Живот за Кресненското дефиле
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What do we eat tonight?!

A study on interactions between wolves, humans and scavengers in the Kresna Gorge, Bulgaria.

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Summary

The study area is Struma River valley from the town of Simitli on the north to the town of Kresna on the south. On the east it reaches the main ridges and includes the western macroslopes of Pirin Mountains and on the west it almost reaches the Maleshevska Mountain close to the border with FYR of Macedonia. It covers the territories of two municipalities –Simitli and Kresna and the total surface of the researched area is 400 km2.

Fund for Wild Flora and Fauna wants to know more about the attitude of the local people against wolves because they want to see how big the risk for poisoning of vultures on the moment is. Next to this they want to explain the situation in the Kresna gorge and other conflicts areas to more people.

The main research questions for this research is: "How big is the risk on poison use in the villages within the research region? And what can be done to minimise the risk on poison use in the research region and Mediterranean Europe?"

To collect data about the human/predator conflict in the Kresna gorge questionnaireswere carried out with mayors, farmers and livestock owners. This questionnaires resulted in a big dataset with answers. The data about the way of keeping livestock, the influence of the wolf on the livestock breeding, livestock owners opinion about certain solutions and the attitude of local people towards wolves are used for this study and also partly for (Wilpstra, 2015)'s study about wolf predation on livestock in the same area.

The Kresna gorge:

The results of the questionnaires show that 384 domestic ungulates are killed by wolves annually. This comes down to an average of 7.23 % of the total animals of every village. But it varies from 0.25% to 21.28% of the total animals of the village. Bear depredation is only found in two villages Oshtava and Senekos where they predated in total 11 animals. The depredation in the villages Rakitna, Oshtava, Mechkull and Simitli is significantly higher than expected on basis of the livestock abundance.

On this moment the highest risk on poisoning in the Kresna gorge is in the villages: Oshtava, Simitli, Gorna Breznitza and Mechkull. In Oshtava a poison bait was found during the questionnaires and the number of predated livestock is high. In Simitli three poisoning cases were reported and are predated numbers high. In Gorna Breznitza 3 out of 4 people were not cooperative and a poison case was found when FWFF visited the area before. In Mechkull depredation numbers were high and a vulture died there close to the village before. To decrease the risk on illegal poison baits use in the Kresna gorge the human/predator conflicts in the areas should be minimised. However, to minimise these conflicts by reintroducing wild prey species or improving the protection of livestock as stated in (Wilpstra, 2015) takes a lot of time. In this time the illegal poison use could already have killed all scavengers in the area. To protect endangered scavenger species actions have to work directly.

Together with the feeding site, FWFF"s compensation program has created a relatively safe environment for scavengers in the area where FWFF is most active on a short term . For the area of Brezhani, Mechkull, Poleto, Rakitna and Senekos (the most active area of FWFF) one poisoned vulture was found near Mechkull. However, outside this region more poisoning cases have occurred.

Poisoning cases are reported from Gorna Breznitza, Oshtava, Simitli, Kresna and Vlahi. From two of these cases it is sure that it is the result of a conflict between people, but from two others it is sure that it is a case where they try to poison wolves because they killed a lot of livestock. In the remaining area, the villages of Krupnik and Polena, a goat association is very active in training dogs to protect their livestock. As the associations consist of quite a number of livestock breeders and they are all happy with their dogs they do not want them to get poisoned. These livestock breeders are all against poison use for this reason which also helps to prevent the use of poison by the other livestock breeders in the area.

Mediterranean Europe

To decrease the use of poison in Mediterranean Europe and to create a safe environment for scavengers immediate actions are needed. The compensation program of FWFF has proven to do this job very well, in a small area and with a lot off efforts. From the beginning also longer term solutions, like restoring wild prey populations and optimising livestock protection, are needed. Both measures are supported in the Kresna gorge by more than 50% of the surveyed people and they could on a certain moment replace the compensation program.

Finally, wolf conservationists could be an very important actor in solving the problem of poison use to kill wolves. However, their influence could also lead to the increasing use of poison baits to kill wolves. As more initiatives and projects arise to strengthen wolf populations in Mediterranean Europe more people want to protect the wolf in every country. Most often this means that they want to ban the wolf hunting. However, in most countries where wolf hunting is allowed the human/predator conflicts are not solved and healthy prey populations are still not available. When wolf hunting will be banned in this countries and human predator conflicts are still not solved it will most probably increase the risk on the use of illegal poison to kill wolves. In these areas there are still some remaining scavenger species, the increase of the usage of illegal poison baits could result in local extinction of certain species.

Another risk of the strengthening of wolf populations in Mediterranean Europe is that it could result in new human/predator conflicts in areas where wolves were not seen before. As some of these areas are still inhabited by endangered birds species , the possible illegal poison use as a reaction on the new-born conflict could mean a severe decline in populations of endangered scavenger species.

However, the influence of wolf conservationist does not necessarily need to be negative. A cooperation between wolf conservationists and scavenger conservationists could work together on strengthening wild prey populations and improving livestock protection. When this is achieved the human/predator conflict will decrease which will have positive results for scavengers as well as the wolves. If prey species populations are not available and prevention measures not in place this should have higher priority than bringing back the predators. If it happens the other way around the arise of a human/predator conflict is a logical result which could have a dramatic ending for the scavengers. Conserving one not threatened species at all costs should not be a reason for the extinction of others which are threatened. Conservationist should look on ecosystem level to nature and not only try to preserve the species they prefer. Next to this highly threatened species should have more priority than less or not threatened ones.

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1. Introduction

1.1 Area description

The study area is Struma River valley from the town of Simitli on the north to the town of Kresna on the south. On the east it reaches the main ridges and includes the western macroslopes of Pirin Mountains and on the west it almost reaches the Maleshevska Mountain close to the border with FYR of Macedonia. It covers the territories of two municipalities –Simitli and Kresna and the total surface of the researched area is 400 km2. See Annex 1 for a map of the research area.

The climate is transitory Mediterranean. The mixed oak forest – *Quercus pubescens*, *Carpinus orientalis* and *Fraxinus ornus*, as well as the mixed forests of *Juniperus excels* and *Q. pubescens* with undergrowth of evergreen Mediterranean shrubs are widely spread at an altitude of up to 500 m.

There are also sparse artifi cial plantations of Austrian Pine Pinus nigra as well as farmlands, mainly pastures (Kostadinova and Gramatikov, 2007). Large parts of the area are covered by mosaic of small open grassland plots and bushes and creeping deciduous forest. On higher altitudes the forest is dominated by beech *Fagus sylvatica* and further up by coniferous forest. Most of the area, except the valley's bottom is represented by rough terrain with steep slopes and deep gorges. Any flat plot is turned into arable land.

1.2 Company and project description

Fund for Wild Flora and Fauna (FWFF) is working on conservation and restoring of vultures populations in southwest Bulgaria. and thus finds necessary the problem of poisoning to be controlled. Illegal poisoning is undoubtedly one of the main threats to biodiversity in Southern Europe and especially for threatened scavengers. (STOYNOV, 2014)

1.3 Problem statement

Fund for Wild Flora and Fauna wants to know more about the attitude of the local people against wolves because they want to see how big the risk for poisoning of vultures on the moment is. Next to this they want to explain the situation in the Kresna gorge and other conflicts areas to more people. Nowadays, the protection of the wolves is very much encouraged from people who do not know the local situations very well and don´t see the risk for threatened scavenger species as the vultures and eagles.

1.3 Research Questions

How big is the risk on poison use in the villages within the research region? And what can be done to minimise the risk on poison use in the research region and Mediterranean Europe?

