



**Investigate Human-leopard Conflict in Galliat and Contiguous to
Abbottabad and Margalla
Scientific Committee Project, WWF-Pakistan**

Final Progress Report
(October, 2005 to August 2007)



Prepared by
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- 1. Project Number:** 50038401
- 2. Project Title:** Investigating Human-leopard conflict in Galliat and Contiguous to Margallah and Abbottabad
- 3. Project Executants:** WWF-Pakistan Nathiagali Office
- 4. Project Duration:** 24 Months
- 4.1 Project Starting Date:** October 2005
- 4.2 Project ending Date:** September, 2007
- 4.3 Progress Report for the period of:** Final Report

5. Project Objective

Objective - 1: Demarcate the current occurrence zone of leopards in Galliat and Thandiani area on the basis of sighting records to determine its distribution, population and density.

Objective - 2: Minimize risk to human life and property by leopards and develop mechanism to reduce economic impacts of depredation on individual herders.

Objective - 3: Protect leopards from direct killing through awareness, training and lobbying

Objective - 4: Build capacity of wildlife staff to use tranquilizer gun to handle the situation instead of direct killing/shooting of leopards.

Objective - 5: Develop a funding proposal to address human-leopard conflicts in the entire range of leopard occurrence.

6. Project Summary (not more than 500)

In June and July, 2005 a Common leopard (*Panthera pardus*) killed six women in the forests of District Abbottabad. This incidence greatly influenced the community's feelings and resulted in negative attitude towards the conservation of wildlife, especially the carnivores. The occasional incidence of leopard predation on livestock had been accepted since long but the leopard attacking human being changed the whole scenario. The leopards emerged as a symbol of terror for the communities on one hand, and on the other, tremendous hue and cry was made with demands for the total elimination of leopards from area.

While realizing the potential danger, WWF-Pakistan started a project titled "Investigate Human-leopard conflict in Galliat" on pilot scale. Keeping in view the gravity and magnitude of the problem, the project took certain initiatives to manage human-leopard conflict. The project focused mainly on collecting baseline information, analyze the root causes of the problem and suggest mitigating measures. In this regards, leopard population was calculated, its major prey species identified, habitat modeling through GIS carried out and livestock depredation surveys conducted. Main reasons of leopard attack on human being identified and mitigating measures suggested reducing its attack chances. To equip locals with necessary knowledge and skills pertaining to preventive measures from leopard attacks, five trainings were organized and a manual drafted to guide people regarding preventive measures.

To ensure the conservation of leopard and keeping community away from both economic and social losses, a community-based livestock insurance scheme was launched. The scheme has so far yielded positive results and has the potential to be replicated elsewhere having the same problems.

7. Methodology

Specific questionnaires and data sheets were designed to collect data on leopard population, occurrence, predation and damages to life and property. Villages were selected on the basis of the severity of the problem and surveys conducted in target areas. GPS was used to record crucial sites and GIS used as a tool to present information on map. Guidance was sought from literature and various experts on social and biological aspects of the project. Efforts were also undertaken to seek support for the solution of the problem through indigenous knowledge. Trainings, print and electronic media and local forums were used as tools to share the information about leopard's ecology, behavior and importance for the ecosystem.

8. Results and their significance

The results revealed that sensitivity of human-leopard conflict was a potential threat for the survival of leopard as also of the biodiversity. A total of 175 leopard sighting locations and 502 livestock depredation sites were

documented and plotted on the GIS map. Significant information was obtained about the species population and sex status from the regular monitoring of the fixed monitoring tracks. Eleven leopards were identified over 115.27km² study area. Mean encounter rates of different variables like pugmarks, scats, livestock and people use of the habitat was calculated and developed as baseline for future studies. Ten prey species were identified after the microscopic analysis of the hairs present in the scats. GIS-based habitat modelling of leopard was also started. The social attitude of women towards leopard conservation was also assessed during the reporting period.

