

## Conservation Strategies on Bird and Mammal Species in Yukarigokdere-Isparta, Turkey

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**Abstract:** Forest management plans in Turkey were made based on wood production and the related services with classical approach until recent years. However, today transition was made through functional planning based on ecosystem. To this extent, sample practices have been started in different areas in Turkey. Study area is one of the sample plots which are made multiple planning in GEF II project. The study area was visited in periodic intervals between 2006 and 2008 to identify the mammal and bird species. About 3 days camping was done with tents for field studies. Directly and indirect observation methods were used in this study. About 11 mammal and 72 bird species were determined in study area. Disappeared, target species were determined and their conservation strategies were suggested.

**Key words:** Isparta, observation, fauna, Kasnak Oak, target species, endemic

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### INTRODUCTION

Conservation of bird and mammal species in other words, conservation of biodiversity in an area requires sustainable conservation of the species and their habitats. Biodiversity involves the whole of the genes, species, ecosystems and functions in an area. Many people perceive biologic diversity only as the species diversity. This approach is inadequate in terms of the principle of sustainability of biologic sources. Today many species can co-exist in the same area thanks to habitat differences and different ecologic demands of the species. For this reason to conserve the species in a more efficient manner, it is more acceptable to conserve their habitats, ecosystems and to develop programs aiming to further improve their health. In recent years, biologic diversity conservation studies do not only involve species. With a holistic approach, conservation of habitats and distinction of inter-habitat ecological corridors and forming a network of the conserved areas began to be adopted.

Located on the intersection point of large continental plates in geographic terms and thus having various climate types and a wide variety of living environments (habitat), Turkey is one of the most important biodiversity areas in the world. Having approximately 464 bird (Kirwan *et al.*, 1998) and 140 mammal species, Turkey has a richness that almost equals to the whole of European continent. The study is the transition point of inner and coastal areas of Mediterranean, which is the richest region of Turkey in terms of biodiversity. In addition, the study

area contains Kasnak Oak *Quercus vulcanica* forest, which is an endemic species of Turkey. In study area, Isparta Province has the biggest population of Kasnak Oak *Q. vulcanica* in Turkey (Avci, 1996). Since Kasnak oak forest consists of endemic, rare and endangered tree species, the forest was announced as Nature Protected Area in 1987. Total area of Kasnak Oak Nature Protected Area is 13,005 ha, the altitude varies between 1200-1900 m. Natural Conservation Area is located between 37°37'30"-37°47'29" North latitudes and 30°47'22"-30°32'30" East longitudes (Karatepe, 2005).

No fauna study has been carried out in the study area. There are studies carried out only in Kasnak Oak Nature Protected Area. In this area, Gundogdu (2002) identified 27 bird species in his master's thesis. Avci (1996) reported that 55 bird and 11 mammal species were distributed in the area.

The principle ecosystem of Yukarigokdere consists of high mountains, maquis scrubland, rocks and fields. Important bird and mammal species and the ecosystems where these species are distributed should be identified in forest management plan in such a way to ensure sustainability of Yukarigokdere forests and biologic diversity should be protected and monitored.

### MATERIALS AND METHODS

The study area altitude ranges from 680-2395 m. The area lies between North latitudes of 41°6'31.9" and 41°8'9.999" m and East Longitudes of 30°32'12" and 31°31'22" m

