

# National Action Plan for Leopard (*Panthera pardus*) Conservation in Armenia

**2020-2030**



Caucasian leopard (*Panthera pardus ciscaucasica*). © WWF-Armenia



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## **Abbreviations**

BMZ – Bundeministerium für wirtschaftliche Zusammenarbeit und Entwicklung (Germany)  
CNF – Caucasus Nature Fund (Germany)  
DoE – Department of Environment (Iran)  
ECF – Eco-Corridors Fund (Armenia, Azerbaijan, Georgia)  
EIA – Environmental Impact Assessment  
FPWC – Foundation for the Preservation of Wildlife and Cultural Assets (Armenia)  
GIS – Geographical Information System  
GIZ – Deutsche Gesellschaft für Internationale Zusammenarbeit (Germany)  
ICMR – Inspection of Conservation and Mineral Resources (Armenia)  
IRI – Islamic Republic of Iran  
IUCN – International Union for Conservation of Nature  
KfW – Kreditanstalt für Wiederaufbau (Germany)  
MoU – Memorandum of Understanding  
NABU – Naturschutzbund Deutschland (Germany)  
NAP – National Action Plan for Leopard Conservation in Armenia  
NAS – National Academy of Sciences (Armenia)  
NGO – non-governmental organization  
NSS – National Security Service (Armenia)  
PA – protected area  
PCA – priority conservation area  
RA – Republic of Armenia  
RF – Russian Federation  
SNCO – state non-commercial organization  
SPPA – Support Programme for Protected Areas-Armenia  
SSC – Species Survival Commission  
TJS – Transboundary Joint Secretariat for the Southern Caucasus (Armenia, Azerbaijan, Georgia)  
UNDP – United Nations Development Programme  
USSR – Union of the Soviet Socialist Republics  
WWF – World Wide Fund for Nature  
YSU – Yerevan State University (Armenia)

# 1. PREAMBLE

## 1.1. Structure

According to the 2010 Red Data Book of the Republic of Armenia, the leopard is critically endangered in the country. It occurs only in the mountains of southern Armenia and its population size does not exceed 10-15 individuals. Implementation of the previous 2009 National Action Plan (NAP) for Leopard Conservation in Armenia led to an impressive progress, due to which the transboundary (Armenia-Nakhichevan) population size increased and some individuals succeeded to return to the formerly abandoned areas in Khosrov Forest State Reserve and Vayots Dzor Province. In spite of these inspirational facts, the leopard population in Armenia remains to be very unstable and fragile as its range extends as a narrow strip along the Armenia-Azerbaijan (Nakhichevan) and Armenia-Iran state borders, it is highly fragmented and any threat may disrupt the population and even cause its local extinction.

Being among the rarest and flagship species of the Armenian Highland and the Caucasus Ecoregion, the leopard enjoys great attention from the national governments, international organizations and local people. Moreover, as leopards are very mobile their protection safeguards the conservation of habitats and large tracts of biodiversity-rich lands.

The main aim of the NAP 2019 is within 10 years (2020-2030) to keep and strengthen the progress achieved so far, reduce threats, stabilize the leopard and wild prey populations, and to develop different ways of leopard conservation.

This NAP follows the Strategy for the Conservation of the Leopard in the Caucasus Ecoregion, which was produced in 2017 and approved by the RA Ministry of Nature Protection (now Ministry of Environment) in 2019 (act No. 2-08,1/2004-19, January 9, 2019). It was prepared by the Armenian branch of World Wide Fund for Nature (WWF-Armenia) within its project “Leopard conservation in the southern Caucasus” supported by WWF-Germany. It summarizes the results of the workshop “National action plan for leopard conservation in the Caucasus: Armenia” which was held February 25-26, 2019. The list of participants of this workshop is given in Appendix 2.

The NAP is comprised of four thematic parts:

1. Species and populations
2. Important places – habitats and corridors
3. Human dimensions and conflict mitigation
4. Policy, legislation and international cooperation

Each part consists of one or more objectives, results and activities required to achieve the mentioned results. Their description is provided in Chapter 3, Chapter 4 and Appendix 1. The NAP is comprised of 8 objectives, 20 results and 44 activities. Each objective has 1-4 (on average 3) results and 1-5 (on average 2) activities are required to get a result. This approach makes the procedures targeted, realistic and effective. To further boost it, during the above-mentioned workshop and the preparation of the NAP some objectives, results and activities were lumped or removed as irrelevant.

## 1.2. Justification

The RA government has signed and ratified a number of agreements related to the conservation of biodiversity, including the leopard:

- Convention on Biological Diversity (entry into force in 1993)
- Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention, entry into force in 2008). The leopard and bezoar goat are included in its Appendix II
- Convention on the Conservation of Migratory Species of Wild Animals (entry into force in 2011). The leopard is included in its Appendix II
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (entry into force in 2009). The leopard is included in its Appendix I
- The RA government has signed a number of laws and legislative acts, including
  - Law on fauna (entry into force in 2000)
  - Law on hunting and game management (entry into force in 2007)
  - Law on specially protected natural areas (entry into force in 2007)
  - Law on tariffs imposed to compensate damage to fauna and flora resulting from environmental violations (entry into force in 2005)
  - Decree No. 860-N “On protection, conservation, management and registration of animal hunting grounds” (entry into force in 2016)
  - Decree No. 121-N “On organization and implementation of animal monitoring” (entry into force in 2009).

Moreover, the RA Ministry of Environment has approved the following regional documents on leopard conservation:

- Ecoregion Conservation Plan for the Caucasus (2012)
- Strategy for the Conservation of the Leopard in the Caucasus Ecoregion (2017)

An urgent need of actions to avert leopard extinction in Armenia has been determined by the following factors:

- The leopard is threatened at the national and global levels
  - The leopard is listed in the 2010 Red Data Book of Armenia as “critically endangered” (status CR C2a(i);D)
  - The leopard is listed on the 2016 IUCN Red List of Threatened Species as “vulnerable” (status VU A2cd). The status of the subspecies living in the Caucasus, which is called the Caucasian or Persian leopard (*Panthera pardus ciscaucasica* = *P.p. saxicolor* = *P.p. tulliana*), is still unpublished but in the last edition (2008) it was designated as “endangered” (status EN C2a(i))
- The up-to-date range of the leopard in Armenia represents a dense network of protected areas (PA) and migration corridors, which is confined to rocky and hardly accessible areas in the Zangezur, Vayk, Meghri, Bargushat and Geghama mountain ridges. No any PA is large enough to secure population viability, sufficient population size and permanent residence. In these conditions, viability of the leopard population is very unstable and fully dependent upon the connectivity of individuals in the country and its transboundary areas (Nakhichevan, Iran, Artsakh)

- A significant part of the leopard range in Armenia is covered by the Zangezur Ridge stretched along the Armenia-Azerbaijan (Nakhichevan) state border where even short-term viability of the species is under constant threat because of poaching, disturbance, infrastructure development and mining
- The leopard population faces numerous threats (section 2.2)

