Report on human-wildlife conflict study results

Deliverable #4

Prepared by

Teimuraz Popiashvili and Bejan Lortkiphanidze

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Contents

1   INTRODUCTION

This report is Deliverable #4 as per Contract for Professional Consulting Services signed between UNDP and NACRES – Centre for Biodiversity Conservation & Research. It describes a study analyzing the scope and nature of human-wildlife conflict (HWC) in Machakhela valley.

Human-Wildlife Conflict in Machakhela Valley is a complex issue involving husbandry, agricultural practices and the attitudes of the local population and the status of wildlife around the villages. While we have previously discussed most of the listed aspects, wildlife status remains the least studied, as it requires wider ecological surveys and, thus, more resources. Habitat condition, population density of wild animals, availability of natural prey and diet preferences are primary factors in shaping the wildlife dimension of the conflict; this dimension is missing from our study.

2   STUDY AREA

Study area is located in the southwestern Georgia, within the administrative borders of Khelvachauri Municipality, Autonomous Republic of Adjara (See Appendix #1). Terrain of the study area is rough, with steep slopes and deep gorges. Highest elevation point is Khedismta (2151 masl) and the lowest - Machakhela River's outfall (40 masl). Machakhela River, also called Machakhlistskali, is a west-flowing river, which originates in Turkey and enters Georgia in the midway of its flow. It runs about 19 kilometers in Georgian limits and joins Chorokhi River near village Machakhlispiri; in this distance, river drops by 360 meters, thus it is characterized with fast flow. Tributaries of Machakhela River have even bigger amplitude; they run in canyon-type valleys and make numerous waterfalls and rapids. Area is characterized with sub-tropical, humid climate.

Most of the study area is covered with globally unique Colchis Forest with well-developed understory. Due to illegal logging, forest was heavily damaged in 1990s and early 2000s. Logging extremely reduced original beech (*Fagus orientalis*) and chestnut (*Castanea sativa*) forests which was later replaced by secondary alder (*Alnus glutinosa*) growth. Non-forested areas include settlements and active or abandoned agricultural lands. Worm and humid climate supports high rate of vegetation growth, thus abandoned agricultural land is covered with fern and lianas. Meadows near or on mountain ridges are very limited in size, hence forested areas are used as pastures. Forest surrounds settlements so tightly, that sometimes it becomes difficult to see borders.

There are 10 main villages in the study area with approximately 5,000 inhabitants in total. Six villages (Sindieti, Acharisaghmarti, Tskhemlara, Chikuneti, Zeda Kokoleti and Kveda Kokoleti) are situated on the right slopes of Machakhela gorge, others (Kedkedi, Skurdidi, Kveda Chkhutuneti and Zeda Chkhutuneti) on the left slopes. Due to the terrain characteristics, distribution of the settlements is very uneven. It seems people were building houses wherever they could find relatively flat areas, thus, some houses are deeply intruded into the forest. There are settlements on higher elevations (up to 750 m), but lower slopes along the rivers are relatively densely populated. Almost all the families have at least one agricultural parcel, which are located either near houses or remotely, surrounded by forest.

Machakhela National Park holds about 60% of the study area excluding settlements, agricultural lands and the forests managed by National Forestry Agency. Park was established in 2012 with an initial size of 8733 hectares and was reduced to 7327 ha in summer, 2017. Reason of the size reduction was incorrect planning of the park borders, which included some traditionally owned agricultural lands, thus raised conflicts with local population. Currently, park surrounds villages and agricultural lands so, that provides reasonable buffer to let local population continue traditional activities without causing conflicts. Generally, park includes relatively high elevation forested areas.

Typical Settlement in Machakhela valley

Except the Machakhela Valley, we also organized field trips to the summer pastures, where people from the Valley migrate with their livestock every year. We carried out fieldwork in Ghaghvi valley (close to Jazigoli Lake), Adigeni municipality and upstream Chirukhistskali River in Shuakhevi municipality (see Appendix #2 for map). Machakhela people use both places intensively for as summer pastures.

3   METHODOLOGY

In studying Human-Wildlife Conflict (HWC), we carried out two types of surveys: (1) defining scale and structure of HWC in Machakhela valley and (2) Local Attitude surveys. The first set of surveys are primarily used to identify local husbandry practices, wild animals that are problematic, preventative measures employed by locals and the characteristics of wild animal damage. On the other hand, our Local Attitude survey was formulated separately because it is primarily used to measure local opinions and beliefs towards wild animals and Machakhela national park. Regardless of whether or not these beliefs are justified, attitudes serve as important indications for future conflict-mitigation and preservation work. In other words, HWC surveys attempt to look at what is actually happening in Machakhela valley whereas the Local Attitude survey looks at what locals perceive to be happening, giving us a more social perspective in analyzing human-wildlife conflict.

Interviewing local population was the main approach in the HWC study in Machakhela valley. We used semi-structural interview approach to study scale and structure of the HWC in the valley. Structural questionnaires were disseminated among the local population to obtain data on Local Attitude. All the questionnaires prepared in advance and tested in the field to check if they were easily understandable and contextually relevant for the locals. Questionnaires were then restructured and some of the questions were updated based on the test results (Appendices #3; #4; #5; #6).

In addition, we decided to monitor and record HWC incidents. Examining the site immediately after an attack can reveal valuable information on the nature of the attack, its underlying conditions and the extent of damage or loss. We thought that building a network among the local population and having local field assistants ready to respond to attacks were key components of HWC monitoring.

4 DATA COLLECTION

4.1 Human-Wildlife Conflict Surveys

The Human-Wildlife Conflict (HWC) survey was a key component of the study, aiming to collect general information on the HWC situation: husbandry and agricultural practices, locally used preventative measures, expected and actual loss, and corresponding economic impact on local livelihoods. These surveys were split up into three fieldwork trips:

a. Interviews at the beginning of the season
b. Interviews at summer pastures
c. Interviews at the end of the season

4.1.1 Interviews at the beginning of the season

The first stage of our HWC survey was conducted from late April to the beginning of May. We carried out two weeks of fieldwork, collecting data on the general HWC situation in Machakhela valley. Livestock husbandry, agricultural practices, the knowledge of locals and their practices to avoid predator attacks were recorded during the field survey.

We visited all ten of the main villages in Machakhela national park (Kedkedi, Sindieti, Ajaris Agmarti, Skurdidi, Tskhemlara, Chikuneti, Zeda Kokoleti, Kveda Kokoleti, Kveda Chkhutuneti and Zeda Chkhutuneti) to interview various local groups. Since some agricultural lands in Machakhela valley (close to village Ajaris Agmarti) also belong to Keda Municipality, we also interviewed landowners from the latter. 83 questionnaires were completed and data were entered in a preliminarily prepared MSO Access database.

4.1.2 Interviews at summer pastures

Pastures in Machakhela valley are limited and do not provide enough space for local livestock. Therefore, some families practice transhumant pastoralism, taking their livestock to subalpine and alpine meadows in the municipalities of Adigeni and Shuakhevi. Other families do not follow their livestock per se but hire shepherds to keep their livestock during the summer. Only a small fraction of the village's livestock stays in Machakhela valley.

Knowing conflict details at the summer pastures is important for generating a more comprehensive picture of HWC in Machakhela. Conflict details specific to summer pastures help explain locals' perceptions on wild animals, subsequently helping us to evaluate correctly damages caused by predators. We conducted 26 interviews in total: 20 in Jazigoli and 6 in Chirukhi.

4.1.3 Interviews at the end of the season

We carried out our final survey in October, interviewing 96 respondents. The survey focused on quantifying the number of wild animal attacks and estimating the economic loss caused by wildlife during 2017. To assess the financial dimensions associated with total loss, we asked locals about the level of damage in 2017 and how it has changed compared to previous years.

4.2 Monitoring and Recording HWC Incidents

At the beginning of the project, we hired local field assistants – Iveri Shavadze. He was responsible to respond to attacks in Machakhela valley. We printed simple brochures with short descriptions of the project, study objectives and contact information for both a local field assistant and NACRES team member. When visiting the

study area in May, we disseminated the brochure among locals and asked them to call us as soon as an attack happens.

Unfortunately, the local population did not respond to our request; not a single call was received by us nor by local field assistants. It seemed that the locals did not see the benefits of cooperating with us and informing us about damages caused by wildlife. Therefore, we changed our approach and decided to collect information ourselves through regular visits to the villages, rather than waiting for locals to call. Since it was impossible to visit every single family regularly, we visited villages and asked people if they or their neighbors had wildlife attacks. In these conditions, we collected 22 incidents of wildlife attacks on livestock and beehives. However, not all of them were collected immediately after they occurred. Therefore, some details remain approximate and unprovable.

Villagers believe that bears were responsible for all 22 incidents, though they were not present for any of the attacks. We found evidence for the presence of bears in only half of the cases. It is interesting that use of preventative measures was reported in only five cases. Even out of these five, prevention was very basic, such as using scarecrows, white tapes, blinking lights and barriers to prevent cattle from entering the forest. Some owners installed several devices, but only after they received damage.