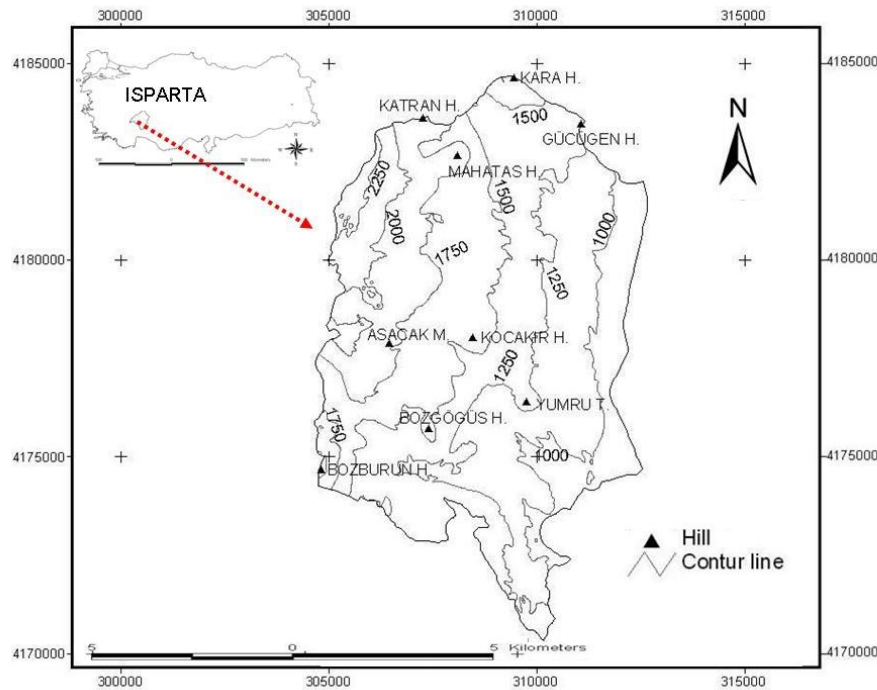


Fig. 1: Geographical location of the study area

according to Zone of UTM WGS 84 36. Total area is 8669.29 ha. Annual average precipitation is 771 mm. Main matter is substantially hard calcareous and granite, clay stone, sandstone, various metamorphic matters, crystalline rocks, flysch and limestone may exist on mountainous districts (KHGM, 1994). Annual average temperature is 13°C. Geographic location of the area under investigation is shown in Fig. 1.

The study area was visited in periodic intervals between 2006 and 2008 to identify the fauna. The methods of census at point count and transect line were employed (Bibby *et al.*, 1992). About 3 days camping was done with tents for field studies.

The study was conducted in the parts of the area in which birds and mammals possibly exist more intensively such as road, openings and edges considering the area's geographic nature and fauna. Observations were conducted within the first 3-4 h periods following sunrise in the mornings and within 2-3 h periods before sunset in the evenings in summers. These observations were conducted during daytime in winters.

In addition, observations were conducted between 09:00 pm and 01:00 am along the transected parts by using projectors and headlamps of cars to determine nocturnal species. Generally, observations were based on visual contacts with the animals however, excreta, feather and traces on the days in which the floor covered by snow

especially in winters were used for identification. Different binoculars were used for observing birds and mammals during the study.

Various books were consulted in identification of the observed bird and mammal species (Bang and Dahlstrom, 1980; Turan, 1984, 1990; Kiziroglu, 1989; Brown *et al.*, 1992; Jonsson, 1993; Kence and Bilgin, 1996; Kirwan *et al.*, 1998).

## RESULTS AND DISCUSSION

In the study area, 11 mammal species from 8 families belong to 6 classes, 72 bird species from 26 families belong to 7 classes were identified (Table 1 and 2).

**Disappeared species:** Based on the reports of the hunters and taxidermy samples which were said to have existed, hunted and stuffed in the locality the species, which were known but no record of which were obtained for almost 20-25 years were considered as extinct species. These species are shown in Table 3. Among these species, bear, wild goat and Griffon vulture are still distributed in neighboring areas (Sutculer and Asagigokdere).