The Project launched community-inspired livestock insurance on pilot basis to overcome the economic losses of farmers due to leopard attack on livestock. Membership of the scheme reached up to 133 from 33 livestock owners within one year while 23 livestock owners were compensated. This scheme provides a tangible benefit to the local communities and supports leopard conservation and finds ways to live in harmony with leopards. Five “Mitigating measures trainings to reduce the chances of leopard attacks on livestock and human beings” were conducted.

9. Major Activities and Progress made so far

A.1 Collect sighting record of leopards through GPS readings

Information was collected through a questionnaire on the size of the leopard, sighting date and time, geographical location of the sighting, and other evidences of the presence of leopard in the area. Based on that, surveys were conducted to confirm the claims and reports.

A.1.i Leopard sighting surveys

During the reporting period, 115.27km² area was surveyed. Interviews and meetings were conducted with the communities. In the reporting period (October 2005 to June 2007), leopards have been sighted in 175 places in study area. The geographical coordinates of all the sighting sites were recorded and plotted on the GIS map. In 2005, leopards were sighted in 31 places, in 2006, in 94 places and in 2007 (up to June), in 50 different places. The number of sightings were higher in May (30), June (27), July (12) and August (14) compared to rest of the months.

It was observed that the number of sightings inside the villages (97) were higher than the sighting inside the forests (78). About 30% sightings were near the water sources of the study area. Of the total sightings, 43% were sighted in morning, 18% in the afternoon and 39% in the evening. About 69% sighting records were obtained from local women, who usually visit the forests daily for the fuelwood and fodder collection.

In 2005, one cub was sighted without mother at Ratti Mitti, two cubs in 2006 at four different locations (Kalabagh, Namlimera, Jandarpara,

Bagnakkar) and in 2007, only once a leopard with cubs was sighted near the green spot of the union council, Nathiagali. (GPS locations of the cub sightings are provided in the leopard census report in the annex.)

A.2 Population estimation in study (Pugmark survey)

Based on the previous year sighting records and local people knowledge, the project team identified and mapped nine fixed monitoring tracks of the leopard showing the territorial marking of the leopard in the study area. All the tracks were monitored on regular basis during the reporting period. A special datasheet was designed to collect relevant information from the tracks, containing footprints, feces, and other sign-related information. Details of the monitoring tracks are provided in the Table.1

Table.1 Details of the Monitoring Tracks

Track Code	Track Name (Distance covered during the monitoring)
T1.	Pipeline Track, (12Km)
T2.	Chakhanapani Track, (08Km)
T3.	Darwazakus Track, (11.5Km)
T4.	Mallach&Pasalla village Track, (15Km)
T5.	Diar Sari Track, (08Km)
T6.	Ratri Track, (32Km)
T7.	GH, Lassar, Kalapani Track, (08Km)
T8.	Lahurkus& Gulbaba Ziarat Track, (13Km)
T9.	Sajangali Track, (34Km)
T10.	Lalazar Track, (10Km)

A.2.i Encounter Rate Results of the Pugmark Survey

Based on the results of two surveys, encounter rate of the scats and footprints, livestock and people use of different tracks was calculated. First survey was conducted in August-September 2006 and second was conducted in April-May 2007. The calculated mean encounter rate will be used as (indices) baseline in future to assess the trend of the use of habitat by the leopard, livestock and people:

Mean encounter rate calculated for the leopards' footprints was 0.0972, for scat 0.0657, for livestock 1.7581, and for the people, it was 2.5143 in August-September 2006. In 2007, survey was again conducted in April-May, and a great variation in the results was observed. Mean encounter rate for the leopard footprints was 1.133, for scat 0.111, for livestock was 1.7925, and for the people, it was 3.15946. The comparison of results of both the surveys shows that all the tracks were used more frequently in April-May compared to August-September by all the four parameters. It is therefore suggested that April and May were better for the surveys, compared to August-September. To understand the whole year use of the tracks by the leopards, regular monitoring of the area is highly desirable (for detailed results see table.5 & 6 provided in the leopard census report). Species

occupancy require more surveys. This will be carried out with help of “PRESENCE” after 3rd and 4th survey it will be done.