What is the most used way of keeping of livestock in the research region?

How can the used grazing plots be described?

How much livestock is owned by large holdings in the research region?

How much animals are killed every year and in two years by wolves?

How much animals are killed every year and in two years by bears?

Which percentage of the herds is killed by predators in the last two years?

How big is the difference between the expected and observed predation rate per village?

What is the peoples attitude towards the wolf?

What do people think about certain solutions?

What is the relation between wolves and scavengers in natural ecosystems?

What is the relation between wolves and scavengers in conflict areas?

What should be changed in the wolf conservation to take into account the scavengers?

Does FWFF's compensation program help to reduce the use of poison ?

How big is the risk on poisoning in every village in the research area nowadays?

What is the conclusion on how to minimise human/predator conflicts in the research area according to the study of (Wilpstra, 2015)?

1.5 Acknowledgements

I want to especially thank Emilian Stoynov and Hristo Peshev for their guidance and help in the carrying out this research. I also want to thank Georgie Vantov and Milos van Leest for translating all the questionnaires for me and joining me on the field work. At last I want to thank all the people which I have met on the field for their cooperation. The willingness to help in different ways have saved a lot of time and resulted in a big pile of information about livestock breeding in an area with predators.

2. Methodology

To collect data about the human/predator conflict in the Kresna gorge questionnaires(see Annex 2) were carried out with mayors, farmers and livestock owners. This questionnaires resulted in a big dataset with answers. The data about the way of keeping livestock, the influence of the wolf on the livestock breeding, livestock owners opinion about certain solutions and the attitude of local people towards wolves are used for this study and also partly for (Wilpstra, 2015)'s study about wolf predation on livestock in the same area.

To analyse how the way of keeping livestock in the area is the completed surveys were divided in to groups on basis of some characteristics. To analyse which percentage of total people have this characteristics the number of people within the group was multiplied by 100 and dived by the total number of surveyed people. The characteristics could be the size of the herd, the type of shepherd, etc.

Field observations were used to describe the grazing plots. The livestock numbers which are owned by large holdings and the number of killed animals by predators are the result of a sum of all answers. To analyse if there is a difference between the expected predation rate on basis of the livestock abundance and the observed predation rate per village a Chi-Square analysis is used. The analysis of the people's attitude against the wolf is made by field observation and speaking with people in the field. Next to this, the answers on the questions about certain solutions to decrease the number of victims made by wolves, are used to confirm these observations. People's opinion about certain solutions are directly turn in to percentages by multiplying by 100 and dividing by the total surveyed people.

The percentage of the herd which is killed by predators, the difference in expected and observed predation, the information about poisoning cases and the areas of activeness of FWFF and the goat associations is used to make a critical analysis of FWFF's compensation program and the risk analysis per village.

Finally, a part of another research in the same area is cited. This research was conducted to show possible solutions for human/predator conflict and thus is very important.

3. Results

3.1 Livestock Breeding (Kresna gorge)

3.1.1 The way of keeping livestock in research region.

In the region the general way of keeping sheep and goats is grazing. During the day the animals graze and are most often guided and protected by a shepherd with guarding dogs. During the night the animals stay in a coral. For cows it is more a less the same but the guiding and protecting is most of the times less intensive. Some cattle farmers lock the cattle up during the night others just leave them free ranging outside. Every livestock owner has its own opinion about what is the most beneficial way to raise their livestock. So in practice this means that there are some differences in the way of keeping the livestock. In this paragraph the differences will be explained.

Sheep and Goat

Within the sheep and goat herds there are 3 different types of:

Herds:

- Sheep herd with Shepherd and guarding dogs: 14%
- Goat herd with Shepherd and guarding dogs: 26%
- Mixed herd (goat/sheep) with shepherd and guarding dogs: 60%

Shepherds:

- A fulltime hired shepherd: 26%
- The owner grazing the herd fulltime: 42%
- The owner grazing the herd part-time (other part hired shepherd or village herd): 32%

Corals:

- In the village: 34%
- Outside the village: 36%
- In the summer outside the village in the winter within the village: 30%

All herds have guarding dogs to protect the herd. The number of dogs varies from 1 to 17 but 72% of the owners have a sufficient number of dogs(>3) and 28% an insufficient number of dogs(<3)(STOYNOV, 2014)

The size of the herds varies from 16 to 790 animals.

- 26% of the owners have 16-50 animals
- 22% of the owners have 51-100 animals
- 32% of the owners have 100-300 animals
- 20% of the owners have more than 300 animals

Cows

Within the cattle herds you have 4 types of:

Shepherds:

- A fulltime hired shepherd: 26.9%
- The owner grazing the herd fulltime: 38.5%
- The owner grazing the herd part-time (other part hired shepherd or village herd): 30.8%
- Closed rearing(no shepherd): 3.8%

Corals:

- In the village: 8%
- Outside the village: 36%
- Part of the year free ranging 36%
- In the summer outside the village in the winter within the village: 20%

All herds have guarding dogs to protect the herd. The number of dogs varies from 1 to 10 but 64 % of the owners have a sufficient number of dogs(>3) and 36 an insufficient number of dogs(<3)(STOYNOV, 2014)

The size of the herd varies from 6 to 150

- 20% of the owners have 6-25 animals
- 44% of the owners have 26-50 animals
- 8% of the owners have 51-75 animals
- 20% of the owners have 76-100 animals
- 8% of the owners have >100 animals

Horses and Donkeys

Horses and Donkeys are most often left to graze on their own and almost never guarded by a shepherd or dogs. The difference between horses and donkeys however is that the donkeys most often graze in areas close to the houses where the horses sometimes are left to graze in more remote areas.

Finally, it is good to know that professional herds most often have a hired shepherd, a sufficient number of dogs, are within an association(sheep/goat) and have a herd with at least 100 sheep/goats or at least 50 cows.

3.1.2 Grazing places used by large holdings.

The grazing places which are used by the surveyed people are most often in summer close to village for the smaller herds and further away from the village for the bigger herds. In winter almost all herds are grazing closer the villages. In the summer the bigger cattle herds from the Eastern part of the research area mostly graze in national park Pirin and the ones from the Western part most often use " Kadica" a grazing place close to the border with FYR of Macedonia. The biggest sheep/goat herds of the Eastern part of the research area are in the summer using grazing places within national park Pirin and the area around the village Vlahi. The ones from the Western part are using the grazing places between the Struma river and the border with FYR Macedonia.

Most grazing places consist of a pastures with small forest patches. It is clearly visible where bigger herds frequently graze as the pastures are better maintained. This pastures are most of the time greener and consist of short grazed grasses. The places were smaller herds graze are most of the time not very well maintained pastures as they are moving their animals all the time to different grazing places. These pastures consist of more herbs and longer grasses.

3.1.3 Number of livestock owned by large holding

Village Name:	Cattle	Sheep	Goats	Equines	**Total livestock**	Pigs	Chickens	Dogs	Beehives
Brezhani	40	25	208	5	278	11	86	24	7
Gorna Breznitza	0	80	6	2	88	2	10	10	0
Kresna	202	1660	1002	16	2880	30	72	93	75
Krupnik	248	1408	605	44	2305	32	78	82	0
Mechkul	6	37	29	2	74	3	15	6	0
Oshtava	240	60	64	10	374	2	19	32	0
Polena	95	173	146	23	437	10	51	21	0
Poleto	4	391	167	4	566	16	53	20	0
Rakitna	92	80	80	9	261	5	45	19	0
Senokos	35	15	55	2	107	2	20	9	8
Simitli	489	873	555	31	1948	24	157	45	0
Vlahi	0	550	240	15	805	0	0	25	0
Total large holdings	1451	5352	3157	163	**10123**	137	606	386	90

Table 1 Livestock numbers per village

As showed in Table 1 above the most livestock belong to people from the villages Kresna, Krupnik and Simitli. These are also the biggest villages in the area. Most often these people graze their animals on grazing places further away from the village. For the village of Krupnik the numbers are probably higher because at least 6 existing farmers were not found. This is the same for Gorna Bresnitza, Senekos, Polena and Brezhani where some people were not willing to cooperate and some were not found. Next to this it is shown that often farmers have other animals next to their livestock for home consumption. Finally, it is good to notice these numbers are not the total numbers for the research area as smaller holdings are not included and maybe the existence of some farmer was not noticed.

