BPCP

FINAL REPORT

Conservation and Monitoring of Tibetan Antelopes in Hoh-Xil Nature Reserve

(Project No. 201404)

Period covered: May 1, 2004 – January 31, 2005

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1. SUMMARY

The Tibetan antelope (*Pantholops hodgsonii*), otherwise known as chiru is one of the world's most endangered species. It is listed as Endangered animal by the World Conservation Union (IUCN)[6] and given local protection by China under its Wildlife Protection Law which prohibits hunting and trade[1-4]. The chiru is also protected by CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora)[11]. In the last one century, hunt grazing was the main threat to this species. These years the actions of governments and wildlife protection organisations have brought poaching under control. But there are other dangers, the deterioration of the antelope's natural habitat and the degradation of the environment are continuing threats to the survival of the species. Tibetan Antelopes habitat in the vast expanse of 880,000 square kilometers in Qinghai-Tibet Plateau. Hoh-Xil is one of the main distribution areas of the chirus. Each year, flocks of Tibetan antelopes will move to *Zhuonai Lake* and *Taiyang Lake* to give birth. The newly built Qinghai-Tibet railway is right on their migrating corridor. In order to ensure the chirus pass through the railway safely, 15 passages were built in Hoh-Xil [12, 17]. It is the first year that all these passages put into use. In the two months of migration season we monitored 10 kilometer-wide migration corridor including two wildlife passages (*Hoh-xil passage* and *Chumaer River passage*), above 90% of chirus passed the railway in this area. We successeded in monitoring the movement pattern of the migrating population along the rail line. In mid-June, we recorded 1660 female antelopes migrated into Hoh-xil, all of them using Hoh-xil passage to cross the railway. By late August, chirus went back, 2303 individuals passed the railway, among which 1/3 were new born babies, about 56% using crossing structures, the others over passed the railway directly. The efficiency of passages are greatly improved than last year, when only 400 chirus using wildlife corridors and hundreds of them gave birth near the railway. The efficiency of crossing structure was affected by the structure of the passages, wolf, un-recovered vegetation and *etc*. The results provided valuable information on behavioral ecology and migration of chirus, and may diagnose a potential problem on infrastructure development at an early stage, which may be the main threaten factor to this endangered species in the future.

This project is not only a monitoring project but also a conservation plan. Together with the staff from the Reserve Management Office, we cleared the rubbish under the bridge, limited the activities near passages, assisted in stopping the traffic to help the chirus cross the road. Our monitoring results and recommendations were provided to Bureau of Forestry, transportation department. It will be used to make conservation plan for the next migration season.

Before fieldwork started, our training workshop was held in field, involving several staff from the management office and transportation agency. It is a short but efficient training course. After fieldwork finished, our team members gave some presentations about our project in middle school, universities, scientific communities and BP Beijing office; the presentation got very active response. Our project greatly improved the public awareness on Tibetan Antelopes.

Key words: Conservation, Monitoring, Tibetan Antelopes

2. INTRODUCTION

The Tibetan antelope, or Chiru, is the only genus of large mammal endemic to the Tibetan Plateau, distributed between *Ngoring Hu* in China and the Ladakh region in India. The geographical range once extended to western Nepal, but none have been seen for several years [5,7,8,13,18]. Tibetan antelope is regarded as an threatened mammal in the IUCN Red List, and also in the Appendix I species under the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES); In China, the chirus are stated as a Class I protected species, prohibiting capture as well as the big games except for special permit from the government. By the mid-90s chiru numbers decreased from one million or more to less than 75,000 in a century, estimates by George Schaller [9], due principally to poaching for shahtoosh. There used to be large herds of 15,000 or more but now live in much smaller aggregations[9].

The movement pattern of chiru is quite complex, both resident and migratory populations exist. There are differences between the movement patterns of the females and males. Seasonal migration of females and yearlings is the main character of chiru reproduction. Each summer adult females and their female offspring of last year will move about 300 kilometers between their winter mating grounds and summer calving grounds, while males tend to remain near their wintering grounds, until eventually join a mixed herd when females back. In late June to July single calves are born. Till now the wintering areas of chiru are fairly well known, but not adequately information are available on most calving areas. *Zhuonai* and *Taiyang* lakes are clearly known main calving ground of Tibetan antelopes, located in northwest of Hoh-xil National Nature Reserve (HXNR). Schaller reported that there were at least four and possibly more major migratory populations on the Tibetan plateau, each with different migration routes [9]. Hoh-xil is one of the most important breeding ground of the four populations mentioned above. The HXNR is located in the territory of Qinghai Province; the altitude is 4,500 meters on average above sea level[13]. Every June and July the antelopes migrate to *Zhuonai* and *Taiyang* Lakes to calve where the climate is pleasantly cool and water and grass are abundant. In late July of early August, they begin migrating back with their calves.

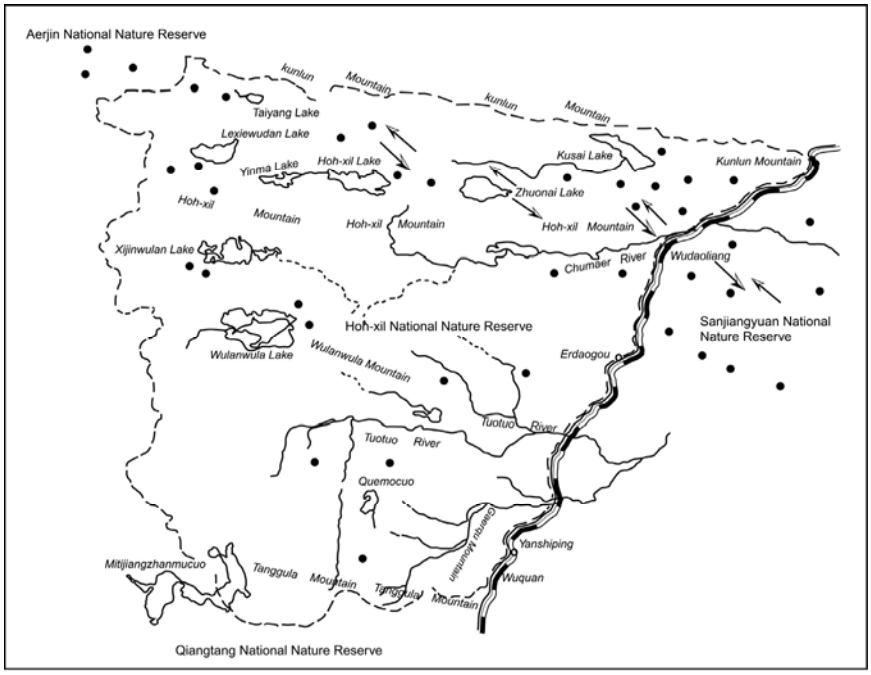


Fig.1 Distribution and migrating route of Tibetan Antelopes in Hoh-xil nature reserve

The Qinghai-Tibet Railway, which is 1,956 kilometers long, will be the highest and longest plateau railway in the world, scheduled to begin operating in 2006. It went across three main national nature reserves; among them two were especially designed for Tibetan Antelopes. The newly built Qinghai-Tibet Railway (QTR) from Golmod to Lasha is just across the chiru's migrating corridor on the boundary of HXNR and Sanjiangyuan Reserve. In order to ensure the chirus and other species pass through the railway smoothly, 15 passages were designed in the reserve, including overpass, under pass and some bridges. The main structure was finished and put into use in 2004.

In the past ten years, Chirus have received a great deal of attentions from scientists and governors. Recently work mainly focused on their biology, behavioral ecology and reproduction. We ourselves also have made some studies on the population genetics and got some useful data from the DNA sequence analysis. The result indicated that gene flow exist among the different populations. The chirus in Hog-wild is now facing three major threats of survival: Hunting grazing, impact of human activities and the trends of global warming. The impact of infrastructure especially transportation development on the habitat and migration of chirus are main factors that will threaten this species now and in the future. As it was the first time that animal safe passages have been used in the railway construction in China, we have almost no useful scientific information and experience about it until recently, it is still lack of methodical studies. The government and transportation department have already recognized the conflict between railway construction and migration of chirus but have no idea and sufficient information to make a reasonable conservation plan for the species. Will the construction disturb the migration and exchanges between populations? Can antelopes pass through the railway smoothly? How effective the passages can work? Which kind of corridors is more efficient? From all reasons above we organized this project.

