

THE STATUS AND CONSERVATION OF PANGOLINS IN CHINA

Pangolins fall in *Pholidota* order, *Mandilae* family and *Manis* genus. There are only 7 species left in the world where 3 species found in Asia and 4 species found in Africa. The 3 species in Asia which can be found in China are Chinese pangolin (*M.pentadactyla*), Indian pangolin (*M.crassicaudata*) and Malayan pangolin (*M.javanica*). Pangolins in China are mostly found in Changjiang and Nange province. They are listed as China second grade protected species, as well as in CITES Appendix II, IUCN red and green book. The last species (*M.javanica*) mentioned above is the latest wild species found in our country.

Among the 3 species, Chinese pangolin is the most widely spread in China and had the least changes in number of species in a geographical area in history. Other provinces in China still have an average population distribution of pangolins except in Jiangsu province which are most likely extinct in the area (local hunters had not been seen in the production area for more than 30 years). Nonetheless, the pangolins' ecology area is drastically becoming smaller and the population is being segmented into smaller groups like a small islands.

The following articles are about the usage, status and conservation acts of pangolins in our country, and can be used as guidelines by related conservation organizations in scientific research.

(1) The usage and origin resource of pangolins

Usage

The important values of pangolins are as medicine and food. The body parts used are scales and meat. At the meantime, the species used for medicine and food in China are Chinese pangolin and Malayan pangolin while Indian pangolin is seldom used.

a) Medicine

Nowadays, the scale of the pangolins are often used as one of clinical medicines, it has been always used ever since ancient time till now. In September 2002, during a market research at Guangxi Yuling Chinese Herbs shop, it was found out that at least 40 tones of live pangolin scales would be sold if it is on sale in open market. If the average weight of a pangolin scale is 0.62kg that means 40 ton of pangolin scales is equal to 64.516 thousand of pangolins. Because it is already hard to capture pangolins in China, other major Chinese herbs shops get their pangolin scale stocks from Yuling Chinese Herbs shop (average 60%), or taking stocks from Guangxi and Yunnan (average 40%). According to the calculation, our country Chinese herb shops need about 107.527 thousand of pangolin scales. Yang Li Qun (1994), has expected that China needs about 110 ~ 150 thousand pangolins annually to enable to satisfy the needs of the local Chinese herbs shops market. Lee Wen Jun (1998) has found out in his research of pangolins' scale trading market at HeBei AnGuo and others big Chinese herbs shops that the annual trading of pangolins' scale has reached about 80 ~ 100 ton (should say that most of the pangolins' scale supplies in China are centralized in these markets), which also

equivalent to 129.032 ~ 161.290 thousand pangolins. Combining all the data above, it is estimated that China needs between 105 ~ 165 thousand ton of pangolins annually to be used as medicines which is 135 thousand ton on average.

The price value of pangolins in China: In early 80's, the price is RMB8 ~ 12/kg, early 90's at RMB70 ~ 90/kg, mid 90's at RMB110 ~ 130/kg, late 90's at RMB320 ~ 400/kg, early 2000 at RMB420 ~ 450/kg, and the price goes up drastically after year 2000.

b) Food

The love for consuming wild animals in Huanan area especially in Guangdong and Kangou areas already has a long history. After opening up the reformation, the common practice of eating wild animal parts has become more prevailing and has spread from Guangdong area to other economy booming areas and spread more to the whole of China. The most rampant years for consuming wild animals were in late 80's and early 90's, and then it slowly turns into underground activity. Pangolins have been one of the most high class delicacies among wild animals and it has been always seek by wild food lover. In the end, no one knows the total amount of pangolins being slaughtered for food. Figure 2 and 3 show the numbers of pangolins which are slaughtered for food confiscated by forest officer. It shows that the market needs for pangolin as food is growing abundantly and it is definitely a growing trend in China. The officer thinks that the number of confiscation has only occupied 4 ~ 5% in the market. It means that the actual numbers of pangolins used as food in Guangxi and Nanning city is 10.4 ~ 13.0 thousand pangolins which means 28.5 ~ 35.6 pangolins were consumed per day on average in year 2002. Some media reports had proven the fact that Nanning city have to consume about ten thousand pangolins every year which also can estimate the amount of pangolin used as food in Guangdong province for year 2002 in Maoming and Zhanjiang city is 2.60 ~ 3.25 thousand. Therefore, it is estimated that the amount of pangolin used as food in the whole Guangdong province including 21 poor city is 26.0 ~ 32.5 thousand pangolins in year 2002, which means each city consumes 3.4 ~ 4.2 pangolins per day. If including economy rich and consumed a lot of wild animals' cities in the province such as Shanghai, Beijing, Fujian, Zhejiang, Jiangsu and also wild animals' meat lovers in Hainan, plus others less developed city (city, district), the yearly consumption of pangolin in China is at least 100 thousand pangolins, which means at least 100 thousand of pangolins are needed to satisfy the China consumption market needs and probably needs 150 thousand pangolins if the market is fully open.