3.2. Predators influence on the livestock breeding (Kresna gorge)

3.2.1 Number of animals killed per village by Wolf

	Start questionnaire 2014; late August						End questionnaire 2014;late November						**Total**
	Depredation on livestock by Wolf												**Depredation**
	2013						2014						**Wolf**
Village Name:	Cattle	Calf	Sheep	Goats	Equines	**Total**	Cattle	Calf	Sheep	Goats	Equines	**Total**	**2013/2014**
Brezhani	0	3	0	0	0	3	0	7		0	0	7	10
Gorna Breznitza	0	0	1	0	0	1	0	0	1	0	1	2	3
Kresna	3	11	32	15	0	61	0	6	34	25	0	65	126
Krupnik	1	4	35	22	0	62	2	13	24	29	0	68	130
Mechkul	0	0	10	8	0	18	0	1	1	0	0	2	20
Oshtava	7	38	7	0	0	52	2	26	7	0	1	36	88
Polena	0	5	0	2	5	12	0	0	10	10	5	25	37
Poleto	0	0	11	10	0	21	0	0	16	12	0	28	49
Rakitna	1	5	9	18	0	33	0	15	3	2	0	20	53
Senokos	0	3	0	0	0	3	0	1	0	0	0	1	4
Simitli	5	30	50	29	2	116	0	10	48	35	1	94	210
Vlahi	0	0	2	0	0	2	0	0	0	0	0	0	2
Total large holdings	17	99	157	104	7	**384**	4	79	144	113	8	**348**	**732**

Table 2 Number of animals killed per village by Wolf

As shown in Table 2 above the total killed animals for 2013 is 384 this comes down to 5,6 animals per surveyed livestock breeder. For 2014 this number is expected to be more or less the same. Further it is visible that sheep are most predated but also calves and goats are very much predated by wolves . As expected because of their size are adult cows not very much predated and are horses or donkeys also not very much predated.

3.1.2 Number of animals killed per village by Bear

	Depredation on livestock by Bear				Total Depredation
	2013		2014		Bear
Village Name:	Calf	Cow	Calf	Cow	2013/2014
Brezhani	0	0	0	0	0
Gorna Breznitza	0	0	0	0	0
Kresna	0	0	0	0	0
Krupnik	0	0	0	0	0
Mechkul	0	0	0	0	0
Oshtava	4	0	5	0	9
Polena	0	0	0	0	0
Poleto	0	0	0	0	0
Rakitna	0	0	0	0	0
Senokos	0	0	1	1	2
Simitli	0	0	0	0	0
Vlahi	0	0	0	0	0
Total large holdings	4	0	6	1	11

Table 3 Number of animals killed per village by Bear

As shown in Table 3 above the predation by bear focusses complete on cattle and mostly on calves. Next to this it is clearly visible that this just in one part research area as Senekos and Oshtava are both on the edge of national park Pirin and just a few kilometres away from each other. Next to this the farmers use summer pastures in the national park where also predation could have occurred.

3.1.3 Percentage of herd killed by predators per village.

% of herd Killed by Wolf	% of herd Killed by Bear
2013/2014	**2013/2014**
3,472222222	0
3,296703297	0
4,191616766	0
5,338809035	0
21,27659574	0
19,04761905	2,35
7,805907173	0
7,967479675	0
16,87898089	0
3,603603604	0,77
9,731232623	0
0,247831475	0
7,231057987	0,11

Table 4 Percentage of herd killed per village

As shown in Table 4 above suffer the small villages on the Eastern site of the research area; Rakitna, Mechkull and Oshtava the biggest losses compared their livestock quantity.

3.1.4 Predation rate per village; expected and observed

Village Name:	Expected predation rate(%)	Observed predation rate(%)	Difference with expected predation rate(%)
Brezhani	2.75	1.37	-1.38
Gorna Breznitza	0.87	0.42	-0.45
Kresna	28.45	17.21	-11.24
Krupnik	22.77	17.76	-5.01
Mechkul	0.73	2.73	**2**
Oshtava	3.69	12.02	**8.33**
Polena	4.32	5.05	0.73
Poleto	5.59	6.69	1.1
Rakitna	2.58	7.24	**4.66**
Senokos	1.06	0.55	0.51
Simitli	19.24	28.69	**9.45**
Vlahi	7.95	0.27	-7.68
Total large holdings	100	100	0

Table 5 Predation rate per village; expected and observed

In Table 5 above the expected predation rate on basis of the village livestock quantity is compared with the observed predation rate for the village to see which villages suffer more losses than expected and which less. It shows that Mechkull, Oshtava, Rakitna and Simitli suffer significant bigger losses than expected on basis of their livestock quantity. This could have several reasons but the most important one is that probably the livestock protection there is not optimal. For the villages Kresna, Vlahi and Krupnik it is the other way around; there are less losses than expected on basis of their livestock quantity. The reason for this most probably is that the livestock protection there is optimal. When livestock protection for one place is optimal it would be most logical that the wolf tries to find a place where it is not which results in the noticed differences above. Finally, it is good to notice that for some villages the observed predation is just slightly higher than expected but for individual farmers it could be great losses without having a big difference.

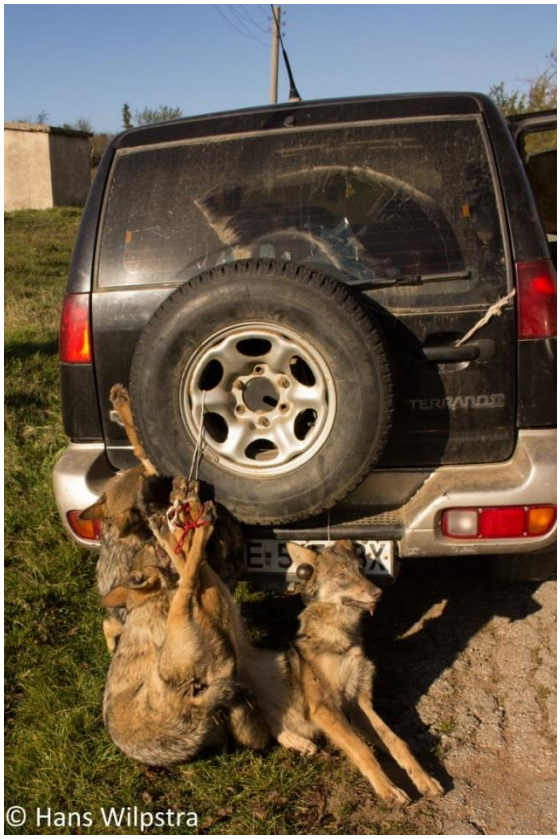
3.3 Humans and predators (Kresna gorge)

