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Original Article

Conservation strategies for the Caucasus Viper, *Vipera kaznakovi* Nikolsky 1909, in the East Black Sea Region, Turkey

Türkiye'de Doğu Karadeniz Bölgesi'nde Kafkasya Engereği, *Vipera kaznakovi* Nikolsky 1909 için koruma stratejileri

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ABSTRACT

We evaluated the current status and main threats to the Caucasus viper (*Vipera kaznakovi* Nikolsky 1909), from the East Black Sea Region, Turkey, via 21 days of intensive fieldwork and interviews with locals. We found that habitat loss and destruction, illegal collection, and intentional or accidental killings are the main threats to *V. kaznakovi* in the region. We prepared a 5-year Action Plan for the Turkish General Directorate of Nature Conservation and National Parks and outline a strategy for promoting the sustainability of the species with participation of regional administrations, non-governmental organizations (NGOs), and locals. The major conservation measures include: (1) creating protected areas in regions with high viper densities (2) preventing and controlling illegal collection, (3) raising awareness among locals to reduce the intentional and accidental killing of vipers.

Keywords: Caucasian viper, biology, conservation, reptiles, research, Anatolia

ÖZ

Türkiye'nin Doğu Karadeniz Bölgesi'nde Kafkas engereği (*Vipera kaznakovi* Nikolsky 1909)'un mevcut durumunu ve başlıca tehditleri 21 günlük yoğun saha çalışması ve yerel halkla yapılan görüşmelerle değerlendirdik. Habitat kaybı ve yıkımı, yasadışı toplama, kasıtlı veya kazayla öldürmenin bölgedeki başlıca tehditler olduğunu gördük. Türkiye Doğa Koruma ve Milli Parklar Genel Müdürlüğü için 5 yıllık bir Eylem Planı hazırladık ve bölgesel yönetimlerin, STK'ların ve yöre halkının katılımıyla türün sürdürülebilirliği için yol haritası belirledik. Başlıca koruma önlemleri şunlardır: (1) yüksek engerek yoğunluğu bölgelerinde korunan alanlar yaratmak (2) yasadışı toplanmayı önlemek / kontrol etmek, (3) yerel halk arasında kasten veya kazayla engerek ölümleri azaltmak için farkındalık yaratmaktır.

Anahtar Kelimeler: Kafkas engereği, biyoloji, koruma, sürüngenler, araştırma, Anadolu

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INTRODUCTION

The Caucasus ecoregion is one of the earth's 36 recognized biodiversity hotspots and covers more than 500,000 km^2, including Armenia, Azerbaijan, and Georgia, as well as the North Caucasian portion of the Russian Federation, the northeastern part of Turkey, and a portion of northwestern Iran. The ecoregion possesses nearly 90 reptile species, about 20 of which are endemic, with many having distributions of only a few thousand square kilometers (ECP, 2012; CEPF, 2019).

The venomous snake family Viperidae consists of 38 genera and more than 355 species globally (Uetz and Hošek, 2019). Unfortunately, habitat loss, introduced invasive species, environmental pollution, disease, unsustainable land use, and global climate change pose major threats to viperid species. Vipers, like many other reptile species, face increased extinction risks (Gibbons et al., 2000; Aghasyan et al., 2009; Maritz et al., 2016), especially from human-induced habitat loss and harvesting (Böhm et al., 2013). Anatolia has approximately 15 viper species belonging to three genera:

Vipera, *Macrovipera*, *Montivipera* (Mallow et al., 2003; Baran et al., 2012; Uetz and Hošek, 2019). Northeastern Anatolia is one of the most important regions, as it harbors about half of these species (Mebert et al., 2016).