The price of live pangolin in China: at Hainan is 2 ~ 3 yuan/head during 60's and 70's and it became illegal trading during 90's; at Guangdong is about 40 ~ 80yuan/kg during early 90's, 160 ~ 240yuan/kg during mid 90's, 420 ~ 680yuan/kg in late 90's; near Guangxi border, refer to Figure 1.

Origin resource

During early 80's, the usage amount of pangolin as medicine and food is small. After opening up the reformation, people's consciousness of the economy market had become stronger as well as the knowledge of the usage of pangolin resource is growing

rapidly, especially during early 90's when China had established and entered entirely the social economy market. After into the 90's, because pangolin resources in our country are almost in depletion, and the demand in the country is very high, the benefit of illegal exportation of pangolin is very optimistic, with the condition of many good economy benefits, therefore the illegal trading of pangolins activities began to arise. The pangolins in SEA countries had came into China through Guangxi and Yunnan, and then send to provinces near to the border of South China Sea such as Guangdong, Hainan, Fujian, and also sold to major Chinese herbs stores and restaurants in hotels. According to Long Jun's (1994) research, the pangolins trade at Zhuangzhu municipal area near Guangxi border is about 60 thousand heads of pangolin in 1991, and 30 thousand pangolins in 1992; Fan Ji Yong reported (2000) that 2000 live pangolins and 500 ~ 800kg of pangolin scales were smuggled to China through border of Yunnan every year. The species of pangolin smuggled are those of Asia three species, the main species smuggled in early 90's is mostly Chinese pangolins, Malayan pangolins as the main species smuggled in late 90's and into 2000 era, which mainly for the scales as medicine and live pangolin as food, but there's still no discovery of 4 Africa species smuggled into China. Now, the pangolins used for medicine and food are mostly smuggled, and till now the smuggling activities could not be controlled effectively. The main reasons are the laws related to illegal trading are not perfect, the enforcement of laws are not strict, and these add the level of difficulty to the effort of our country to curb this problem.

(2) The rich resources amount of pangolins and its changes

China has never done a special research on the rich resources amount of pangolins in the country but has used the amount of pangolin seized, amount of pangolin scales being purchased, amount of wild pangolins' burrows etc. as an index to estimate the rich resources amount of pangolins and other changes. In history, Fujian, Guangdong, Guangxi, Yunan, Guizhou, Hunan, Hainan and Taiwan are big provinces with pangolin resources. According to the incomplete statistic of Chinese Herbs department at Guangdong province, it has seized more than 20,000 pangolins in early and late 60's. Fujian, Hunan, Guangxi, Guizhou and Yunan have the similar amount of pangolins seized annually as Guangdong. These six provinces have seized 120,000 pangolins annually. Other producing areas have seized approximately 50,000 ~ 60,000 pangolins annually. Therefore, the numbers of pangolin seized annually in the whole China is around 170,000 ~ 180,000 heads in the early and late 60's. If based on the ratio of 1:5 (20%) amount seized over amount of resources accordingly; used as a comparison to estimate the amount of pangolins in Guangdong and China in the early and late 60's, the ratio is 100,000 to 850,000 ~ 900,000 heads. But from the early 80's, the rich resources amount of pangolins started to decrease and it becomes more severe especially in recent 10 years. Zhou Dong Liang (1996) has compiled a statistic between the year 1982 ~ 1994, it shows that Fujian province has the highest purchasing amount of pangolin scales in the year 1990 which in total of 4092kg, by assuming all the pangolin scale came from Fujian and based on the calculation of 1 pangolin provides 0.62 thousand gram of scale. Therefore, the once big province of Fujian which provides pangolin resources, the amount of pangolins seized in 1990 is 6498 heads and the amount of rich resources is about 32490 heads. It shows that the pangolin resources in Fujian province, regardless of