3.3.1 People´s attitude towards the wolf.

The local people's attitude to the presence of the wolves is strongly negative. Most people hate wolves because the they kill their livestock and most of the time the livestock is one of their few sources of income or food. To replace this livestock for much of the local people costs them more than half of their average monthly wage or an average monthly pension. (FWFF, 2015) However, not all livestock breeders hate wolves because they kill livestock (as shown in 3.3.2). Some just thinks it is the wolf's natural behaviour and protect the livestock as good as they can. It also seems that livestock owners with bigger herds have less problems with wolves as they have more animals and compared to their income the losses due to the wolves are relatively small. However, for people with just a few animals having one killed is a tragedy. (Wilpstra, 2015)

In the past in Bulgaria there was massive predator control. This included bounties for shooting wolves and poisoning campaigns. As a result wolves almost became extinct. Only some small groups survived in mountainous areas. The wolf population started recovering in the early 1980's and the population is now estimated to consist of 1000-1200 wolves. (Lifextra, 2015)

As most of the local people hate the wolves they support the hunting on wolves. When wolves are shot people celebrate it and think it will help to solve the conflict. Wolf hunting is allowed year round and there are no specific quotas defined. It is estimated that 234-249 individuals are killed annually. (Moura, 2013)



F*ig. 1Three young wolves shot and tight to the back of the car in Rakitna, Bulgaria*

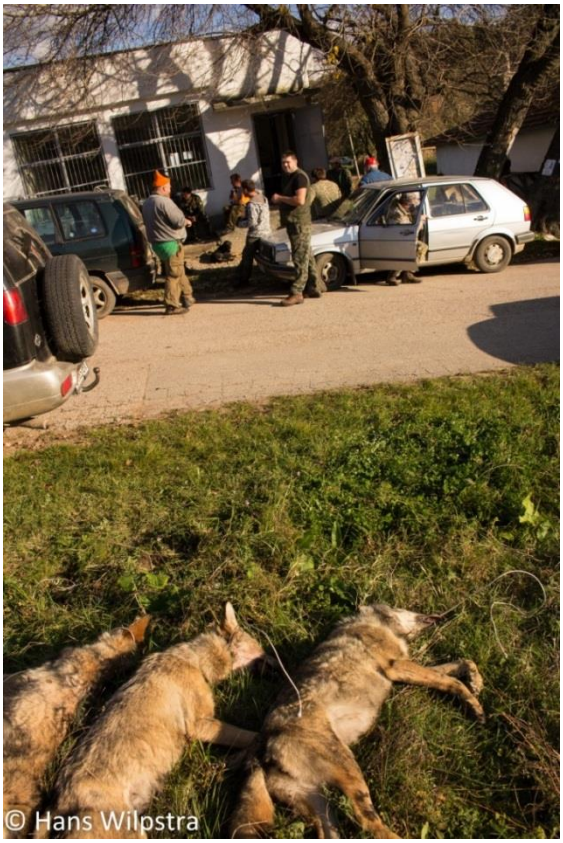


Fig. 2 Hunters and villagers celebrating their successful hunt in front of a local shop in Rakitna, Bulgaria

3.3.2 Livestock owners opinion about solutions

To find the livestock breeders opinion about solutions for livestock depredation their opinion about five measures are analysed. In this paragraph first the questions are shown and thereafter the answers are discussed.

What is the best solution in your opinion to decrease livestock depredation in your area?

1. Full extirpation of wolves by shooting?

80,9% thinks it is a good solution, 19,1% thinks it is not a good solution.

2. Shooting problematic wolves?

86,8% thinks it is a good solution, 13,2% thinks it is not a good solution.

3. Use of poisoned baits to kill wolves?

0% thinks it is a good solution, **100**% thinks it is not a good solution.

4. Use of guarding dogs?

80,9% thinks it is a good solution, 19,1% thinks it is not a good solution.

5. Shift from small livestock (sheep and goat) to cattle?

16,2% thinks it is a good solution, **83,8**% thinks it is not a good solution.

6. Increase of number of wild prey(deer, wild boar, etc)

55,9% thinks it is a good solution, 44,1% thinks it is not a good solution.

From this answers we can conclude that a big part of the surveyed people(80,9%) want to shoot all wolves and even more (86,8%) want to shoot the problematic ones.

Nobody told us that they think using poison baits to kill the wolves a good solution but we found a poison bait during the questionnaires. So most probably nobody wants to tell that they think it is a good solution because it is an illegal practice. Important to notice however is that most people which have dogs and believe these dogs help to protect the herd will most probably not use poison because they are afraid to poison their own dogs. Several people added to their answer that they think it is bad because they will poison the dogs. Also several dogs which were poisoned were reported.

For shifting from sheep/goat to cattle just 16,2% of all surveyed people think it helps to decrease the livestock depredation. Most people think that it will not work because the wolves will kill the calves as also proved in (Wilpstra, 2015). Next to this all sheep/goat farmers are used to their type of livestock and do not want to change.

The last and most interesting question for nature conservationists proved that just a bit more than half of the surveyed people(55,9%) think it is a good solution to increase the numbers of wild prey. However, most people added to this that they know that there is a lot of poaching and that it is hard to do.

3.4 Wolves and vultures friends with benefits? (Mediterranean Europe)

3.4.1. The relation between wolves and scavengers in "wild ecosystems".

"wild'' ecosystems are ecosystems which are shaped mainly by natural process. This means that there is not much human presence or intervention. Very few activities take place which need natural resources. This means that there are natural populations of different wild ungulates species which can use this natural resources. Speaking for Mediterranean Europe this will be roe deer, red deer, fallow deer, wild horse, wild cattle, European bison, etc. The predator populations in this ecosystem is directly linked to the prey population and the prey population is linked to amount of food available and diseases which occur. Finally, the scavenger population is linked to amount of food left over from predators or diseases.

Fig. 3 Wolf and Griffon vultures (Shpirer, 2015)

3.4.2. The relation between wolves and vultures in human/predator conflict areas

In ecosystems shaped by human presence and intervention there are human activities which take place in nature and use natural resources. In many conflict areas the only activities which can take place in nature and gives a substantial income is the breeding of livestock. (STOYNOV, 2014) The terrain is not suitable for much other activities. Next to livestock breeding most of the time intensive hunting takes place. For some more rich people the hunting is most often just a hobby and for others with less money a second source of income or food.

With intensive hunting and livestock breeding taking places in nature the natural processes change. As a results of intensive hunting wild ungulates populations become smaller. On the other hand as a result of the livestock breeding numbers of domesticated ungulates become higher. The final result is that predators start to change their diet composition. When wild ungulates populations decrease more domesticated ungulates will be eaten by predators. Which results in hatred against predators. In the desperation to kill the wolves ,because it eats the hunters wild ungulates and the livestock breeders livestock, people try to shoot and poison the wolves. This is bad for the wolves as they are killed by both poison and hunting but also for all the scavenger species as they die from poisoning.

The main reason for the small scavenger populations in Bulgaria is also found in the massive poisoning campaigns in the 1950's and 1960's (Lifextra, 2015) Most scavenger species almost became extinct. Nowadays poison use is as an illegal practise. However, it is still often used in the desperation to kill wolves. Most people do not even know that the poison not only can kill the wolves but also the scavengers. The problem however appears not only in Bulgaria it also appears in Spain, Greece, Italy, Portugal, Austria, Croatia and other countries (STOYNOV, 2014)

Fig. 4 A cow possibly chased of the rocks by wolves and died. Back part is eaten and a man confessed to poison in the leftover.....