The Caucasus viper is an average-sized venomous snake endemic to the Colkhic depression, a narrow area bordered by the Black Sea to the west, high altitudes of the Caucasus mountain range to the east, and altitudes as high as 1000m a.s.l of the Minor Caucasus mountains to the south and southeast (*Tuniyev* et al., 2009; Tuniyev and Tuniyev, 2009). The area is split between Abkhazia, Georgia, Russia, and Turkey. Due to its beauty, the Caucasus viper has been illegally harvested and exported from Turkey since the 1950s (Tunçer, 1991). The species is classified as Endangered [EN B2ab (ii, iii, v)] in the IUCN Red List due to its small, fragmented distribution (less than 500 km^2). There is continuing decline in area of occupancy, extent of occurrence, quality of its habitat, and number of mature individuals (Tuniyev et al., 2009).

Here, our objective was to assess the population status and major threats to *V. kaznakovi* in the province of Artvin, which lies in the heart of its distribution in the Eastern Black Sea region in Turkey. We estimated the relative density and evaluated the environmental factors affecting the distribution of *V. kaznakovi* to describe the current ecological niche of the species and to forecast its potential future distributional pattern (between 2050 and 2070). We conducted a rapid assessment based on fieldwork observations, interviews with local people, and a literature review to develop a five-year (2015-2019) species conservation action plan with contributions from regional administrations, non-governmental organizations (NGOs), and local officers from the General Directorate of Nature Protection and Natural Parks (GDNPNP).

MATERIALS AND METHODS

Study Area: The study was conducted in the province of Artvin, East Black Sea Region, Turkey, as it constitutes the heart of the distribution of *V. kaznakovi* in Turkey. Artvin (between 40° 35′ N and 41° 32′ N, and 41° 07′ E and 42° 00′ E) comprises 7,436 km^2 and is divided into eight districts: Ardanuç, Arhavi, Artvin, Borçka, Hopa, Murgul, Şavşat, and Yusufeli. It is located on the coast of the Black Sea in the northeastern corner of the country, bordering Georgia, and has an oceanic climate (Cfb) according to the Köppen classification (Peel et al., 2007). Steep valleys are carved by the Çoruh River system. Forests are surrounded by the Kaçkar, Karçal, and Yalnızçam mountains, which can reach up to 3,900 m.

Fieldwork: The study site was divided into approximately 60 UTM grids [1/25.000 map parcels, 150 km^2]. We conducted 21 days of intensive fieldwork between May and September 2015 with two or three people. We utilized visual encounter surveys (Guyer and Donnelly, 2012) to search for snakes in the study area. Habitats in each grid were visited at least three times to detect vipers.

We calculated the relative density of *V. kaznakovi* using catch-per-unit-effort (CPUE) indices (Rodda, 2012) by dividing the number of vipers captured by sampling effort in three locations: (1) Arhavi, (2) Hopa, (3) Borçka. We searched for snakes in 20 m×2 km routes. Each route was sampled six times by a team of two people between 09:00-18:00 hrs and between May and June 2015. We refrain from indicating the exact location due to threats from illegal trade. Our method might overestimate the species' true abundance and reduce the capacity to detect both the presence and severity of a population decline. However, our data provide a preliminary basis for qualitatively assessing population trends.

During fieldwork, we interviewed locals with questions that aimed to provide information on their attitudes toward snakes. We asked respondents: (1) How many vipers they have encountered in their life?; (2) whether they recognize the viper species when they were provided photos of it; if they responded affirmatively to the previous question, (3a) where (locality) or (3b) when (season, time) did they observe the viper?; (4) what other snakes inhabit the region?; and (5) their attitude toward these snake species.

Prior to beginning field studies, we created preliminary ecological niche models using maximum entropy approaches to guide field efforts and determine potential new localities for the Caucasus viper. Following the completion of fieldwork, we added our localities and reanalyzed our data to model the species' current and future potential distribution.

Ecological Niche Modeling: A total of 29 records were compiled from the literature (Orlov and Tuniyev, 1990; Mulder, 1995; Tarkhnishvili et al., 2002; Baran et al., 2002, 2005; Afsar and Afsar, 2009; Mebert et al., 2014; Gül et al., 2016) and our own fieldwork. Locality information lacking coordinates was referenced to the closest location provided in earlier studies using Google Earth Pro vers. 7.1.5 (Google Inc.). All records were georeferenced using a WGS84 coordinate system and checked for accuracy with ArcGIS (v10, ESRI, California, USA). To minimize sampling bias which could otherwise result in overestimating the predicted distribution (Merow et al., 2013) and to reduce spatial autocorrelation (Boria et al., 2014; Fourcade et al., 2014), we drew a 10-km buffer area around each occurrence record in spThin ver. 0.2.0 (Aiello-Lammens et al., 2015) thinning the total number of records from 29 to 17 localities.