## 2. GENERAL INFORMATION

### 2.1. The status of the leopard in Armenia

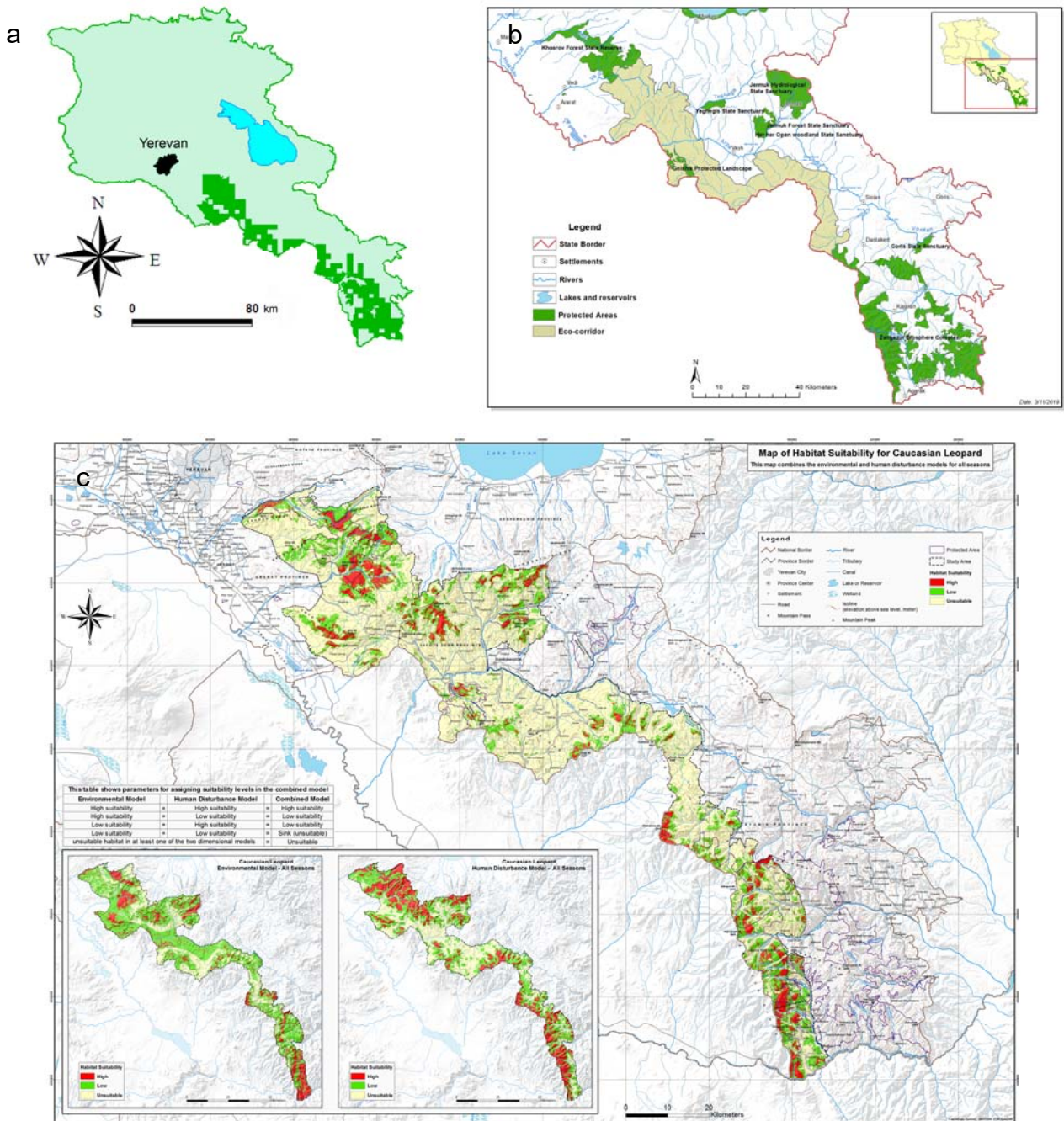
The leopard is one of the rarest species of the Armenian Highland and the Caucasus Ecoregion. In the USSR, before the 1970s leopards and other large predators had been considered as vermin and intensively wiped out under state support. In 1972 the leopard was officially declared a protected species and in 1987 it was included in the Red Data Book as “endangered” (Khorozyan and Abramov 2007; Khorozyan 2011). In 2008 the Caucasian or Persian leopard (*Panthera pardus ciscaucasica* = *P.p. saxicolor* = *P.p. tulliana*) living in the region was designated by the 2008 IUCN Red List as “endangered” (EN C2a(i); Khorozyan 2008) and its updated status assessment is pending now. The leopard is included also in the 2010 Red Data Book of Armenia as “critically endangered” (CR C2a(i);D).

The leopard range in Armenia is located in the country's south within the provinces of Ararat, Vayots Dzor and Syunik. Before the 1970s, this big cat also used to be recorded in north-eastern Armenia, but then disappeared there (Khorozyan and Abramov 2007; Khorozyan 2011). It occurs from Khosrov Forest State Reserve southwards to the Armenia-Iran state border on the Geghama, Zangezur, Vayk, Bargushat and Meghri ridges (Fig. 1).

The leopard range in Armenia covers about 3000 km<sup>2</sup> (Khorozyan et al. 2010). The habitats include arid mountain steppes, sparse forests, subalpine and alpine meadows. Meadows have been used only during the snow-free seasons for movements. As snow cover is an important limiting factor for leopards, they prefer to live in arid grasslands and sparse forests located on the southern slopes. An essential requirement is the presence of precipitous rocky areas which hold the main prey (bezoar goat *Capra aegagrus*), secluded shelters and cover for hunting, and least accessible sites for people and livestock. The other prey species are the wild boar (*Sus scrofa*), roe deer (*Capreolus capreolus*), Armenian mouflon (*Ovis orientalis gmelini*), Indian crested porcupine (*Hystrix indica*) and European hare (*Lepus europaeus*) (Khorozyan et al. 2008).

Gray wolf (*Canis lupus*), Eurasian lynx (*Lynx lynx*) and brown bear (*Ursus arctos*) are the main competitors of leopards.

The distribution of leopards in Armenia requires in-depth scientific research, especially in Jermuk Hydrological State Sanctuary and Vorotan River gorge which are the only corridors linking Nakhichevan with Artsakh (Nagorno Karabakh). Computer modelling, particularly Maxent software program, is very useful in such studies but it should incorporate all southern Armenia as during previous efforts the territories of Jermuk, Vorotan gorge, Bargushat and Meghri ridges were excluded (Fig. 1c).



**Figure 1.** The leopard range in Armenia according to the (a) GIS grid, (b) protected areas and corridors and (c) computer modeling by Maxent. Sources: I. Khorozyan (a), WWF-Armenia (b, c).

The leopard population in Armenia and other Caucasian countries is heavily fragmented and represents a network of small priority conservation areas (PCA), primarily PAs, and corridors between them. Any threat (see section 2.2) weakens the connectivity between and within the PCAs. Dispersing sub-adult individuals, especially males, are able to pass long distances between suitable “islands”, but such movements are dangerous and can end up with the killing of a predator which poses a potential threat for domestic animals or people. Importantly, mountainous habitats are naturally patchy what aggravates the adverse impacts of fragmentation.

The leopard population in southern Armenia is closely linked with the one living in the north of the Islamic Republic of Iran (IRI). Although Iran is much larger than Armenia and



therefore holds a much bigger population of leopards, during the past 10-15 years Iranian nature has been affected by unprecedented and ever-increasing human pressures. Large-scale poaching of leopard and its prey species, especially mouflon and bezoar goat, are the main threats to leopard survival in Iran. An analysis of published data (Kiabi et al. 2002; Sanei et al. 2012) shows that the national leopard population guesstimated as 550-850 individuals is losing 21-32% during five years from poaching and this trend allows to designate the status of the leopard in Iran as “endangered” (EN C1;C2a(i); Khorozyan and Ghoddousi, 2016, unpublished report to IUCN). The leopard status in Kiamaki and Arasbaran PAs adjoining to Armenia is worse than expected (Moqanaki et al. 2013). It fully depends on how these areas are connected with Iran’s main leopard population concentrated on the Alborz Mts. along the southern coast of the Caspian Sea, but there is still no information about the connectivity between the Alborz and Caucasian populations.

## 2.2. Main threats

Here are presented the main threats to leopard that workshop participants classified as “very important”, “important” or “not important” (Table 1). The list of threats was originally taken from the Strategy for the Conservation of the Leopard in the Caucasus Ecoregion (2017), but then revised, updated and, when necessary, enlarged during the workshop.

**Very important threats** include poaching, permanent disturbance along the state borders (especially on Armenia-Nakhichevan border), mining, border troops, long-term political instability for the Artsakh conflict, lack of connectivity between PAs, and insufficient levels of law enforcement, conservation policy, management and legislation. All these threats lead to killing or displacement of leopards towards remote and safe areas, often beyond the borders of Armenia.

**Important threats**, such as animal husbandry, deforestation, infrastructure and rural development, have an indirect effect on leopard by strongly and negatively affecting its ungulate prey populations. For example, sheep breeding in mountain meadows makes the populations of Armenian mouflon and, to a lesser extent, bezoar goat to retreat to safer and uninhabited areas. Diseases transmitted from domestic animals may cause high mortality in prey populations and thus limit the leopards’ prey base. This is a serious threat in the forests of southern Armenia where wild boar abundance has plummeted in the past 10 years due to African swine fever.

Rural population of Armenia continues to decrease and man-nature relationships tend to be viewed through the prism of socio-economic interests, causing the loss of indigenous knowledge and close relationships with nature. On the other hand, predators can indeed kill domestic livestock, inflict significant financial losses and exacerbate negative public attitudes towards them. Finding solutions to these issues requires large-scale activities in collaboration with local people and stakeholders.

Armenia enjoys close cooperation with international conservation organizations and its neighbour Iran, but available opportunities are not fully used and their promotion is essential.

**Table 1.** Threats faced by the leopard in Armenia.

Threat	Very important	Important	Not important
<b>Species and populations</b>			
Leopard poaching	+		
Prey poaching	+		
Diseases transmitted from domestic animals		+	
Disturbance along the state borders	+		
<b>Important places – habitats and corridors</b>			
Deforestation		+	
Overgrazing and competition between livestock and wild prey		+	
Development of sheep breeding		+	
Expansion of agricultural areas and changes in land use		+	
Infrastructure development and recreational zones outside of communities		+	
Road construction		+	
Mining	+		
Border troops	+		
Presence of hunting grounds		+	
Lack of connectivity between protected areas	+		
<b>Human dimensions and conflict mitigation</b>			
Loss of indigenous knowledge and close relationships with nature		+	
Leopard killing to prevent or retaliate livestock depredation losses		+	
<b>Policy, legislation and international cooperation</b>			
Long-term political instability	+		
Insufficient levels of law enforcement	+		
Insufficient levels of international cooperation and use of available opportunities		+	
Lack of relevant policy, management and legislation	+		

### 2.3. Scientific research

Following the NAP 2009, scientific research of leopard and its prey in Armenia has become more international. This means that research has been carried out either by Armenian specialists who publish in international teams of co-authors, or by foreign specialists.