3. AIMS AND OBJECTIVES

3.1 Project aims

The aim of this project is to assess the disturbance of construction of the newly-built QTR to the migration of chirus, survey the status of the species using field-monitoring techniques. Results from this study may diagnose any potential problems with transportation development at an early stage and provide solutions to reduce conflict between railway construction and conservation.

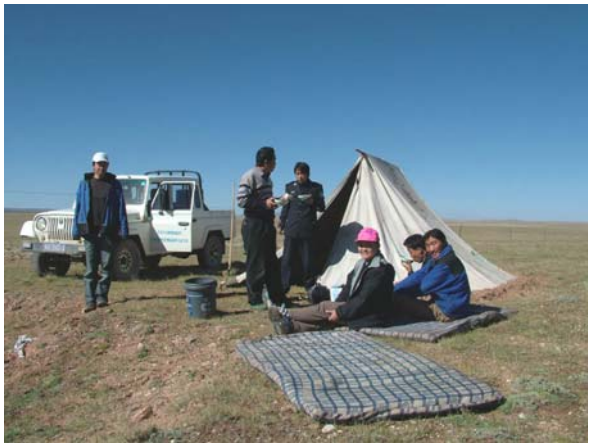
3.2 Objectives

1) Provide reliable information on behavioral ecology and migration of chirus.
2) Disturbance caused by the railway and construction is identified.
3) Efficiency of the different wildlife corridors is assessed.
4) A reasonable conservation plan for the construction period and for the future generated.
5) Mornitoring techniques and field skill of the local students and residents are improved.
6) The management and conservation of the chiru and their habitat are advanced.
7) The links with the local staff of the Department of Forest, transportation angency and NGOs are strengthened or created.
8) Public awareness of the species is improved.

4. METHODS

4.1 Training

Our training workshop was held in field, involved several staff from the management office and transportation agency. We discussed some problems in monitoring method and exchanged our experience in field survey. It is a small but efficient training course.



4.2 Field servey

During 20th June and 22th August, we monitored the movement pattern of the migrating population along the rail line, two methods were used.

4.2.1 Video Cameras and Time Lapse Video Recorder

Video cameras were used in two under bridge passages (*Chumaer River* Passage and *Hoh-xil* Passage) on the main migrating route to record the passes of chirus, it also could help to observe the behavior that may indicate hesitancy or stress in animals using the crossing way. 90% of the antelopes crossed the railway by using these two bridges or over pass the railway bed between which. Most of monitoring equipments and data transferring were provided by Ministry of Railway (MOR). The equipment can work 8-10 hours continuously with sun power supply during the daytime. The video cameras were mounted under the bridge in different direction. Data can be recorded with the Time Lapse Video Recorder, then transferred by an data cable to MOR office in Golmod, 270 km away from

the working sites, and recorded in an hard disk

4.2.2 Counters

We also counted the number of chirus, which pass through the crossing structures, and those went across the railway not using the passages. In some situation such as rainy or cloudy, the video camera could not work or keep on working continuously; and chirus may over pass the railway in different position, we have to count the number of chirus by telescopes directly. The work is simple but efficient. Chiru is active in the daytime and rest at night, their activities concentrated during the daytime. It's possible to monitor their moving by very simple equipments. We drove a vehicle with the staff of the reserve along the Qinghai-Tibet Highway (QTH), which accompanied the rail line to inspect the whole working area.

5. Other Project Components

5.1 Supporting institutions

Institute of Zoology Chinese Academy of Sciences
China Ministry of Railways

5.2 Local participation and approval

Institute of Zoology Chinese Academy of Sciences
Administration Bureau of the Hoh-xil Nature Reserve
Bureau of Forestry, Qinghai Province (BFQH)
China Ministry of Railways

In the last two years we have worked with BFQH, MOR together to design the passages, and developed a good relationship with MOR, the local government and the Nature Reserve.

Hoh-xil Nature Reserve is almost uninhabited. The Chinese Ministry of Railways was the major stake-holder in this area. They helped us to set up the working sites near the passages and also to make provision to deliver recommendations from our study team to other stakeholder agencies.

5.3 Government permission

In this first year monitoring project, no animals will be handled, so special government permission will not be needed. We have got fully supporting by BFQH, MOR and HXNR.

5.4 Public Awareness and Education

The data of the monitoring will be presented back to the local community members and the related government units we mentioned above. The results will also be presented to the scientific community and some non-government organization. The training course provided valuable field working skills to the staff of MOR and the reserve, and it helped us to set up an efficient network among the Reserve, Institutions and local government also.

6. MONITORING RESULTS

6. 1 Westward migration (From winter range to calving ground)

From June 21st to July 2nd, 1660 chiru individuals passes were detected at *Wubei Bridge* (*Hoh-xil Passage*, which is an under bridge corridor), chirus moved from *Sanjiangyuan* Reserve into HXNR to give birth, including females and sub-adult females and 9 new-born babies. As sub-adults grow rapidly, it is difficult to distinguish yearling females from adults [9]. The pregnant female and sub-adult females have a tendency to form large herds to go across the railway. We accounted the group size and chirus number in our survey area along the rail line. Each day the chirus accumulated into large herds under the rail bed or moving along the rail line, attempted to cross the railway. We recorded 29 groups in westward migration under *Wubei Bridge*, which is the main wildlife passage in this area; the group size was 256.9 on average, 54.1% of them formed large herds above 300 individuals (Fig. 4 and Table 4), while last year only about 400 chirus used this crossing structure, hundreds of pregnant females gave birth near the railway. The chirus accumulated under the bridge during the daytime, and scattered after the sunset if failed to cross the railway. They went back to the bank of *Chumaer* River, where is

about 6-10 km far from the corridor, abundant of grass, they rested during whole night. All of the chirus passed through the bridge smoothly within 12 days (Table 1, Fig 2).

Table 1. Summary of chiru passes at Wubei Passage in Westward migration

Date	6.21	6.22	6.23	6.24	6.25	6.26	6.27-30	7.1	7.2	Total
Number of individuals	400	0	697	0	121	175	0	80	187	1660

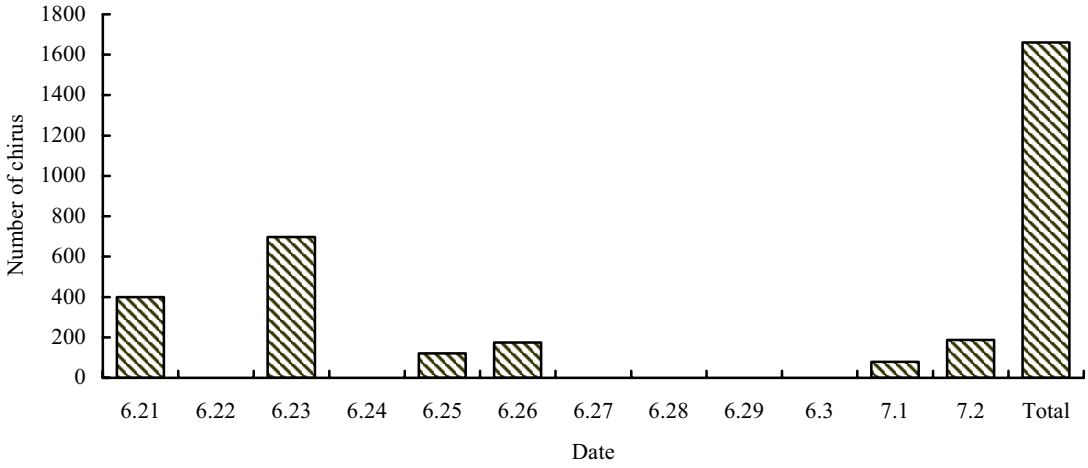


Fig 2. Summary of chirus passages at Hol-Xil Passage in Westward migration

6. 2 Eastward migration (From calving ground to winter range)

In late July, antelopes came back with newborn offspring. Our working sites were set about 300 km from the calving ground, when the chirus returned near the rail way, the babies were at least one month old. We sampled 51 populations randomly, the ratio of offspring to female adults varied in different groups from 15:100-94:100, with an average of 53:100 (Table 2). Under normal circumstances, the ratio of young to females ranged from 30:100 to 50:100 in Qiangtang [9], which is another winter range of chirus. Our number is a bit higher than the ratio reported by Schaller. But the number of death will increase in the unfinished trip, and also in their first year of life, "in the winter and early spring, one third of the young died", said by Schaller[9]. So at last the ratio of young/female adult will be 30:100 to 40:100, on an average level as before. The railway disturbance on birth rate of chirus seems not significant. The return population were smaller in size, individuals activity dispersedly, no group larger than 300 was found, the average group size was only 87.7. (Fig 4, Table 4). In the back trip 45.8% of chirus over passed the rail bed directly, not using and wildlife corridors (Fig 3 and Table 3). Our field work finished on August 18th, when main chiru population crossed the railway, the number after August 18th was provided by staff of the HXNR. 2303 individuals were recorded passing the railway in total.