We used 19 bioclimatic variables as predictor variables for the current distribution. The bioclimatic variables were obtained from the WorldClim database (Hijmans et al., 2005, http://www.worldclim.org) at a spatial resolution of 30 arc-seconds (ca. 1 km), which were derived from monthly temperature and rainfall data as averages of the period from 1950-2000. Bioclimatic variables for 2050 (average for 2041-2060) and 2070 (average for 2061-2080) at a spatial resolution of 30 arc-seconds (WorldClim 1.4, http://www.worldclim.org/cmip5_30s) were obtained from intermediate (the representative concentration pathways, RCP4.5) and worst (RCP8.5) emission scenarios and used for predicting the future distributional patterns of the species. The data set of the "Hadley Global Environment Model 2 - Earth System",

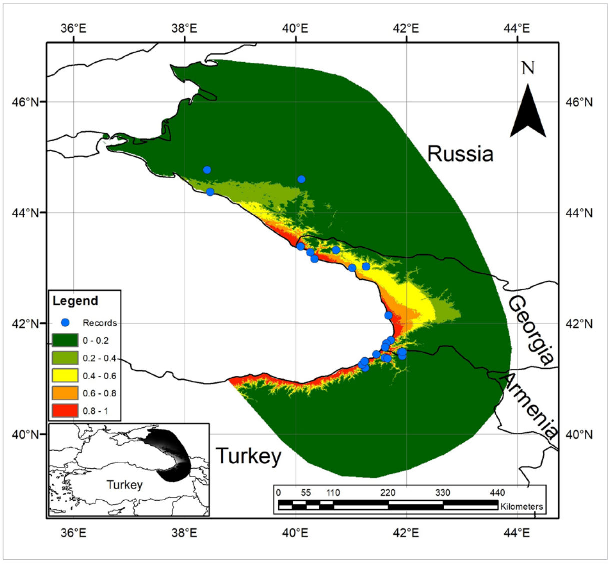

Figure 1. The known and potential distribution model of the Caucasus viper. Probability of presence increases from green to red

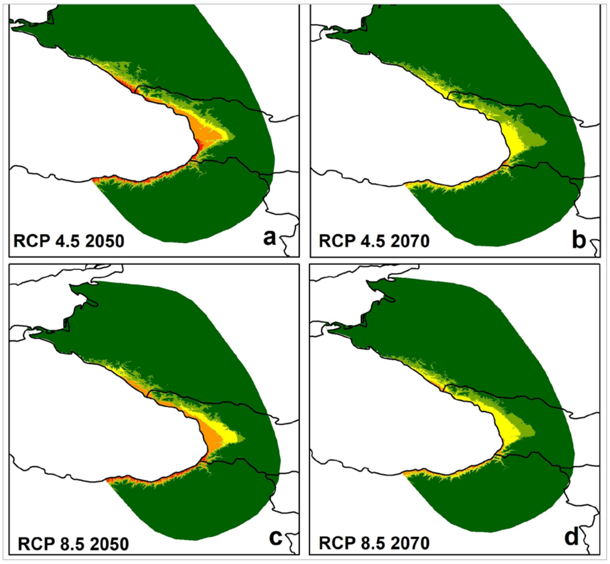

Figure 2. Future distribution projections (2050 and 2070) of the Caucasus viper. Probability of presence increases from green to red

developed within the scope of the 5th Coupled Model Intercomparison Project (CMIP5) by the Met Office Hadley Centre (UK, http://www.metoffice.gov.uk/), was preferred. We buffered the climatic variables by 2 degrees using the minimum convex polygon method to represent the study area.

