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Wildlife At Risk and its programme on Rescue and Conservation of Java Pangolin: *Manis javanica* Desmarest, 1822

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Summary

A total of 139 individuals of pangolins have been rescued by Wildlife At Risk at Cu Chi Wildlife Rescue Station, since 2006. The death rate is 33%. Six (06) pangolins born at the Cu Chi Wildlife Rescue Station were on an experimental program of breeding for conservation. Most of the pangolins was released until its weight reach approximately 7kg per each one at 15 months old. Artificial food is tested to feed pangolin at the station. A good result of adaption is reflected by an increasing weight of the pagolin. However, using the food during breeding period still needs futher studies.The paper also discusses the time to place a pair of pangolins, how to make artificial food for the species and several interesting questions on breeding are questioned.

General Introduction

Wildlife Rescue activities were conducted since the establishment of WAR in Ho Chi Minh City (HCMC) in 2004. Receiving and repatriating of Batagurs (*Batagur baska)* and Orangutan (*Pongo pygmaeus*) to its natural habitats are most important reasons for WAR and our key partner, the HCMC Forest Protection Department (FPD) to set up a Wildlife Rescue Station (WRS) inside Cu Chi FPD campus in HCMC. The Station has received more and more endangered species, including Pangolin (*Manis javanica)* or also called "Con Trut" in some provinces in South Western of Vietnam.

Information in this paper was observed and recorded at Cu Chi WRS during the period from 2006 to May 2015. Further studies are needed in order to support Wildlife Rescue and Conservation activities.

The first group of Pangolins was registered to Cu Chi WRS by HCMC FPD in 2006. These individuals were confiscated from an illegal trade and confiscated by HCMC FPD. They were then rehabilitated and released back to the nature. Any individual that loses some body parts, is kept at the station to support education activities. Taking care of, feeding and treating are conducted, observed and recorded by WAR staff, as belows. We expect to receive more information from colleages in this field in order to be more efficiency in conservational recovering and breeding activities.

Rescuing of Javan Pangolin (*Manisjavanica*) at Cu Chi Wildlife Rescue Station.

The total area for Pangolin rescue at Cu Chi is 3m large by 30m long ($90m^{2)}$ that accounts for 2% of total area of the station. It includes ten enclosures of $6m^2$ each. Three sides of each enclosure were built of ciment of 1.8m height while the front side was created of reinforced glass of 10mm

thichked in order to support observation activities. The iron net was covered on the roof for better security purposes. An iron door was designed at the back for animal keepers to enter or evacuate. At the back of the enclosures' block, there is a lobby (1m x 30m) that is locked after every entry or exit for the purpose of security and accidental escape of wildlife. Because of the pressure of rescuing many species in HCMC, we aren't able to take priority in recuing just one species at the station (*in 10 years from 2006 to2015, over 6,000 heads of different wildlife were rescued and released by the station*)

Since 2006, only one species of Pangolin, the Javan Pangolin *(Manis javanica),* has been registered and rescued at Cu Chi WRS, based on identification documents such as the Vietnam Red Book, and other identification books for Vietnam and South East Asia.

Table 1: The number of rescued and releasedPangolins in the period from 2006 to 2015

Year	**Receive from different sources**		**Out from the Cu Chi (54%)**		**Dead (33%)**	**Remain (13%)**
	Rescued (95%)	Born at the Station (5%)	Releasing	Transfer		
2006	3	0	0	0	0	
2007	22	0	11	9	1	
2008	1	0	0	0	0	
2009	28	0	0	0	19	
2010	51	0	50	0	9	
2011	0	0	2	0	0	
2012	0	4	0	1	0	
2013	1	1	0	0	3	
2014	2	1	3	0	2	
2015	31	2	3	0	14	
Total	**139**	**8**	**69**	**10**	**48**	
	147		**79**		**48**	**20**

Source: Annual Report of Wildlife At Risk.

Table 1 indicates that any big trading case where over 20 individuals of pangolins were confiscated, most of the pangolins were exhausted and dehydrated due to being kept for too long. This leads to high dead rate and quite a few individuals died one in two days after being transferred to the station. As showed in Table 1, the death rate is approximately 33%. In one case shown in table 1, the government acts faster and the pangolins were transferred quicker to the station, number of dead is reduced. Sucessful rescue rate for pangolin is approximately 70%.

One challenge of Cu Chi WRS is that after the pangolins are rehabilitated (normally from three to six months), the government's legal procudures are not completed yet such as no conclusion on how a trading case's evidence should be treated. Therefore, the wildlife might have to be kept for a longer unnecessary time which is not a principle of rescuing and releasing activities.

Table 2: Venues for releasing and receiving Javan Pangolin of Cu Chi Wildlife Rescue Station.