4.3   Local Attitudes Survey

Drafts of attitude questionnaires were elaborated and tested in the field at the beginning of May. Based on the test results, the questionnaire would be updated. For example, an introduction was added to the questionnaire to help interviewees understand the study's purpose and assure him/her that all provided information would be confidential. Experts gave us recommendations, allowing us to finalize the questionnaire. According to the given advice, several questions were rephrased and the introduction was shortened and simplified (see Appendix 6).

We printed out 500 copies of the final questionnaire and carried out brief fieldwork trips to disseminate them among locals at the end of May. NACRES team instructed field assistant – Iveri Shavadze how to disseminate the questionnaires and how to collect the filled forms.

Field assistants continued to disseminate the questionnaires independently in June and the beginning of July while trying to collect filled questionnaires. We aimed to reach four, general target groups: (1) school teachers, (2) school children (grade nine and above), (3) protected area and forest service rangers and (4) other locals from Machakhela. A total of 470 questionnaires were disseminated among locals.

From those 470, we received 386 filled questionnaires. Therefore, 82% of the questionnaires were filled. The data was entered into a preliminary prepared MSO Access database.

5   HWC SURVEY RESULTS AND DISCUSSION

5.1   Local Husbandry Practices

Most families run small-scale husbandries in Machakhela valley. Keeping cattle, growing hazelnut plantations and having small-scale corn/vegetable agricultural fields are common husbandry practices - equal portion of respondents (93%) practicing each type. Beekeeping is less popular (23%)[1] but usually represents a significant

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[1] Here figures exceed 100% because some respondents practice more than one agricultural segment

source of income for some locals. Locals usually grow fruit trees, grapes and berries, but these agriculture segments are either rarely or insignificantly damaged by wildlife. Therefore, we focus on cattle, hazelnuts, corn and beehives as the main vectors of HWC:

- **Cattle** are the most popular livestock in Machakhela valley—only two families reported keeping goats. Having two cattle heads per family is most common, but cattle number per family varies from 1 to 8 individuals. Locals often keep cattle as a subsistence practice, keeping milk products for their own use. Few families, often with three or more milking cows, sell milk products. Cattle are kept in barns from November/December to March/April. With a lack of pastures in Machakhela, cattle must graze at small forest openings or roadside areas. Locals usually do not accompany their cattle since the animals are able to find their way back in the evening. If they are late, owners search and herd them back. Occasionally, cattle stay in the forest all night, becoming easy targets for predators. Approximately one third of families send cattle to summer pastures either in Jazigoli (Adigeni Municipality) or Chirukhi (Shuakhevi Municipality). Some families migrate to the mountains with their livestock while others hire herders. Cattle usually migrate to the mountains at late-May and return around mid-September.

- **Hazelnut** in Machakhela became popular 5-7 years ago and plantation areas increase each year. Locals prefer to cultivate hazelnuts instead of tea, tobacco or corn. Hazelnut harvests are mostly sold. Respondents often do not provide clear figures on their hazelnut plantation sizes. While some did not know, others deliberately avoided answering the question. Hazelnut plantations are mostly surrounded by forest and can extend far from an owner's house.

- **Corn** growing is popular among the Machakhela people, as it is used for corn flour or to feed chicken. Corn straw is stored and later used to feed cattle. According to respondents, cornfield areas decreased dramatically in the last decade. People abandoned relatively large and remote cornfields to cultivate in small plots of land near their houses. Many respondents state that this shift is due to wildlife depredation. However, we found another possible reason; locals can easily find jobs in Turkey with good incomes working on tea or hazelnut plantations. Since it is much more profitable than growing corn, this might be the main reason why locals abandoned the cornfields.

- **Beehives** are found near people's houses and appear to be more protected. Nevertheless, sometimes bears do not hesitate to attack these beehives to eat honey and bees and damage the hives.

5.2   Problematic Wild Animals

For the interviews at the beginning of the season, 96% of respondents (N=83) said that wild animals represent a problem for them: 89% ranked brown bears as the most problematic animal and others named wild boars (5%), jackals (3%) and badgers (2%).

Chart 1. Locals ranked wild animals as the most problematic (1st), less problematic (2nd) and least problematic (3rd) (N = 83)
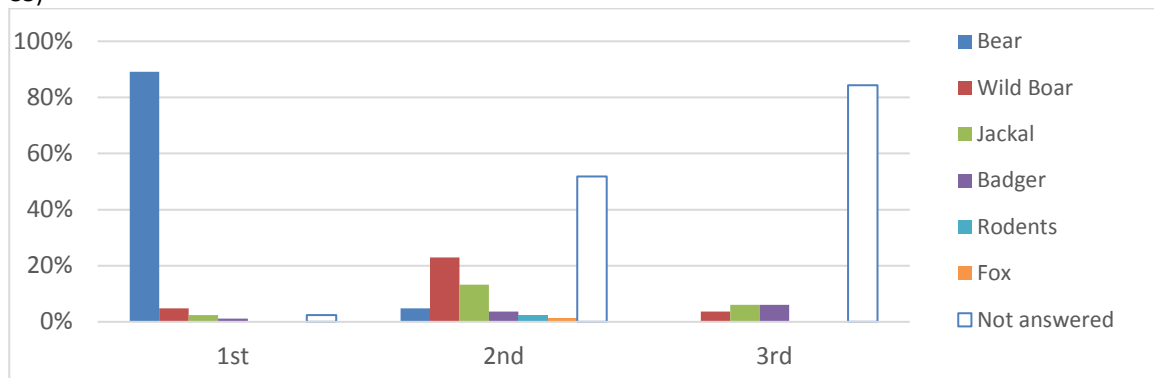
As seen on Chart 1, most of the respondents ranked wild boars and jackals as the second most problematic species. Interestingly, 51% of the respondents who considered bears as the most problematic animal did not name any other species as less or least problematic. For these respondents, it seems that the only noteworthy problematic species is the bear.

As omnivores, bears damage more forms of local husbandry as compared to other nuisance species (see Table 1). The data also indicates that most of the problematic species depredate on corn and vegetables.

Table 1. Interactions of wild animal species with household products according to respondents' answers

	Household products	Livestock	Hazelnut	Corn/Vegetable	Bees	Fruits	Poultry
	Bear	✓	✓	✓	✓	✓	
	Wild Boar		✓	✓			
Animal Species	Jackal			✓			✓
	Badger			✓			
	Rodents		✓				

In the spring of 2017, respondents named wildlife as the main cause of damage to local husbandry. Locals believe that livestock, hazelnut plantations and agricultural fields receive more damage from wild animals than from disease, weather or natural disaster. Only beekeepers named disease and weather condition as the main causes of business loss. In Autumn, during the second half of the survey locals complained about the Brown Marmorated Stinkbug (*Halyomorpha halys*) outbreak that significantly damaged hazelnut plantations. Brown Marmorated Stinkbug is an introduced species and first found in Georgia in 2015. Respondents stated that loss caused by the Stinkbug was greater than any bear damage.

Chart 2. Reasons for loss of main agriculture in Machakhela valley according to locals' answers (based on spring survey)
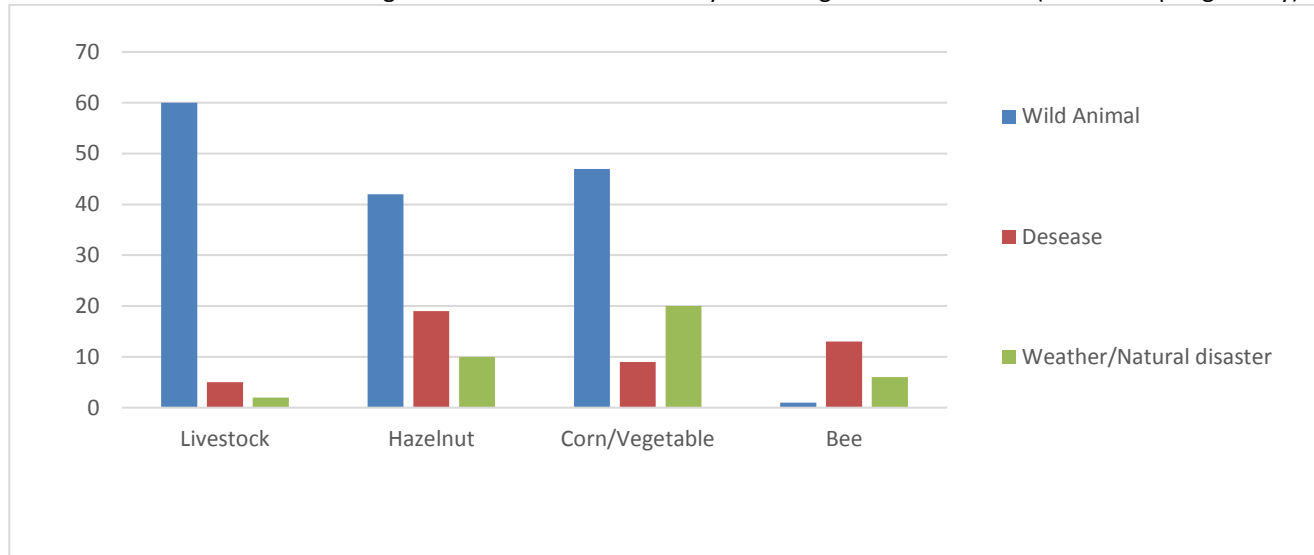
The majority of respondents (83%) believed that loss caused by wild animals increased in the last few years. Half of them blamed Machakhela national park's protection regime; reduced hunting measures gave rise to a growing bear population, allowing more bears to depredate on local agriculture. Other explanations include: (1) the destruction of the Turkish border fence, allowing for the movement of wild animals to Machakhela; (2) the reduction of natural food sources due to dying chestnut trees, causing more of the animals to attack; (3) the focus of wildlife attacks on existing agriculture, since intensive human migration from Machakhela has reduced areas of cultivated land and cattle numbers.