3.4.3 Status of scavengers and wolves in Europe

Looking at the IUCN red list status of the Wolf (Canis lupus) it is stated as a Least concern species. However, looking at the IUCN red list status of the scavenger species it is stated that : one is endangered (Neophron percnopterus), 3 are vulnerable(Aquila heliaca, Clanga clanga, Aquila adalberti) and 3 are near threatened(Gypaetus barbatus, Aegypius monachus, Milvus milvus). (IUCN, 2015)

There are several reasons for the decline of the scavenger species population. However, one of them which is proven to have a negative influence all species is the use of poison baits. (IUCN, 2015) Thousands of vultures, eagles, black and red kites are still getting poisoned even after the official ban of the use of poison baits for predators' control. (STOYNOV, 2014)

Looking at the distribution maps of the wolf and the scavenger species in Mediterranean Europe it becomes very clear that in places where wolf populations are small or missing some endangered species are still striving. For instance the distribution of the Spanisch Imperial eagle(Aquila adalberti, Fig. 5) and the Black vulture(Aegypius monachus Fig. 6) populations in Spain lies for almost 90% outside the current wolf territories(Fig.7). The reason for these species survival in Spain could be the presence of conflict free areas. *All Figures; (IUCN, 2015)*

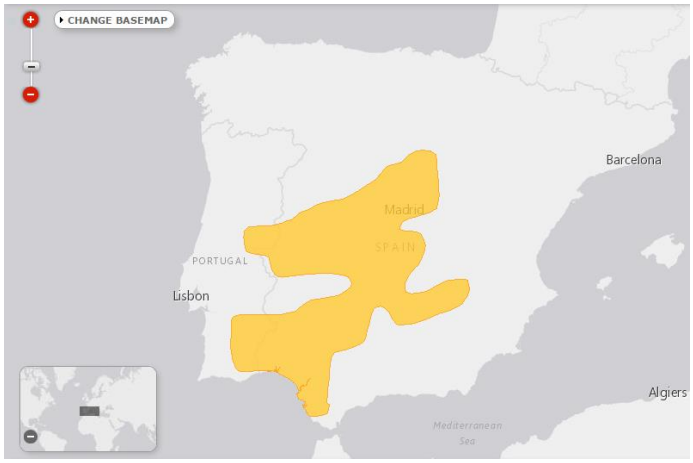


Fig. 5 Distribution of the Spanish Imperial eagle in Spain(Aquila adalberti)

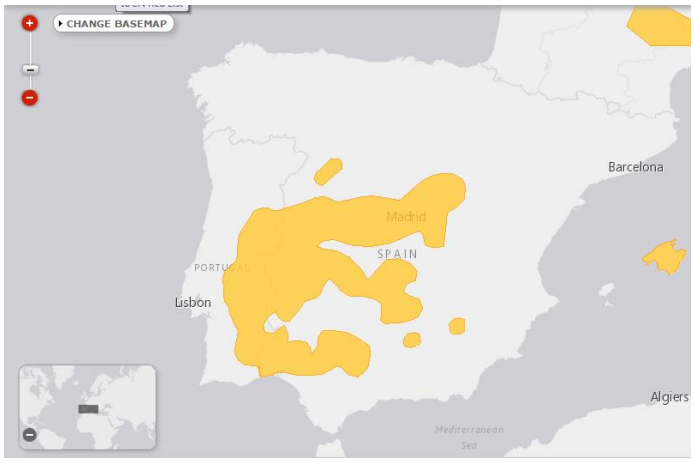


Fig. 6 Distribution of the Black vulture in Spain(Aegypius monachus)

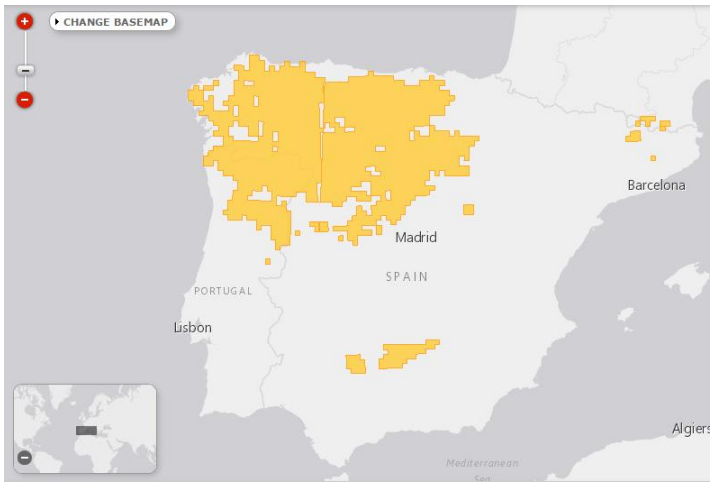


Fig. 7 Distribution of the Iberian wolf in Spain (Canis lupus)

3.4.4 Wolf conservation and the risk on poison use

As more initiatives and projects arise to strengthen wolf populations in Mediterranean Europe more people want to protect the wolf in every country. Most often this means that they want to ban the wolf hunting. However, in most countries where wolf hunting is allowed the human/predator conflicts are not solved and healthy prey populations are still not available. When wolf hunting will be banned in this countries and human predator conflicts are still not solved it will most probably increase the risk on the use of illegal poison to kill wolves. In these areas there are still some remaining scavenger species the increase of the usage of illegal poison baits could result in local extinction of certain species.

Another results of the strengthening of wolf populations in Europe is that it could result in new human/predator conflicts in areas where wolves were not seen before. Because some of these areas as already shown in paragraph 3.4.3 are inhabited by endangered birds species , the possible illegal poison use as a reaction on the new-born conflict could mean a severe decline in populations of highly endangered scavenger species.

From above mentioned reasons we can conclude that before introducing predator to places where they were not seen for a long period it is good to think about the local situation. What will the comeback of the wolf mean for the local people? And what kind of risks brings this to the other species in the area?

This means knowing wild prey population sizes, livestock numbers, already established prevention measures and the altitude of local people toward the comeback of predators. Next to this the situation should be constantly monitored to keep a close watch on how it develops and to take measures when needed.

If prey species populations are not available and prevention measures are not in place this should have higher priority than bringing back the predators. If not the arise of a human/predator conflict is a logical result which could have a dramatic ending for scavengers. Conserving one not threatened species at all cost may not be reason for the extinction of others which are threatened. Conservationist should look on ecosystem level to nature and not only try to preserve the species they prefer. Next to this highly threatened species should have more priority than less or not threatened ones.

3.5 Stop the poisoning, save the vultures (Kresna gorge)

3.5.1. Critical analysis of FWFF compensation program.

	Percentage of herd killed by Wolf	Percentage of herd killed by Bear	Poisoning	FWFF	
Village Name:	2013/2014	2013/2014	cases	active	Comments
Brezhani	3,47	0	No	X	
Gorna Breznitza	3,30	0	Yes		People not cooperative
Kresna	4,19	0	Yes		Dogs poisoned; reaction on conflict between people.
Krupnik	5,34	0	No		
Mechkul	**21,28**	0	Yes	X	
Oshtava	**19,05**	2,35	Yes		Conflict with wolf
Polena	7,81	0	No		
Poleto	7,97	0	No	X	
Rakitna	**16,88**	0	No	X	
Senokos	3,60	0,77	No	X	
Simitli	9,73	0	Yes		???
Vlahi	0,25	0	Yes		Dogs poisoned; reaction on conflict between people.
Average % large holdings	7,23	0,11			

Table 6 Critical analysis of FWFF compensation program per village

As visible in Table 6 above the compensation program of FWFF is not solving the human/ predator conflict. In the areas where FWFF is active the percentage of the herd which is killed is still high. However, the aim of the program is to have no poisoning. In the areas where FWFF works actively there was almost no poisoning (only one case in Mechkull). So in this way the result is positive. There could be several reasons for this; it could be that people when they are desperate after a wolf kill find the opportunity to get some animals compensated '' better than nothing'' and call the organisation, but it could also be that the compensation program gives the people the feeling that somebody listens to them and tries to help them which makes them less angry. The most important thing is that people have an alternative for poisoning. They can release their anger on somebody who listens and tries to help them.