No	National Park and Nature Reserve	Quantity of releasing/ transfering	Year
1	U Minh Thuong National Park – KienGiang	23	2007,2010,2011,
2	Lo go Xa Mat National Park – TayNinh	16	2007,2010,2014,2015
3	Cat Tien National Park – Dong Nai	18	2007,2010
4	U Minh Ha National Park	12	2010
5	Transfer to SaiGon Zoo – Ho Chi Minh City	5	2007
6	Transfer to Palm civet và Small memmals program Cuc Phuong National Park – NinhBinh	4	2007
7	Transfer to Hon Me Wildlife Rescue Station – KienGiang	1	2012
	Total	79	

Base on the procedure for wildlife rescuing applied at Cu Chi WRS (appendix 1), any pangolin that is recovered, does not contain any disease and could move, eat naturally will be proposed to release to a protected area have same habitat of Javan pangolins. Other bases for proposed release sites of Java Pangolin are the Vietnam Red Book or published documents on Vietnam's wildlife and/or WAR's survey results and official confirmation of the national park or protected area where the pangolins are to be released.

Two questions are raised here including (1)**Will released individuals survive? Do they create any conflict with current population?** The first question can be solved by employed radio micro chip to monitor the released wildlife. However, WAR' resources are very limited at Cu Chi WRS while there is a high pressure for wildlife rescue of other endangered species. We would rather focus our resources on save more endangered wildlife and release them back to the wild. Regarding the second question of a conflict between old and new populations, this is a big question and it's impossible to answer in just one or two years. This needs a long term research and monitoring conducted by academic institutes, universities and the protected area with a weighted resources for the issue. At the same time, quite a few nature reserves do not have adequate data on species and its population size. In order to avoide this conflict, if any, the pangolins were released in small group of two to three individuals and on different times in different years.

Breedings of Javan Pangolin (*Manisjavanica*).

In 2010, Cu Chi WRS rescued one female of Javan Pangolin that lost one paw. After its health was recovered, it was paired with a normal male. One other pair was also grouped from one normal male and one normal female for comparison. The pairs were set in each cage as described before. Fortunately, at one twilight night in October 2011, mating activity was recorded for the pair with the lost paw female. In March 2012, the pair delivered two babies. The other pair did not deliver any baby. The reason was unknown.

During the mating and pregnancy time, the male and the female still be kept together in the same cage to avoid stress for wildlife, until the baby was one month old. Then to avoid unexpected effects on babies, the male was separated and then released back to the wild. In September 2012, another baby pangolin was deliveried by the female though there is no male pangolin war paired at that time. This start to creat an interest to WAR staff and a question is **whether the male and female mated in the month right after the female delivered the babies?**

A trial activity of pangolin breeding to be accelerated by WAR team. A male was paired up with the female one, right after she delivered babies. And after six months, the female delivered one baby. However, the baby died right after being born and the female died one week after that. During this time of pangolin be paired up for breeding purpose (2013), they were fed with alternative food (*the issue will be discussed in next part*) in stead of one hundred percent of natural food of ant-egg, as usuals.

At the end of 2013, a new pair of pangolin was set up and they were also fed with alternative food. In early of 2014, a baby was also born but died after that.

The first three baby pangolins (out of four) were released at 15 months old, weighed approximately 7kg each. One baby female pangolin was kept for breeding research purposes.

Summary:a) Of the first two pairs set up in 2011, only one pair delivered babies. Of the three breeding times (March 2012) (September 2012) and (March 2013),the first two times, it delivered two babies while the last one it delivered one baby only. Is it because that **the lost-paw femalehas hight fetility**? **We need to prove it by keeping one of its babies at the station for further studies.**

b) From the end of 2011 to 2014, three pairs were set up. Among those, one did not give birth; one delivered one baby, and the other delivered babies in three times including the first two times with a same male delivering two individuals each time, and the third timewith another male delivering one baby.

c) Total number of babies born due to paring up is six, of which two died, three were released back to the wild and one was kept at the station. Survival rate of young pangolin *in the first week may be 50%* and rely on their feed with its mother's breast milk.

d) **Is this true that female pangolins could continue to mate and breed six months after a delivering?**

In some cases pangolins delivered two babies just after one month being transferred to Cu Chi WRS. In the cases, the mothers might be pregnanced at the time of being rescued already. Table 1 shows that a total of eight individuals of pangolins are born at Cu Chi WRS.

Similar to other wildlife species, pangolin prefers quiet during mating season. Therefore, the cages were set at the furthest place to avoid disturbances. Within seven to ten days after the babies were delivered, noise and access are limited seriously.

Veterinary and Caring

Appendex 1 of this paper introduces essential steps for rescue, examinating and caring a pangolin.This section will discuss about ingredients and food quantity.

Rescued pangolins were fed with ant-eggs or termits. Each pangolin eats a quantity of ant eggs and/or termites which is equal to 5% of its body weigh. This rate is applied for healthy individuals those are going to be released.

For the mother pangolin, the rate is increased to 15% of its weight. And this rate is applied in three months after delivering babies.

Food cost of pangolin breeding: Let's come up with a figure for an average male and female pangolins those weighted roughly five kg, the pregnancy is six months, and the baby nurturing is three months, and young individual starts feeding from the forth month and be released when it is 15 months old. Belows is the cost:

Male and female: 0,5kg ant-egg/day x 30days x 6 months = 90 kg.