Respondents believe that more damage is received from wildlife in the period from July to September, with a clear peak in August (see Chart 3). Most likely, the main reason for this is that two main agricultural products, hazelnut and corn, become ripe during this period and attract wild animals.

Chart 3. Locals' responses to the question "In which months do you tend to lose more to wildlife damage?"
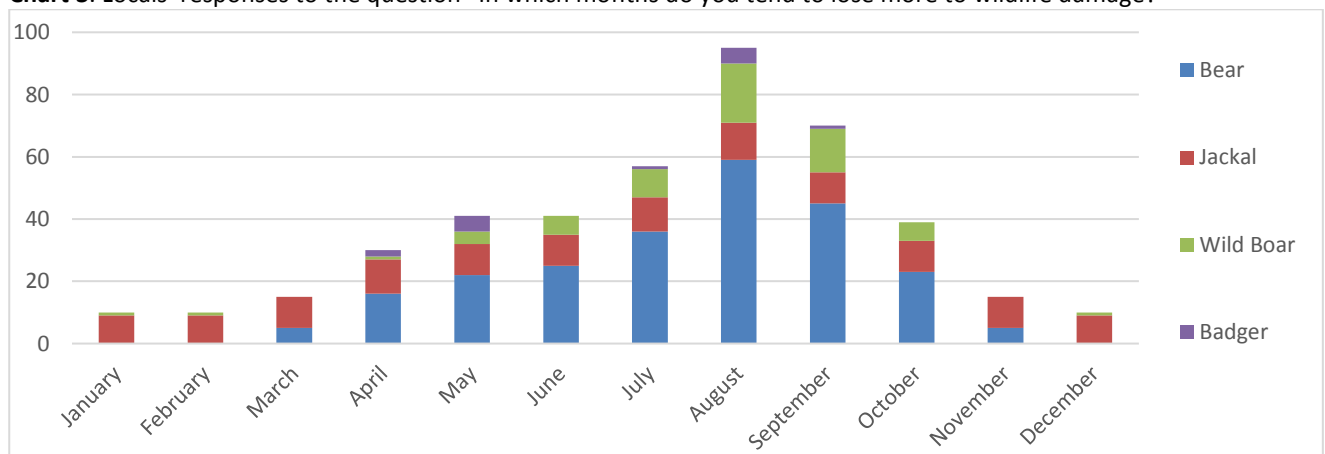
Bears threaten livestock during their activity period (March – November), becoming more problematic when fruits become more attractive along with hazelnut and corn (May – June and July – September, respectively).

According to the locals, intensity of jackal attacks in Machakhela is constant year-round. Jackals are blamed for attacking poultry, which are accessible all year.

Wild boars appear in April and damage agriculture until November. They start by digging sowed grains early in the season then continue to eat grown vegetables later on. The problem becomes acute when hazelnuts and corn are ripe.

5.3 Preventive measures

Local people use diverse methods to prevent losses. Electric fences are the most popular method to protect property. While effective, running 220 V (50 Hz) through the fence is extremely dangerous to both domestic animals and humans. Hence, the method should be included in the "lethal protection measures" category. Lethal protection measures also consist of shooting down animals or using traps to catch and kill nuisance animals. These methods were used by a small number of respondents (see Chart 4). As these lethal practices are illegal, some respondents may abstain from providing information. Therefore, with our familiarity with local usage of lethal protection, we propose that this is an underestimate and lethal methods are more popular than shown in the chart.

Chart 4. Preventive measures used by locals in Machakhela
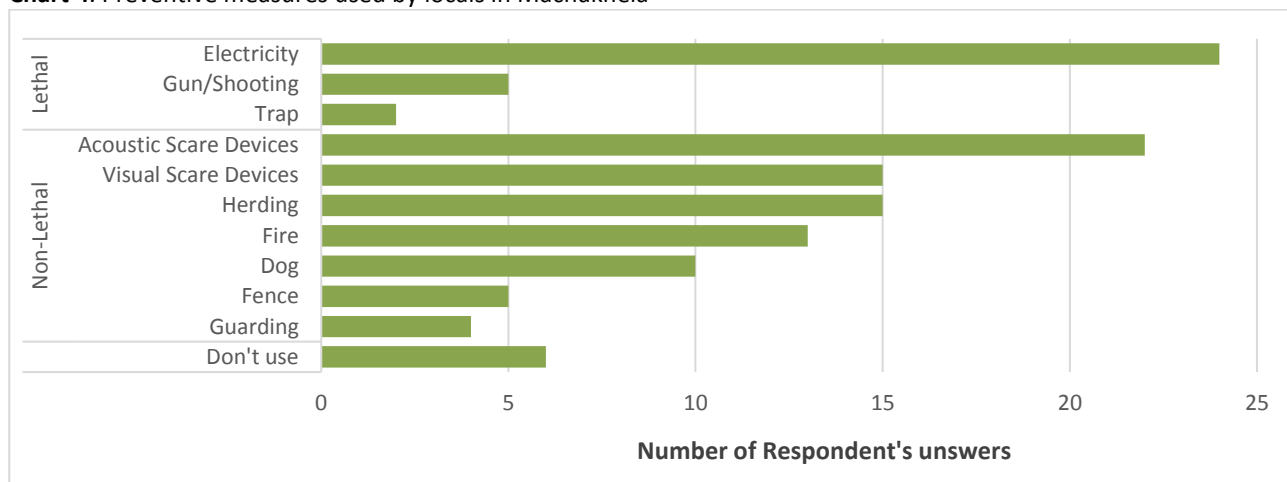
Fire is a popular method to scare wildlife from agricultural fields. Villagers often burn tires, plastic and rubber near their plantations. Burning tire lasts especially long and is used widely by locals. In addition to visual disruption from smoke, fire methods also produce excessive smells that deter wildlife. It should be mentioned that burning car tires and plastic lead to air and soil pollution.

More than half of the respondents (58%) stated that their preventive measures are not effective. Of the respondents who are satisfied with preventative measures, the majority (60%) use electric fences.

We asked respondents what they believe is the most acceptable way to solve this problem and how the government can help minimize it. Most answers on both questions included lethal solution. They would like the government to allow for the killing of wild animals by locals, or by hired professionals.

5.4 Damage caused by wild animals

According to our interviews at the end of the season (N = 96), approximately 45% of respondents stated that they experienced damage during 2017. The lower and middle sections of Machakhela valley appeared to be more affected than upper zone, where only 36% of the respondents had loss. Highest portion of respondents (64%) received damage in Sindieti.

Thirty-eight percent of respondents believe that their loss in 2017 was less than usual whereas 41% identified medium loss and 21% identified more-than-usual loss. At the summer pastures, the majority of the respondents said that current season was less problematic than usual. No single bear attack was recorded on summer pastures and two thirds of the respondents believe that they have more problems in Machakhela valley

compared to the summer pastures. A majority considers that in mountains wolf is more problematic animal than bear.

Thirty-seven percent of respondents who suffered an attack during the report period perceived their loss as Large; 40% Medium; 12% Small and 5% Insignificant. Seven percent did not answer this question.

In Chart 5, we summarized attacks according to the species of wild animal and the type of husbandry. Damage to bean fields, walnuts and fruits were categorized as "other." These damages were not significant sources of monetary loss so locals and owners often did not perceive them as meaningful. The chart shows that losses caused by bears outweighs other species. Bears attack hazelnut and corn fields more frequently than cattle or beehives.