To reduce the negative effect that might result from multicollinearity among the bioclimatic variables (Heikkinen et al., 2006; Dormann et al., 2013), some highly intercorrelated variables (r>0.9 or <-0.9) were removed using a pairwise Pearson correlation. Four environmental variables [BIO4=Temperature Seasonality (standard deviation*100), BIO6=Min Temperature of Coldest Month, BIO7=Temperature Annual Range (BIO5-BIO6), BIO9=Mean Temperature of Driest Quarter] were selected to provide a subset of the bioclimatic variables based on the ecological requirements of the species (Höggren et al., 1993; Mallow et al., 2003; Tuniyev and Tuniyev, 2009).

We modeled the geographic distribution of the Caucasus viper using maximum entropy modeling with MAXENT 3.4.1 (Phillips et al., 2018). We implemented the randomly selected background approach (Phillips et al., 2006) and k-1 jackknife method recommended for working with relatively small data sets (Pearson et al., 2007; Shcheglovitova and Anderson, 2013). We built models with regularization multiplier values ranging from 0.5 to 10 (increments of 0.5) and with six different feature class combinations (L, LQ, H, LQH, and LQHP, where L=linear, Q=quadratic, H=hinge, P=product and T=threshold), resulting in 100 individual model runs. We applied the 10-percentile training presence logistic threshold approach as recommended by Liu et al. (2005) to transform the cloglog output into a continuous map of the presence-absence distribution. The cloglog outputs represent habitat suitability from 0 (unsuitable) to 1 (suitable). We used the Wallace v1.0.6.1 modular platform (Kass et al., 2018) in R vers. 3.5.2 for preparing and analyzing species distributions. Model accuracy was evaluated from four evaluation metrics using ENMeval (Muscarella et al., 2014). Results were imported and visualized with ArcGIS v10.0.

Conservation Action Plan: During our fieldwork, we interviewed villagers, farmers, beekeepers, hunters, shepherds, and officers. We obtained knowledge on the ecology, life cycle, phenology, and local opinions of *V. kaznakovi* and attempted to confirm their validity during fieldwork. Fieldwork, interviews with locals and literature data on species were used to draft a conservation action plan (CAP). We followed Open Standards methodology (2013, http://cmp-openstandards.org), using threats classification (vers. 2.0) and actions classification (vers. 2.0) keys. Final CAP targets and actions were shared with stakeholders (locals, NGOs, local administrations, GDNPNP) in a workshop on October 9th, 2015.

RESULTS

1. Habitat Suitability Modeling: Primary factors related to the distribution of the species were minimum temperature of coldest month (BIO6, 62.1%), temperature annual range (BIO7, 27.9%), temperature seasonality (BIO4, 9.5%), and mean temperature of driest quarter (BIO9, 0.5%). The distribution model indicated that there are suitable habitats in Trabzon to the west and along Çoruh Valley to the south (Figure 1). According to the model, the mean AUC value of the current distribution consensus model is quite high (0.990). In the future, the potential distribution of the species will decrease in the western and eastern parts of its current range (Figure 2).

2. Visual Surveys and Abundance: Visual surveys in suitable habitats of (1) Arhavi, (2) Hopa, (3) Borçka returned estimated abundances ranging between 2-15 individuals/km depending on weather conditions (Table 1). Viper abundance in Arhavi was

lower and ranged between 2-3 individuals/km. We visited the Karagöl-Sahara (Ardanuç), Hatila-Valley National Park 2-3 times and interviewed local inhabitants but failed to detect vipers. We visited Altındere (Maçka, Trabzon) in 2018 and failed to detect the vipers as well.

3. Threats and Conservation actions: Interviews suggested that many locals could recognize *V. kaznakovi*, often referring to it as "kantra" or "kantha". Residents of Arhavi, Hopa and Borçka recognized the species as well (N=36 people, mean >80%). Only a police sergeant claimed that he saw the viper in Murgul. No residents of the Artvin city center and the neighboring regions Şavşat, Ardanuç, and Yusufeli recognized the viper (<10%). Seven vipers (five in Hopa and two in Arhavi) were reported to be killed during our fieldwork. Presumably, 10-20 individuals used to be killed annually in Hopa. Interviews showed that there are approximately 2-3 snake bite incidents per year in the vicinity of Hopa.