At last FWFF as a NGO, their goals and also the vultures become more known in the area. By collecting carcasses at peoples houses for free they help the people to get rid of their carcasses. Otherwise they have to pay for the carriage or have to find a place to leave it. At the same time they also tell about the vultures and how vulnerable they are for poison. Local people are most of the time happy to get rid of their carcasses. So when they want this collection to be continued they will think about FWFF and the vultures before instead of using poison.

3.4.2. Risk analysis per village

	Percentage of herd killed	Percentage of herd killed	Difference with		Goat			
	by Wolf	by Bear	expected predation	FWFF	Associations		Poisoning	
Village Name:	**2013/2014**	**2013/2014**	**rate(%)**	**active**	**Active**	**Comments**	**Cases***	**Risk**
Oshtava	**19,04761905**	2,349869452	**8.33**			Conflict with wolf	Yes, 1	High
Simitli	9,731232623	0	**9.45**			Poisoned dogs; no reason for conflict between people.	Yes, 3	High
Gorna Breznitza	3,296703297	0	-0.45			People not cooperative	Yes, 1	High
Mechkul	**21,27659574**	0	**2**	X		Vulture died from secundaire poison of dog carcass	Yes,0	High
Rakitna	**16,87898089**	0	**4.66**	X			No	Medium
Kresna	4,191616766	0	-11.24		X	Dogs poisoned; reaction on conflict between people.	Yes,1	Medium
Vlahi	0,247831475	0	-7.68		X	Dogs poisoned; reaction on conflict between people.	Yes,1	Medium
Poleto	7,967479675	0	1.1	X			No	Low
Polena	7,805907173	0	0.73		X		No	Low
Senokos	3,603603604	0,766283525	0.51	X			No	Low
Brezhani	3,472222222	0	-1.38	X	X		No	Low
Krupnik	5,338809035	0	-5.01		X		No	Low
Average % large holdings	7,231057987	0,10866344	0					
Legend:	Increases risk	Decreases risk	Unsure data					

Table 7 Poison risk analysis per village

*number of people who know of poisoning cases

As shown in Table 7 on page 22 several different factors are used to determine the risk on poison use in each village. However, it is difficult to determine whether somebody will use poison or not. So the table above shows a founded estimation. The risk on poison use is considered to be big when conflicts with wolves or other conflicts are in an active stage. A conflict with wolves is in active state when a high percentage of the herd is killed and the observed predation is higher than expected. Next to this also the activeness of bot FWFF and the goat Associations is seen as something that lowers the chance on poisoning.

The village of Oshtava is estimated to be the most risk full village concerning poison use. The conflict with wolves (and also bears) is big and very active as even a poison bait was found during the questionnaires.

For the village Simitli the situation is a bit unclear but with a high percentage animals killed and an observed predation which is higher than expected on basis of the livestock abundance it seems to be in active conflict. This together with three people who know of poison cases makes it quiet risk full.

For the village of Gorna Breznitza an exception is made because from the data it does not look like there is a conflict. However, the village is considered to be still in an active conflict with wolves as it was when two vultures of FWFF in 2013 were poisoned on a goat which was collected from the village. With the questionnaires three out of four livestock owners were not cooperative which made the results for the village quite unreliable and made the three livestock owners more suspicious for using poison.

FWFF is active in Brezhani, Mechkull, Poleto, Rakitna, and Senekos. In this area one poison case has occurred in 2013 a griffon vultures was probably secondary poisoned from a dog carcass close to the village of Mechkull (Stoynov, 2013). The village of Mechkull as well as the village of Rakitna seem still in an active conflict with wolves. For both villages the percentage which is killed of the total animals is high and the predation is more than expected on basis of the livestock quantity. For the other village the percentage which is killed of the total animals is not so high and also no poisoning cases have occurred.

In Krupnik and Polena as wel as Kresna and Vlahi there are active members of two goat association. This associations also work a lot with guarding dogs. The result of this is that much of the people in these places have good dogs and they don’t want anybody to poison them. This is a good thing because it helps FWFF in combating poison use. However, in both Kresna and Vlahi there were poisoning cases. The reason in Kresna is a conflict between a livestock breeder and hunters. The livestock breeders dogs had killed several hunting dogs. In reaction the hunters poisoned the dogs of the livestock breeder. In Vlahi an almost similar case occurred when somebody wanted to sue a person who used poison. In reaction a pack of the owners working dogs were poisoned.

3.4.3 Minimising human/predator conflicts (Wilpstra, 2015)

As stated in (STOYNOV, 2014) the illegal poisoning in Southwest Bulgaria has its origin mainly in conflicts between predators and livestock. This was the reason for (Wilpstra, 2015)'s research on this matter. Down below the conclusion of (Wilpstra, 2015)'s research on how to minimise human/predator conflicts in the Kresna gorge is shown.

Bringing back populations of wild prey species

The example of paragraph 3.4 already shows that good wild prey species populations are a key factor in solving human/ predator conflicts. It is shown that this could also work in Bulgaria as the reintroduction of fallow deer already partly helped to solve the conflict in Studen kladernetz in Eastern Rhodopi.

The reintroduction of fallow deer could also be done in the Kresna gorge however, the intensive hunting and poaching in the area makes it hard to find a suitable place to start breeding and without breeding places the number of released deer should be really high and they should be released at the same time.

A good possibility would be to reintroduce fallow deer and/or red deer in National park Pirin as it is forbidden to hunt there. Other possibilities could be to fence a large area to start breeding from there and release when numbers are high enough.

But reintroduction of these missing species will probably not solve the problem completely as also showed in Studen kladernetz. However, looking at the German situation it seems that if all wild prey species are back in place in high numbers it will change the situation drastically. To expect the same result however is not realistic because in the Bulgarian landscape is harder to protect animals from predation by wolf and the way of keeping the livestock is more risk full.

Optimizing livestock protection

To reduce problems with wolves the way of protecting the livestock should be optimised. This could be done with small changes in every days livestock management. One of the aims of this study was to find relations between the way of keeping the livestock and the wolf depredation. The following relations were found:

Cattle

The study showed that:

1. The bigger herd gets the higher the number of victims.
2. People who graze their animals their selves all year round or have a hired shepherd all year round have less victims then people who graze the herd part-time their selves.
3. Cattle herds which spent the night a part of the year free ranging have a higher percentage of the herd is killed than cattle herds which spent the night all year round in a coral outside village.
4. Cattle herds with three or less dogs have more kills than herds with more than three dogs.

To improve the protection of cattle herds the following points could be done:

1. Do not leave the animals free ranging in the night.*
2. Do not graze animals part-time but have 1 persons responsible.
3. Have a sufficient number of dogs guarding the herd(>3) .

* *was found to make a significant difference.*

Sheep/Goat

The study showed that:

1. The bigger the herd gets the higher the number of victims.
2. People who have a hired shepherd all year round have less victims then people who graze the animals part-time or full time their selves. The reason for this could be that professional livestock breeders with good guarding dogs most often have a hired shepherd.
3. People who use a summer and winter coral have more victims than those who have only one coral. However, the percentage of the herd killed is not much higher for the people with summer and winter coral so it could also be that bigger owners use summer and winter coral and have more victims because they are more vulnerable(point 1).
4. People with an sufficient number of dogs have on average more animals killed. However, again the percentage of the herd which is killed is lower for people with a sufficient number of dogs so probably these are the bigger owners which are more vulnerable(point 1) and that is why they have more animals killed.
5. Mixed herds have more animals killed than homogenous herds and also the percentage of the herd which is killed is higher.
6. Village herds have on average more animals killed and the percentage of the herd which is killed is also higher.
7. There is a significant difference between the herds in or outside associations. Herds inside associations have a significant lower percentage of the herd killed then those outside.