A.2.ii Pugmark Tracing Technique

All the leopard trails pass through the forests or grassy areas where it is impossible to get a suitable pugmark impression. To know about their movements in such areas and to be able to record pugmark tracing or make a plaster cast, Paw Impression Pads (PIP's) with soft soil were required. PIP's of 3m length and 1m width were placed along the identified leopard trails with due regard to the overall topography of the study area. During the reporting period, more than 40 footprints were traced and after careful analysis of data only eleven (11) tracks were identified as individual leopards. Standard method was used to analyze the traced pugmarks. Individual leopards were distinguished from each other and their localities were monitored regularly throughout the study, to get additional information about the leopard behavior. Places for camera traps installation and for regular monitoring of leopards inside the national park, were identified.

Table.2 Details of the identified individual leopards

Track Code	Length (cm)	Width (cm)	Sex	Foot
T1	10.1	8.6	Female	HF
	9.3	8.9	Male	HF
T2	9.3	9.7	Male	HF
T3	11.0	9.0	Female	HF
T4	9.0	8.1	Female	FF
T5	9.9	9.9	Male	HF
T6	8.4	8.4	Male	HF
T7	8.4	7.2	Female	FF
T8	8.5	7.9	Female	FF
T9	9.3	7.9	Female	FF
T10	7.9	6.6	Female	FF
Total	07Females & 04Males			

Based on the above data, it is clear that the study area has a minimum of 11 leopards over 115.27km² area. During the last two years, four leopards were killed by the local communities in the study area. Three females were killed, one in Khunkalan and two in Lahurkus, while one adult was killed in Kundla, whose status was not known.

A.2.iii Preservation of tracks (Footprints), pugmark tracing

Preservation of tracks (footprints) is a useful tool to keep the field record for measurement and comparison with other tracks, as well as for the exhibition and educational purposes. This technique was also used additionally to get more information about the leopard population and other relevant aspects with the sighting record collection & pugmark tracing techniques. A total of eleven pugmarks were preserved during the reporting period. Plaster of Paris was used

to preserve the tracks. This method is not only more costly compared to the pugmark tracing, its results are also not useful for further analysis to reach population estimates.

A.2.iv Scat analysis (prey species identification)

Feces collection and analysis helps determine the food habits/foraging pattern of the animal. Knowing the importance of feces, the researcher collected 100 scats from different locations during the study and analyzed. Prey species were identified based on the microscopic hair analysis and the presence of bone fragments, teeth, nail and other hard parts as described by Grobler & Wilson (1972) and Mukharjee et.al (1994). Based on the analysis of 22 scats, great diversity was found and ten prey items were recorded and their percentage worked out.

The diet of a carnivore reflects both the availability of its potential prey, as well as a suite of morphological, behavioral and physiological adaptations that allow the individual to locate, capture, ingest and digest a variety of prey taxa (Kok *et al.* 2004).

This study is the pioneering effort in Pakistan to know the prey species of the leopard. The diameter of the scats after drying, were measured in mm, around the thickest part with the help of Vernier caliper. Result showed that about 73% scats were in the range of around 21-27mm and about 27% between 17-20 mm. The oven-dried weight of all the scats was measured. About 59.2% of the scats weighed within 40gm, 27.2% ranged from 41-45gm and 13.6% weighed within 46-50gm.

Macro-analysis of leopard scats was done and it was observed that all of them contained hair remains, about 3% had bones, 4% had claws and about 3 % had grasses. Prey species were identified during the microanalysis of the hair. 68.2% were domestic prey, and 31.8 % was wild prey. Among the domestic prey, goats contributed 40%, dogs 18.1%, cows 4.5%, and buffalo 4.5%. Among the wild prey, monkeys were the major contributors with 22.7% share, rodents were 9% while others contributed in minor quantities.

A.2.v GIS based habitat modeling of leopard land cover study

During the reporting period, an intern conducted a GIS-based habitat modeling of leopard land cover study. Study results though useful, but require covering some more aspects also. Study draft report is available as Annex-.