Table 1. Number of observed snakes in transects

Sampling date	Arhavi	Hopa 1	Hopa 2	Borçka
14.05.15	2	5	6	2
18.05.15	3	9	15	5
23.05.15	2	5	11	3
11.06.15	2	4	4	2
13.06.15	3	6	7	3
20.06.15	2	8	5	4
Mean	2.3	6.2	8.0	3.2
CPUE	1.2	3.1	4.0	1.6

CPUE: catch-per-unit-effort

Different governmental agencies and NGOs have been involved in various conservation measures for *V. kaznakovi*. Major threats (Table 2) and conservation actions (Table 3) identified by all organizations and other stakeholders (conservation groups, volunteers, and consultants) include habitat loss and destruction due to urbanization; the use of infrastructure; and intensive agricultural activities. The limited number of suitable areas for settlement and agricultural activities on the Black Sea coastline has adversely affected the species. Another important problem is illegal collection of the species for the pet trade or for scientific study. Generally, people often encounter vipers at high densities in appropriate habitat. People often deliberately or accidentally kill or wound the vipers because they are venomous or because of fear. Unfortunately, we were not able to measure the effect of habitat modifications and climate change on the species. According to our ecological niche model, the potential distributional area of the species could be reduced between 18% and 29% (18% reduction for RCP4.5 2050, 24% reduction for RCP4.5 2070, 21% reduction for RCP8.5 2050, and 29% reduction for RCP8.5 2070) in the next 30-50 years depending on the severity of climate change.

Conservation activities should include expansion of protected areas to include important viper habitats. In addition, some key habitats that should be considered for protection include public areas in the provinces of Hopa, Borçka, and Arhavi. All types of poaching and agricultural activities must be prohibited in these areas. The potential and known distribution of the species should be shared with governmental offices and other relevant organizations for use in planning (road, quarry, and infrastructure work, etc.) and urbanization activities. Generally, these activities should be minimized, as they extensively damage viper habitats.

One of the most important problems is illegal collection for the pet trade or for scientific study. Appropriate measures

Table 2. Major threats to the Caucasus viper in Turkey

Major Threats	Reasons	Threat Level
Residential & Commercial Development		
Housing & Urban Areas	Constructing new houses, infrastructure works, etc.	High
Agriculture & Aquaculture		
Annual & Perennial Non-Timber Crops	Opening or restoring new agricultural lands; using pesticides and artificial fertilizers.	Medium
Biological Resource Use		
Hunting & Collecting Terrestrial Animals	Deliberate or accidental killing by locals, illegal collection of vipers for pet trade, scientific collection.	High
Natural System Modifications		
Dams & Water Management / Use	Altering water flow patterns from the viper's natural range.	Medium
Climate Change		
Changes in Temperature Regimes	Potentially affecting the phenology and distribution of species.	Unknown
Changes in Precipitation & Hydrological Regimes	Potentially affecting the phenology and distribution of species.	Unknown