Table 2. Population composition in return migration

Sample Population	Adult and Sub adult female	New born Offspring	Offspring/ 100Adult Female
1	51	41	80
2	54	31	57
3	17	14	82
4	15	8	53
5	7	3	43
6	32	30	94
7	27	17	63
8	14	7	50
9	5	4	80
10	9	2	22
11	14	6	43
12	6	3	50
13	17	6	35
14	17	13	76
15	37	18	49
16	21	14	67
17	24	14	58
18	73	40	55
19	44	26	59
20	84	63	75
21	11	4	36
22	54	26	48
23	7	4	57
24	25	5	20
25	18	3	17
26	62	29	47
27	27	15	56
28	57	27	47
29	32	12	38
30	128	72	56
31	129	63	49
32	11	9	82
33	14	8	57
34	22	19	86
35	60	30	50
36	72	40	56
37	22	12	55
38	44	17	39
39	13	7	54
40	20	10	50
41	46	25	54
42	27	13	45
43	26	11	43
44	24	16	67
45	14	6	43
46	67	18	27
47	41	27	66
48	8	3	38
49	33	8	24
50	174	97	56
51	33	5	15
Σ	1894	1008	53

Table 3. The number of chirus passes in return migration

Date (Aug)	08	09	10	11	12	13	14	15	16	17	18	19-	Total	Passages/ Overpass(%)
Number of individuals using passages	0	0	0	0	190	444	0	178	298	181	0	0	1291	56.1
Number of individuals over passing the railway	3	0	21	0	0	0	243	86	0	21	143	495	1012	43.9
Total	3	0	21	0	190	444	243	264	298	202	143	495	2303	

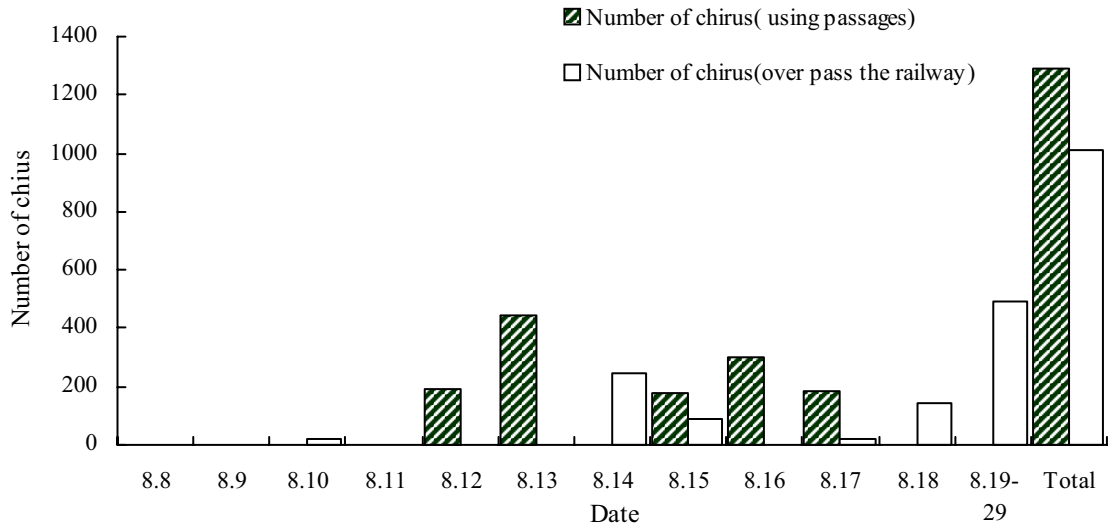


Fig 3. The number of chirus across the railway in return migration

7. DISCUSSTION

7.1 Comparison of Westward migration to return migration

7.1.1 Group size

The population in westward migration was different in group size from that of in eastward migration (Fig 4, Table 4). The reason which causes the difference is quite complicated. Firstly, Qinghai-Tibet highway is accompanied with the railway, in return migration chirus had to first cross the road then pass the railway, the busy traffic disturbance force the chirus to scatter into small groups, it's impossible for a large herd to cross the road in a very short time. The highway was built in 1950's, chirus have used to crossing the highway in their migration in more than half a century, they have more experience in facing the road than it in railway. When they arrived in Chumaer River near the highway, they will stay for ten to twenty days, feeding babies, before continue with their return trek. They divided into small groups to cross the road. As the space between highway and the railway is narrow, there is no enough space for antelopes to form large herds. However, in westward migration antelopes would first pass the railway, the rail bed is much higher and the slope is sharp, though there

are some bridges and wildlife passages, without experience, these infrastructure may be danger to them. Chirus formed large herds which can lighten the stress caused by new barrier. This may partly explain why chirus accumulated under the railway. But the fact is even before return population arrived in the area near the railway, the population was already quite large in size, this was confirmed by the staff of the Hoh-xil Reserve, who inspected the whole migrating routes and the calving ground of chirus many times. We deduce this may due to the pressure of reproduction, the pregnant female formed large herds to ensure the efficiency to get to their calving ground in time safely, it's dangerous to give birth on their way of migration. But when they arrived in the summer range, the date of confinement is different, to take care of the offspring, it's impossible to start their back trip in large herd on the same time. All this explanations are still lack of enough data to confirm, which may need further research in the future.

Table 4. Comparison of Group size in Westward and Eastward migration

Group size (Individual)	Number of Population (Westward)	Number of Population (Eastward)	Number of Individuals (Westward)	Number of Individuals (Eastward)	Number of chirus in different size of Population/ Total number of chirus (Westward)%	Number of chirus in different size of Population/ Total number of chirus (Eastward)%
0-50	8	11	227	313	3.0	13.2
51-100	4	5	292	399	3.9	16.8
101-150	2	8	270	962	3.6	40.6
151-200	2	1	378	195	5.0	8.2
201-250	3	1	689	223	9.2	9.4
251-300	2	1	575	276	7.7	11.7
301-350	3	-	987	-	13.3	-
651-700	1	-	651	-	8.7	-
701-750	1	-	707	-	9.5	-
751-800	1	-	772	-	10.4	-
851-900	1	-	900	-	12.1	-
1001-1050	1		1001	-	13.4	-
Total	29	27	7449	2368	-	-
Average	-	--	256.9	87.7	-	-
Median	-		178	88	-	-