B. Assessed the extent of damages to livestock

a) Livestock depredation survey conducted

Livestock depredation survey was conducted over 115.27km² throughout the project where needful information was collected for 2005, 2006 and up

to June 2007. Efforts were also made to validate predation incidences by examining the freshly killed livestock. Geographical coordinates of different attack sites were recorded and will be plotted on the map through Geographical Information System (GIS).

More than 400 affected families were interviewed. A total of 483-goats, one each buffalo, ox, sheep and horse and ten cows were killed in five union councils located in the study area. Of the total depredation, 56.2% incidents were reported from the Union council Nathiagali, 35.4% from Union council Bakot, 8.1% from Union council Nagribal, 7.6% from Union council Berot and 3.9% from Union council Namlimera.

The study revealed that 70% of attacks occurred inside villages, followed by 30% in the protected area. GIS map for the Y2005, 2006 of livestock depredation sites is provided as annex- . Main reason of livestock depredation was the careless herding practices. The farmers/livestock owners usually left their animals in nearby forests and herd them back in the evening without any guard. Second is the poor construction of the pins for night stay of the livestock.

C. Test economic and social viability and acceptability of various options through consultation

During the livestock depredation survey, information about an indigenous compensation mechanism was also collected. Whenever a farmer loses livestock (for whatever reason) villagers support the affected family with cash to reduce his loss. That system was an informal and non-obligatory. For the last ten years, this system is no more working well due to villager's migration to cities, and change in lifestyle. Still, in some remote parts of the study area, it exists. So, the project team took this system as foundation and started dialogue to formalize it in the form of *livestock insurance scheme*. And the communities were briefed accordingly. A local NGO named "Garain Welfare Society" was identified and selected to launch this scheme. A formal mechanism was developed for the implementation of the scheme with the mutual consent of the local communities that bound them to insure their livestock under the scheme through a lifetime registration fee of PkRs.100 (\$1.66). They were further required to pay an annual premium of PkRs.130 (\$2.16) per goat, to the committee. Moreover, they were also bound to inform and register all the goats with the livestock insurance scheme committee. A committee of seven members constituted for taking decisions regarding the compensation, including the representatives of local government, religious leaders, member of WWF-Pakistan and the governing body members of the NGO. WWF-Pakistan provided technical input to initiate the process besides a donation of an amount of PkRs. 20, 000 (\$333) as seed money (it's a life time contribution). The local NGO provided PkRs.7,000 (\$117) as their

contribution. Initially, 33 livestock owners deposited an annual premium of PkRs. 29,000 (\$483).

Gradually, the schemes popularity increased and its membership increased day by day reaching to 133 from 33 within a year. The scheme compensated 23 livestock owners within the first one year and distributed PkRs.38,300 (\$638) as compensation against livestock depredation by leopards. Available net balance with NGO is PkRs.48,500 (\$808), This year's registration is in progress. The scheme is running smoothly and working under the direct supervision of the local NGO. The government and other relevant organizations working in the same area also showed interest to support the initiative. The "Garain Welfare Society" skill has also been built to run the scheme more comfortably in the area.

The Project team believes that in Galliat region, women are mostly responsible for the livestock rearing besides other household activities. If women are engaged in such kind of schemes, the sustainability will be ensured.

D. Develop training modules for communities

During the reporting period, various reasons of leopard attacks on human and livestock were identified by consulting the literature, meetings with the local communities, incident reporting and with the guidance of the Chief Technical Advisor. A social survey was conducted to "Assess the women attitude towards the leopard conservation" in the project area (Report is available as annex). The survey recommended a need of training for women to protect themselves from leopard, while out in the forests and found women receptive in getting such training. As such, five trainings were conducted on "Mitigating measures to reduce leopard attack chances on livestock and human" (training report is attached as annex) in three union councils of the project area. More than 130 women participated in these trainings so far.

Efforts were made to share that knowledge with the communities of the whole region through media (electronic and print) and other local forums. Leopard's importance for the ecosystem was highlighted and information about the man-eater leopard was shared with all the target groups (university students, media personal, religious leaders, school children, teachers, local communities, tourists and people who are involved in leopard conservation), to gain support for the conservation of the species in the region.

