village.

There were two kinds of metal leg traps: large ones (diameter 30 cm) with saw-teeth on two jaws that spring together to catch large mammals, and smaller ‘pinch’ traps (diameter 10 cm) of similar design used for trapping rodents and birds.

Leg snares were of variable size according to the intended prey. Larger ones were aimed at large mammals, while smaller ones were directed especially at pheasants and partridges. The leg traps were sprung by a 1.2–1.5 m bamboo cane. They were designed for catching smaller mammals, reptiles, and birds which live mainly on the ground. Both bamboo cage and pitfall traps were made exclusively for catching turtles and mammals. The spring leg traps and metal leg traps often catch birds. They are capable of trapping pheasants, pigeons, coucals, pittas, laughing-thrushes and even raptors.

Discussion

The study showed that, even in a remote village of Hainan island, China, hunting of birds at a local scale was amazingly high. Conversations with the villagers suggest that until about 1980, wildlife resources were abundant. Hunters just used shotguns to kill large mammals such as deer and wild boar for their own consumption. Subsequently, some villagers began to sell wildlife in local towns but the price was low (1.2 RMB/kg). As the standard of living improved for town-dwellers, people became more interested and able to purchase wildlife for culinary uses, and prices rose. For example, the prices for wild boar, deer and cobra at the time of the survey were 40 RMB/kg, 60 RMB/kg and 260 RMB/kg, respectively. The profits to be made led to unrestrained hunting all year round and at night. Although the public selling of wild species has been illegal under Chinese law since 1988, a prosperous black market has developed since, and the illicit trade continues unabated.

Thus many species of birds have now become hunting quarry in the village and the forest nearby. Amongst them, the two coucal species (Greater Coucal and Lesser Coucal *Centropus bengalensis*) are noteworthy for their popularity. This situation arises because they are consumed very widely in Hainan as a supposed tonic, whilst also being soaked in local alcoholic liquor to produce a traditional Chinese medicine. Of all bird species, only the Barn Swallow *Hirundo rustica* and three swift species *Apus* spp. are deliberately spared by the hunters: they hold a special place in local customs, and in Hainan society in general, partly because they build their nests on houses and are therefore cherished in traditional culture. These observations imply that, for a small number of species, traditional culture can play a role in the conservation of birds and other wildlife at the local or regional scale.

The impact of hunting is being exacerbated by habitat destruction. The area around the village is still being used for slash and burn agriculture. However there is now a tendency to plant rubber trees and betel nut palms as long term, low maintenance and profitable crops, rather than allow areas to return to forest after a few years use for food crops. Numerous areas that had been recently burnt but not used for cultivation of crops were observed. Due to farming activities and human disturbance, many species of bird are now restricted to the higher parts of Nanmao forest.

Our field survey indicated that the Hainan Partridge is still present in the bamboo forest at 600–700 m and in the evergreen broad-leaved forest higher up the slope. The partridges occur at greatest density in the monsoon rainforest close to the ridge-top where one of six partridges carrying a transmitter as part of our research was shot by a local hunter. Despite the remoteness of these habitats from the village, and the extreme density of ground vegetation, we found hundreds of leg snares in this area, and had to stop the partridge radio-tracking research in this area.

Recommendations

In view of our findings, we make the following suggestions for mitigation of this threat to improve the long term conservation prospects for Hainan's forest birds and their habitats.

First, the only way for the forest to maintain populations of the First and Second Class state-protected bird species, including the two endemic species, the Hainan Partridge and Hainan Peacock Pheasant, will be establishment of a Nature Reserve and enforcement of the associated laws designed to protect wildlife and its habitats (Primack and Ji 2000).

Second, the conflict between biodiversity conservation and the exploitation of natural resources by local people needs to be addressed. The standard of living in the village is low, and the income derived from the sale of wildlife is both financially crucial to households and the prime cause of over-hunting in the area. As a means of generating income by alternative ways, the villagers should be assisted to maximise profits from growing crops and supplying minority artefacts (e.g. traditional garments) to the burgeoning tourist industry. Local people should also be given priority for employment in the nature reserve, so that they can maintain a link with their ancestral landscape. They can offer uniquely well-informed guidance to visitors, many of whom will be unfamiliar with their cultural heritage, the tropical rainforest and its wildlife species.

Third, the effectiveness of any management initiatives undertaken in the Nature Reserve can only be judged by monitoring some indicators of ecological health from amongst the wildlife species and habitats present. In this case the Hainan partridge might be promoted as a flagship (Liang *et al.* 2002) for the Nature Reserve as well as a species for annual monitoring. It calls distinctively at dawn during the breeding season (Yang *et al.* 2011), enabling counts to be repeated systematically. It is a prime target for hunters as well as being highly sensitive to human disturbance and habitat degradation (Cai *et al.* 2009). Only through effective management of the Nature Reserve will the partridge population remain stable, or possibly increase.

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