As a result of long-term studies, a GIS grid-based leopard monitoring scheme was developed, described and verified (Khorozyan et al. 2010). This scheme allows to affirm leopard presence or absence in a given area (grid cell) from the occurrence of its signs, mainly scats, and provides a methodological guideline.

Due to large-scale conservation activities applied since 2002 by WWF-Caucasus and the governments of Armenia and Azerbaijan, leopard numbers in the Zangezur Ridge in 2013-2014 have increased up to 7-10 individuals (Askerov et al. 2015). This progress led to the facts that 11 individual leopards were identified in this area in 2014-2018, breeding was confirmed and one male succeeded to reach Khosrov Forest State Reserve from southern Nakhichevan and establish a home range (Askerov et al. 2019; reports of WWF Armenia).

German scientists are focused on land use, habitat quality and their effects on large mammals, including leopard, in the Caucasus in terms of species status and landscape connectivity (Bleyhl et al. 2017). This study is practically not so important because, taking the scale of all the Caucasus, southern Armenia represents a small and narrow area for which the results are spatially not enough accurate. Moreover, the status of leopard and its corridors depends not that much on habitat quality, but on human impacts and prey base, but these factors were not studied by the authors. In a more recent study, these scientists found out that sheep breeding has a significant negative effect on the distribution of Armenian mouflon (Bleyhl et al. 2019), which has important implications for mouflon and leopard habitats in the Zangezur, Vayk and Urts ridges.

## 2.4. Leopard conservation

Leopard conservation in Armenia has been implemented within the programs of the RA Ministry of Environment and international organizations (WWF, CNF). These programs can be targeted on leopard conservation or emphasize sustainable land use and community development, which also contribute to the preservation of leopard, its prey and other wildlife species.

Implementation of the NAP 2009 led to a great progress in conservation in southern Armenia. Arevik National Park, Zangezur and Khustup State Sanctuaries were established in Syunik Province and Arpi Protected Landscape, the first community-based PA in Armenia, was established in Vayots Dzor Province. A number of private conservation areas were founded, such as the Caucasus Wildlife Refuge by the Foundation for the Preservation of Wildlife and Cultural Assets (FPWC). Zangezur Biosphere Complex SNCO (<https://zangezurkh.am>) was founded to optimize the management of the PAs of Syunik Province. Prior to 2009, Khosrov Forest and Shikahogh State Reserve were the only PAs in southern Armenia.

WWF-Armenia keeps on carrying out the long-term project “Leopard conservation in the southern Caucasus” by implementing leopard monitoring, anti-poaching and awareness-raising activities (<https://leopard.am>). This organization also conducts the project “Promotion of eco-corridors in the southern Caucasus” through the Eco-Corridors Fund (ECF; <https://www.ecfcaucasus.org/armenia>) aiming at the implementation of sustainable land use practices and reduction of natural resource use. This project created a number of community-based conservation areas which enforce the protection of leopard and its prey.

The Caucasus Nature Fund (CNF; <https://www.caucasus-naturefund.org>) provides financial assistance to PAs in order to increase administrative expenses and to promote staff training and regular conservation operations.

United Nations Development Programme (UNDP; <http://www.am.undp.org/>) assisted in the development of Khosrov Forest State Reserve's capacities, establishment of Khustup State Sanctuary and enlargement of Zangezur State Sanctuary.

The Support Programme for Protected Areas-Armenia (SPPA) is ongoing in PAs and communities managed by Zangezur Biosphere Complex SNCO under financial support provided by the German government (BMZ/KfW).

## **3. VISION, GOALS AND OBJECTIVES**

### **3.1. Vision**

Leopards and all wildlife prosper in natural habitats across the Caucasus ecoregion in harmony with people.

### **3.2. Goals**

Ensure the conservation and sustainable management of leopard, its wild prey and habitats in Armenia, build and implement mechanisms for co-existence of nature and local communities.

### **3.3. Objectives**

#### ***Species and populations***

1. Increase viability of leopard and prey populations
2. Continue leopard and prey studies and create a standardized monitoring system, scientific program and central database

#### ***Important places – habitats and corridors***

3. Create an efficient PA network in leopard PCAs
4. Improve leopard and prey conservation and raise the role of awareness, education and training in leopard conservation outside of PAs

#### ***Human dimensions and conflict mitigation***

5. Secure long-term support of local communities through the mitigation of human-leopard conflicts and involvement of local people

#### ***Policy, legislation and international cooperation***

6. Strengthen international, regional and transboundary cooperation for leopard conservation
7. Optimize current management and improve it as necessary
8. Improve and coordinate efforts to secure international funding for leopard conservation

## 4. DESCRIPTION OF ACTIVITIES

### Result 1.1. Before 2025, current populations of leopard and its prey reach stability or increase

#### *Activity 1.1.1. Apply systematic population estimation of leopard and prey*

The main prey of the leopard in Armenia, all Caucasus and adjacent countries of the Middle East (Iran, eastern Turkey, Iraq) is the bezoar goat. Wild boar plays a secondary role and can serve an alternative prey species wherever bezoar goat numbers are low. Leopard also can kill roe deer and porcupines in some forested areas and mouflons on mountain meadows. Population sizes of almost all these species are rather low because of poaching, habitat loss and, in case of wild boar, diseases transmitted from domestic animals. In the 2010 Red Data Book of Armenia, the bezoar goat is classified as “vulnerable” and the mouflon as “endangered”. In the 2019 IUCN Red List of Threatened Species, both these ungulates are designated as “vulnerable”.

Scientifically reliable estimations of leopard and prey populations are either absent or conducted irregularly in a few areas. The main method of leopard counts is the application of camera-trapping. Camera-traps, usually two in front of each other, are positioned on mountain trails where, according to tracks, scats, scrapes and other signs, leopards commonly move. These devices should be set up and checked throughout the whole range of the leopard, from Khosrov Forest State Reserve southwards to the Armenia-Iran state border, using the GIS grid of 4x4 km or 5x5 km cells. This method is described in details in the guidelines produced by WWF-Armenia and its collaborators (Ghoddousi et al. 2019).

These guidelines also describe how to count ungulates. According to preferred habitats, these species can be split into the mountain ungulates (bezoar goat, mouflon) and forest ungulates (wild boar, roe deer). Mountain ungulates can be observed during the daytime and their numbers can be estimated by means of point counts from dominating heights. This is the main method still traditionally used in the mountainous areas of the former USSR, but it becomes more reliable if implemented by two observers simultaneously (double-observer point count; Ghoddousi et al. 2016). As mouflons live in less precipitous and more hilly areas than bezoar goats, they can be counted through line transects. In contrast, wild boars and roe deer inhabit dense forests and shrublands and they are usually active at night or crepuscular time. For this reason, populations of these animals can be estimated from the same camera-traps set for leopards by calculating the relative abundance index or applying the random encounter model (Ghoddousi et al. 2016, 2019). The methods of porcupine counts are not developed, but this is not a big problem as this rodent plays an insignificant role in leopard diet and its consumption is determined by dietary preferences of individual leopards.

Regular application of these methods makes possible to obtain essential quantitative information about leopard and prey numbers and to use it as a baseline for future estimations and descriptions of population trends.

**Activity 1.1.2.** *Collect and analyze information about prey poaching and natural mortality in leopard PCAs*

Information about prey losses caused by poaching and natural mortality is extremely important in status assessment of the leopard's prey base, yet its acquisition is very difficult and time-consuming. Poaching and mortality records are sporadic, unpredictable and often remain unreported. To keep on collecting such data, it is essential to be always in fieldwork and to maintain close contacts with local people, especially hunters, forest rangers and inspectors.

The most optimal way to do this work is to collect and verify relevant information by rangers of PAs and the Inspection of Conservation and Mineral Resources (ICMR) during their regular shifts.

**Activity 1.1.3.** *Organize meetings for caretakers from different areas to foster exchange in experience and information*

Caretakers are local volunteers participating in fieldwork and helping with camera-trap check-ups, animal observations and counts. They play a very important role in leopard and prey conservation, but need to regularly meet to share experience, problems and information. This is particularly urgent for caretakers from different provinces.