Chart 5. Numbers of wild animal attacks by species and husbandry during the season 2017
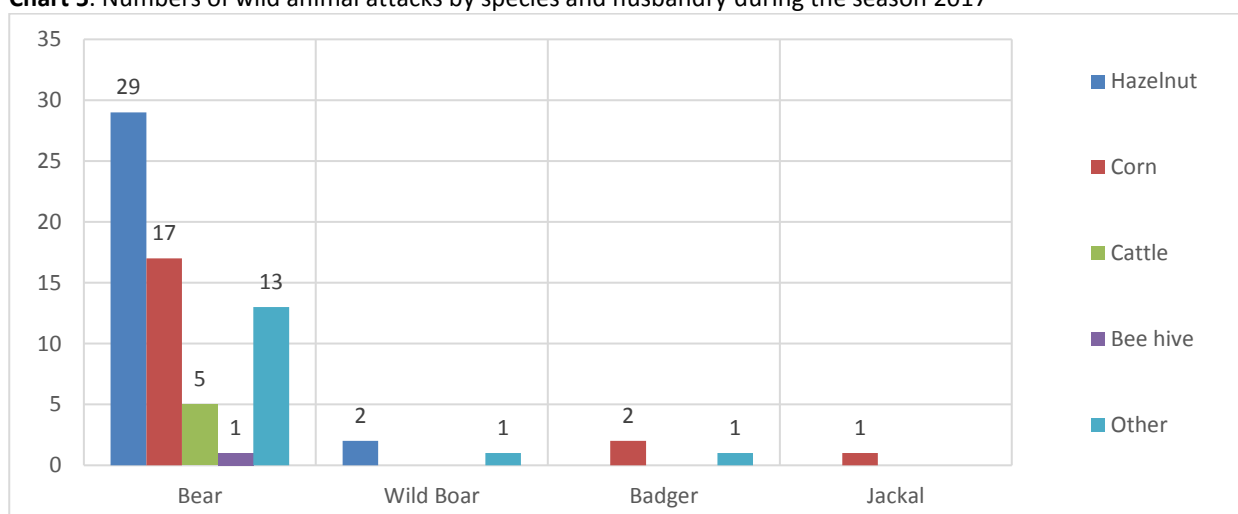
It is important to note that the table shows the number of families affected by wild animals instead of a count of individual attacks. We tried to gather numbers on individual attacks but people could not answer, as most of them discovered the damage after it happened. Therefore, they could not determine how many times wild animals had entered the field or plantation.

According to one respondent, jackal damaged cornfield only once and apparently, the damage was not high. Although, according to spring survey many respondents named jackal as second most problematic species. Probably, jackals attack more during winter season and that is why locals have clear negative attitude to the animal. In addition, compared to other problematic animals, jackal is more often seen and heard by locals, and as many people are scared of it, they perceive jackal as a problematic animal regardless the actual damage caused by this animal.

We calculated the cost of damage to primary products based on the respondents' information. Unfortunately, respondents only provided the amount of damaged products due to brown bears. Even if we focus on bear damage, we only have figures about hazelnut, corn, cattle and beehives. When talking about other species and products, locals did not perceive them as significant.

In terms of financial loss, hazelnut outnumbered others (see Chart 6). The total financial loss of 25 respondents who provided figures of hazelnut damage amounts to ₾11,183[2]. Financial damage due to cattle depredation comes in second at ₾5550 (n = 5). Despite the fact that bear often attack cornfields, overall financial loss is

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[2] Calculations of financial loss are based on product prices provided by the respondents.

relatively low, at ₾2,455 (n = 15). Although bear attacks on cattle and beehives are relatively rare, the financial loss per attack on these products is much higher than others are.

Chart 6. Total and average financial loss per Family in 2017 as reported by respondents.
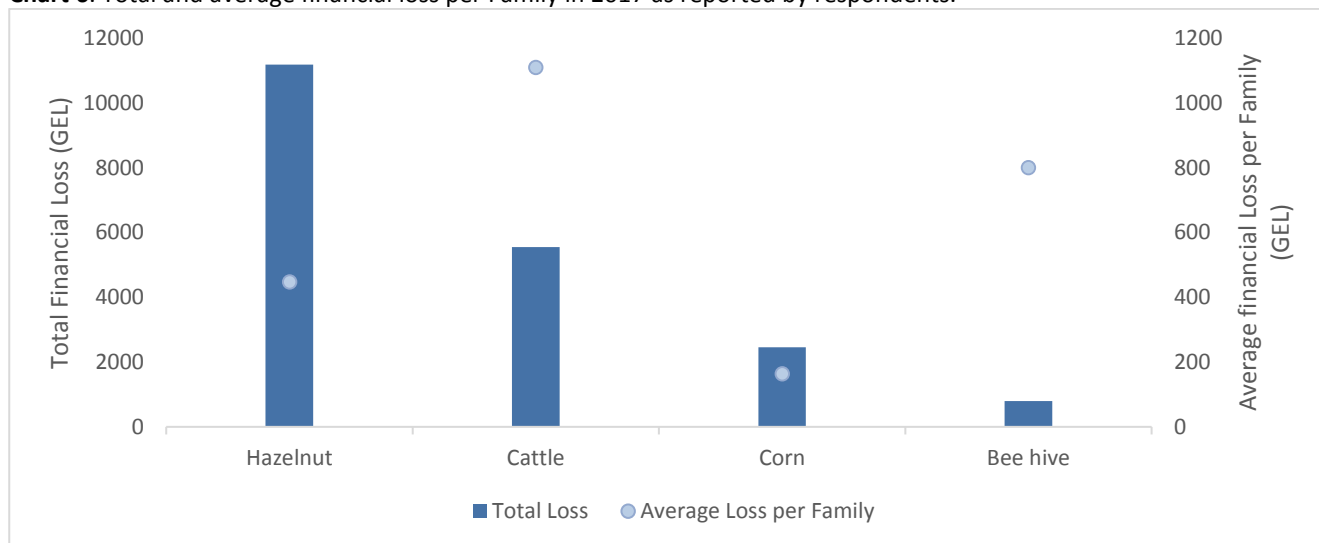
In addition to the figures provided above, wild animals damage hazelnut trees (bears, wild boars) and corn straw (bears), both of which have significant value. Bears' attacks on cattle have an added emotional dimension, influencing local's attitudes towards Machakhela National Park and nature conservation in general.

5.5 Monitoring and Recording HWC incidents

We recorded 22 bear attacks in total during the year 2017. Attacks on livestock and beehives were relatively easier to track because (1) it leads to significant amounts of financial loss that resonates among locals, and (2) people noticed it soon after it happens. Thus, we were able to describe 100% of the livestock and beehive damage that happened in 2017. We recorded all nine attacks on cattle in Machakhela, resulting in 11 heads damaged (nine of them killed and two injured). The first attack on livestock happened at the end of April when we were on the field. Bears attacked a young cow near Zeda Kokoleti village that belonged to a ranger of Machakhela national park. We found that a big bear visited the kill site in the evening and, when it felt signs of

our presence, relocated the carcass to safer places. The next day, we relocated our camera traps accordingly. The bear came again two hours after we left and ate the cow remnants. The bear looked very relaxed and even slept on the carcass. The camera trap captured a video of a dog barking at the bear and, surprisingly, the bear did not run away. It even went a short distance toward the dog and scared the dog away.

It is interesting that out of the nine attacks on livestock, seven happened in the lower part of the Machakhela valley, while the middle and upper parts of the valley had one case each (Appendix map #7). According to spring survey in

The bear sleeping near the cow carcass

year 2016 bear attack on cattle mostly happened in upper part of Machakhela Valley.

Damaged hazelnut bunches

Bears start to enter nut plantations already in July. During this period, nuts develop nutrient-rich seeds and its shell is easier to chew. Therefore, this time is convenient for bears to consume and digest nuts. We visited nine hazelnut plantations in Machakhela valley where there were bear damages. In most cases, the plantation had poor surrounding and was overgrown with tall grass and sometimes adjust to forest. Under dense vegetation, bears feel protected and more easily approach human settlements and/or plantations. Bears occasionally break down hazelnut tree branches to eat the seeds more easily. Damaged hazelnut trees need a long time to recover, and locals cannot harvest them for at least three years after the damage. Young hazelnut trees usually remain safe after bear attacks because they are not too high to reach. Therefore, animals can easily obtain the nuts without damaging the branches.

Pear tree, cherry trees were damaged in three cases, but the damage was insignificant. Wildlife attack monitoring data does not include attacks on cornfield because information was received too late—when cornfields were already harvested by locals.

Most attacks happened around and even within the villages. It seems that bears (and particular nuisance individuals) enter populated parts of the valley without any hesitation (Appendix map #7).

5.6   Local attitude survey results and discussion

The breakdown of respondents' age and gender is shown in the following chart. Although, gender is approximately equally proportional (Male – 54%, Female – 46%), we have an uneven distribution among age groups (Chart 7). From those who answered the question (N = 347), 23% have higher education, 72% secondary and 5% elementary. 15.7% of all surveyed people were teachers, 20.7% were school pupils or students and 1.5% were staff members of the protected area.