E. Build the capacity of wildlife staff to use tranquilizer gun to handle the situation instead of direct killing/shooting of leopards.

Project staff didn't organize this training for the Wildlife department staff because in September 2005, the department conducts an orientation session for the use of the tranquilizer gun for all the Park staff at Abbottabad office. The DFO, Ayubia National Park and the Tranquilizer

gun specialist were the resource persons. They briefed the staff members about the use of the gun and the chemicals required for tranquilizing an animal as per body weight and animal condition (sex, age, pregnant or not etc). They also briefed the participants about the situations to use the tranquilizer gun, and the side effects of the medicines on animal health.

Mr. Muhammad Kalim, a tranquilizer gun specialist is also engaged in the Ayubia National Park, Wildlife Department. During the reporting period, three animals were tranquilized successfully in different locations. To avoid duplication, the project didn't organize the proposed training separately.

10. Targets not achieved and reasons thereof

Though all the aspects of planned study for the reporting period were touched, but due to lack of resources (financial & time limitation), awareness activities were mostly concentrated around the Ayubia National Park. Under education & training component; as per project requirement five trainings were arranged for mitigating measures to reduce the leopard attack chances on human and livestock.

11. Others (additional progress)

- Developed and submitted two funding proposals (one for CBOT Grants and second to Species Survival Commission of IUCN).
- Briefed the National Assembly "Standing Committee on Environment" on leopard-related issues in Galliat, and progress made so far (November, 2005, March 2006 and February, 2007) on regular basis.
- An abstract titled "Community-based livestock Insurance Scheme; a solution to resolve human-leopard conflict in northern Pakistan" was submitted for International conference on Field Biology and Conservation Conference, September 2007.
- Conducted regular meetings with the communities of the problem zone to highlight the importance of carnivores (Common leopard) in the ecosystem. Discussions with religious leaders were also held to seek their support for leopards.
- Media meetings were held and reports published to minimize the current conflict
- In addition to the regular project activities, a close watch was provided and timely information gathered and shared with colleagues on all trappings and killing of leopards or leopard attack on human being.
- A close liaison was established with the Ayubia National Park wildlife management field staff

12. Conclusions and Recommendations

In June 2005, a leopard killed six women in different locations in district Abbottabad first time in the history of Pakistan. That incident has completely changed the previous scenario for the leopard conservation in its historic habitat. Leopard emerged as a symbol of terror and fear. It was very difficult for the conservationists to make the local communities accept this species again. None of the conservation organisation was ready to play their role: it was even difficult for the Wildlife department to convince the communities for the leopard conservation. Being the leading conservation organisation, WWF-P, took it as a challenge and launched this project in the problem zone. Project team draw certain lines of actions to tackle this issue through awareness, research and compensation schemes.

- Regular meetings, dialogue and awareness sessions were held in five union councils around Ayubia National Park, to restore the confidence of the affected communities and facilitated and contributed a lot to reduce the level of tension and fear in the region. A total of 05 trainings “Mitigating measures to reduce leopard attack chances on humans and livestock” were organised and information about the leopard behaviour shared through different forums (including print and electronic media) in order to normalise the tense situation of the area.
- A community-based livestock insurance scheme was launched in March 2006 in the same village. The people of the village agreed to join hands for the conservation of leopard as a result of a series of dialogue and meetings. Further, they also agreed to sign an agreement for imposing ban on the retaliatory killing of leopard in the area. This achievement is not less than a success story in the field of wildlife conflict management. This scheme requires replication in other parts of the leopard habitat in the region as well.
- The Project also collected useful information on scientific lines about the leopard ecology and the behaviour-related aspects; never collected in the past on the species anywhere in the country. This information is required to be collected from the area on regular basis along the application and use of advanced technologies used for population estimation and home range identification.
- The project helped a lot to build the capacity of the staff in information collection on scientific lines as well as in handling the wildlife conflict situation.