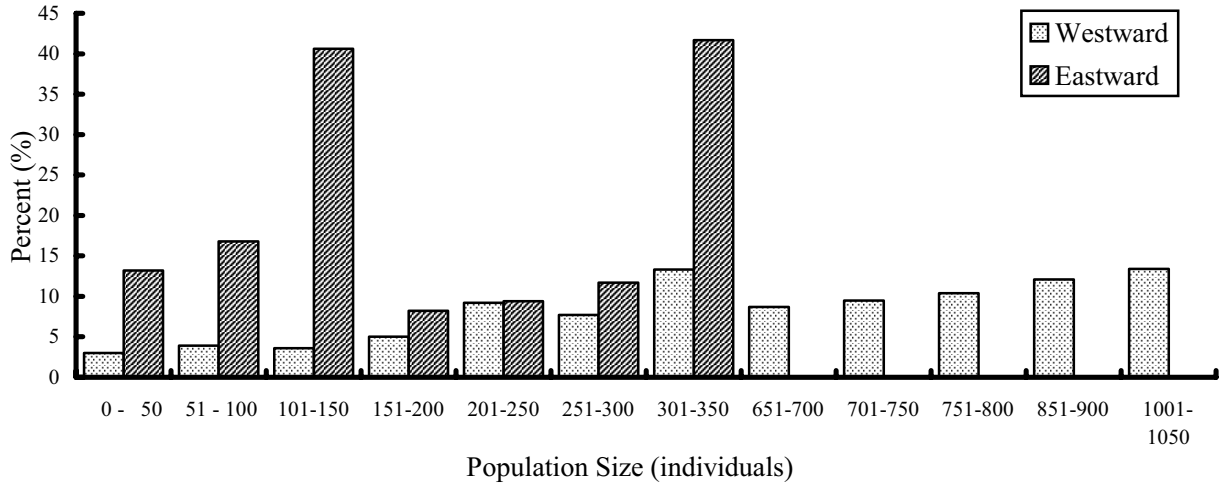


Fig 4. Comparison of Group size in Westward and Eastward migration

7. 1. 2 Passage use and migratory period

The using of wildlife passages is obviously different between Westward migration and the back trip. All chirus passed through the railway by Hoh-hil Passage, while only 56.1% of chirus used the crossing structure in return migration. As mentioned above, in back trip the chirus will first cross the highway, in the 10 km of migration corridor from Chumaer River to Wu Daoliang (Fig 1), the average distance between highway and railway is about 1 km, in some area only 200 m. The road traffic disturbance, human activities and poor living conditions made chiru only make a short stay in this area. Due to the heavy road traffic, the chirus had no chance turning back to the other side of the highway but to over cross the rail bed when in danger, such as wolf, tourist or anything meant danger to them. We have found a group of chirus made up of 20 female adults and 10 babies scattered by a wolf, they quickly climbed up the sharp slope of rail bed, cross the railway, running into the vast grassland on the other side of the railway. However, in westward migration, before crossing the railway, there was a large area with abundant food, water and enough space for escaping from danger. There may be another reason, we found the young babies are much braver than their mothers, sometimes they led the group over across the rail bed, to take care of young, the adults had to follow with the babies.

In migration before giving birth, 1660 chirus passed our working sites in 12 days in large herd. In return trek, 2303 individuals spent 22 days passing through this area, 77.46% of chirus passed the railway from Aug12th to Aug17th. On Aug 20th, after the construction suspended for two weeks, the activities near the Wubei bridge continued, which disturbed the rest of chirus to use wildlife corridors.

7. 2 Disturbance to migration of chirus.

7.2.1 The railway structure itself

The railway itself is a physical barrier. The impact of the huge structure on chiru activities is apparent. When chiru faced this “Great wall”- like infrastructure, they hesitated under the sharp slope of the rail bed and gathered into large group, this had not happened before the construction of rail way. Though the "passage ways" - trestle bridges, mostly - have been built at key points along the migrating route, the instincts of chirus may instead prompt them to climb up to the high ground of the rail bed and have a wary look around before proceeding just like crossing the highway. In fact this happened last year in the main construction period, when the rail bed is still in built, not covered with stone which used for protecting the rail bed. Only 1/4 or less using the in-built passage. The efficiency of corridors greatly improved this year, all chirus passed through the crossing structure in Westward migration. With last year’s experience, the chirus began to adapt themselves to the new circumstances. The learning ability of chiru gave us strong impression. But only one-year data is not sufficient to get the conclusion whether the wildlife passages is successful of not, the efficiency may changed annually, and the rail track and accessory structure in built will also have impact on migration of chirus in future. In summary, from the monitoring results, we can say the railway structure itself have significantly impact on migration of chirus, but not disrupt their migration corridors. Long-term monitoring work is quite necessary.

7.2.2 Destruction to land surface

The destruction to land surface under the wildlife corridors and along the rail line is another main impact on chiru activities. Tibetan antelopes are very sensitive animals, sometimes seemed “a bit

nervous" in our mind. One afternoon, we saw a small group of chirus have just crossed the road, running along the rail line, under a small bridge which is about ten meters long, two meters high, they made some attempts to go across it, one adult passed through it successfully, but on the other side she suddenly stopped, stuck by a rail track and turned back. This also happened sometimes when a small hole, bricks under the bridge or tools using in construction on their way. Any change on the land surface may affect or even stop the chiru from moving. They seemed very careful with anything happened on land surface, but sometimes ignore the running train over their head! According to railway construction planners and the Qinghai Environmental Protection Bureau, the area affected by the rail bed's construction is to be returned to its original condition. Detailed plans call for the replanting of any and all vegetation that is destroyed in the course of construction. We saw some turf transplanted back to the rail bed. In fact the swathe of tundra disrupted by railway construction is quite narrow. The most worrisome sites are the intermittent staging areas and sand quarries located off to the side of the railway construction site, roughly every ten kilometers. In last year's migration the chiru could not use the corridors partly due to this reason. As main structure of railway in Hoh-xil have finished this year, most of sand quarries and material were moved off, the condition of passage improved. But we can still find such things under the crossing structures or along the railway, which affected the passage of chirus. Fortunately, first time the railway departments have mapped out strictest standards in China's railway construction history to ensure that the railway is environmentally friendly. All heads from the construction teams have signed a contract committing themselves and their fellow workers to protecting the local environment during the building of the railway. On our way from Golmud to Hoh-xil, the post-construction clean up along portions of the railway, where construction is finished, looks fairly good. The railway construction firms confirmed to remove all equipment and recovered the vegetation upon completion in all construction sites, we think the efficiency of crossing structure will be greatly improved.

7.2.3 Human activities

The Qinghai-Tibet railway runs along the eastern boundary of the Hoh-xil Wildlife Protection Reserve, all human activity has been banned in this area. The construction of the Qinghai-Tibet Railway and the nearby highway brought human activities to the reserve. In all disturbances to migration of chirus, human activities might be the most serious one. Chiru is active in the daytime, could not keep them from the disturbance of human activities. The migration season is in summer, when is the most busy period during construction

of railway or other activities on Plateau. The tourists, volunteers, scientists crowed into this area. The attempts of crossing highway or railway made by chirus were often interrupted by exciting tourists or truck drivers. During the short concentrate period both in Westward migration and their back trip, all activities was limited or stopped near main passages by management department of Hoh-xil Reserve, to ensure the chiru pass through construction sites smoothly. The contractors have been doing their best to minimize the adverse impact of the railway's construction on migration, but the activities of tourists and truck driver were not under control, and greatly affect the migration of chirus. We have seen a truck driver chasing a group of chirus, a tourist rushing into a large herds to take photos, someone throwing stone to chirus, we were trying our best to persuade them from doing so, but have no rights to limit their activities. Human activities brought by railway and highway may be main threat to this species now and in the future even than the infrastructure itself.

7.2.4 Road effect

It's difficult to distinguish whether the disturbance on chirus caused by road or railway in the narrow zone between railway and highway, especially in return migration. The chiru passages at railway depended on the crossing efficiency of road. The road effects included traffic flow, human activities and features of the roadbed.

The Qinghai-Tibet Highway is the most important transportation lifeline to Tibet Plateau, nearly 85 percent of Tibet's inbound and outbound goods and materials are carried along this highway. The Golmud-Lhasa road has degraded under hundreds of heavily laden trucks. To take advantage of the short summer work season on high plateau, the construction period concentrated during June to September, the foundation work for the rail bed increased the already busy road traffic. Among the four highways to Tibet Plateau, the road condition of Qinghai-Tibet highway is the best due to weather condition and landscape. In the rainy season, the coach, trucks and other transportation vehicles all selected this route due to safety consideration, brought more traffic pressure on the highway. We made some primary research on road traffic, recorded six days of traffic flow, during the most concentrated migration period; the average traffic flow was 1.24/minute in daytime. The peak occurred in 13:00-14:00pm (showing in Table 5 and Fig 5.), the number increased to 3.28/minute. We also monitored the movement of chirus, accounted the number of groups which attempt to cross the highway, found high frequency of passes was just during the most busy period of traffic. (Fig5 and Table 5.), that reduce the successful rate in crossing the highway, and affect the passages of railway in the back migration. Relationship between the traffic flow and migration of chiru still need further investigation.