**Result 1.2. Before 2025, all leopard PCAs and their corridors are identified, described and mapped, methods of corridor management are proposed and their implementation is initiated**

**Activity 1.2.1.** *Identify necessary and reliable indicators to describe leopard PCAs and corridors*

Leopard habitats in southern Armenia are more or less known, but little is understood about the areas which can be considered as PCAs for permanent living and breeding and which can serve only as corridors. Leopards, especially females, can permanently live and breed only in safe and uninhabited areas with plenty of prey and secluded places. Most importantly, such areas must be large enough as leopards are solitary and each individual needs its own home range.

Corridors can be smaller than PCAs, but they must be wide and not very long to allow animals to safely reach from one PCA to another one. If a corridor is geographically long, it should have prey-rich and safe stepping stones with suitable habitats where leopards might stay for some time before continuing their movements. The role of corridors is vital for sub-adults, especially males, when they leave their natal areas to disperse and establish their home ranges.

Armenia is a small country and setting aside large enough areas for leopards or other predators is impossible. The most practical and efficient way is to establish a dense network of PCAs and corridors between them. This situation is very similar to central Europe where human density is very high and most landscapes are modified by humans, but predators succeed to live and expand their ranges through numerous corridors (Chapron et al. 2014). In this case, a priority issue becomes to secure favorable attitudes of local people to leopards and other predators and to make corridors functioning and inter-connected.

It should be admitted that even under the best-ever conservation the Armenian population of leopards is unable to become independent from the neighboring populations in Nakhichevan, Iran and Artsakh. Utmost attention should be paid to promote transboundary conservation, considering the up-to-date issues of national security.

**Activity 1.2.2. Map important PCAs and corridors**

This work is underway due to the cooperation between WWF-Armenia and Humboldt University of Berlin, Germany.

**Activity 1.2.3. Describe the main threats, estimate their impacts and determine mitigation measures (EIA) in leopard PCAs and corridors**

Making corridors functioning and inter-connected requires a scientific assessment of active threats by quantitative indicators within the framework of the Environmental Impact Assessment (EIA). The methods, results and threat mitigation measures should be described comprehensively in a report to foster further discussions and decision-making.

Revision of the RA law “On environmental impact assessment” and development of licensing mechanisms for EIA implementing companies will surely increase the effectiveness of this work.

**Result 2.1. Before 2025, leopard and prey population studies are finished in leopard PCAs**

**Activity 2.1.1. Identify PCAs where studies are required**

All areas of leopard distribution in Armenia need research, particularly in the fields of population estimation, distribution mapping and threat assessment. Information from Khosrov Forest State Reserve, Zangezur State Sanctuary and Arevik National Park is more detailed than from other areas, but it should be regularly updated through monitoring. Traditionally, studies are more active in the areas where leopard presence is strongly confirmed while the other areas are neglected. This is a wrong and narrow-minded approach as leopards can appear in any suitable area and such cases are unpredictable.

Mobile species like leopard should be studied by surveying more areas, each for shorter time, and not by surveying fewer areas with more time spent in each.

**Activity 2.1.2. Carry out leopard and prey studies in all PCAs where they are necessary**

There are a number of important areas where studies and information are very limited, including:

- Zangezur Ridge in Sisian and Dastakert districts
- Geghama Ridge outside of Khosrov Forest State Reserve
- Vayk Ridge
- Jermuk Hydrological State Sanctuary and Vorotan River gorge as the only corridors linking Armenia with Artsakh
- Urts Ridge

- Possible corridors between these areas, Nakhichevan and Artsakh

Studies in these areas will require assistance from the RA Ministry of Environment as some areas are located in borderline lands or privately owned.

In other areas, studies should be conducted on a regular basis to update the information about leopard and prey status.

## **Result 2.2. Before 2025, a standardized leopard and prey monitoring system is created and verified**

**Activity 2.2.1.** *Develop a methodological guideline of leopard and prey monitoring in compliance with standardized methods and a scientific program of relationships between leopards and other large predators*

Methodological basics of leopard monitoring can be taken from the methods of population estimation in section 1.1.1. In addition to camera-trapping, it is essential to use fecal genotyping which beginning from the early 2000s is rapidly developing and becoming more affordable and available than ever before. To proceed with this work, it is required to assess and develop existing capacities of genetic analysis in Armenia. A strong advantage of fecal genotyping is that the same samples can provide all information about the diet, predator species (leopard scats can often be confused with wolf or lynx scats), sex, identity and kinship (Dutta et al. 2012; Dutta et al. 2013). Hormonal analysis of scats allows to know the stress level and/or reproductive status of an individual (Kinoshita et al. 2011).

When organizing the leopard monitoring in Armenia and elsewhere in the Caucasus, a great deal of experience can be borrowed from the monitoring of another big cat species, the snow leopard (*Panthera uncia*). Snow leopards live in high and very precipitous mountains of Central Asia which are structurally similar to those of the Caucasus. A standardized system of snow leopard monitoring, known as the Snow Leopard Information Management System (SLIMS), was developed in 1996 and has been intensively used throughout the species range. Information about SLIMS can be found at <http://snowleopardconservancy.org/text/conservation/slimenu.htm>. Some information about leopard monitoring can also be found in the guidelines published within the North Caucasus leopard reintroduction program in Russia (Rozhnov et al. 2019).

**Activity 2.2.2.** *Create a monitoring system for leopard, prey and other important species (large predators and their prey), central database and restricted access interactive platform for information exchange by national specialists*

The purpose of animal monitoring is not only to collect data, but also to process and analyze them. Without data processing and analysis the whole process becomes aimless and time-consuming. Data collected by rangers and inspectors should be regularly sent to some zoological organization's (Scientific Center of Zoology and Hydroecology NAS RA or Faculty of Zoology YSU) central database where they can be processed and then used in scientific research or conservation works. The database should operate online and be available to everyone, but access to it should be restricted only to a narrow circle of national specialists.



The first stage of this work should be aimed at the revision and standardization of monitoring-related legislation. It is important to specify the general framework and the coordinating body of monitoring implementation, data collection, maintenance and analysis. Particularly, major revision is required for item 8, decree No. 121-N “On organization and implementation of animal monitoring” as the management of forests and forest lands is now delegated to the RA Ministry of Environment.

It is also required to develop a legislative act specifying the procedures of data collection, accountability and provision of incentives to respective personnel.

***Activity 2.2.3. Select and train PA staff to implementation of leopard monitoring in leopard PCAs and standardization of collected data***

Personnel of PAs located in leopard PCAs should be professionally trained to the monitoring of leopard, other large predators and their prey. Training should combine the presentation of theoretical materials, application of practical field course, and discussions with explanations and troubleshooting. During the training, attendants should get to know about how to collect and label data, enter them into computer and send to the central database.

**Result 2.3. Before 2025, a scientific program of leopard, other large predators and prey studies is initiated**

***Activity 2.3.1. Identify research gaps and priorities***

The above-mentioned topics of population estimation, identification and mapping of PCAs and corridors, and population monitoring can become subjects of in-depth scientific research in their own rights. Some other topics also demand for urgent investigations:

- Ecology of brown bear, wolf and lynx, their conflicts with humans and mitigation measures
- Distribution mapping of leopard, brown bear, wolf, lynx and ungulates, large-scale research of their distribution areas and modeling of distribution trends
- Effects of domestic animals on wild ungulates, especially in terms of disease transmission and reduction of feeding grounds
- Veterinary studies of ungulates, especially wild boar, the role of forest pest control and animal vaccinations in disease transmission, and effects of diseases on ungulate ecology and distribution

***Activity 2.3.2. Develop and initiate coordinated programs to fill identified gaps***

Scientific studies on the above-listed topics can be carried out by national and/or foreign scientists, but preferably within their cooperation.

### Result 3.1. Before 2030, effectiveness of PAs is estimated

**Activity 3.1.1.** *Apply the Management Effectiveness Tracking Tool (METT) or similar tools to estimate the effectiveness of PAs, beginning from leopard PCAs, and submit the results to authorities*

Estimation of PA effectiveness is very important to identify weak points and solve associated issues. Doubtless, the main problem of all PAs is insufficient funding and lack of self-financing capacities. There are also some legislative problems. For example, there are no mechanisms to provide incentives to PA or ICMR staff which could secure additional payments to team members who capture poachers or work overtime.

Low levels of hunting management also affect the effectiveness of PAs. Estimation of game species populations and maximum sustainable yields have not been done and the numbers of annually issued licenses are not reliable. Although licenses specify permitted hunting grounds, in practice hunting is done everywhere. It has a negative impact on protected species as PAs are rather small and animals often leave them, becoming a hunter's trophy beyond the PA boundaries. It is reasonable to amend legislation and establish ca. 2 km wide buffer no hunting zones around the PA boundaries. If feasible, a moratorium for hunting can be declared for some period (e.g., 5 years) throughout Armenia or only in southern Armenia. Such a moratorium exists in Nakhichevan since 2001 and a recent increase and expansion of the leopard population is partly caused by this factor (Askerov et al. 2015; Askerov et al. 2019).