Chart 7. Distribution of respondents' age and gender
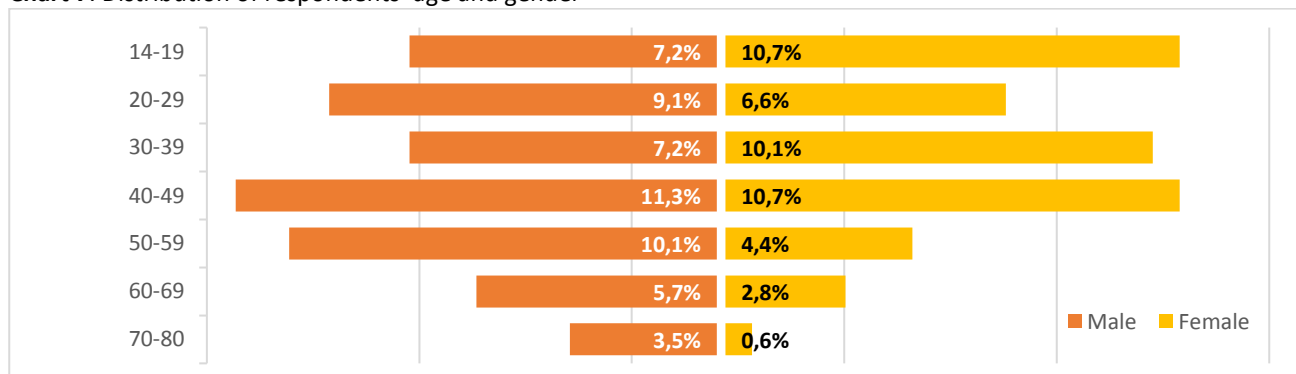
People were asked to mark which answers best expressed their attitudes towards wild nuisance species. As Chart 8 shows, answers are generally more negative. Wild boars and badgers are the least disliked, and

surprisingly, wolves are the most hated animal species— even when there are no wolves in Machakhela valley and bears are the most responsible for locals' damages.

Chart 8. Local population's answers on question: 'Which answer better describes your attitudes to following species?'
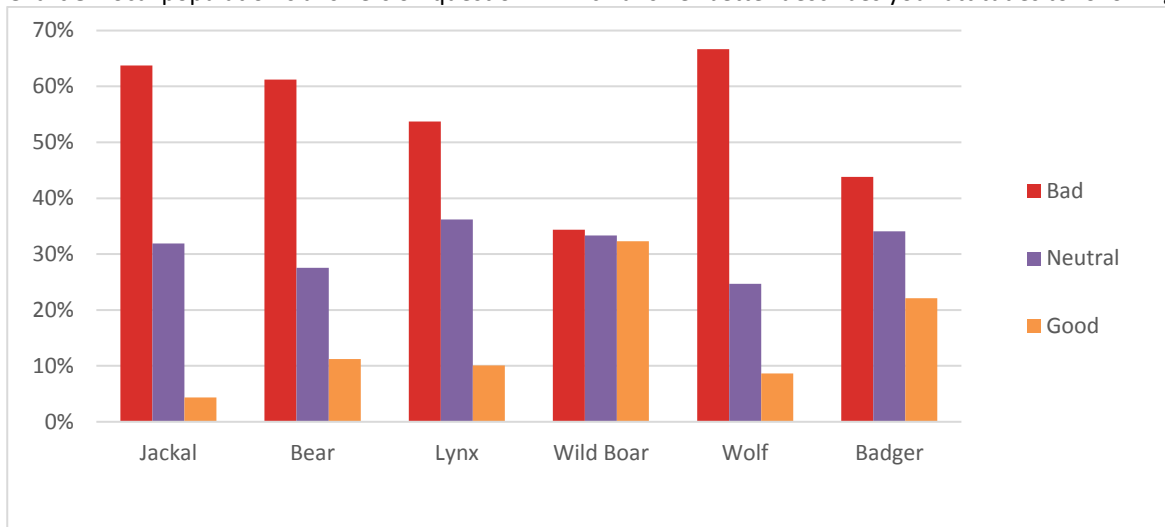
Bears are seen to either destroy or cause significant damage to local property (Chart 9). Percentage of responses that identify wolves under those same damage categories is approximately half. It seems that our respondents' attitudes are not only based on the local incidences but also strongly influenced by the perceived prominence of wolves.

Chart 9. Local population's answers to the question: 'Which answer better describes the level of property damage by the following animals?'
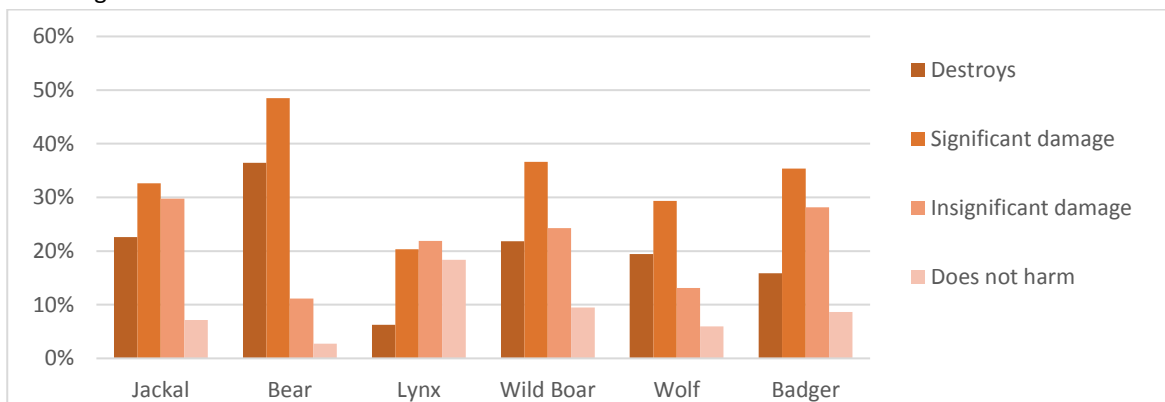
We presumed that negative attitudes towards wolves came from experiences in the summer pastures. Those who participated in our survey at Jazigoli and Chirukhi claim that mountains have more problems with wolves than with bears. If we recall that almost all families were migrating during The Soviet Union, then we can extrapolate that negative attitudes towards wolves came from those who used to spend summers at the mountainous pastures. If this presumption is true, then older people (who are more likely to have experienced transhumance) should have more negative views of wolves. Surprisingly, data suggests the opposite – older people (age of 50+) appeared to have more negative views towards bears than wolves. We also found that general attitudes of older people towards other wild animals were relatively positive. In order to find potential roots for these attitudes, we asked people if they were told stories about the wild animals during their childhood. Sixty-eight percent answered "Yes," and these species (wolf and bear) were negative characters in most of those stories.

Even more difficult to explain negative attitude toward jackals. According to our data, the species are responsible for least damage in the Machakhela valley. It seems that overall negative attitude in the country reflects on the public attitude in Machakhela.

Respondents generally believed that the presence of those animals inhabiting Georgia is bad. The only exception are wild boars, with 38% of people thinking their inhabitance is good.

Wolves, bears, and lynx form a trio of the most dangerous animals to humans, although most people have not heard about an attack on humans in Machakhela valley during the last 10 years (Chart 10). Respondents, who claim to know of attacks, were asked to provide more details. Details showed that, in most cases, respondents provided stories about wild animals' attack on agriculture or non-violent human-wildlife interactions, without harm.

Chart 10. Have you heard of attacks on humans by the following animals in Machakhela in the last 10 years?
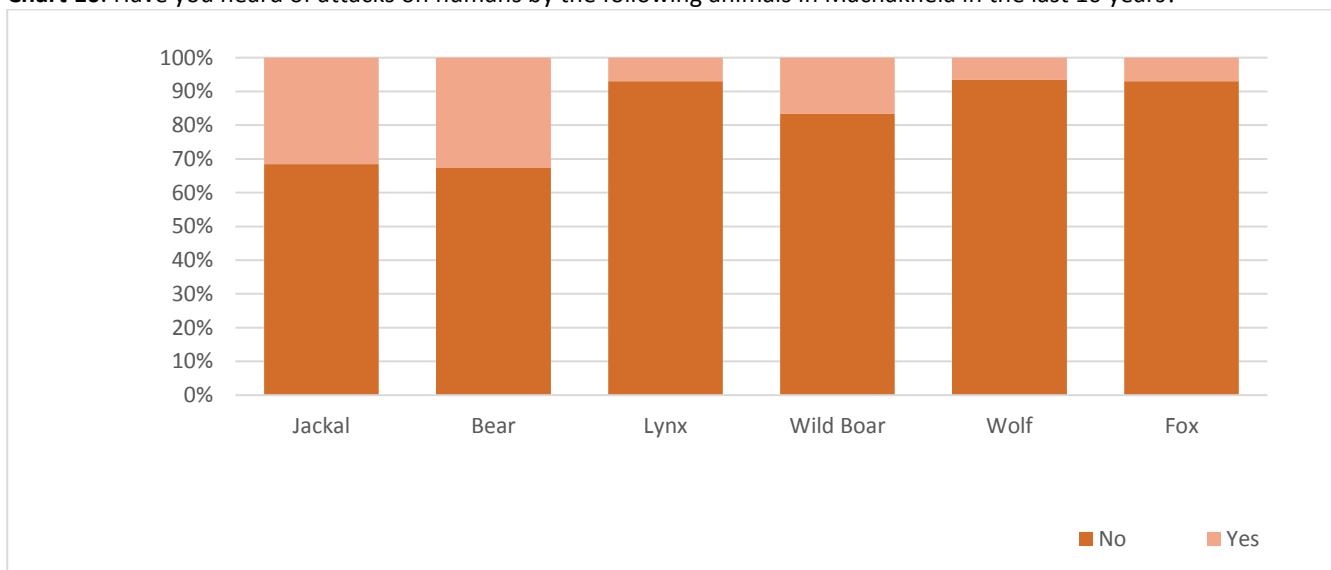
Most people believe that there are too many or many jackals, bears and wild boars in Machakhela valley and that their numbers are increasing. A majority of respondents believe that hunting the listed species is not allowed. Forty-eight percent believe hunting should be allowed in the national park and almost 80% believe that they should be allowed to kill wild animals that attack agriculture. Ninety-three percent of respondents believe that owners with agriculture damaged by wild animals should receive monetary compensation money. Less respondents (73%) believed that money should be paid only on the condition that those owners actually tried to protect their agriculture.