We are hoping the situation will be advantaged when the railway put into use. By 2007, 16 trains will shuttle between Golmud and Lhasa every day, the railway will offer a safer, convenient and reasonably-priced means of travel for Tibetan people and tourists, it can carrying nearly eight million

tons of cargo annually, coal, cement, oil and other essential raw materials will be transported to Tibet from China's resource-rich regions by train instead of road transportation. The pressure on road traffic may be reduced.

Table 5. The traffic flow in Qinghai-Tibet highway, and crossing attempts made by chirus.

Time period	9:01-10:00	10:01-11:00	11:01-12:00	12:01-13:00	13:01-14:00	14:01-15:00	15:01-16:00	16:01-17:00	17:01-18:00	18:01-19:00	19:01-20:00
Average traffic flow of six days (Per hour)	72	69.3	74.9	69.4	98.4	87.0	80.53	75.4	65.4	63.2	65.2
Group number of making attempt (Per hour)	3	2	9	4	7	6	6	1	0	2	3

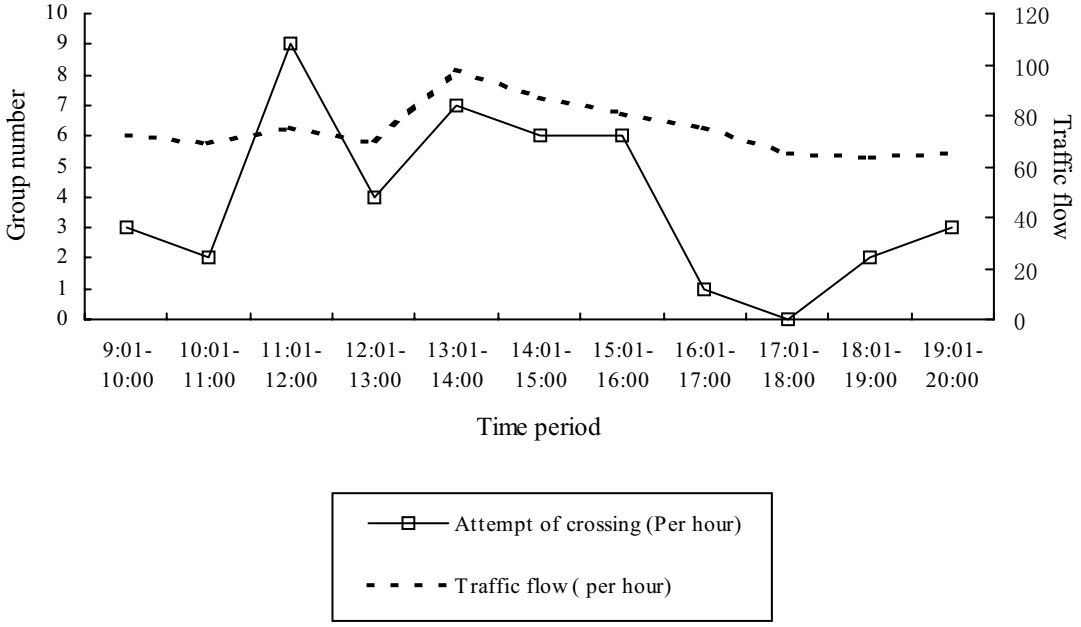


Table 5. The traffic flow in Qinghai-Tibet highway, and crossing attempts made by chirus.

7.2.5 Predators

Schaller (1998) documented Tibetan antelope mortality caused by disease and predators such as the wolf (Canis lupus), brown bear (Ursus arctos), and He suggested that wolf predation might at one time have been a substantial mortality factor for chiru, particularly on the calving grounds. In our field investigation we detected the occurrence of wolves for ten times, and recorded two successful preys near main passage. When the

chirus accumulated under the bridge, it provides the opportunity for the wolves. The chasing of wolves sometimes affected the using of corridors, scatter the chirus, but this will not threat the whole migration process, it's not main disturbance on efficiency of wildlife passages.

7.3 Evaluation of crossing structures

In our first year project, our monitoring area covered the ten-km-wide concentrated migration corridors, including Chubei Overpass corridor, Chumaer Under bridge Passage, Hoh-xil wildlife Passage and a railroad bridge about five kilometers north of it, which near the main construction site in this area. There are also some culverts and small bridges along the rail line in our working area. Our monitoring equipment fixed under Hoh-xil Bridge and Chumaer Passages, as all this structures are near the highway, it's possible to inspect the other crossing structures during the daytime by driving vehicles along the highway. In Westward migration, our monitoring results showed all chirus used the Hoh-xil Passage, the efficiency of the corridors was 100%, while only 56.1% in back trip. 40 chirus passed through Chumaer Bridge, two chirus passed a culvert. The using of crossing structures affected mainly by unclear construction material, un-removed equipments, transportation vehicle, the distance between highway and railway, human activities. (Table 6.)

Table 6. Comparison of the efficiency of different crossing structures

Structure Name	Structure Type	Passages of individuals		Efficiency of the structure		Disturbance to the using of structure
		Westward migration	Eastward migration	Westward migration	Eastward migration	
Chumaer Bridge	Under pass Wildlife Passage	0	41	0	1.8%	a. Un-cleared construction material b. Un-removed equipments, vehicles c. Human activities d. Short distance between highway and crossing structures
Chubei Passage	Overpass Wildlife Passage	0	0	0	0	a. Un-cleared construction material b. Un-removed equipments, vehicles c. Human activities
Hoh-xil Bridge	Underpass Wildlife Passage	1660	1248	100%	54.2%	a. Un-removed construction material b. Human activities
Wudaoliang Railroad Bridge	Underpass bridges	0	0	0	0	a. Main construction sites b. Large amount of construction materials and builder of the railway c. Destroyed land surface d. Accessory of the railway e. Human activities
Other Small Bridges	Underpass bridges	0	2	0	0.1%	a. The structure itself b. Un-recovered environment c. Human activities
Culverts	Underpass structures	0	0	0	0	a. The structure itself

Chumaer Bridge The human activities was the most serious factor which affected the efficiency of all crossing structures, including the tourist, builder of the railway and other human activities brought by highway. Chumaer River used to be main migrating corridors, but the efficiency of the Chumaer Bridge is quite low. The bridge itself is almost the same as Hoh-xil Passage in structure, the difference is the less distance between highway and railway, and the surface of land was destroyed by the construction machine, the raw material such as sand, brick were not cleared, the builder of the railway lived in camp just near the bridge. Though the construction was halted, the workers were not removed from the working sites; their activities affected the using of passages. The migration was affected both by the railway and by the highway in this narrow area.

Chubei Passage This over-cross passage is about 2km southwest of Chumaer Bridge, near Chumaer River, the situation is similar to Chumaer Bridge, the unfinished construction and human activities are main impact factors.

Wubei Bridge It is the most effective corridor in this migration season, the efficiency greatly improved than last year-when the main construction period of this section was not finished. In June 2004, the main construction completed, workers were removed from the working sites, together with most of the machines, but still something left or unclear under the bridge. In the first several days of migration, we found some vehicles still passed this area, with the support of the park police from management of the reserve, all human activities were stopped during the daytime. There is another advantage of this passage - the open area between highway and railway, providing chirus enough space to stay and being kept away from the noisy road. The improvement of the efficiency is mainly due to the increased condition in environment near the passage.

Wudaoliang Railroad Bridge This bridge is in north of Wubei Corridor, though it is not designed for chiru passage, but may be one corridor for migration in the future. The structure is similar to Wubei Bridge and a bit far from the highway, with a large open area near the passage. But now the main construction sites located near the bridge, and part of the structure are still in built, which limited its use this year.

Other small bridges and culverts This kind of structure is most used by brown bear (*Ursus arctos*), wolf (*Canis lupus*), fox（*Vulpes ferrilata* ）and Tibetan gazelle (*Procapra picticaudata*), but unlikely used by chirus. Most of such structure is about 1-2m in height, 5-10m long. It's dark in the narrow corridor, and the land surface under the bridge is not cleared or recovered. We detected only two individual passed through a small bridge. The prospect of such structures needs further investigation in the future.

7.4 Recommendations & Conservation actions.

7.4.1 Recommendations

Based on monitoring results and evaluation of crossing structures showing above, we made following recommendations.

a. Stop or limit the human activities near wildlife passages, even after the railway put into use.