Table 3. Conservation action plan for the Caucasus viper in Turkey

Actions	Priority	Responsible Agencies, Organizations and Individuals
Land / Water Management		
Site/Area Stewardship		
• Some important viper habitats must be managed, and all types of hunting and agricultural activities must be prohibited in these areas.	High	Law enforcers, Mukhtars. Local governments, Forestry, Agricultural, Governorship offices.
Species Management		
Species Stewardship		
• The potential and known distributions of the species should be shared with governmental offices and other relevant organizations for use in planning in construction (road, quarry, and infrastructure work, etc.) to avoid damaging viper habitats. • To add actions of the conservation of the viper to other wildlife management plans. • Snake rescue teams must be founded to transport vipers in gardens and houses to their natural habitats.	High	Law enforcers, Mukhtars. Local governments, Forestry, Agricultural, Governorship offices, Universities.
Ex-Situ Conservation		
• Gifting a few vipers to some national zoos to provide the necessary conditions to support the sustainability of the species.	High	Zoos, Universities.
Awareness Raising		
Outreach & Communications		
• Protecting viper habitat by preventing illegal agricultural land openings. • Inform locals/farmers on the usage of pesticides and artificial fertilizers in viper habitats, which decrease availability of viper prey. • Presenting and distributing posters, brochures, etc. on the importance of the species in exhibitions at festivals in highlands of the Eastern Black Sea Provinces.	High	Ministry of Foreign Affairs, Customs Office, Governorship
Law Enforcement and Prosecution		
Detection and Arrest		
• Inform customs, law enforcement, etc., to reduce illegal viper collecting and enhancing controls for bio-smuggling and bio-smugglers	Critical	Ministry of Foreign Affairs, Customs Office, Governorship.
Non-Criminal Legal Action		
• The collection of the viper should not be permitted in their natural habitat for scientific purposes without appropriate justification. • Encouraging in-situ studies on the ecology, monitoring, and biology of the species.	High	GDNCNP, Universities.
Conservation Designation and Planning		
Protected Area Designation and/or Acquisition		
• After obtaining results of the viper monitoring study, establish protected areas in key regions for the viper.	High	GDNCNP, Universities.

Table 3. Conservation action plan for the Caucasus viper in Turkey (Continue)

Site Infrastructure		
• Conduct an inventory of viper deaths (road mortality and other reasons) with the help of rangers, mukhtars, shepherds, beekeepers, and expert personnel. • Noting occurrences by other individuals to make an observation map through the help of rangers, mukhtars, NGOs, and locals.	Medium	GDNCNP, Universities.
Research and Monitoring		
Basic Research and Status Monitoring		
• Supporting or conducting research on the ecology and biology of the species. • Monitoring the population trend of the species over several years.	Critical	GDNCNP, Universities.
Education and Training		
Formal Education		
• Preparing educational materials for primary and secondary schools to attract attention to the viper and its protection. • To inform and educate officers, gendarmes, customs house guards, and forestry rangers on the harm of smuggling the species.	High	GDNCNP, Forestry, Agricultural, Governorship. Education offices, Universities, Schools.
Training and Individual Capacity Development		
• To teach snake rescue team members how to handle a venomous snake. • To inform locals and especially mukhtars, the shepherds, and the beekeepers who encounter the species most often, about the prohibition on killing the species and its criminal penalties. • Increasing awareness of the importance of the species and the threat of bio-smuggling to locals via posters, brochures, one-on-one training, etc.	High	GDNCNP, Universities.
Institutional Development		
Internal Organizational Management and Administration		
• Other provinces where the species occurs should be informed and encouraged to implement planned activities. • Coordinating and contacting with wildlife conservation units in Russia and Georgia where the species occurs to determine mutual and common conservation strategies. • Organizing a workshop with all stakeholders in 2022 for the revision of the conservation action plan.	High	GDNCNP, Ministry of Foreign Affairs.

should be taken to reduce illegal collection of the vipers, including enhancing controls of bio-smuggling and bio-smugglers.

There are limited data on the ecology and population trends of *V. kaznakovi* in Anatolia. Research has primarily focused on the taxonomy or venom of the species. There is an urgent need for universities to prepare and support a national viper monitoring plan.

Education and training actions are also an important part of the conservation plan. Government employees and locals should be informed of the importance of vipers for biodiversity conservation. Booklets, brochures, and other educational materials should be prepared to increase public awareness.

DISCUSSION

Managers, regulators, and the public are interested in the conservation of threatened, endangered, or iconic species (Burger and Zappalorti, 2016). Vipers are usually misunderstood and persecuted reptiles (Maritz et al., 2016). However, given their slow development and low fecundity, they face high extinction risk (Gibbons et al., 2000; Maritz et al., 2016).