Ninety percent of respondents believe that people need more information about wild animals, and most of them prefer to receive this information via activities organized by the national park (55%). Additionally, preferred mediums to receive information were TV/radio (37%), internet (34%), excursions (28%) and presentations (17%).

Machakhela National Park is not considered a problematic organization according to 49% of respondents, while 29% marked "Yes", 21% marked "Cannot answer" and 4% did not answer. Locals' main concerns are related to logging, hunting/fishing and grazing restrictions. It is important to state that the initial planning of the national park's borders stirred negative reactions among locals. In some cases, the drawing of park borders split traditionally owned land, resulting in multiple conflicts. During our study, the process of re-adjustment had already started; however, it was not yet reflected in peoples' attitudes.

According to the respondents, the main functions of the national park are to improve the economic conditions of locals (37%), attract tourists (31%) and improve the environment (30%).

Twenty-five percent of respondents stated that they have benefited from the national park and a larger portion of respondents (40%) expect to benefit in the future. These last two figures are very important, as an increasing number of satisfied people will foster the support necessary to make the park more effect.

6 CONCLUSIONS

- The bear is the most problematic species in Machakhela valley and is responsible for the most damage in our study area. Locals name wild boar and jackal as the second problematic species but our survey shows that their damage is too small comparing to damage caused by bear.
- Cattle, hazelnut plantations, cornfields and beehives are the most affected by bear attacks;
- A majority of locals believe that loss caused by wild animals has increased in past years. Some of them blame Machakhela national park; protection regimes have reduced hunting in the valley, subsequently leading to a growing bear population that increasingly depredates on local agriculture;
- Respondents believe that they receive more damage from wildlife in the period from July to September, with a clear peak in August;
- To prevent wild animal attacks, locals often use brutal methods such as conventional electricity (220v). Tire-burning is also widely accepted method to deter wildlife from the agricultural lands.
- Most respondents (58%) state that their preventative measures are ineffective. Of those who were satisfied with their preventative measures, a majority (60%) are using electric fences.
- Up to 50% of respondents received damage from wildlife in year 2017; lower villages of the valley are most affected;
- 37% of respondents who suffered from wildlife attacks in 2017 perceive the damage to be "big" ; for 40% of interviewees the loss was average and only 12% perceive the damage to be "small";
- Financially, hazelnut plantations receive the largest amount of damage from bear raids, followed by cattle damage and then corn damage;
- Monitoring locations of the attacks showed that bears do not hesitate to enter populated places in close proximity to local houses so that they can depredate on cattle/beehives/orchards.
- The wild boar is the least disliked animal in Machakhela valley. Surprisingly, the wolf is most hated even when there are no wolves in Machakhela valley;
- 71% of respondents replied that they receive damage from jackals, but in 2017 we recorded only one case when the jackal(s) attacked cornfield and damage was insignificant.
- 27% of respondents stated that Machakhela National Park creates problems– implementing logging and hunting restrictions is the main reason for concern;
- 26% of respondents stated that they benefit from the national park, and even more (42%) expect to benefit in the future.

Appendices
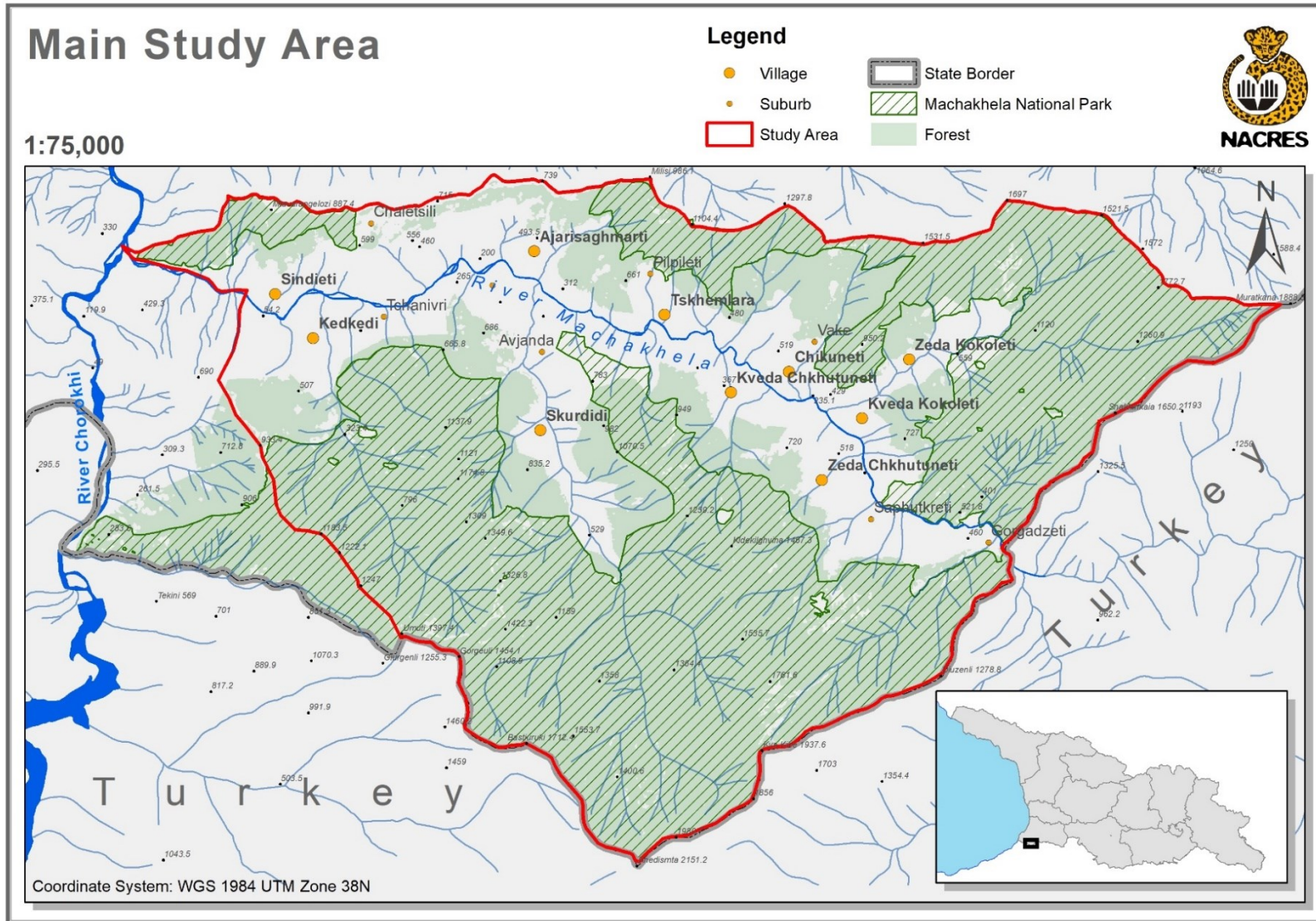
Human-Wildlife Conflict Study Areas
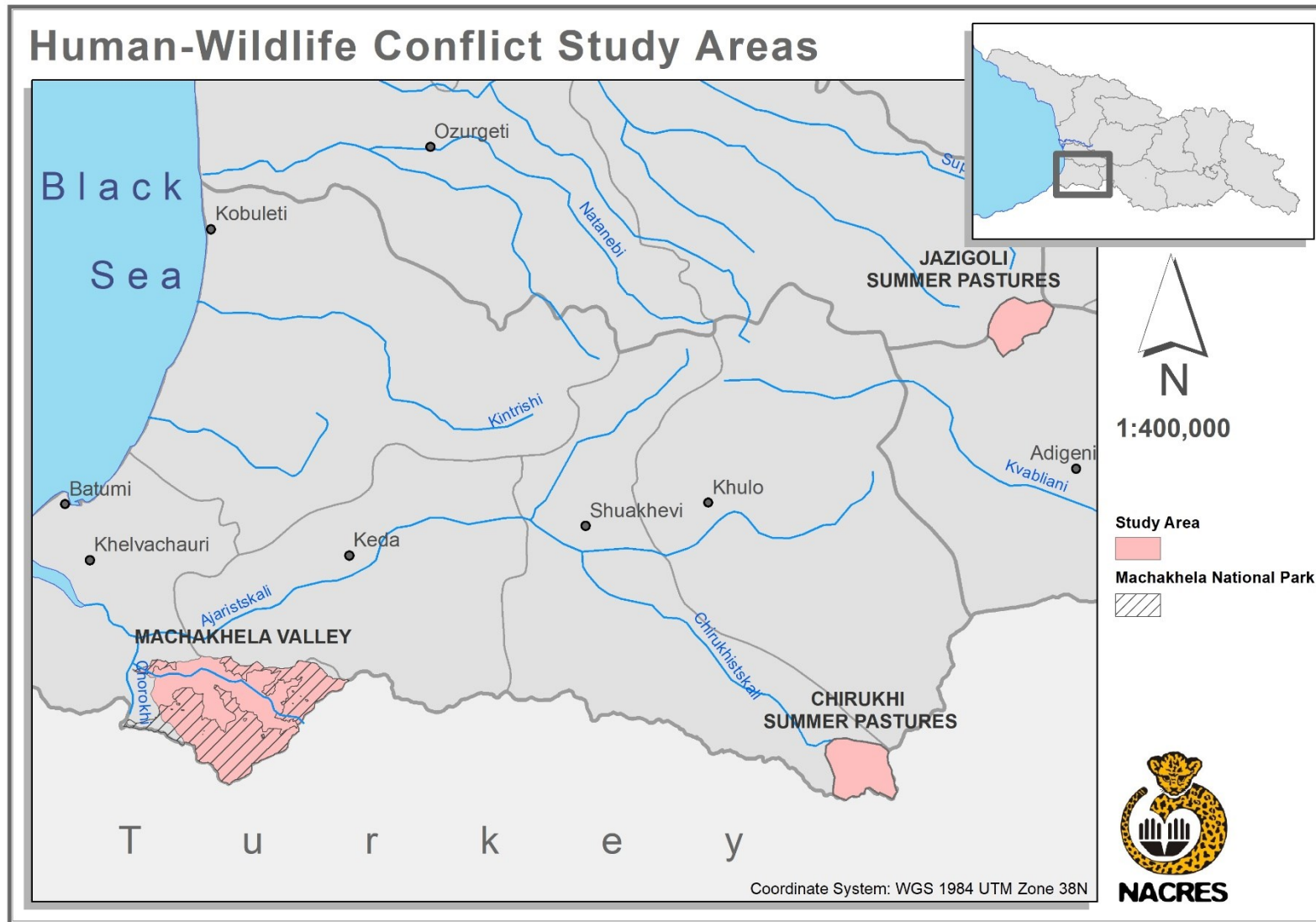
APPENDIX #3 HUMAN-WILDLIFE CONFLICT SURVEY QUESTIONNAIRE – PART ONE