In the past three years of construction period, construction work was halted for the antelopes in the concentrated migration period, this should be continued in the next migration season. In the future, the activities of tourist, researchers and truck drivers should be limited by the manager of the reserve.

b. Advantage or modify the wildlife passages

We have mentioned above, over 40% of chirus over cross the rail bed in return trek. We recorded the position where chirus most liked to climb the rail bed. Some researcher had advised to modify the sharp slope of the rail bed and remove the stone, which covered on its surface. This will make the chirus to climb the rail bed easier but not safe for the running train and the chiru itself. We don't agree with their mind, as most of chiru began adapting to the new-built wildlife passages, the best is to lead them pass through the corridors safely and avoid from the rail accident. Due to the safety consideration, we recommend building fence in the most frequent sites of chiru over passing; these sites are showing in Table 7.

Table 7. Most frequent sites of chiru over passing

Position	K2992-2993	K2994-2995	K2995-2996
Frequency of over passing the rail bed (individual/day)	8.5	16.25	10.5

c. Ensure the rail department to remove all equipments and recovered the vegetation upon completion in all construction sites, remove all construction material and equipment during construction period.

d. Reduce the road disturbance in rebuilding of Qinghai-Tibet Highway, by building more passages.

Now there are not any crossing structures on Qinghai-Tibet Highway, and the environment is degraded due to busy traffic recent years, we could not ensure the traffic flow to be reduced in the future, stopping the traffic will cause traffic jam on the highway and economic loss, it will not solve the problem completely. The highway will be renew in the next several years, it's possible to build some wildlife passages and change the route in some area, further investigation is necessary to provide reliable and sufficient data in future designing.

e. Enhance management of the Reserve and conservation capability building

The railway is on the boundary of two reserves, the west region is controlled by management department of Hoh-xil National Nature Reserve and the east area is managed by Sanjiangyuan National Nature Reserve. The railway and highway is in charged of transportation department. The chiru's activities covered all these areas. The cooperation of the three management departments should be enhanced in ensuring the smooth migration of chirus. Till now most of conservation actions were taken by 3 wildlife protection stations belonging to Hoh-xil Reserve, ethnic Tibetan wildlife enforcement officials were employed by the Forestry Bureau of Qinghai province, working at wildlife protection stations. Their duty is to patrol the construction sites, stop traffic when herds of antelope cross the road.

Some non-government organizations such like Green River, and other volunteer league also made some contribution to protecting the antelope, mainly in improving the public awareness of chirus, their work is well known to public through media. Each summer the volunteers from all over the country will work for the protection stations and take part in some conservation projects. Everyone with good health, work attitude and love of animals could be volunteers, no particular requirements for an applicant's age, gender or vocation. They will pay for their trip and all other living expense during the one-month working in Reserve. They are passionate young people; their efforts and passion can inspire the people around them. But we found there exist some problems in their work due to different education background of the volunteers. Most of them full of passion but lack of enough field experience, basic knowledge of chirus and wildlife conservation, this may reduce the effectiveness in coping with real problems. And there is another factor which limited the activities of the volunteers, considering Hoh-Xil's harsh natural conditions and frigid winter, volunteers will be on patrol only from June to August. Each team will be consisted of five or six volunteers and each volunteer will work on Plateau for only a very short period (about 10 days). It will take a week or more for them to adapt themselves to the environment of high altitude. So the most effective measure is to enhance the management of the Reserve and capability building. Most of staff of the management office in Hoh-xil is ethnic with abundant field working experience; in our fieldwork we found their work is quite efficient. They managed to strike the right tone in their relationship with the powerful construction companies - cooperating in sharing information but maintaining credible independence of action. Powerful financial support is necessary to maintain their work in the reserve.

f. Improve the public education work.

Too much work has been reported on improving the public awareness of conservation the chirus, on newspaper, popular journals and websites. Till now most conservation action succeeded in making people be aware of the importance of protect the Tibetan Antelopes. But we found most of people still lack of general knowledge of the species and wildlife conservation. A college student asked me: “Why not cut off the migration of corridor of chirus? Though this may cause damage to the population in the first several years, but at last their behavior will be changed, we don’t need to spend so much money to build crossing structures for them.” We have been in touched with some of the tourists and truck drivers mentioned above in highway, most of them knew the chiru are protected animals, but they didn’t realized their behavior seriously disturbed the chiru activities. They were excited when facing a large herd of chirus which is fresh to them, could not help shouting or closing the chiru to take photos, the wildlife passages are unfamiliar to most of people in China, sometimes they approached to the bridges, because they didn’t know the use of those structures. More efforts should be made to strengthen the education in public from children to adults, for people with different education background including constructors of the railway and drivers on highway, not only in improving the awareness of chiru conservation and poaching but also on general knowledge of conservation and wildlife passages.

g. Further research on rail and road disturbance to migration of chirus; long-term monitoring on migration of chirus

The rail and road disturbance to migration of chirus are still lack of systematic monitoring and research. No sufficient data are available in the research area in China. In the future transportation development, information will be required for the government and transportation agency in making reasonable conservation plan in construction period. The record needed to be completed and accurate, while we found past record could not be used for scientific research and analysis, because the data collection method was not scientific. The rail and road will produce long-term effect and may be main threat to migration of chirus, more problems may occur in the future. The passages are the first to be built and used in China, there is still much to be learned about the effects of development on their habitat and migration. Long-term monitoring and financial support in further research are vital in protection of chirus.

7.4.2 Conservation actions.

a. Monitoring report to department of railway, Bureau of Forestry and local government.

Our monitoring results were submitted to department of railway, Bureau of Forestry and local government, and cited in their annual report. The data will be used in making conservation plan in next migration of chirus.

b. Assisting the park police from the reserve to stop traffic in highway.

On return trek, park police in the Hoh-xil National Nature Reserve stopped the traffic to assist the journey of chirus. Our team members took part in their conservation actions, and help to monitor the human activities near passage.

c. Public education

After the field survey finished, our monitoring results were presented by our team members in middle school, colleges, universities and some conference, we also wrote some articles for popular journals [14-16], the response was active, published on websites[19-24] and newspapers (Appendix 1) Our most exciting experience was in middle school, we were deeply impressed and inspired by their passions and the love of wildlife. Their knowledge in wildlife conservation was rich than we expected, some questions they raised were surprising professional, even than college students! The next generation of conservationist is among these lovely young students.

8. LOGIC FRAMWORK

Project Number: 201404 **Planning period: May 2004-April 2005** **Project Title:** Conservation and monitoring of Tibetan Antelopes in Hoh-Xil National Nature Reserve			**Location** Hoh-xil National Nature Reserve
Objectives/ activities	**Success indicator**	**Means of Verification**	**Assumptions**
<u>Project purpose</u> Assess the impact of the human activity and disturbance of construction of the newly-built Qinghai-Tibet railway to the migration of the chiru population, diagnose any potential problems with transportation development at an early stage and provide solutions to reduce conflict between railway construction and conservation.	It's difficult to evaluate it in quantity. The disturbances are complex, not easy to measure. The success may be indirectly. For example, our recommendation accepted by transportation department, conservation action is taken to reduce the disturbance.	Final report on assessment of rail disturbance on migration of chirus and evaluation of the effectiveness of the wildlife corridors	None
<u>Overall results</u> 1. Reliable information on behavioral ecology and migration of chirus are avaible.	Number of press articles increased including significant national and international profile	Published papers in scientific and popular journal	None
2. The disturbance caused by railway is identified.	Monitoring results.	Final report.	
3. Efficiency of the different wildlife corridors is assessed.	Monitoring results.	Final report.	
4. A reasonable conservation plan for the construction period and for the future generated.	Recommendation accepted and monitoring results cited by Department of Railway, Chinese Bureau of Forestry and local government and used to take some action in their construction of future planning.	Final report	
5. Mornitoring techniques and field skill of the local students and residents are improved.	More well trained staff in management department of reserve and conservation organizations.	Final report	
6. The links with the local staff of the Department of Forest, transportation angency and NGOs are strengthened or created.	Efficient network.	Final report	
7. Public awareness of the species is improved.	Number of press articles increased including significant national and international profile.	Press cuttings files (Appendix)	