**Target (endemic, indicator, threatened, commercial) species:** No area-based or country-based endemic species were identified in the study area during the study. Among the identified species, the species which belonged to the

Table 1: Determined mammal species in study area

Order	Family	Species	Mamals	Commercially*	IUCN red list category	Habitat
Carnivora	Canidae	<i>Canis lupus</i> L.	Wolf	Forbidden (Except hunting)	LC	S
	Mustelidae	<i>Vulpes vulpes</i> (L.)	Fox	Free	LC	KO, M
		<i>Mustela nivalis</i> L.	Least weasel	Forbidden	LC	K, M
		<i>Martes foina</i> L.	Beech marten	Free	LC	K, M
		<i>Meles meles</i> (L.)	Eurasian badger	Forbidden	LC	İO, OİA
Artiodactyla	Suidae	<i>Sus scrofa</i> L.	Wild boar	Free	LC	İO, KO
Lagomorpha	Leporidae	<i>Lepus capensis</i> (L.)	Brown hare	Free	LC	OİA, S
Rodentia	Sciuridae	<i>Sciurus vulgaris</i> L.	Red squirrel	Forbidden	NT	KO, YO
Insectivora	Erinaceidae	<i>Erinaceus concolor</i> L.	Hedgehog	Forbidden	LC	OİA
	Talpidae	<i>Talpa levantis</i> Thomas	Mole	Forbidden	LC	KO
Chiroptera	Vespertilionidae	<i>Myotis</i> sp.	Bat	Forbidden	KO	

\*2009-2010 Central Hunting Committee (MAK)-Turkey; LC: Low Critically, NT: Near Threatened, M: Maquis, OİA: Gaps in forest, K: Rocky, YO: Broad leaves forest, S: Steppe, İO: Coniferous forest, KO: Mixed forest

Table 2: Determined bird species in study area

Order/Family	Species	Birds	Migration	IUCN red list category	Commercially*	Habitat
<b>Falconiformes</b>						
Accipitridae	<i>Circus cyaneus</i> (L.)	Hen-harrier	KG	LC	Forbidden	S
	<i>Accipiter gentilis</i> (L.)	Goshawk	KG	LC	Forbidden	S, K
	<i>Accipiter nisus</i> (L.)	Sparrowhawk	Y	LC	Forbidden	KO
	<i>Buteo buteo</i> (L.)	Buzzard	Y	LC	Forbidden	OİA
	<i>Buteo rufinus</i> (CRETZSCHMAR)	Long-legged Buzzard	KG	LC	Forbidden	OİA
	<i>Aquila chrysaetos</i> (L.)	Golden eagle	KG	LC	Forbidden	K
	<i>Hieraetus pennatus</i> (GMELIN)	Booted eagle	YG	LC	Forbidden	KO
Falconidae	<i>Falco tinnunculus</i> L.	Kestrel	Y	LC	Forbidden	KO, İO