General information about the interview (the section is filled by interviewee)

1. Interview ID: _____

2. Date: _____

3. Interviewer: _____

4. Village (site): _____

Information about wild animals

5.   Do wild animals cause problems for you?   ☐ Yes   ☐ No   ☐ Partly

6. Name the three most problematic wild animals and rank them (1 = the most problematic)

Animal	Category

7. Which field of agriculture is damaged the most by named wild animals?
   Please, answer according to your previous answer

Agriculture \ Wild animal			
Livestock			
Corn/Vegetable			
Nuts			
Beehives			
Other			

8. Loss caused by wild animals in last period has:

    ☐ Decreased   ☐ Remained unchanged   ☐ Increased

9. In case of answers "decreased" or "increased", what is the reason?

_____

10. In which month(s) do you receive damage from wild animals more frequently?
    Please provide answer using 3 most problematic animals named by you in question #6.

Animal \ Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec

11. How do you protect your agriculture from wild animals?

☐ Shepherd ☐ Fence ☐ Guard ☐ Dogs ☐ Gun

☐ Explosive ☐ Burning tire ☐ Electricity ☐ Trap

☐ Scarecrow (describe _____)

☐ Other

_____

12. Are those methods effective? ☐ Yes ☐ No

13. What is the most acceptable way to solve this problem?

_____

14. Have you or your friend/relative suffered losses from wild animals this year?

☐ No ☐ I had ☐ friend/relative had

15. Do you need any assistance to protect your husbandry? What kind of assistance can it be?

_____

Information about agriculture

16. Types and quantity of agriculture:

Quantity \ agriculture	Livestock	Corn/Vegetable	Nut	Hive	Other:
number/m^2/row					
Mark the most important one for you					

17. Number of family members _____

18. Number of employed family members _____

Please, describe your agriculture business in more detail:

_____

_____

19. What is the main cause of loss for your agriculture?
Please, provide ranking: 1 = most problematic;

Agriculture \ Reason of loss	Diseases	Natural disaster	Wild animals	Other reason
Livestock				
Corn/Vegetable				
Nuts				

Beehives				
Other				

Other questions

20. Would you be interested in insurance of your livestock/harvest?

       ☐ Yes   ☐ No

21. Do you want to inform us about the attacks?

       ☐ Yes   ☐ No

22. In case of additional questions, to make it easier for us to contact you, please fill in your name and contact info:

_____

Notes

_____

_____

_____

_____

APPENDIX #4 HUMAN-WILDLIFE CONFLICT SURVEY QUESTIONNAIRE – PART TWO

1. Interview ID: _____

2. Date: _____

3. Interviewer: _____

4. Village (site): _____

5. Does the respondent participated in the previous (the first) survey? ☐ Yes ☐ No

6. Do you have loss caused by wild animals this year? ☐ Yes ☐ No

7. How many attack have you encountered this year? Please list animals and affected type of agriculture.

Animal species / Agriculture			

8. Please assess damage caused by the wild animals to your agriculture.

Animal specie / Agriculture			

Please try to assess monetary loss of the damage caused by wild animals

_____

9. This damage is: ☐ less than average ☐ average ☐ more than average

10. The financial loss for you is: ☐ High ☐ average ☐ low ☐ not significant

11. Respondent's name: _____

12. The birth date: _____

13. The contact information: _____

Notes

_____

_____

APPENDIX #5 HUMAN-WILDLIFE CONFLICT SURVEY QUESTIONNAIRE – SUMMER PASTURES

1. Interview ID: _____

2. Date: _____

3. Surveyor: _____

4. X _____ Y_____

5. When did you arrived at summer pastures? _____

6. When do you plan departure? _____

7. Do wild animals make problem to you at summer pastures?

    ☐ Yes   ☐ No   ☐ Partly

8. Where do you have more problems due to wild animals?

    ☐ Machakhela valley   ☐ Summer Pastures   ☐ same

9. In your opinion, what is the reason of difference?

_____

_

10. Which animals are more problematic at summer pastures? Please, rank 1 = more problematic, 3 = least problematic

    1. _____ 2. _____ 3. _____

11. Which measures do you use to protect your livestock?

    ☐ Herding   ☐ Fence   ☐ Guard   ☐ LGD   ☐ Gun

    ☐ Petards   ☐ burning tires   ☐ Electricity   ☐ Trap

    ☐ Scarecrow (Details _____)

    ☐ Other
    _____

12. Are these measures effective?   ☐ Yes   ☐ No

13. What do you think what is the best solution of the problem

_____

14. Type and number of livestock at summer camp:

Type	Number

15. Have you or your acquaintance suffered from wild animal attacks at summer pastures?

☐ No   ☐ I have   ☐ My acquaintance have _____

16. What kind and size of damage did you get this summer?

Livestock Type	Killed	Damaged

17. Financial cost of the damage:

_____

_____

_____

18. Comparing to previous years, this damage is:

☐ Less than usual   ☐ About average   ☐ More than usual

19. Are you interested in livestock insurance?

☐ Yes   ☐ No

20. Please, provide your contact details in case of additional questions (name, surname, phone number):

_____

Remarks

[Questionnaire #: _____]

Public attitudes and environmental awareness survey questionnaire

Dear Respondent

Thank you for cooperation!

In order to reduce the damage caused by wild animals and to select appropriate methods, it is necessary to know root causes of a conflict between human and wildlife. With this purpose, within the framework of the UN Program, the survey was planned. The results of the survey will help us to carrying out the activities that will significantly reduce the damage caused by wild animals and will mitigate the existing conflict.

Survey mainly relies on the information provided by the population. Therefore, engagement of the local population is crucial for its success. We highly appreciate your time and would like to thank you for your honest responses. Your answers should reflect your opinions and not the opinions of others. **Please, note that we do not ask you to indicate your name in the questionnaire.** We guarantee your privacy and assure protection of any information obtained through the questionnaire.

Please answer all the questions below. If you do not have answer to a particular question, you can choose a neutral answer, or the proposed option "do not know".

Thank you!

Sincerely,

Biodiversity Conservation Research Centre "NACRES"

Tel: +995 32 2 53 71 25 / +995 32 2 53 71 24

E-mail: administrator@nacres.org

www.nacres.org

www.facebook.com/nacres.org

_____

Below you will find questions with estimated answers; Please mark one answer for each animal that best describes your attitude towards them.