Summary of objectives/activities
1.1 Two fixed working sites were set up with the support of MOR for long-term monitoring 1.2 Adjust and set up equipment, transfer all team members and local staff to working sites on time. 1.3 Population size, composition, and the behaviour in migration were recorded. 1.4 A report on behaviour ecology will generate.
2.1 We recorded the behaviour of chirus, when they across the railway. 2.2 Rail disturbance to migration of chirus are monitored and analysed. 2.3 Detail record on use of wildlife crossing structures. 2.4.Report on assessment of rail disturbance to migration of chirus has already been submitted to MOR and local government and Chinese Bureau of Forestry with recommendation on conservation.
3. The efficiency of different crossing structure are evaluated and compared in final report, and submitted to rail department.
4. Report on conservation status and the problems we found in the field work also submitted to related department in government and NGOs, our results were cited in their annual report, and used to make a reasonable conservation plan for the next migration season.
4.2 The detail final report on conservation status of Tibetan antelopes will help the policy maker and management of reserve to advance their work.
5.1 The short training workshop involved local staff and constructor of highway was held in field several days before field work. Team members and all participants discussed the monitoring method and exchange the experience in field work.
6.1 In field survey we cooperated with Bureau of Forestry, MOR and management department of Hoh-xil National Nature Reserve, the links were strengthened through this project, and may lead to further cooperation in conservation actions.
7.1 Articles on introduction and results of our project were published on some newspapers, popular science journals and website. 7.2 The project is promoted to wider public through presentation and traing in middle school, college , conference and other social society.

Timetable

2004.05.01-2004.05.31 –Communicating to the related local government unit. Equipment preparation. Project planning.

2004.06.01-2004.06.10 - Two fixed working sites were set up with the support of MOR. Adjust and set up the equipment, transfer first team, which made up of two participants from Shaanxi institute of Zoology and two of us) to working sites. Arrange the accommodation.

2004. 06.10-06.12- Adaptation to the high altitude environment.

2004. 06.13-06.15- Short training workshop.

2004.06.17-7.9 - Field survey. Monitoring.

2004.07.10-13 – Transfer all team members back to Beijing, due to healthy consideration; long-time working in plateau will cause heart disease.

2004.07.30-2004.08.1 – Transfer second team to working sites (all our team members).

2004.08.03-2004.08.05- Equipments set-up and adjustment.

2004.08.06-200408-22- Field monitoring.

2004.08.22-2004.08.28- Fieldwork finished, back to Beijing.

2004.09.01-2004.12.31

- Data analyzing
- Report (Evaluation of wildlife crossing structures and monitoring results) produced and submitted to Chinese Bureau of Forestry, Management office of Hoh-xil National Nature Reserve and local government. Evaluation of wildlife crossing structures and monitoring results.
- Final report production
- Presentation and submission of results to MOR, BFQH, HXNR, BPCP and related NGO, newspapers and journals of popular sciences.

  9.23 Presentation for middle school student from Dongzhimen middle school. (Organized by BP Beijing)

  9.29 Presentation in BP Beijing Branch.

  10.30 Presentation in National Mammalian conference in HuBei

  11.10 Presentation in Capital Normal University.

  12.20 Presentation in Central University for Nationalities.

2005.1 Submit final report to BP and related organizations. Research paper will be submitted with permission of BP.

Financial Report

• *Pre-project expenses:*	
o Administrative	
Insurance 250/person x 4	1000.00
Training course:	*
Transportation (By vehicle)	1061.00
Reconnaissance (already finished last year)	*
Sub Total	**2061.00**
o Equipment	
Field rations	1990.83
Medical (medicine and oxygen etc.)	*
Photographic (video camera:) 850x 8cameras	6800.00
Video splitter (3x3) 2300 x 2sets	4600.00
Time-lapse decoder 3150 x 2sets	6300.00
Cables, batteries, tapes etc.	2450.00
Communications (mobiles phone)	1900.00
Packing	*
Maps	*
Sub Total	**24040.83**
• *Field expenses:*	
Living costs: 4man-56days at 50/day	11200.00
Local guide:	*
Drivers: 1man x 56days x 50/day	2800.00
Local participant	*
Fuel costs	7206.18
Vehicle use 2.00/km x 9053km	18106.00
(Vehicle and fuel costs was provided by MOR in first-month field work)	
Sub Total	**39312.18.**
• *Post-Project expenses:*	
Report production	*
• *Contingency:*	*
Total :	**RMB 65414.01**
Current exchange rate 1USD = 8.25RMB	**USD 7928.97**
Amount received from BPCP till now	**USD 5625.00**

*** Support of Provided by MOR**

Our dream- a "second nature"-

Improving transportation without putting nature second

I found this word in an surface transportation policy project, I really love this. It means:

" The development of our modern society has caused immense destruction to the natural environment native to our earth ('first nature'). However, we can establish a new world -- a 'second nature', where humans and animals can live in harmony. We can achieve this through a series of effective measures, including setting up wildlife passages."

The BP Conservation Program Award, helpsus to enhance the development of this undertaking. It is really a valuable and exciting opportunityfor us!