The female that feeding baby after delivering babies in 3 months:

0,3kg ant-egg/day x 30days x 3 months = 27kg.

Young pangolin starts eating from the fourth month to 15 months old:

0,15kg/day x 30 days x 12 months = 54kg

Everage price for a kilogramme of ant-egg is 200.000 VND.

At Cu Chi WRS, food for pangolins was created from additional ingredients and anteggs in order to reduce cost for rescuing and breeding of pangolins. This combination started in October 2013 and ended in the beginning of 2015. The rate of food was 10% of its body weight. A formular introduced in next section were used by WAR staff after learning from other rescue centeres in other countries.

Formular of alternative food for pangolin at Cu Chi.

The alternative food accounts 10% ofpangolin's body weight.

* Below are ingredients of the alternative food for an average pangolin of 5 kg.

1/ Grinded apple:	0,2 kg (41,87 %)
2/ Ant Eggs and Ants:	0,16 kg (33,76%)
3/ Grindedcoconut:	0,05 kg (10,50%)
4/ Bread Yeast:	0,025 kg (5,25%)
5/ Chicken egg:	0,041 kg (8,62%)

A total of 0,476 kg of alternativefood is cooked and kept in atmosphere temperature before feeding at once.

Our observation shows that the pangolins adapt to alternative food and gain weight rapidly. While using alternative food, the babies were born two times. Alternative food was fed during mating and nurturing time. However, in both cases of delivery the babies died one day after being born. (!)

Two theories are raised including (1) The female pangolin that gave birth three time continuously in 2012, 2013 and died after delivering baby the third time one week, might be too old or level of delivery is too close (*every 6 months in 1.5 year*). 2) The alternative food might not suitable for the female that the milk is not enough for the baby or the nutrient from mother was not healthy enough to transfer to the embryo during the pregnant. This need further studies.

Conclusion

This is a completely new activity. Our observations will be continued in the future and we do hope to come up with further results.

The main objective of Cu Chi WRS is rescue and release as much as possible the endangered species including pangolins. However, we do hope that there would be less wildlife confiscation and thus less activity of wildlife' rescue and release so that we could focus our resources on further studies.

It's feasibility to breed the pangolin for conservation purposes. However, it's needed to study about nutrition, enclosures and survival rate after born. The sucess of pangolin breeding might also depends on fertility of females.

Further reseaches on pangolin breeding which might be resource and time costly, need to be supported by a reseach centers, institutes and/or a university.

Reference

1. Vietnam Red Book, 2007.
2.Mammals of Vietnam, 2013.
3.www.wildlifeatrisk.org
4.www.iucnredlist.org

Appendix 1: Rescue Procedure.

1. **General examination:**Examinations were conducted to different body parts including claws, legs, eyes, snout, and scales… in order to evaluate its condition. Gender and species is also identifies at this step. This is applied upon wildlife come to Cu Chi WRS. No food appliedin the first 10 hours since animal arrive to rescue center, except drinking water. Animals under a supervise of VET.
2. **Weighting:**This helps to decide the suitable amount of food for the individual (if an individual is too fat, the amount of food could be reduced).
3. **Creation of a registration record:** This is to record information of each individual of wildlife and then being updated.
4. **Isolation:** This is to prevent diseases, if any, from transplanting into other rescued wildlife at the Station. Isolation time depends on health condition of each individual but it should be at least 21 days (3 weeks).
5. **Food quantity:** Pangolin feeds mainly on ant-eggs and/or termites. Food quantity for each individual depends on its weight at the time of rescuing. Normally, the food quantity is equal to 5% of the body weight. The pangolin is fed once per day at 5 pm (This is standard time for nocturnal animal).
   Ex:Food quantity for an individual of 5kg (5% of its body weight).

Name of food	Unit	Item	Note
Ant egg	gr	250	
Termite	gr	250	

6. **Purgative**

No	Name	Ingridient	Item	Note
1	Ivermectin	Ivermectin	0,003mg/kg	
2	Levamisole	Levamisole	5mg/kg	

7. **Enclosure cleaning:** The enclosure is cleaned up, and water is changed every day in order to prevent skin and digestive disease. Antiseptic liquid is sprayed twice a month.
8. **Releasing back to the wild:** After being rescued and rehabilitated for one to six months, the pangolins could be released back to the wild. The venue for releasing should be a protected area that is suitable to pangolin. Only healthy pangolins could be released back to the nature. No food applied to animal before travel one day.

Appendix 2: Some photos of rescueing and releasing Pangolins at Cu Chi Wildlife Rescue Station

Image 1: Pangoline rescue area at Cu Chi Wildlife Rescue Station

Image 2: Inside a Pangolin'senclosure

Image 3 and 4: Releasing Pangolins to Lo Go Xa Mat National Park – TayNinh Province

Image 5: Receiving Pangolins from Enviromental Police of Ho Chi Minh City.

Image 6: Pangolinsare mating at Cu Chi Wildlife Rescue Station.