1. Which of these answers describe your attitude towards these animals?

	Very bad	Bad	Neutral	Good	Very good
Jackal	☐	☐	☐	☐	☐
Bear	☐	☐	☐	☐	☐
Lynx	☐	☐	☐	☐	☐
Wild boar	☐	☐	☐	☐	☐
Wolf	☐	☐	☐	☐	☐
Badger	☐	☐	☐	☐	☐

2. The fact that this animal inhabits in Georgia is:

	Very bad	Bad	Neutral	Good	Very good
Jackal	☐	☐	☐	☐	☐
Bear	☐	☐	☐	☐	☐
Lynx	☐	☐	☐	☐	☐
Wild boar	☐	☐	☐	☐	☐
Wolf	☐	☐	☐	☐	☐
Badger	☐	☐	☐	☐	☐

3. Which of following suggestions do you agree with?

	Causes no damage to livestock/ harvest	Causes mild damage to livestock/ harvest	Causes significant damage to livestock/ harvest	Destroys livestock/ harvest	Do not know
Jackal	☐	☐	☐	☐	☐
Bear	☐	☐	☐	☐	☐
Lynx	☐	☐	☐	☐	☐
Wild Boar	☐	☐	☐	☐	☐
Wolf	☐	☐	☐	☐	☐
Badger	☐	☐	☐	☐	☐

4. Which of following suggestions do you agree with?

	Very dangerous for human	Dangerous for human	Mostly harmless for human	Always harmless for human	Do not know
Jackal	☐	☐	☐	☐	☐
Dog	☐	☐	☐	☐	☐
Bear	☐	☐	☐	☐	☐
Lynx	☐	☐	☐	☐	☐
Wild	☐	☐	☐	☐	☐
Wolf	☐	☐	☐	☐	☐
Fox	☐	☐	☐	☐	☐

5. In case of your answer is "dangerous" or "very dangerous", please describe in what situation is that animal dangerous?

_____

6. In your opinion, what is the quantity of those animals in Machakhela valley?

	None	From 1 – to 50	From 51 – to 100	100 or more	Do not know
Jackal	☐	☐	☐	☐	☐
Bear	☐	☐	☐	☐	☐
Lynx	☐	☐	☐	☐	☐
Wild Boar	☐	☐	☐	☐	☐
Wolf	☐	☐	☐	☐	☐
Fox	☐	☐	☐	☐	☐

7. Have you heard of animal attacking human in Machakhela valley in last 10 years?

	Yes	No
Jackal	☐	☐
Bear	☐	☐
Lynx	☐	☐
Wild boar	☐	☐
Wolf	☐	☐
Fox	☐	☐

8. In case of positive answers in previous question, please describe how it happened (when, where and in what circumstances)

_____

9. In your opinion, hunting on which of the following animal is legal in Georgia?

	Permitted	Not permitted	Do not know
Jackal	☐	☐	☐
Bear	☐	☐	☐
Lynx	☐	☐	☐
Wild boar	☐	☐	☐
Wolf	☐	☐	☐
Fox	☐	☐	☐

10. In your opinion, how is the number of animal these animals changing in Machakhela valley?

	Increases	Decreases	Doesn't change	Do not know
Jackal	☐	☐	☐	☐
Bear	☐	☐	☐	☐
Lynx	☐	☐	☐	☐
Wild boar	☐	☐	☐	☐
Wolf	☐	☐	☐	☐
Fox	☐	☐	☐	☐

11. Animals in Machakhela valley are:

	Too much	Many	Few	Very few	Do not know
Jackal	☐	☐	☐	☐	☐
Bear	☐	☐	☐	☐	☐
Lynx	☐	☐	☐	☐	☐
Wild boar	☐	☐	☐	☐	☐
Wolf	☐	☐	☐	☐	☐
Badger	☐	☐	☐	☐	☐

12. Wild animals must live in strictly fenced area.

☐ Strongly disagree
☐ Disagree
☐ Neutral
☐ Agree
☐ Strongly agree

13. Damage by wild animals must be compensated to the population.

☐ Strongly disagree
☐ Disagree
☐ Neutral
☐ Agree
☐ Strongly agree

14. Only those, taking good care of their livestock/hives/gardens/cornfield and are trying to protect them from the wild animals, must be compensated for damage.

☐ Strongly disagree
☐ Disagree
☐ Neutral
☐ Agree
☐ Strongly agree

15. Hunting should be permitted by law in the National Park.

☐ Strongly disagree
☐ Disagree
☐ Neutral
☐ Agree
☐ Strongly agree

16. Killing wild animal should be permitted only in case of their attack on the livestock/hives/harvest.

☐ Strongly disagree
☐ Disagree
☐ Neutral
☐ Agree
☐ Strongly agree

17. Grazing should be permitted in National Park.

☐ Strongly disagree
☐ Disagree
☐ Neutral

☐ Agree

☐ Strongly agree

18. People should be more informed about the wild animals.

☐ Strongly disagree

☐ Disagree

☐ Neutral

☐ Agree

☐ Strongly agree

19. Which sources do you gain information from about the wild animals. *Several answers may be marked.*

☐ Magazines

☐ Tales/legends

☐ Scientific brochures/books

☐ Hunters

☐ School

☐ Family

☐ National Parks employees

☐ Personal experience

☐ TV/radio

☐ Other _____

20. Do you want to gain more information about wild animals?

☐ Yes   ☐ No   ☐ Partly

21. In case of positive answer to the previous question, what format of information would be preferable for you? *Several answers may be marked.*

☐ Magazines

☐ TV/radio

☐ Books

☐ Brochures

☐ Internet

☐ Excursions

☐ National Parks events

☐ Presentations

☐ Other _____

22. How *often* do you visit places where wild animal habitats?

☐ Almost everyday

☐ at least, once a week

☐ once a month

☐ once in every 6 months

☐ once a year

☐ Other _____

23. What do you do when you are in nature? *Several answers may be marked*

☐ Grazing livestock

☐ Collecting wild berries/mushrooms

☐ Hunting

☐ Fishing

☐ Observing wild nature

☐ Hiking/picnic

☐ Performing duties as assigned

☐ Other_____

24. Have you ever seen animals listed below while being in the nature?

Jackal	☐ Yes	☐ No
Bear	☐ Yes	☐ No
Lynx	☐ Yes	☐ No
Wild boar	☐ Yes	☐ No
Wolf	☐ Yes	☐ No
Badger	☐ Yes	☐ No

25. Have you or your family ever been damaged by animals listed below?

Jackal	☐ Yes	☐ No
Bear	☐ Yes	☐ No
Lynx	☐ Yes	☐ No
Wild boar	☐ Yes	☐ No
Wolf	☐ Yes	☐ No
Fox	☐ Yes	☐ No

26. In case of positive answers to the previous question, please indicate what kind of damage was inflicted?

☐ Damaged livestock/hive/harvest

☐ Attacked me

☐ Attacked my family member

☐ Other _____

27. Have you been told stories about wild animals in your childhood?

☐ Often

☐ Seldom

☐ I wasn't told such stories

☐ I don't remember

In case of positive answer, please answer the next question:

28. What kind of characters did these animals depict in stories?

	Mostly positive	Mostly negative	Of various kinds
Jackal	☐	☐	☐
Bear	☐	☐	☐
Lynx	☐	☐	☐

Wild boar	☐	☐	☐
Wolf	☐	☐	☐
Fox	☐	☐	☐

29. Does Machakhela National Park cause any problems for you?

    ☐ No   ☐ Yes   ☐ Do not know

30. In case of positive answer, please mark what kind of problems you've faced. *Several answers may be marked.*

☐ Restriction on livestock grazing
☐ Restriction on cutting wood
☐ Restriction on hunting
☐ Restriction on fishing
☐ Restriction on collecting wild fruits and barriers, mushrooms.
☐ Other_____

31. Do you or your family have any profit from the National Park?

    ☐ Yes   ☐No   ☐ Do not know

32. In case of positive answer, please name your profit.

_____

33. How do you think, can you or your family get any profit from the National Park of Machakhela in the future?

    ☐ Yes   ☐ No   ☐ Do not know

34. In case of positive answer, please name what kind of profit it might be:

_____

35. Do you think you or your family will benefit from the Machakhela National Park?

☐ Improve living environment
☐ Provide population with firewood
☐ Appeal visitors
☐ Protect flora and fauna
☐ Protect cultural and natural heritage
☐ Improve economic situation of the local population
☐ Do not know
☐ Other _____

36. Age: _____

37. Gender: ☐ Female ☐ Male

38. Field of occupation (please, mark only one).

☐ Hunter
☐ Family farm
☐ Teacher
☐ Employee of Protected Areas/forester
☐ Student
☐ Policeman/border guard
☐ School student
☐ Tourism field
☐ Pensioner
☐ Other_____

39. In case of you own family farm, please, indicate the field of agriculture:
   (please, indicate quantity)

☐ Livestock: _____ (number)
☐ Cattle:_____ (number)
☐ Corn/Vegetable:_____ (m^2)
☐ Nut: _____ (number)
☐ Beehives:_____ (hive)

40. Education: ☐ Elementary ☐ High school ☐ Undergraduate

41. Your village _____

Thank you for cooperation.

If you are willing to you can add additional comment below.

_____

_____