	<i>Falco columbarius</i> L.	Merlin	KG	LC	Forbidden	S
<b>Galliformes</b>						
Phasianidae	<i>Alectoris chukar</i> Gray	Partridge	Y	LC	Free	K, S
<b>Charadriiformes</b>						
Scolopacidae	<i>Scolopax rusticola</i> L.	Woodcock	KG	LC	Free	OİA
<b>Columbiformes</b>						
Columbidae	<i>Columba livia</i> GMELIN	Rock dove	Y	LC	Free	K, KO
	<i>Streptopelia decaocta</i> (FRIVALDISKY)	Collared dove	Y	DD	Forbidden	KO
	<i>Streptopelia turtur</i> (L.)	Turtle dove	YG	LC	Free	KO
<b>Apodiformes</b>						
Apodidae	<i>Apus apus</i> (L.)	Swift	YG	LC	Forbidden	K, KO
<b>Coraciiformes</b>						
Meropiidae	<i>Merops superciliosus</i> (PALLAS)	Blue-cheeked bee-eater	YG	LC	Forbidden	YO, KO
	<i>Merops apiaster</i> L.	Bee-eater	YG	LC	Forbidden	YO, KO
Coraciidae	<i>Coracias garrulus</i> L.	Roller	YG	NT	Forbidden	OİA
Upupadae	<i>Upupa epops</i> (L.)	Hoopoe	YG	LC	Forbidden	OİA
<b>Piciformes</b>						
Picidae	<i>Picus viridis</i> L.	Gren woodpecker	Y	LC	Forbidden	İO
	<i>Dendrocopos syriacus</i> (HEMP. and EHR.)	Syrian woodpecker	Y	LC	Forbidden	YO
	<i>Dendrocopos major</i> (L.)	Great spotted	Y	LC	Forbidden	YO, KO
<b>Passeriformes</b>						
Alaudae	<i>Galerida cristata</i> (L.)	Crested lark	Y	LC	Forbidden	OİA, S
Hirundinidae	<i>Riparia riparia</i> (L.)	Sand martin	YG	LC	Forbidden	K
	<i>Hirundo rustica</i> L.	Swallow	YG	LC	Forbidden	KO
	<i>Delichon urbica</i> (L.)	House martin	YG	DD	Forbidden	KO
Motacillidae	<i>Motacilla flava</i> L.	Yellow wagtail	YG	LC	Forbidden	S, OİA
	<i>Motacilla cinerea</i> TUNSTALL	Grey wagtail	Y	LC	Forbidden	S
	<i>Motacilla alba</i> L.	Pied wagtail	Y	LC	Forbidden	OİA
Purinellidae	<i>Troglodytes troglodytes</i> (L.)	Wren	Y	LC	Forbidden	YO
Turdidae	<i>Erithacus rubecula</i> (L.)	Robin	KG	LC	Forbidden	OİA
	<i>Phoenicurus phoenicurus</i> (L.)	Redstart	YG	LC	Forbidden	KO, M
	<i>Saxicola torquata</i> (L.)	Stonechat	Y	DD	Forbidden	M
	<i>Oenanthe oenanthe</i> (L.)	Northern wheater	YG	LC	Forbidden	M, OİA
	<i>Oenanthe pleschanka</i>	Pied wheater	YG	LC	Forbidden	M