The Caucasus viper lives in forests on mountainous slopes, wet meadows, and openings adjacent to forests (Tuniyev et al., 2009). Additionally, vipers have been observed in gardens, mixed-subtropical forests, chestnut, beech, willow, and alder forests and near rivers (Tuniyev et al., 2009; Baran et al., 2012). Its vertical distribution runs from sea level to 600-800m (until 1000m) (Höggren et al., 1993; Tuniyev et al., 2009). The Caucasus viper has also been observed in fir-beech forests and mixed meadow ecotones (Tuniyev et al., 2009). The literature has shown that the Caucasus viper has a denser population at low altitudes in Turkey, and this observation was confirmed by our fieldwork.

Individuals were observed when they were basking near tea gardens, agricultural areas, such as nut gardens, or near non-evergreen forested regions. The ecological distribution model also indicates that there are suitable habitats in Trabzon to the west and along the Çoruh Valley to the south. The distribution of the species is greatly affected by altitude and precipitation (Gül et al., 2016).

The known distribution of the Caucasus viper in Anatolia is in Hopa, Arhavi and Borçka (Baran et al., 2012). The viper is quite common in suitable habitats in Hopa and Borçka. Tuniyev and Tuniyev (2009) also stated that viper can be found in Altındere (Maçka, Trabzon), Karagöl-Sahara (Ardanuç), Hatila-Valley National Park. Even though the aforementioned regions have limited suitable biotopes for the species, records have yet to be reported from these regions.

Its population density varies from as high as 300 individuals in some regions to as low as two or three in small periphery populations in the Russian Federation, where numbers are declining (Tuniyev and Tuniyev, 2009). Tuniyeva and Tuniyev (2009) indicated that the number of individuals in Russia is not much greater than 2,000 and that it is possible to observe as many as 3-15 individuals in a single day. The number of individuals in Georgia is estimated to be approximately 3,000; there is currently no information available for Turkey (Tuniyev and Tuniyev, 2009). Tuniyev and Tuniyev (2009) also suggested that, because viper populations are declining simultaneously in several regions for various reasons, regions with high densities of the viper are in need of protection.

The Caucasus viper suffers from various threats throughout its range. These vipers have been illegally collected for the pet trade since the 1970s (Orlov and Tuniyev, 1990; Höggren et al., 1993). Höggren et al. (1993) stated that high numbers of vipers are illegally collected around Hopa (Artvin). However, they also emphasized that, in the 1970s and 1980s, most vipers were collected from natural habitats. Nearly ten years later, Baran et al. (2002) stated viper numbers have significantly decreased in coastal portions of Hopa. Specifically, they suggested that populations were critically endangered due to overcollection.

Habitats in Georgia and Russia have been damaged due to urbanization, tourism and agricultural activities (Tuniyev et al., 2009). For these reasons, some populations on the coast of the Black Sea are nearly extinct. Habitat damage as a consequence of construction and infrastructure projects are one of the main threats to vipers in Turkey (Tuniyev et al., 2009; Mebert et al., 2016). The use of pesticides and fertilizers poses another threat. Lastly, global climate change will likely exacerbate extinction risk.

The Caucasus viper CAP was prepared for the 5-year period between 2016 and 2020. Planned goals consist of protecting species and habitats, conducting further research, increasing public awareness and resolving problems that limit the protection of species and habitat (Table 3). It is estimated that a budget of approximately 1,000,000 euros, not including labor, would be necessary. The largest portion of the budget would be used to expropriate and manage newly formed protected areas.

Ethics Committee Approval: The study was carried out permission of the Directorate of Artvin Branch of the 12th Regional Directorate of the Department of Nature Protection and National Parks of the Republic of Turkey, Ministry of Forestry and Water Affairs.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept - K.Ç., M.A., C.V.T.; Design - - K.Ç., M.A., C.V.T.; Supervision - - K.Ç., M.A., C.V.T.; Resource - M.A., C.V.T.; Materials - K.Ç., M.A., C.V.T.; Data Collection and/or Processing K.Ç., M.A., C.V.T.; Analysis and/or Interpretation - K.Ç., C.V.T.; Literature Search - K.Ç., M.A.; Writing - K.Ç., M.A., C.V.T.; Critical Reviews - K.Ç., M.A., C.V.T.

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Conflict of Interest: The authors have no conflict of interest to declare.

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