To meet the current challenges, the Region requires a comprehensive awareness program and research on leopard ecology and behaviour.

Recommendations

- A comprehensive awareness program for leopard conservation should be launched as soon as possible for the whole of the Galliat region.
- Livestock insurance scheme initiative should be extended to other parts of the Galliat.
- Scientific information should be collected from the area on regular basis regarding the population status, prey species, leopard sighting and depredation, etc. to assess the changing situation.
- Camera trap study is required for the population estimation, especially for knowing the species density in the region.
- A PhD or at least a MPhil study on the Common leopard ecology or behaviour needs to be carried out.

13. Summary of Results

Objective	Major Activity	Results	Recommendation
1. Demarcate the current occurrence zone of leopards in the Galliat on the basis of sighting records to determine its distribution, population and density	<ul style="list-style-type: none"> • Collect sighting record • Additional Activities other than project proposal like; pugmark survey, pugmark tracing and preservation, and prey species identification were also conducted 	<ul style="list-style-type: none"> • Sighting record for the Y2005, Y2006 and Y2007 (up to June) was collected and plotted on GIS map • Baseline information was developed for the area by the calculation of mean encounter rate of the scats, footprints, livestock and people's use of the habitat • About 11 leopards were identified through the regular monitoring of the 10 leopard tracks and pugmark analysis. 	<ul style="list-style-type: none"> • Sighting record information provide useful information, it should remain continued in the area • Camera trap study is highly recommended to know the leopard density in the area • Mean encounter rate for the scats, pugmarks, livestock and people need to collect on regular basis from the area for the whole year • Pugmark census is also require to conduct on regular basis in the area through out the year •

2.	<ul style="list-style-type: none"> • 	<ul style="list-style-type: none"> • ten prey items were identified through scat analysis • Few leopard tracks were preserved with the help of plaster of paris. 	<ul style="list-style-type: none"> • Remaining 18 scats should be analyzed in order to complete the study • Preserved tracks should be used as an education purpose for children and need to display at information centre
3. Minimize Risk to human life and property by leopards and develop a mechanism to reduce economic impacts of depredation on individual herders	<ul style="list-style-type: none"> • Assess the extent of damages to livestock • Test economic and social viability and acceptability of various options through consultation 	<ul style="list-style-type: none"> • Livestock depredation surveys were conducted and their GPS readings were recorded and plotted on the map for the Y2005, 2006 and June, 2007 • With consultation of local communities a community based livestock insurance scheme was launched in the area in order to reduce economic losses of farmers due to livestock depredation 	<ul style="list-style-type: none"> • Livestock depredation information should also need to collect in future • Insurance scheme idea need to extend to other parts of the Galliat also. • In launching the insurance scheme, women involvement should be consider. • Financial assistance from government is also required to extend this scheme to other parts as well
4. Protect leopard from direct killing through awareness , training and lobbying	<ul style="list-style-type: none"> • Develop training modules for communities 	<ul style="list-style-type: none"> • Five trainings were conducted on “mitigating measures to reduce leopard attack chances on human and property” • 3.1.ii Electronic and print media was used as 	<ul style="list-style-type: none"> • A comprehensive awareness program for the leopard conservation is highly important for the region.

		<p>source to share the leopard attacks chances on human</p> <ul style="list-style-type: none"> • 3.1.iii information was shared with local communities regularly through different forums 	
5. Conduct training for wildlife staff to use tranquilizer guns instead of shooting	<ul style="list-style-type: none"> • The wildlife department DFO, Mr. Safdar Ali Shah, and a tranquilizer gun specialist Mr. Abdur Rehman briefed the wildlife staff on the use of the gun at Abbottabad Office. • Mr. Muhammad Kalim, is already posted in the study area (wildlife department) as a specialist for using the tranquilizer gun. And during the reporting period he tranquilized 03 animals. 		
6. Develop a funding proposal to address human-leopard conflict in the entire range of leopard occurrence.	<ul style="list-style-type: none"> • During the reporting period two proposals were developed and submitted to the donors. Only one was accepted. 		