**Activity 3.1.2.** *Repeat effectiveness estimation once every three years to track the progress*

Three years is an optimal period to evaluate changes in PA effectiveness in quantitative terms. Moreover, female predators and ungulates usually breed every 2-3 years what makes possible to track changes in populations of these species during this period.

### Result 3.2. Before 2030, new PAs are established in leopard PCAs

**Activity 3.2.1.** *Identify possible options for new PAs*

To ensure habitat connectivity for leopard and its prey, southern Armenia should have a complex network of PAs and corridors. Gap analysis shows that it is most important to establish Jermuk and Tatev National Parks which could secure the integrity of leopard populations in Armenia and Artsakh. It is also essential to develop and deepen cooperation to promote the functioning of Armeno-Iranian Friendship and Peace Park.

**Activity 3.2.2.** *Undertake the establishment of new PAs (particularly Jermuk and Tatev National Parks) and the expansion and boundary straightening of extant PAs*

Besides Jermuk and Tatev National Parks and Friendship and Peace Park, it is imperative to cooperate with local communities and, using all information and resources related to land use, straighten the PA boundaries. Currently, Armenia's PAs have very curvilinear boundaries which coupled with their rather small sizes let large mammals (especially leopards) easily leave them and potentially die from poaching on ambient lands. This is called the edge effect.

**Activity 3.2.3.** *Train scientific personnel, equip staff, develop scientific programs, and implement monitoring and population estimation in PAs*

Professional training of personnel of the scientific and conservation departments of PAs and their capacity building (communication means, camera-traps, etc.), proper implementation of monitoring, control of illegal activities and stringent accountability should become integral parts of the management plans and everyday operations of PAs. These works should be done in close cooperation between specialized bodies and international donors.

**Result 3.3. Before 2025, a transboundary program of leopard conservation, monitoring and research is developed and initiated**

**Activity 3.3.1.** *Armenian stakeholders prepare at least one proposal and submit it for funding within the framework of the MoU between RA and IRI on Friendship and Peace Park*

Current political situation makes possible for southern Armenia to cooperate only with Iran in transboundary leopard conservation. Friendship and Peace Park envisages close cooperation between Arevik National Park in Armenia and Dizmar PA in Iran. It also creates favourable conditions for cooperation with the Iranian PAs of Kiamaki and Arasbaran which are located on both sides of Dizmar and thus together with Arevik form a single transboundary conservation complex. It is important also to note that Nakhichevan has Zangezur National Park on the opposite western slopes of the Zangezur Ridge.

**Activity 3.3.2.** *Iranian organizations involved in leopard conservation prepare at least one proposal and submit it to the governments of RA and IRI*

Department of Environment (DoE) represents the governmental authority of Iran which can cooperate with national stakeholders and specialized bodies, particularly universities and NGOs, to develop and implement joint Armeno-Iranian programs.

**Result 4.1. Before 2025, management plans for leopard PCAs are prepared**

**Activity 4.1.1.** *Identify management gaps and develop management plans for leopard PCAs*

Management plans are the main documents ensuring the development and implementation of conservation and other activities in targeted areas. They are particularly required for the Kapan, Goris, Sisian and Vayots Dzor branches of ArmForest SNCO. In this work, it is expedient to cooperate with ECF programs which develop and apply management plans in selected communities of Ararat, Vayots Dzor and Syunik provinces.

**Result 4.2. Before 2030, stakeholders from leopard PCAs are informed and trained in regard to leopard conservation**

**Activity 4.2.1.** *Sign MoUs with hunting organizations, border troops and local communities*

Involvement of local communities, hunting organizations and border troops should become an essential component of leopard conservation. To clarify and specify priority fields and

ways of cooperation with these stakeholders, it is important to develop and sign the Memoranda of Understanding (MoU) which will form the basis for future joint activities.

**Activity 4.2.2.** *Based on MoUs mentioned above, implement awareness-raising and capacity building activities (including education) with schoolchildren, hunters and border guards*

The reality shows that local people, hunters and border guards have very little knowledge about conservation issues and their solutions in Armenia. Educational and other capacity building programs need to be implemented with key stakeholders to solve this problem. This will also lead to cooperation with hunters which will open a path for better understanding of hunting procedures and finding possible compromises.

A repository holding all available materials and information should be established to develop educational and training programs and to maintain and share respective resources.

It is essential to promote cooperation with the RA Ministry of Defense, National Security Service (NSS) and RA/RF border troops in order to prevent poaching of leopard and its prey. A system of research implementation (e.g., camera-trapping) in borderline areas and information sharing by soldiers should be developed.

**Activity 4.2.3.** *Develop and implement educational programs for bachelor students of universities*

Bachelor students of universities demand for more in-depth information and methodological approaches than other stakeholders because they are professionally specialized in ecology and conservation, and their knowledge is originally deeper. This should be taken into account when preparing respective educational materials. A repository mentioned above should be the main source for the maintenance, sharing and exchange of such materials.

**Activity 4.2.4.** *Regularly cooperate with mass media*

Mass media play a major role in fast spreading of information and awareness-raising. Cooperation with them is important and active, but should always develop and diversify, particularly by involving more regional and international media.

**Activity 4.2.5.** *Assess and develop capacities of ICMR branches in Ararat, Vayots Dzor and Syunik provinces*

The ICMR and its regional branches are in hardships and require strong development of staff training, capacity building and funding programs. Current and necessary capacities of the branches in three provinces of southern Armenia should be assessed and, based on the results of this assessment, priority actions should be taken to address the most urgent problems. Changes in legislation should be made as necessary.

### **Result 4.3. Before 2030, model livelihood support (such as ecotourism) programs are developed and implemented to promote leopard and prey conservation**

**Activity 4.3.1.** *Organizations involved in leopard conservation conduct a feasibility study and identify at least one site for the development of ecotourism or other livelihood support practices*

Ecotourism has been widely perceived as the most convenient, ecologically friendly and profitable practice compliant with the maintenance of traditional lifestyle and conservation needs. Leopard habitats are very picturesque and interesting to tourists, but many of them are closed for visits as being located in borderline areas or having no appropriate infrastructure. Many communities nearby the PAs can develop their model ecotourism programs, but their potential and risks should be carefully assessed. A feasibility study will show which communities can be involved in this work and how.

**Activity 4.3.2.** *At least two programs of ecotourism or other practice development are initiated to support sustainable livelihoods*

Alternative practices such as rural tourism, small-scale agriculture and processing industry (apiculture, rabbit or chinchilla breeding, small factories or workshops) can be developed along with ecotourism.

### **Result 5.1. Before 2030, human-leopard conflicts in leopard PCAs decreased by 20%**

**Activity 5.1.1.** *Develop and implement a feasibility study to produce guidelines on compensation and other conflict mitigation measures, and apply effective measures to reduce human-leopard conflicts*

By killing domestic animals, predators can cause serious conflicts with local people and mitigation of human-predator conflicts is essential to improve human attitudes towards nature and conservation. The highest losses to livestock in Armenia are inflicted by wolves while brown bears, apart from killing some livestock, destroy mostly orchard trees and beehives. Depredation losses caused by leopards are negligible and existing prey resources suffice. However, as leopard numbers tend to increase and disperse further away human-leopard conflicts will become inevitable and urge for prompt actions in the future.

Studies show that people experiencing losses from one predator species translate them and associated negative attitudes to all predators (Farhadinia et al. 2017). Therefore, mitigation of losses from wolves and bears may stimulate local preparedness and involvement in conservation of all predators, particularly leopard.

The first feasibility study has demonstrated that it is practical to use strong sheds and good dogs, change livestock breeds or apply deterrents in southern Armenia (Rosen 2017). Meantime, it is just a suggestion and no any mitigation measure was ever scientifically assessed for effectiveness in Armenia or other countries of the region.

Besides the research of conflict mitigation methods, it is imperative also to develop and verify insurance and/or compensation mechanisms and to revise respective legislation. It is important to revive traditional methods of livestock protection, promote their application

and apply new techniques, such as mobile or stationary fences, including those with ropes and flags (fladry, working only against wolves), electric fences and light/sound/visual deterrents.

**Activity 5.1.2.** *Create a database to maintain and provide information on human-leopard conflicts*

As leopards cause almost no harm to people and livestock in Armenia, creating the conflict database is not difficult, but very time-consuming as conflicts are unpredictable and each conflict case should be verified and confirmed by independent experts.

**Result 5.2. Before 2030, the number of local communities situated in leopard PCAs and involved in leopard conservation activities increased by 20%**

**Activity 5.2.1.** *Identify conservation activities where local communities could be involved*

These preliminary works allow to select priority communities and plan essential activities according to desires and capacities of local people. Priority communities should be located in human-leopard conflict hotspots and activities should be targeted at conflict mitigation.

**Activity 5.2.2.** *Develop and implement a participatory program with local communities*

A program should be not only participatory, but also capable to evaluate local people's opinions, attitudes to predators and predator-caused losses before, during and after program implementation. This approach will make it possible to estimate the effectiveness of mitigation measures and implement the program in the most flexible way (adaptive management – learning by doing).