rich resources amount or amount seized annually, is remarkably lower than the amount in the 60's. It has only left 9153 heads in the year 2000. According to the statistic of Guangdong related department, before the 80's, the annual purchasing amount of pangolin scale in only one area of Shauguan has reached 5000kg (approximately provided by 8065 heads). Now, the total annual purchasing amount of all provinces is only a few hundreds kg (approximately provided by not more than 1000 heads) and most areas have difficulties in keeping the pangolin scale. Lee Wen Jun (1998) had done a research in Jun-July 1994 at South Mountain of Guangdong Che 8th Summit protected area, 24 person per day, in 35 km² area, had discovered only one location with fresh pangolin burrows. By using the method of "counting burrows' hole", they estimated that the pangolin resources at Guangdong province is only about 8409.30-20136.88 heads in year 2000. If compare to the 60's, the amount of resources has decreased by 79.68 ~ 91.59%. Nevertheless, the South Summit is one the richest area in China with pangolin resources in history and in the "An Outline Treatise of Medical Herbs" has earliest record of pangolin "Common Raw Lake of South Summit". Fan Zhi Yong (2000) reported that pangolin resources in Zhejiang province is estimated not more than 10,000 heads in recent years, Guangxi has about 1180 ~ 3550 heads, and some areas in Xinan, Huazhong and Huanan has some remaining of pangolins. Liu Zhen He (1998) thinks that at least more than half of the pangolins have become very scarce or on the verge of extinction in three areas: Fujian, Guangdong and Guangxi, which have the original production areas of pangolin. The author has been to Guangdong, Guangxi, Yunan, Hainan, Szechuan and Zhongqing to do a research on pangolin's burrow. He had done a 18-day research at the main place where the pangolins had roosted and had traveled 68km during this research. The result is he had found 3 new locations with traces of pangolin burrows which indicate that it is very hard to find wild pangolin and the amount is very few. According to the facts of the above analysis, the author estimated that the rich resources amount of pangolins in China at present is not more than 50,000 ~ 100,000 heads. If compare to the 60's, the amount had decreased by 88.8 ~ 94.12% and the result of Liu Zhen He's estimation which had decreased at least 80% become as mutual proof to each other. Table 2 shows the total amount of pangolins gathered from the research of mammals in China. The data collected from 5 provinces (city, district) which are Que Hainan, Tibet, Jiangsu, Anhui and Zhongqing shows there are 63,993 pangolins. We think that the amount of pangolin resources in China will not be more than 100,000 even including the data of the above 5 provinces. The reasons are pangolins in Jiangsu might have extinct; pangolins in Tibet are scattered around in small areas like Mangkang, Chayu, Menyu and Luoyu and in history, the amount of pangolins in these areas is very less, not more than 1000 heads; despite Hainan is the main production area of pangolins in history, but it is one of the worst area where pangolins are poached if compared to other main production provinces and the area is small, according to the on site research calculation, the amount of pangolin resources in Hainan is not more than 5,000 heads; pangolins are rarely seen in Anhui and Zhongqing because these areas are not part of the main production areas, and the amount of wild pangolins is not more than 5,000 heads. Due to the similarity in the result of evaluation (50,000 ~ 100,000 heads) and the result from the general investigation in China, and both results mutual proof to each other, therefore both results have a big degree of truth to believe in. If compare to the current demand of 285 thousand pangolins annually (135 thousand heads for Chinese medicine, 150 thousand

heads for food), it shows that the conflict situations of supply and demand, protection and usage of pangolin in China have become more acute.

Looking at the number of pangolins, the groups of pangolins in China are quite large because the groups are widely spread over China. In fact, the population density of pangolins in each provinces is generally low, the lowest is 0.001134 heads per km² (Table 2). This is aligned to the fact from the research done in the wild where pangolins are rarely seen. Because the group density is low, the chances for male and female pangolins to mate can't be ensured and this suggests that they are facing a life threat.

Table 2 Statistic of pangolins population density and quantity in each province (city, district) in China (year 2001)

	Province	Quantity (x 10 ³ head)	Population density (head/km ²)
1.	Zhejiang	6.300	0.056~0.390
2.	Fujian	9.153	-
3.	Jiangxi	27.500	0.1647
4.	Henan	0.100	0.001134
5.	Hubei	2.600	0.1728
6.	Hunan	5.000	-
7.	Guandong	6.500	0.170~0.610
8.	Guangxi	0.990	0.043~0.430
9.	Szechuan	0.150	-
10.	Guizhou	4.000	0.023
11.	Yunan	1.700	-
	TOTAL	63.993	-