To improve the protection of sheep/goat herds the following points could be done:

1. Let livestock breeders become part of an association. *
2. Create a fenced area for village herds. *
3. Do not graze animals part-time but have 1 persons responsible.
4. Try to graze animals in homogenous herds.

**was found to make a significant difference.*

Less kills, less conflicts or less losses less conflicts?

The question above is important to be answered because another result that was found for both cattle as sheep/goat herds is that when the herd size grows also the number of victims grows but the percentage of the herd which is killed goes down. In practise this means that when people have more animals they will have more income and compared to this income the cost of the losses from wolves will be smaller. However, to reach a bigger herd size investments have to be made. People have to wait for instance one year with selling lambs or calves and this way they will miss a part of their

income. To stimulate people to keep more animals a program could be made to compensate them for the income they have to miss by waiting one year or more with selling their offspring.

If wild prey numbers as well as livestock numbers will rise then on a certain moment the conflict(as shown as the percentage of the herd which is killed every year by wolves) will decrease. This is because the needs of the wolves(in the form of food) are fulfilled. However, this will probably only happen when the highest density of wolves in the area is reached and the livestock protection is optimised.

Conclusion

Looking at the depredation numbers for the Kresna gorge we see that 384 animals are killed by wolves annually. This comes down to an average of 7.23 % of the total animals of every village. But it varies from 0.25% to 21.28% of the total animals of the village. Bear depredation is only found in two villages Oshtava and Senekos where they predated in total 11 animals. The depredation in the villages Rakitna, Oshtava, Mechkull and Simitli is significantly higher than expected on basis of the livestock abundance.

On this moment the highest risk on poisoning in the Kresna gorge is in the villages: Oshtava, Simitli, Gorna Breznitza and Mechkull. In Oshtava a poison bait was found during the questionnaires and the number of predated livestock is high. In Simitli three poisoning cases were reported and are predated numbers high. In Gorna Breznitza 3 out of 4 people were not cooperative and a poison case was found when FWFF visited the area before. In Mechkull depredation numbers were high and a vulture died there close to the village before.

To decrease the risk on illegal poison baits use in the Kresna gorge and in Mediterranean Europe the human/predator conflicts in the areas should be minimised. However, to minimise these conflicts by reintroducing wild prey species or improving the protection of livestock as stated in (Wilpstra, 2015) takes a lot of time. In this time the illegal poison use could already have killed all scavengers in the area. To protect endangered scavenger species actions have to work directly. This is the reason for FWFF to start an active campaign against the use of poison and to start feeding scavengers on a special feeding place. By setting up a compensation program FWFF gives farmers an alternative for the use of poison namely (partly) getting back what they have lost from wolves. Next to this FWFF offers farmers an opportunity to speak with somebody who is interested in their problems and want to hear and help them. Together with the feeding site the compensation program has created a relatively safe environment for scavengers in the area where FWFF is most active on a short term . For the area of Brezhani, Mechkull, Poleto, Rakitna and Senekos (the most active area of FWFF) one poisoned vulture was found near Mechkull. However, outside this region more poisoning cases have occurred. Poisoning cases are reported from Gorna Breznitza, Oshtava, Simitli, Kresna and Vlahi. From two of these cases it is sure that it is the result of a conflict between people, but from two others it is sure that it is a case where they try to poison wolves because they killed a lot of livestock. In the remaining area, the villages of Krupnik and Polena, a goat association is very active in training dogs to protect their livestock. As the associations consist of quite a number of livestock breeders and they are all happy with their dogs they do not want them to get poisoned. These livestock breeders are all against poison use for this reason which also helps to prevent the use of poison by the other livestock breeders in the area.

So eventually it shows that FWFF's active work has helped to decrease the use of poison for their active area and the goat associations has prevented the use in their area for now. However , to maintain the active work of FWFF for a very long period will be too expensive because they have to compensate a lot of livestock owners. Next to this the compensation program only focusses on sheep/goat farmers because compensation of cattle will be too expensive. In addition to the compensating program FWFF also gives advices and tells livestock owners that they have to use certain protection measures if they want to be compensated for losses. However, to solve the

problem of livestock depredation is not only a case of good livestock protection and a good compensation program but also having good populations of wild prey as also found in (Wilpstra, 2015)'s study.

In general for Meditereanen Europe this means that to decrease the use of poison and to create a safe environment for scavengers immediate actions are needed. The compensation program of FWFF has proven to do this job very well, in a small area and with a lot off efforts. From the beginning also longer term solutions lik,e restoring wild prey populations and optimising livestock protection, are needed. Both measures are supported in the Kresna gorge by more than 50% of the surveyed people and they could on a certain moment replace the compensation program.

Finally, wolf conservationists could be an very important actor in solving the problem of poison use to kill wolves. However, their influence could also lead to the increasing use of poison baits to kill wolves. As more initiatives and projects arise to strengthen wolf populations in Mediterranean Europe more people want to protect the wolf in every country. Most often this means that they want to ban the wolf hunting. However, in most countries where wolf hunting is allowed the human/predator conflicts are not solved and healthy prey populations are still not available. When wolf hunting will be banned in this countries and human predator conflicts are still not solved it will most probably increase the risk on the use of illegal poison to kill wolves. In these areas there are still some remaining scavenger species the increase of the usage of illegal poison baits could result in local extinction of certain species.

Another risk of the strengthening of wolf populations in Mediterranean Europe is that it could result in new human/predator conflicts in areas where wolves were not seen before. As some of these areas as already shown in paragraph 3.4.3 still inhabited by endangered birds species , the possible illegal poison use as a reaction on the new-born conflict could mean a severe decline in populations of highly endangered scavenger species.

However, the influence of wolf conservationist does not necessarily need to be negative. A cooperation between wolf conservationists and scavenger conservationists could work together on strengthening wild prey populations and improving livestock protection. When this is achieved the human/predator conflict will decrease which will have positive results for scavengers as well as the wolves. If people are not in a conflict with wolves it will become easier to ban wolf hunting and there will be no negative result for the scavengers.

If prey species populations are not available and prevention measures not in place this should have higher priority than bringing back the predators. If it happens the other way around the arise of a human/predator conflict is a logical result which could have a dramatic ending for the scavengers. Conserving one not threatened species at all costs should not be reason for the extinction of others which are threatened. Conservationist should look on ecosystem level to nature and not only try to preserve the species they prefer. Next to this highly threatened species should have more priority than less or not threatened ones.