Table 2: Continous

Order/Family	Species	Birds	Migration	IUCN red list category	Commercially*	Habitat
	(LEPECHIN)					
	<i>Oenanthe hispanica</i> (L.)	Black-eared wheater	G	LC	Forbidden	M
	<i>Turdus torquatus</i> L.	Ring ouzel	KG	LC	Forbidden	YO
	<i>Turdus merula</i> L.	Blackbird	Y	LC	Free	M, KO, YO
	<i>Turdus philomelos</i>	Song thrush	KG	LC	Forbidden	YO, KO
	CHRL.BREHM					
	<i>Turdus viscivorus</i> L.	Mistle thrush	Y	LC	Forbidden	YO
Sylviidae	<i>Hippolais pallida</i>	Olivaceous warbler	YG	LC	Forbidden	İO, KO
	(HEMP. and EHR.)					
	<i>Sylvia atricapilla</i> (L.)	Blackcap	KG	LC	Forbidden	M, KO
	<i>Phylloscopus bonelli</i> (Vieillot)	Bonelli's warbler	YG	LC	Forbidden	OİA, M
	<i>Phylloscopus sibilatrix</i>	Wood warbler	KG	LC	Forbidden	OİA, KO
	BECHSTEIN					
	<i>Phylloscopus collybita</i>	Chiffchaff	KG	LC	Forbidden	OİA
	(VIEILLOT)					
Muscicapidae	<i>Muscicapa striata</i> (PALLAS)	Spotted flycatcher	YG	LC	Forbidden	İO, YO
	<i>Ficedula hypoleuca</i> (PALLAS)	Pied flycatcher	G	LC	Forbidden	M
Aegithalidae	<i>Aegithalos caudatus</i>	Long-tailed tit	Y	LC	Forbidden	YO
	<i>temphronotus</i> GUNTHER					
Paridae	<i>Parus lugubris anatoliae</i>	Sombre tit	Y	LC	Forbidden	İO, KO
	HARTERT					
	<i>Parus ater</i> L.	Coal tit	Y	LC	Forbidden	İO
	<i>Parus caeruleus</i> L.	Blue tit	Y	LC	Forbidden	YO
	<i>Parus major</i> L.	Great tit	Y	LC	Forbidden	KO
Sittidae	<i>Sitta krueperi</i> PELZELN	Kruper's nuthatch	Y	NT	Forbidden	YO, İO
	<i>Sitta europea</i> L.	Nuthatch	Y	DD	Forbidden	İO, KO, M
	<i>Sitta neumayer</i>	Rack nuthatch	Y	LC	Forbidden	K, M
	MICHAHELLIS					
Certhiidae	<i>Certhia familiaris</i> L.	Treecreeper	Y	DD	Forbidden	KO, YO
	<i>Certhia brachydactyla</i>	Short-toed treecreeper	Y	LC	Forbidden	KO
	CHRL.BREHM					
Laniidae	<i>Lanius collurio</i> L.	Red-backed shrike	YG	LC	Forbidden	M, OİA
	<i>Lanius nubicus</i>	Masked shrike	YG	LC	Forbidden	M, KO
	LICHTENSTEIN					
Corvidae	<i>Garrulus glandarius</i> (L.)	Jay	Y	LC	Free	KO, İO, YO
	<i>Corvus corone</i> L.	Hooded crow	Y	LC	Free	OİA
	<i>Corvus corax</i> L.	Raven	Y	LC	Forbidden	K, S
Sturnidae	<i>Sturnus vulgaris</i> L.	Starling	Y	LC	Forbidden	YO
Passeridae	<i>Passer domesticus</i> (L.)	House sparrow	Y	LC	Free	OİA
	<i>Passer montanus</i> (L.)	Tree sparrow	Y	DD	Forbidden	YO
Fringillidae	<i>Fringilla coelebs</i> L.	Chaffinch	Y	LC	Forbidden	KO, YO, İO
	<i>Carduelis chloris</i> (L.)	Green finch	Y	LC	Forbidden	KO, YO
	<i>Carduelis carduelis</i> (L.)	Goldfinch	Y	LC	Forbidden	M, KO
	<i>Carduelis spinus</i> (L.)	Siskin	Y	LC	Forbidden	KO, M
	<i>Carduelis cannabina</i> (L.)	Linnet	Y	LC	Forbidden	OİA, M
Emberizidae	<i>Emberiza cia</i> L.	Rock bunting	YG	LC	Forbidden	K, M
	<i>Emberiza melanocephala</i>	Black-headed bunting	YG	LC	Forbidden	M, OİA
	(Kappenammer)					

\*2009-2010 Central Hunting Committee (MAK)-TURKEY; Y: Native, G: Transit bird, YG: Summer visitant, LC: Low Critically, NT: Near Threatened, DD: Data Deficient, M: Maquis, K: Rocky, S: Steppe, OİA: Gaps in forest, YO: Broud leaves forest, İO: Coniferous forest, KO: Mixed forest

Table 3: Disappeared species

Class	Order	Family	Species	The latest observed years
Mammalia	Artiodactyla	Bovidae	Wild goat <i>Capra aegagrus</i>	1985-1990
	Carnivora	Felidae	Anatolian leopard <i>Panthera pardus</i>	1975-1982
	Artiodactyla	Ursidae	Brown bear <i>Ursus arctos</i>	1990-1995
Aves	Falconiformes	Accipitridae	Griffon vulture <i>Gyps fulvus</i>	1985-1990

group VU and NT according to IUCN Red List and the ones which are allowed to be hunted according to MAK (Central Hunting Committee) decisions were considered as target species (Table 4 and 5). In addition, endangered species were considered as indicator species for the fauna classes and the ecosystems where they were distributed.