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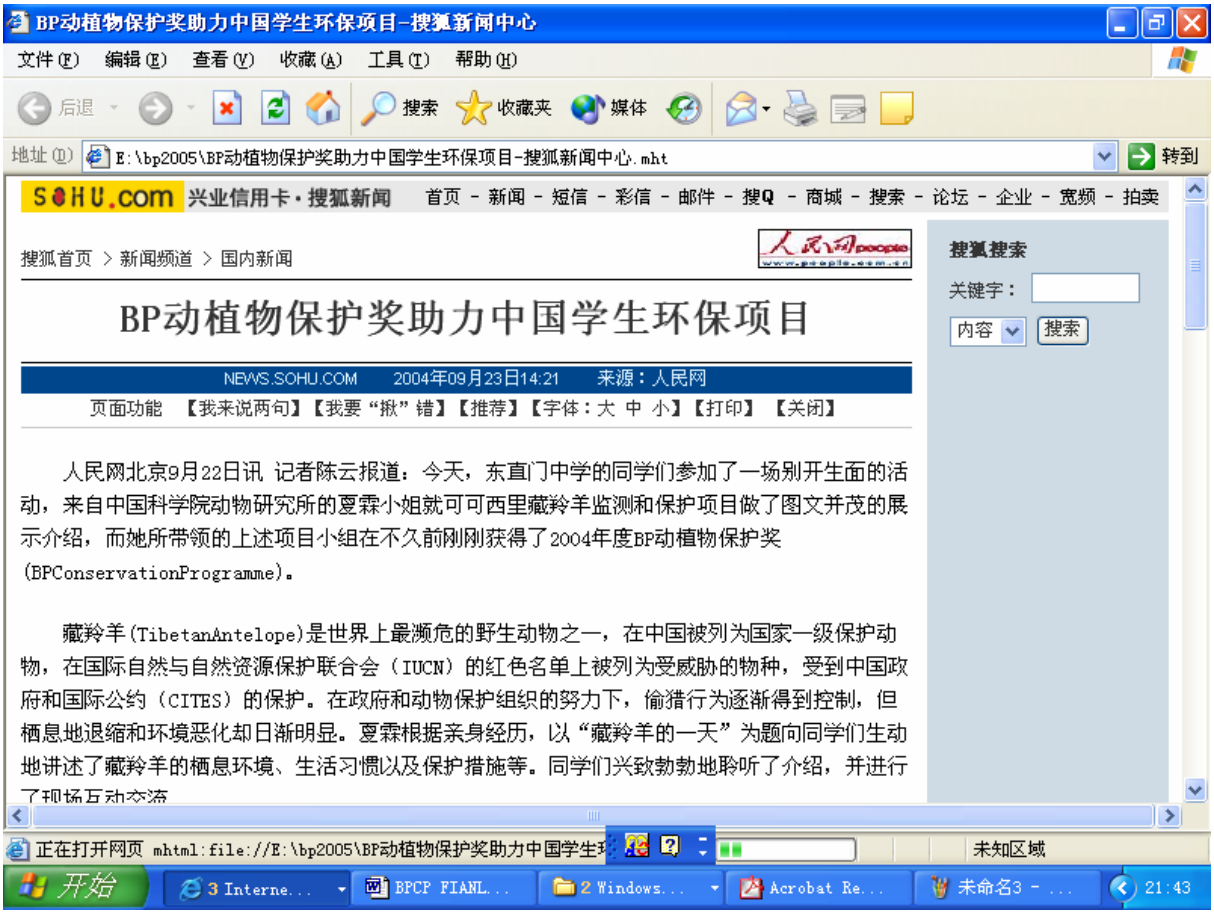
12. Appendix- Press cutting on comment ion of our presentation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BP动植物保护奖助力中国学生环保项目
NEWS.SOHU.COM 2004年09月23日14:21 来源：人民网
页面功能 【我来说两句】【我要“揪”错】【推荐】【字体：大 中 小】【打印】 【关闭】
人民网北京9月22日讯 记者陈云报道：今天，东直门中学的同学们参加了一场别开生面的活动，来自中国科学院动物研究所的夏霖小姐就可可西里藏羚羊监测和保护项目做了图文并茂的展示介绍，而她所带领的上述项目小组在不久前刚刚获得了2004年度BP动植物保护奖(BPConservationProgramme)。
藏羚羊(TibetanAntelope)是世界上最濒危的野生动物之一，在中国被列为国家一级保护动物，在国际自然与自然资源保护联合会（IUCN）的红色名单上被列为受威胁的物种，受到中国政府和国际公约（CITES）的保护。在政府和动物保护组织的努力下，偷猎行为逐渐得到控制，但栖息地退缩和环境恶化却日渐明显。夏霖根据亲身经历，以“藏羚羊的一天”为题向同学们生动地讲述了藏羚羊的栖息环境、生活习惯以及保护措施等。同学们兴致勃勃地聆听了介绍，并进行了现场互动交流
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广告
2005年度BP动植物保护奖开评
2004-09-24 （记者 黄勇）
本报讯 9月22日，北京东直门中学的同学们参加了一场别开生面的活动，来自中国科学院动物研究所的夏霖就2004年度BP动植物保护奖资助的可可西里藏羚羊监测和保护项目做了图文并茂的展示介绍。
据了解，自1985年启动至今，BP动植物保护奖已经资助了来自71个国家共250多个环保项目，平均每年有超过350个项目申请该奖项。在中国，BP更是不遗余力地向学生们推广和介绍项目。迄今为止，先后有15个来自中国的学生项目获奖，除了上述的可可西里藏羚羊监测和保护项目，还包括在龙岗国家级自然保护区进行的对灵长目动物的野外调查项目、在天津开展的一项对鸟类动物多样性和保护的研究，以及海南岛雨林濒危鸟类和哺乳动物保护的野外考察等。
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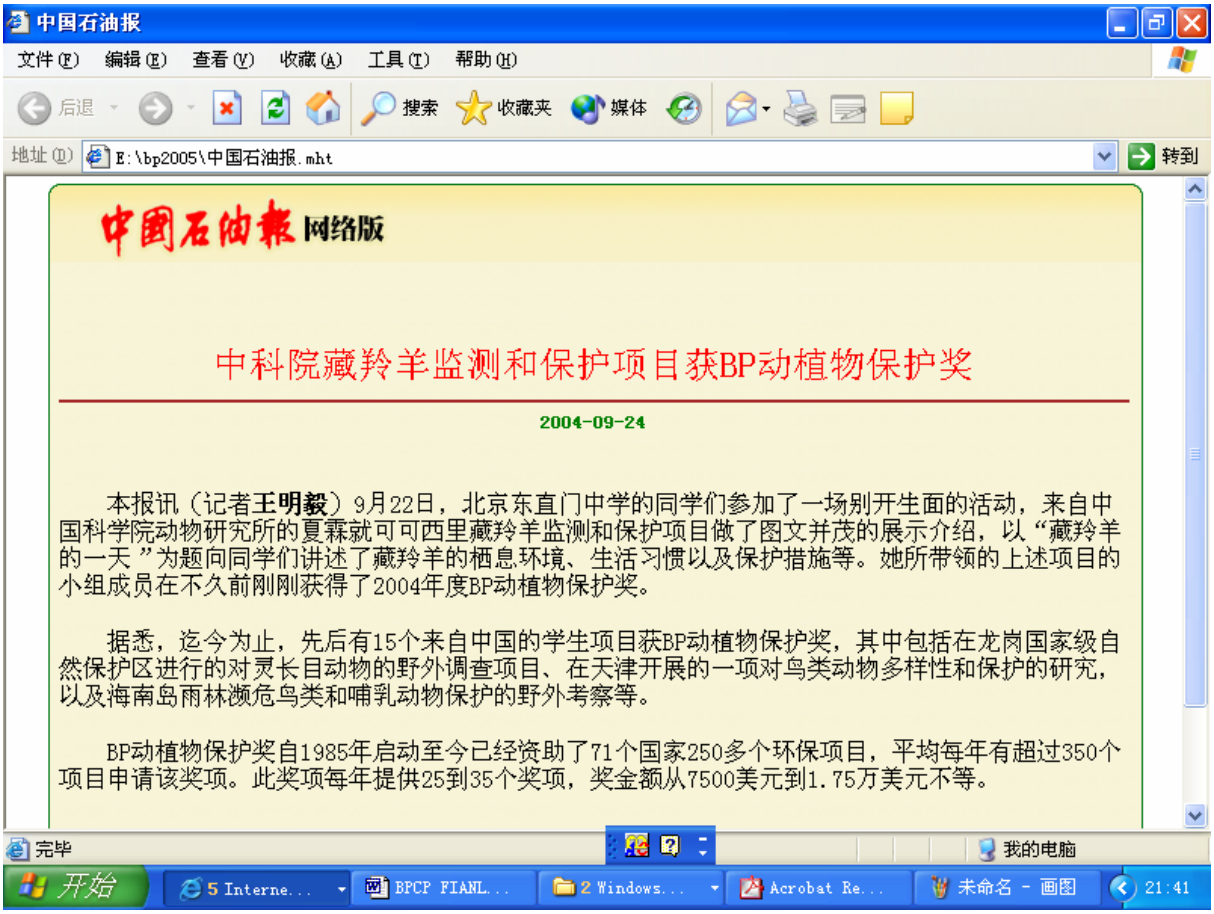

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中科院藏羚羊监测和保护项目获BP动植物保护奖

2004-09-24

本报讯（记者**王明毅**）9月22日，北京东直门中学的同学们参加了一场别开生面的活动，来自中国科学院动物研究所的夏霖就可可西里藏羚羊监测和保护项目做了图文并茂的展示介绍，以“藏羚羊的一天”为题向同学们讲述了藏羚羊的栖息环境、生活习惯以及保护措施等。她所带领的上述项目的小组成员在不久前刚刚获得了2004年度BP动植物保护奖。

据悉，迄今为止，先后有15个来自中国的学生项目获BP动植物保护奖，其中包括在龙岗国家级自然保护区进行的对灵长目动物的野外调查项目、在天津开展的一项对鸟类动物多样性和保护的研究，以及海南岛雨林濒危鸟类和哺乳动物保护的野外考察等。

BP动植物保护奖自1985年启动至今已经资助了71个国家250多个环保项目，平均每年有超过350个项目申请该奖项。此奖项每年提供25到35个奖项，奖金额从7500美元到1.75万美元不等。

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BP动植物保护奖 助力中国学生环保项目

http://www.csonline.com.cn 2004年09月23日14时47分 星辰在线

人民网北京9月22日讯 今天，东直门中学的同学们参加了一场别开生面的活动，来自中国科学院动物研究所的夏霖小姐就可可西里藏羚羊监测和保护项目做了图文并茂的展示介绍，而她所带领的上述项目小组在不久前刚刚获得了2004年度BP动植物保护奖(BP Conservation Programme)。

藏羚羊(Tibetan Antelope)是世界上最濒危的野生动物之一，在中国被列为国家一级保护动物，在国际自然与自然资源保护联合会（IUCN）的红色名单上被列为受威胁的物种，受到中国政府和国际公约（CITES）的保护。在政府和动物保护组织的努力下，偷猎行为逐渐得到控制，但栖息地退缩和环境恶化却日渐明显。夏霖根据亲身经历，以“藏羚羊的一天”为题向同学们生动地讲述了藏羚羊的栖息环境、生活习惯以及保护措施等。同学们兴致勃勃地聆听了介绍，并进行了现场互动交流。

(剩下3 项) 标准 le://E:\bp2005\BP动植物保护奖 未知区域

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