(3) The analysis of reasons for resources in critical condition

There are many factors that caused danger to the wild animals. According to the controlled situation of many years and a lot of local surveys, we think that the reasons for China wild pangolins to be in critical condition are as below:

a) Over captured and exploitation

Over captured and exploitation will caused the exhaustion of resources and is one of the main reasons that caused pangolins resources to be in critical condition and these actions had destroyed the structure of pangolin groups. When the external forces are continuously stronger than the pangolin adaptation power, the pangolin groups will decline gradually until they are unable to revive. The capture of pangolins is centred in the late 70's to late 80's. At this period of time, in Zhen Lian hill village Shigu lake Yingde city of Guangdong province, hunters can captured at least 5,000 ~ 6,000 pangolins in 100km² radius of each village. The old experienced hunter can captured hundreds of pangolins, the least also has 10 ~ 30 heads, and generally about 50 heads, but now there are no more traces of pangolins.

b) The damage of roosting area

The damage of roosting area is another important factor that caused pangolin resources to be in critical condition. The main roosting area for pangolins is in the environment of broad-leaved forest, mixture of broad-leaved and pine forest and thick growth at mountains or hilly areas. They are very strict in selecting living environment, sensitive towards the change of environment and addition to that pangolins are very selective in food where they only eats ants species which shows that pangolins have very poor adaptation to the change of environment. Once the roosting area is damaged, it will cause the amount of pangolin groups decrease rapidly in a short period of time. The main reasons that caused the roosting area to be damaged are deforestation for development, building and repairing roads, exploitation of mineral products, logging of forest, exploitation of resources from forest, illegal logging of forest, fast growing of human population which needs a big activity area and also environmental pollution. These factors had changed the structure of pangolins' roosting area including shrinking of area size and segmentation of population or lost of population.

c) The factors of pangolins' population growth

The evolution of pangolin is very low, and it is always refer to as primitive group among mammals. Pangolin reproductive rate is very low, mostly one young per birth, and give birth once a year. Therefore, the number of population grows very slow. Pangolin belongs to special type of animal, it has special needs in food and hiding area, eats only ants species, needs to live in a stable and specific environment, very poor in adapting to new environment, very sensitive to changes of environment (this is one of the main reasons why it is difficult to be rear by human and breed in captivity), very difficult in adjusting its behaviour to adapt to environment changes, it is a typical K-type strategy animal. Once the amount of pangolins dropped which caused by over hunting and killing, the amount is very difficult to recover. If the population density is very low, the population in certain area may extinct. In the natural environment, pangolins' defend ability is very poor whereby they almost don't have any reaction towards hunters instead their defend mechanism is hiding their heads and four legs at their abdomen, then use their thick and long tail to cover up the whole body which forms a ball-like shape and stay still. This made it easy for hunters to capture them. Sometimes they also open up their scale towards hunters but they lack of auto-attack behaviour. At times, pangolin will run away when meet with dangerous situation but pangolin uses its fore leg to run, therefore the speed is limited and very difficult to run away from being captured by hunters. Besides that, pangolins spend most of its time in burrow. Hunters captured them easily as though the pangolins are trapped in their own burrow. The hunters just need to dig the burrow, fill the burrow with water or smoked the burrow to capture the pangolins.

(4) Pangolins in captive-breeding

Our country had started to explore the technique of captive-breeding in the 80's of the last century. Jiangxi Forest Institute, Jiangxi Gaoan county Forestry Department, Hunan Dragon Mountain county, Guizhou Lei Shan county, Guangxi Pinnan Wild Animal Breeding Farm, Fujian province Forestry Office, Shanghai Zoo, Taipei city

Independent Zoo, Guangdong Zhanjiang Teacher Training College and etc. had done this kind of work. Even though it did not succeed due to many aspects of reasons but it has accumulated a lot of experiences and had initially found out the main direction and solved the key techniques' problems: how to solve the problem of man-made food and captive-breeding area for pangolins and how to prevent and treat pneumonia. Pangolins usually die after staying for a few days in captivity and not more than a month. Most of them die of pneumonia (85.12%). The main reasons are pangolins could not adapt to man-made food and living in captivity.

(5) Suggestions on how to protect pangolins

- Immediately stop the usage of wild pangolins;
- Organize rapid force to carry out thorough investigation on pangolin resources;
- Open up a research centre on wild pangolins to involve more of science and technology and also depends on it to protect pangolins;
- Build a natural protection area for pangolins to have better protection of their roosting area and can carry out protection project locally;
- Vigorously find a replacement product for pangolins used as medicine, use less or don't use wild pangolins at all;
- Vigorously create condition to open up independent research centre to find various protection methods for pangolins;
- Conducts a research on success and failure rate of releasing confiscated pangolins using scientific method;
- Revise the protection grade of all 3 species pangolins in China to become first grade protected animals;
- Suggest to work out an action plan on protection of wild pangolins in China as soon as possible.