**Conservation strategies:** It was observed that local people did not pose a threat to the distributed species. The fact that Yukarigokdere villagers have a high-income level and have no expectation of making profit on the forest may be the reason of this situation. The species that should be conserved or monitored:

Table 4: Target species (Commercial)

Class	Order	Family	Species	Population size
Mammalia	Carnivora	Canidae	Wolf <i>Canis lupus</i> L.	Low
			Red fox <i>Vulpes vulpes</i> (L.)	Good
		Mustelidae	Beech marten <i>Martes foina</i> L.	Good
			Wild boar <i>Sus scrofa</i> L.	Low
Aves	Artiodactyla	Suidae	Brown hare <i>Lepus europaeus</i> (L.)	Low
	Lagomorpha	Leporidae	Partridge <i>Alectoris chukar</i> Gray	Good
	Galliformes	Phasianidae	Woodcock <i>Scolopax rusticola</i> L.	Low
	Charadriiformes	Scolopacidae	Rock dove <i>Columba livia</i> Gmelin	Good
	Columbiformes	Columbidae	Turtle dove <i>Streptopelia turtur</i> (L.)	Good
	Passeriformes	Turdidae	Blackbird <i>Turdus merula</i> L.	Good
		Corvidae	Jay <i>Garrulus glandarius</i> (L.)	Good
		Passeridae	Hooded crow <i>Corvus corone</i> L.	Good
			Hause sparrow <i>Passer domesticus</i> (L.)	Good

Low: During this type of field study, observation ratio was 20-30% at different parts of the area for each 3-day camping; Good: During this type of field study, observation ratio was 90-100% at different parts of the area for each 3-day camping

Table 5: Target species (Threatened and indicator)

Class	Order	Family	Species	Population size
Mammalia	Rodentia	Sciuridae	Red squirrel <i>Sciurus vulgaris</i> L.	Good
Aves	Coraciiformes	Coraciidae	Roller <i>Coracias garrulus</i> L.	Low
	Passeriformes	Sittidae	Kruper's nuthatch <i>Sitta krueperi</i> Pelzeln	Good

Low: During this type of field study, observation ratio was 20-30% at different parts of the area for each 3 day camping. Good: During this type of field study, observation ratio was 90-100% at different parts of the area for each 3 days camping

Table 6: Threatening analysis table

	Threats	
	Actually	Potentially
Natural sources		
Natural old forests	Nothing	Ecosystem damage Conversion to production forest
Alpine and subalpine area	Dense grazing	
Production forests	Poaching on predators Purpose only production log in management plane actually	Ecosystem damage No planning forest resources for multiple use
Lemur	During military exercises ecosystem damage Grazing pressure	Ecosystem damage
Kasnak oak		Removing protected area status
Nature protected area	Nothing	Ecosystem damage Genetic structure damage
Agricultural areas	Fertilizing, apply of insecticide	Increasing of production ambition

## Mammals

**Red squirrel *Sciurus vulgaris* L. (Risk degree: NT):** Red Squirrel is distributed almost at every region of Turkey. Their habitat consist holes of old trees or coppices. Thus, they do not prefer to live in forests, which are cut-down and renewed at the end of their lifetime. Apart from conserved areas and some woodland, unfortunately today the habitats of these species get smaller and smaller. Squirrels generally live in Kasnak Oak Nature Protected Area. Since, apart from scientific purposes, no human activity is permitted in this area which is covered with broad-leaved and old trees, the field has no risk of conservation problem or habitat break-down.

## Birds

**Roller *Coracias garrulus* L. (Risk degree: NT):** Rollers are one of the winter migratory species in Turkey. In the study area this bird is not under the risk of hunting. However, the bird can be affected from the chemical pesticides used in fruit-growing activities in the region.

## Kruper's nuthatch *sitta krueperi pelzeln* (Risk degree

**VU):** It is one of the three Nuthatch species distributed in Turkey. It is estimated that 2/3 of the world population of Kruper's Nuthatch is distributed in Turkey. This bird's population development is considered as vulnerable. The habitat of this species is broad-leaved, old forests. In the study area this bird intensively uses Kasnak Oak Nature Protected Area. There is no risk of hunting for this species.

**Threatening analysis table:** The existing and future threats on bird and mammal species in the study area were determined based on field and office studies (Table 6).

**Strategically plane:** The strategic planning for the bird and mammal species distributed in Yukarigokdere shown in Table 7.