**Result 5.3. Before 2030, sustainable livelihoods are secured for 10% of local communities**

**Activity 5.3.1.** *Identify conservation activities which can contribute to the development of sustainable livelihoods*

These activities have already been done within the ECF programs. Beginning from 2017, six agreements were signed in Vayots Dzor Province (Areni and Eghegis communities), Ararat Province (Zangakatun community) and Syunik Province (Sisian and Zaritap communities) to implement local community-managed conservation programs.

**Activity 5.3.2.** *Develop and implement a sustainable livelihood development program*

Above-mentioned programs aim to develop, approve and initiate wildlife habitat management and conservation plans in selected communities of southern Armenia. However, such programs need to be implemented in many more communities with the mobilization of more financial and human resources.

## **Result 6.1. Before 2030, illegal transboundary trade in leopard parts and derivatives immediately decreases**

**Activity 6.1.1.** *Optimize information exchange related to trade in leopard parts and derivatives with custom services and other organizations, including international bodies (TRAFFIC, Interpol)*

It is required to evaluate the levels of existing cooperation between respective entities and then to fill gaps and use opportunities for development. The RA Law on fauna needs amendments to further regulate the procedures of wildlife part and product imports and exports and the procedures of wildlife keeping and use in captive and semi-captive conditions.

**Activity 6.1.2.** *Train personnel of custom and border services to identification of species included in CITES and the national list of protected species, especially leopard and its prey*

It is expected to train 60 persons per year. It is reasonable also to develop and sign MoUs with the RA Ministry of Defense and RA/RF border troops about the cooperation in different fields of conservation (training, population monitoring, anti-poaching activities).

## **Result 6.2. Before 2025, agreements on transboundary monitoring are prepared and launched, at least within leopard PCAs**

**Activity 6.2.1.** *Identify transboundary (RA/IRI) PCAs*

The transboundary PCAs are already known: Arevik National Park in Armenia and Dizmar, Kiamaki and Arasbaran PAs in Iran. However, inter-governmental cooperation on joint activities in these areas is proceeding very slowly and demands for much more efforts.

**Activity 6.2.2.** *Establish working groups for the development of common vision(s) and program(s)*

National working groups should involve representatives of governmental bodies, universities, NGOs and borderline PAs. It is imperative to develop and sign an inter-governmental agreement on joint implementation of leopard studies and conservation in order to improve the status of the transboundary leopard population through expert visits and information exchange.

## **Result 6.3. Before 2030, leopard and prey monitoring is established and successfully implemented in the Caucasus Ecoregion**

**Activity 6.3.1.** *IUCN/SSC Cat Specialist Group and WWF, in cooperation with national stakeholders, coordinate the establishment and functioning of the working group*

This work should be done through close cooperation with all countries of the region, especially Iran, Georgia and Russia, and international organizations having experience of working in the Caucasus, such as universities.

**Result 6.4. To track the progress of implementation and coordination of the regional strategy, meetings of regional stakeholders are organized once every three years**

**Activity 6.4.1.** *WWF-Caucasus Programme Office organizes meetings of regional stakeholders*

The purpose of these meetings is to coordinate activities, summarize the progress of regional strategy implementation, discuss and solve problems, avoid replicated efforts, and to foresee and develop scientific, financial and technical opportunities.

**Result 7.1. Before 2025, the NAP and associated programs are reviewed and updated according to the Strategy for the Conservation of the Leopard in the Caucasus Ecoregion**

**Activity 7.1.1.** *Establish a national working group to review and update the NAP*

Implementation of the NAP should become a subject of regular monitoring by a specialized national working group. It allows to assess the effectiveness of activities, make necessary changes and update the NAP.

**Activity 7.1.2.** *Once every three years, organize meetings of national stakeholders to review and update the NAP*

The NAP version updated by the national working group will be provided and discussed every third year during the national stakeholder meeting. The final updated version of the NAP will be submitted to the RA Ministry of Environment for official approval.

**Result 8.1. Before 2030, financial resources from governmental and private donors increase by at least 50%**

**Activity 8.1.1.** *Implement information campaigns and awareness-raising activities among donors*

Insufficient funding is the main obstacle for the improvement of the status of leopard and its prey in Armenia. All possible efforts should be mobilized to increase the amounts of funds and the numbers of donors involved, what will require the implementation of awareness-raising activities for donors about Armenia's nature and conservation, especially the leopard. These activities can include campaigns and other actions, with wide dissemination of information through international mass media and online resources. A leopard conservation fundraising portfolio should be produced in printed and online versions to present programs, participants and stakeholders, implementation periods, requested budget and funding secured from other sources. All these activities should be transparent and acquired funding is to be a subject of stringent accountability.

**Activity 8.1.2.** *Organizations involved in leopard conservation inform each other about their fundraising strategies and coordination of international fundraising to avoid mutual competition*

As stakeholders are many but donors are few, such meetings represent an important platform to evaluate own capacities and opportunities for development. These meetings



should be organized not only to share information, but essentially to learn about application conditions and procedures and to get experience in proposal writing and project management.

## **5. IMPLEMENTATION OF THE NATIONAL ACTION PLAN**

### **5.1. Official approval and launching**

Practical implementation of the NAP is launched after the official approval of this document by the RA Ministry of Environment.

### **5.2. Stakeholder involvement and capacities**

Conservation of leopard, its prey species and habitats is impossible without the involvement of state bodies, scientific institutions, international and national conservation organizations, regional conservation entities and local people. The list of these stakeholders includes, but is not limited to, the following organizations:

- RA Ministry of Environment
- International entities, including
  - WWF (World Wide Fund for Nature)
  - CNF (Caucasus Nature Fund)
  - KfW (Kreditanstalt für Wiederaufbau)
  - BMZ (Bundeministerium für wirtschaftliche Zusammenarbeit und Entwicklung)
  - ECF (Eco-Corridors Fund)
  - UNDP (United Nations Development Programme)
  - NABU (Naturschutzbund Deutschland)
  - TJS (Transboundary Joint Secretariat for the Southern Caucasus)
  - GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeit)
  - IUCN/SSC Cat Specialist Group
  - TRAFFIC (The Wildlife Trade Monitoring Network)
  - Interpol (International Criminal Police Organization)
  - CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora)
- Academic institutions, scientific and educational entities, universities and NGOs specialized in biodiversity research, conservation and/or education
- Territorial administration bodies
- Local administration bodies
- Forest Committee
- PAs
- Inspection of Conservation and Mineral Resources
- Hunting organizations
- ArmForest (Hayantar)
- Border troops
- Mass media

- Business organizations, including
  - Companies implementing EIA
  - Insurance companies
  - Trading companies
- RA Ministry of Economy
- RA State Revenue Committee
- Police
- Iranian stakeholders – DoE, PAs, NGOs and universities

### 5.3. Financial support and fundraising

It is expected that the constituent activities of the NAP will be supported financially by RA state budget and international donors, particularly as grants from the international organizations listed above in section 5.2.

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**APPENDIX 1. Timetable**  
**National Action Plan for Leopard (*Panthera pardus*) Conservation in Armenia**

(\*) Organizing and implementing bodies are not separated as the same body (for example, university) can independently raise funds, manage and implement programs

(\*\*) Specialized bodies include academic institutions, scientific and educational entities, universities and NGOs specialized in biodiversity research, conservation and/or education

<i>Objectives</i>	<i>Activities</i>	<i>Periods</i>	<i>Preliminary budget (Euro)</i>	<i>Expected results</i>	<i>Financial sources</i>	<i>Implementing bodies (stakeholders)(*)</i>
<b>SPECIES AND POPULATIONS</b>						
<b>1. Increase viability of leopard and prey populations</b>	<b>Result 1.1. Before 2025, current populations of leopard and its prey reach stability or increase</b>					
	<b>Activity 1.1.1.</b> Apply systematic population estimation of leopard and prey	2020-2025	900,000	Data on annual and seasonal counts of leopard and prey are available	RA Ministry of Environment, WWF, CNF, UNDP, NABU, GIZ and other international organizations	RA Ministry of Environment, PAs, specialized bodies (**)
	<b>Activity 1.1.2.</b> Collect and analyze information about prey poaching and natural mortality in leopard PCAs	2020-2025	0	Data on annual and seasonal counts of prey poaching and natural mortality are available		RA state and territorial administration bodies (data collection), specialized bodies (data analysis)
	<b>Activity 1.1.3.</b> Organize meetings for caretakers from different areas to foster exchange in experience and information	2020-2025	5,000	Caretakers regularly meet to exchange experience and information	RA Ministry of Environment, WWF, CNF, UNDP, NABU, GIZ, FPWC and other international and national organizations	Specialized bodies