Discussion

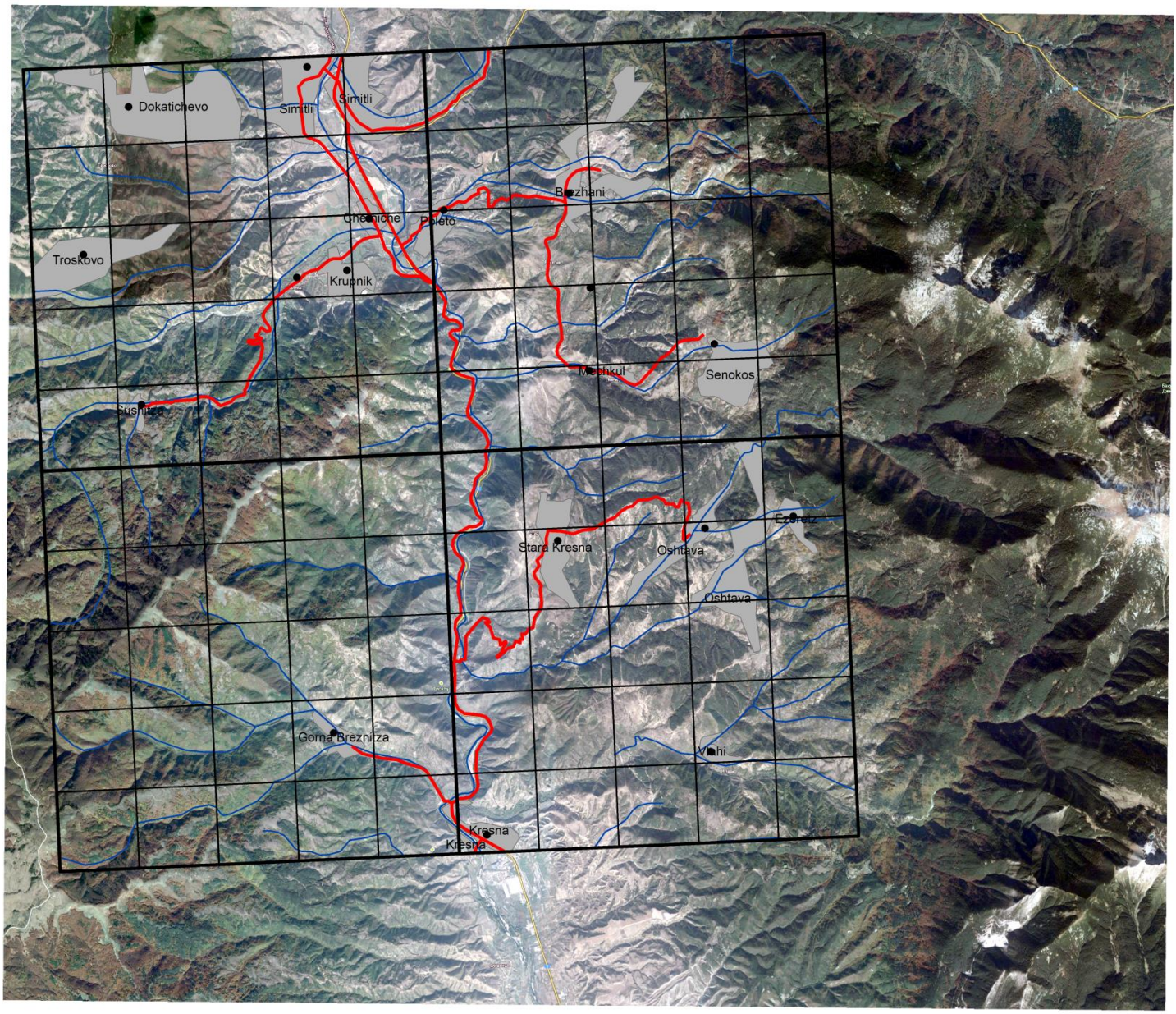
Because the research makes use of questionnaires to collect data there is always a risk that surveyed people are not speaking the truth. Next to this the research does not say that the risk analysis and critical analysis of FWFF's compensation program is the complete truth. I have tried to make an estimation on basis of data collected from the interviews and from speaking with FWFF's staff. At last the information shown in paragraph 3.4.4 is a result of logical reasoning on basis of ecosystem knowledge, current developments and human behaviour. However, it was not possible to support this information with other sources because this is the first report that mentioned the subject.

Recommendations

To find out if the relation between the wolves presence and the distribution of scavenger species is significant another research should be done. This research should compare areas where wolves are present with areas where there are no wolves and check if there is a difference in the number of scavengers or the number of scavengers which is killed by poison. This could even be a desk research.

Annexes

Annex 1 Map of research area



Annex 2 Used Questionnaire

Name Farmer:			**Phone Number:**				**Adress:**					
			Cattle	Sheep	Goats	Horses	Donkeys	Pigs	Chickens	Dogs	Total	Beehives
Number of livestock owned by the farmer:												
Where do you deposit your dead animals?												
Fwff												
Carriage												
Dig it or leave it												
Give it to the dogs												
Have you ever seen vultures in your area?	Yes											
	No											
		Calves	Cattle	Sheep	Goats	Horses	Donkeys	Pigs	Chickens	Dogs	Total	Beehives
Number of killed livestock from predators:	**2013**											
	Wolf											
	Dog											
	Bear											
	Jackal											
	2014											
	Wolf											
	Dog											
	Bear											
	Jackal											
Number of livestock you know is killed by predators in the region:	**2013**											
	Wolf											
	Dog											
	Bear											
	Jackal											
	2014											
	Wolf											
	Dog											
	Bear											
	Jackal											
(If there is no killed livestock) attacks on livestock?	Yes	No										

(If there is no killed livestock) attacks on livestock?	Yes	No		
Area of grazing(show it on map)	Name place		Plot nr	
Summer				
Winter				
Place of killed or attacked livestock (show it on map)	Name place		Plot nr	
Way of keeping of the livestock?				
Grazing				
Closed rearing				
Owner grazing the herd				
Hired shepherd				
Transhumance				
Collective herd				
The animals spent the night in:				
Coral within the village				
Coral outside the village				
Free ranging				
Summer coral outside village Winter coral within the village				
Do you think the number of killed livestock has changed?				
Increased				
Decreased				
Stable				
Do not know				
Are there any guarding dogs?	Breed	Number		
Non- working guarding dogs?	Breed	Number		
Do you know about poisoning cases?				
Yes				
No				
Do you know about any compensation program for livestock depredation?				
insurance company				
State compensation program				
NGO compensation program (FWFF)				
Compensation by hunters				
Don't know				
Is it working for you?				
Yes				
No				
What is the best solution in your opinion to decrease livestock depredation in your area?				
Full extirpation of wolves by shooting				
Yes				
No				
Shooting the problematic wolves				
Yes				
No				
Use of poisoned baits to kill wolves				
Yes				
No				
Use of Guarding dogs				
Yes				
No				
Shift from small livestock(sheep and goat) to cattle				
Yes				
No				
Increase of number of wild prey?(deers, wild boar, etc.)				
Yes				
No				

(If there is no killed livestock) attacks on livestock?	Yes	No		
Area of grazing(show it on map)	Name place		Plot nr	
Summer				
Winter				
Place of killed or attacked livestock (show it on map)	Name place		Plot nr	
Way of keeping of the livestock?				
Grazing				
Closed rearing				
Owner grazing the herd				
Hired shepherd				
Transhumance				
Collective herd				
The animals spent the night in:				
Coral within the village				
Coral outside the village				
Free ranging				
Summer coral outside village Winter coral within the village				
Do you think the number of killed livestock has changed?				
Increased				
Decreased				
Stable				
Do not know				
Are there any guarding dogs?	Breed	Number		
Non- working guarding dogs?	Breed	Number		
Do you know about poisoning cases?				
Yes				
No				
Do you know about any compensation program for livestock depredation?				
insurance company				
State compensation program				
NGO compensation program (FWFF)				
Compensation by hunters				
Don't know				
Is it working for you?				
Yes				
No				
What is the best solution in your opinion to decrease livestock depredation in your area?				
Full extirpation of wolves by shooting				
Yes				
No				
Shooting the problematic wolves				
Yes				
No				
Use of poisoned baits to kill wolves				
Yes				
No				
Use of Guarding dogs				
Yes				
No				
Shift from small livestock(sheep and goat) to cattle				
Yes				
No				
Increase of number of wild prey?(deers, wild boar, etc.)				
Yes				
No				

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