**Observing of target species:** The target species identified in the study area should be monitored and should be

Table 7: Strategically plane

Programme	Actions
Conservation of rare species and habitats	No changing status of Kasnak Oak nature protected area Conservation of mature trees 20-30 m <sup>3</sup> snags and dead and dying trees in hectare have to be left in production forests Encouraging organic agriculture
Rehabilitation of commercial species and their habitats	Military exercises should be taken the area out or not be done in rare habitats Predator species such as wolf which are distributed in alpine and subalpine area must protected from shepherds' attacks Agricultural crops such as corn, potato must be cultivated in forest gaps for wild boar. So, the wild boars don't go agricultural areas to be nourished. Thus, they be died by farmers Agricultural Encouraging organic agriculture especially in neighboring areas to forest borders Preventing dense poaching about brown hare and partridge

Table 8: Record form for observing of target species

Observation		Species name	Sexual properties			Number
Situation (Coordinate)	Date		M	F	J	T

M: Male, F: Female, J: Junenile, Y: Total

separately evaluated in terms of population. In addition, ecosystem damage should be controlled. The form that should be used and the information to be collected for carrying out these studies are given in Table 8. The information of observing of target species population and ecosystem in this study as:

- Species name
- Population size
- Population density
- Sex rates
- Age dispersions (for mammals)
- Natality rate
- Mortality rate
- Migrations
- Ecosystem loss
- Habitat division
- Changing of main stand
- Degrading of Herbaceous plants and shrub species
- Global warming effect

#### Determining of critical ecosystems and special areas:

Endangered or vulnerable species important for scientific studies, habitats of endemic species in Turkey, biosphere reserves, biotopes, biogenetic reserve areas, unique geologic and geomorphologic formations fall into the group of areas that are of critical importance or characteristics. Kasnak Oak Nature Protected Area is the uniquely critically important area in the study area with its plant and wild animal species. This area contains the majority of the fauna and target species populations identified in the study area. For this reason, conservation

status prohibiting human activity except scientific studies should be pursued in this area. However, there is a dilemma towards protected areas between local people and protected areas managers in terms of the goals and objects. In other words, while managers might be concerned about the conservation of natural resources, local people may be more concerned about the economic benefits of the natural resources (Alkan *et al.*, 2009).

#### CONCLUSION

The dwellers of Yukarigokdere village earn their lives from fruit growing. The villagers have a high-income level thus have no expectation of making profit from the forest. Because of this there are only 3-4 shepherds and flocks within the forest area which do not harm the habitat. However, wolves attack the flocks on occasional basis and the hunters, whose flocks are injured go wolf hunting. For preventing this damage to the wolves which already have a sparse population, the damages caused by the wolves should be compensated.

One part of the study area belongs to Egirdir Mountain Commando Unit military exercise training area. During military trainings, almost every part of the area is used and long-term camping is organized. These exercises should be carried out except reproduction season of many species and springtime. Although, there are species like wolf, brown hare, woodcock, partridge and wild boar which are commercially permitted to be hunted in the study area as these species do not have sufficient populations, they currently have no economic value.

Apart from these species, red fox, beech marten, rock dove, turtle dove, blackbird, jay, hooded crow which have

adequate population are permitted to be hunted in Turkey. These species are allowed to be hunted in the study area. Red squirrel and Krupers nuthatch which are among the endangered category according to world red list were found to have a good population in the study area. All of these three species are mostly distributed in Kasnak Oak Forest which is a Nature Protected Area. Therefore, there is no conservation problem for these species in the study area. As Roller is migratory bird in the study area, it was not included in population planning.

Among the species, which were known to live in the study area there is a possibility of re-distribution in the area only for Wild goat and Griffon vulture (since they are still distributed in neighboring areas). Griffon vulture is an indicator species of wild goat. Therefore, if wild goat population increases in the study area and if they return to their habitats following wild goats, Griffon vulture will also return to the area. However, as it cannot be foreseen how long would this process takes there is no current need for making a planning for these species.

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