	<b>Result 1.2. Before 2025, all leopard PCAs and their corridors are identified, described and mapped, methods of corridor management are proposed and their implementation is initiated</b>					
	<b>Activity 1.2.1.</b> Identify necessary and reliable indicators to describe leopard PCAs and corridors	2020-2022	20,000	Indicators of PCAs and corridors are identified and described	RA Ministry of Environment, WWF, CNF, UNDP, NABU, GIZ and other international organizations	Specialized bodies
	<b>Activity 1.2.2.</b> Map important PCAs and corridors	2020-2022	10,000	Maps of PCAs and corridors are produced	RA Ministry of Environment, WWF, CNF, UNDP, NABU, GIZ and other international organizations	Specialized bodies
	<b>Activity 1.2.3.</b> Describe the main threats, estimate their impacts and determine mitigation measures (EIA) in leopard PCAs and corridors	2020-2022	50,000	Threats are described and mitigation measures for PCAs and corridors are determined	RA Ministry of Environment, WWF, CNF, UNDP, NABU, GIZ, FPWC and other international and national organizations	Specialized bodies, EIA implementing companies
<b>2. Continue leopard and prey studies and create a standardized monitoring system, scientific program and central database</b>	<b>Result 2.1. Before 2025, leopard and prey population studies are finished in leopard PCAs</b>					
	<b>Activity 2.1.1.</b> Identify PCAs where studies are required	2021-2022	0	Respective PCAs are identified		Specialized bodies
	<b>Activity 2.1.2.</b> Carry out leopard and prey studies in all PCAs where they are necessary	2022-2025	40,000	Studies in little investigated PCAs are carried out	RA Ministry of Environment, WWF, CNF, UNDP, NABU, GIZ, FPWC and other international and national organizations	Specialized bodies

<b>Result 2.2. Before 2025, a standardized leopard and prey monitoring system is created and verified</b>					
<b>Activity 2.2.1.</b> Develop a methodological guideline of leopard and prey monitoring in compliance with standardized methods and a scientific program of relationships between leopards and other large predators	2020-2022	50,000	A leopard and prey monitoring guideline is developed, reconciled and published	RA Ministry of Environment, WWF, CNF, UNDP, NABU, GIZ, FPWC and other international and national organizations	Specialized bodies
<b>Activity 2.2.2.</b> Create a monitoring system for leopard, prey and other important species (large predators and their prey), central database and restricted access interactive platform for information exchange by national specialists	2021-2022	100,000	A monitoring system, database and interactive platform are developed, reconciled and initiated	RA Ministry of Environment, WWF, CNF, UNDP, NABU, GIZ, FPWC and other international and national organizations	Specialized bodies
<b>Activity 2.2.3.</b> Select and train PA staff to implementation of leopard monitoring in leopard PCAs and standardization of collected data	2022-2025	10,000	PA staff is trained to monitoring and data standardization	RA Ministry of Environment, WWF, CNF, UNDP, NABU, GIZ and other international bodies	Specialized bodies

<b>Result 2.3. Before 2025, a scientific program of leopard, other large predators and prey studies is initiated</b>						
<b>Activity 2.3.1.</b> Identify research gaps and priorities						
	2020-2022	0	Necessary and priority research topics are identified, assessed and described			Specialized bodies
<b>Activity 2.3.2.</b> Develop and initiate coordinated programs to fill identified gaps						
	2020-2025	200,000	Respective programs are developed, financed and initiated	National and international scientific donors, RA Ministry of Environment, WWF, CNF, UNDP, NABU and GIZ		Specialized bodies
<b>IMPORTANT PLACES – HABITATS AND CORRIDORS</b>						
<b>Result 3.1. Before 2030, effectiveness of PAs is estimated</b>						
<b>3. Create an efficient PA network in leopard PCAs</b>	<b>Activity 3.1.1.</b> Apply the Management Effectiveness Tracking Tool (METT) or similar tools to estimate the effectiveness of PAs, beginning from leopard PCAs, and submit the results to authorities					
	2020-2022	9,000	PAs located in leopard PCAs are assessed with METT or similar tools, results are submitted to authorities and officially approved	RA Ministry of Environment, WWF, CNF, UNDP, KfW, NABU, GIZ and other international organizations		RA Ministry of Environment, PAs, ICMR, specialized bodies
	<b>Activity 3.1.2.</b> Repeat effectiveness estimation once every three years to track the progress					
	2021-2030	3,000	PAs are assessed with METT or similar tools at least twice, once every three years	RA Ministry of Environment, WWF, CNF, UNDP, KfW, NABU, GIZ and other international organizations		RA Ministry of Environment, PAs, ICMR, specialized bodies

<b>Result 3.2. Before 2030, new PAs are established in leopard PCAs</b>					
<b>Activity 3.2.1.</b> Identify possible options for new PAs	2020-2024	100,000	Options for new PAs are identified, discussed, reconciled and proposed	RA Ministry of Environment, WWF, CNF, UNDP, KfW, NABU, GIZ and other international organizations	RA Ministry of Environment, PAs, specialized bodies
<b>Activity 3.2.2.</b> Undertake the establishment of new PAs (particularly Jermuk and Tatev National Parks) and the expansion and boundary straightening of extant PAs	2025-2030	200,000	Programs to establish new PAs and to expand and straighten boundaries of extant PAs are developed and initiated	RA Ministry of Environment, WWF, CNF, UNDP, KfW, NABU, GIZ and other international organizations	RA Ministry of Environment, PAs, specialized bodies
<b>Activity 3.2.3.</b> Train scientific personnel, equip staff, develop scientific programs, and implement monitoring and population estimation in PAs	2020-2022	100,000	PA staff and capacities are fully prepared for implementation of monitoring and population estimation and conduct respective works	RA Ministry of Environment, WWF, CNF, UNDP, KfW, NABU, GIZ and other international organizations	RA Ministry of Environment, PAs, specialized bodies
<b>Result 3.3. Before 2025, a transboundary program of leopard conservation, monitoring and research is developed and initiated</b>					
<b>Activity 3.3.1.</b> Armenian stakeholders prepare at least one proposal and submit it for funding within the framework of the MoU between RA and IRI on Friendship and Peace Park	2020-2021	100,000	A transboundary project proposal is prepared and submitted for funding	RA Ministry of Environment, WWF, CNF, UNDP, KfW, NABU, GIZ and other international organizations	RA Ministry of Environment, DoE, PAs and NGOs of the IRI and RA Syunik Province, specialized bodies



	<b>Activity 3.3.2.</b> Iranian organizations involved in leopard conservation prepare at least one proposal and submit it to the governments of RA and IRI	2020-2022	20,000	A transboundary project proposal is prepared and submitted for state support and funding	RA Ministry of Environment, DoE, international organizations	RA Ministry of Environment, DoE, PAs and NGOs of the IRI and RA Syunik Province, specialized bodies
<b>4. Improve leopard and prey conservation and raise the role of awareness, education and training in leopard conservation outside of PAs</b>	<b>Result 4.1. Before 2025, management plans for leopard PCAs are prepared</b>					
	<b>Activity 4.1.1.</b> Identify management gaps and develop management plans for leopard PCAs	2020-2025	110,000	Management plans and a list of recommendations to fill management gaps are developed	RA Ministry of Environment, WWF, CNF, UNDP, KfW, NABU, GIZ and other international organizations	RA Ministry of Environment, ArmForest, PAs, NGOs, territorial administration bodies and ICMR branches in Ararat, Vayots Dzor and Syunik provinces, specialized bodies
	<b>Result 4.2. Before 2030, stakeholders from leopard PCAs are informed and trained in regard to leopard conservation</b>					
	<b>Activity 4.2.1.</b> Sign MoUs with hunting organizations, border troops and local communities	2020-2022	5,000	MoUs with hunting organizations, border troops and local communities are signed	RA Ministry of Environment, WWF, CNF, UNDP, NABU, GIZ, FPWC and other international and national organizations	RA Ministry of Environment, local communities, hunting organizations, border troops, specialized bodies
	<b>Activity 4.2.2.</b> Based on MoUs mentioned above, implement awareness-raising and capacity building activities (including education) with schoolchildren, hunters and border guards	2020-2025	250,000	Awareness-raising and capacity building activities are carried out or ongoing	RA Ministry of Environment, WWF, CNF, UNDP, NABU, GIZ, FPWC and other international and national organizations	RA Ministry of Environment, RA Ministry of Defense, NSS, RA/RF border troops, regional educational entities, hunting organizations, specialized bodies

	<b>Activity 4.2.3.</b> Develop and implement educational programs for bachelor students of universities	2020-2025	40,000	Bachelor programs are developed, reconciled, published and initiated	RA Ministry of Environment, WWF, CNF, UNDP, KfW, NABU, GIZ and other international organizations	RA Ministry of Environment, universities, specialized bodies
	<b>Activity 4.2.4.</b> Regularly cooperate with mass media	2020-2025	15,000	National and international mass media are regularly informed about ongoing activities	RA Ministry of Environment, WWF, CNF, UNDP, NABU, GIZ, FPWC and other international and national organizations	RA Ministry of Environment, national and international mass media, specialized bodies
	<b>Activity 4.2.5.</b> Assess and develop capacities of ICMR branches in Ararat, Vayots Dzor and Syunik provinces	2020-2030	300,000	Capacities of ICMR branches are assessed and their development is ongoing	RA Ministry of Environment, WWF, CNF, UNDP, KfW, NABU, GIZ and other international organizations	RA Ministry of Environment, ICMR, local communities, territorial administration bodies, specialized bodies
<b>Result 4.3. Before 2030, model livelihood support (such as ecotourism) programs are developed and implemented to promote leopard and prey conservation</b>						
	<b>Activity 4.3.1.</b> Organizations involved in leopard conservation conduct a feasibility study and identify at least one site for the development of ecotourism or other livelihood support practices	2020-2022	5,000	A feasibility study is conducted, plan for development of ecotourism or other livelihood support practices is developed and reconciled	RA Ministry of Environment, WWF, CNF, UNDP, NABU, GIZ, FPWC and other international and national organizations	RA Ministry of Environment, local communities, NGOs, PAs, ICMR, specialized bodies

	<b>Activity 4.3.2.</b> At least two programs of ecotourism or other practice development are initiated to support sustainable livelihoods	2020-2025	150,000	Programs of development of ecotourism or other sustainable livelihood support practices are developed, financed and initiated	RA Ministry of Environment, WWF, CNF, UNDP, NABU, GIZ, FPWC and other international and national organizations	RA Ministry of Environment, local communities, PAs, ICMR and business enterprises
<b>HUMAN DIMENSIONS AND CONFLICT MITIGATION</b>						
<b>5. Secure long-term support of local communities through the mitigation of human-leopard conflicts and involvement of local people</b>	<b>Result 5.1. Before 2030, human-leopard conflicts in leopard PCAs decreased by 20%</b>					
	<b>Activity 5.1.1.</b> Develop and implement a feasibility study to produce guidelines on compensation and other conflict mitigation measures, and apply effective measures to reduce human-leopard conflicts	2020-2030	70,000	A feasibility study is developed and initiated	RA Ministry of Environment, WWF, CNF, UNDP, NABU, GIZ, FPWC and other international and national organizations	RA Ministry of Environment, specialized bodies, local communities, insurance and trading companies
	<b>Activity 5.1.2.</b> Create a database to maintain and provide information on human-leopard conflicts	2020-2030	10,000	Database of human-leopard conflicts is developed and regularly updated	RA Ministry of Environment, WWF, CNF, UNDP, NABU, GIZ, FPWC and other international and national organizations	RA Ministry of Environment, specialized bodies
	<b>Result 5.2. Before 2030, the number of local communities situated in leopard PCAs and involved in leopard conservation activities increased by 20%</b>					
	<b>Activity 5.2.1.</b> Identify conservation activities where local communities could be involved	2020-2021	5,000	Respective activities are identified and described	RA Ministry of Environment, WWF, CNF, UNDP, NABU, GIZ, FPWC and other international	RA Ministry of Environment, local communities, territorial administration bodies, PAs, ICMR, specialized

					and national organizations	bodies
	<b>Activity 5.2.2.</b> Develop and implement a participatory program with local communities	2020-2030	700,000	A participatory program is developed and initiated	RA Ministry of Environment, WWF, CNF, UNDP, NABU, GIZ, FPWC and other international and national organizations	RA Ministry of Environment, local communities, territorial administration bodies, PAs, ICMR, specialized bodies
<b>Result 5.3. Before 2030, sustainable livelihoods are secured for 10% of local communities</b>						
	<b>Activity 5.3.1.</b> Identify conservation activities which can contribute to the development of sustainable livelihoods	2020-2022	20,000	Respective activities are identified and described	RA Ministry of Environment, WWF, CNF, UNDP, NABU, GIZ, FPWC and other international and national organizations	RA Ministry of Environment, local communities, territorial administration bodies, PAs, ICMR, specialized bodies
	<b>Activity 5.3.2.</b> Develop and implement a sustainable livelihood development program	2020-2030	1,500,000	A sustainable livelihood development program is developed and initiated	RA Ministry of Environment, WWF, CNF, UNDP, NABU, GIZ, FPWC and other international and national organizations	RA Ministry of Environment, local communities, territorial administration bodies, PAs, ICMR, specialized bodies

**POLICY, LEGISLATION AND INTERNATIONAL COOPERATION**

<b>6. Strengthen international, regional and transboundary cooperation for leopard conservation</b>	<b>Result 6.1. Before 2030, illegal transboundary trade in leopard parts and derivatives immediately decreases</b>					
	<b>Activity 6.1.1.</b> Optimize information exchange related to trade in leopard parts and derivatives with custom services and other organizations, including international bodies (TRAFFIC, Interpol)	2020-2023	10,000	A joint program on curbing leopard trade is developed and initiated	RA Ministry of Environment, international organizations	RA Ministry of Environment, RA Ministry of Economy, RA State Revenue Committee, police, TRAFFIC, Interpol, CITES and other respective organizations
	<b>Activity 6.1.2.</b> Train personnel of custom and border services to identification of species included in CITES and the national list of protected species, especially leopard and its prey	2020-2022	36,000	Staff of custom and border services is trained to identification of leopard, prey and other threatened species	RA Ministry of Environment, international organizations	RA Ministry of Environment, CITES, custom and border services, international organizations, specialized bodies
	<b>Result 6.2. Before 2025, agreements on transboundary monitoring are prepared and launched, at least within leopard PCAs</b>					
	<b>Activity 6.2.1.</b> Identify transboundary (RA/IRI) PCAs	2020-2022	40,000	Transboundary PCAs are identified and described	RA Ministry of Environment, international organizations	RA Ministry of Environment, DoE, borderline PAs, international and national specialized bodies (including SPPA and TJS)

	<b>Activity 6.2.2.</b> Establish working groups for the development of common vision(s) and program(s)	2022-2025	40,000	Working groups are established and functioning	RA Ministry of Environment, international organizations	RA Ministry of Environment, DoE, borderline PAs, universities, NGOs, international and national specialized bodies (including SPPA and TJS)
<b>Result 6.3. Before 2030, leopard and prey monitoring is established and successfully implemented in the Caucasus Ecoregion</b>						
	<b>Activity 6.3.1.</b> IUCN/SSC Cat Specialist Group and WWF, in cooperation with national stakeholders, coordinate the establishment and functioning of the working group	2020-2025	20,000	A regional monitoring working group is established and functioning	RA Ministry of Environment, WWF, international organizations	RA Ministry of Environment, specialized organizations
<b>Result 6.4. To track the progress of implementation and coordination of the regional strategy, meetings of regional stakeholders are organized once every three years</b>						
	<b>Activity 6.4.1.</b> WWF-Caucasus Programme Office organizes meetings of regional stakeholders	2020-2030	150,000	Three regional stakeholder meetings are organized	RA Ministry of Environment, WWF, international organizations	RA Ministry of Environment, specialized bodies

<b>7. Optimize current management and improve it as necessary</b>	<b>Result 7.1. Before 2025, the NAP and associated programs are reviewed and updated according to the Strategy for the Conservation of the Leopard in the Caucasus Ecoregion</b>					
	<b>Activity 7.1.1.</b> Establish a national working group to review and update the NAP	2021-2030	60,000	A working group is established and functioning	RA Ministry of Environment, WWF, international organizations	RA Ministry of Environment, specialized bodies
	<b>Activity 7.1.2.</b> Once every three years, organize meetings of national stakeholders to review and update the NAP	2021-2030	150,000	Three national stakeholder meetings are organized	RA Ministry of Environment, WWF, international organizations	RA Ministry of Environment, specialized bodies
<b>8. Improve and coordinate efforts to secure international funding for leopard conservation</b>	<b>Result 8.1. Before 2030, financial resources from governmental and private donors increase by at least 50%</b>					
	<b>Activity 8.1.1.</b> Implement information campaigns and awareness-raising activities among donors	2020-2030	90,000	Respective campaigns and activities are regularly implemented	RA Ministry of Environment, WWF, CNF, UNDP, NABU, GIZ, FPWC and other international and national organizations	RA Ministry of Environment, specialized bodies
	<b>Activity 8.1.2.</b> Organizations involved in leopard conservation inform each other about their fundraising strategies and coordination of international fundraising to avoid mutual competition	2020-2030	0	Organizations regularly meet and inform each other about progress and problems related to fundraising		RA Ministry of Environment, specialized bodies

**APPENDIX 2. List of participants**  
**Workshop “National action plan for leopard conservation in the Caucasus: Armenia”**

February 25-26, 2019  
 Vayk Tourist Center and Hotel, Vayk town, Vayots Dzor Province

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