



## Snow Leopard (*Panthera uncia*) Status in Uzbekistan

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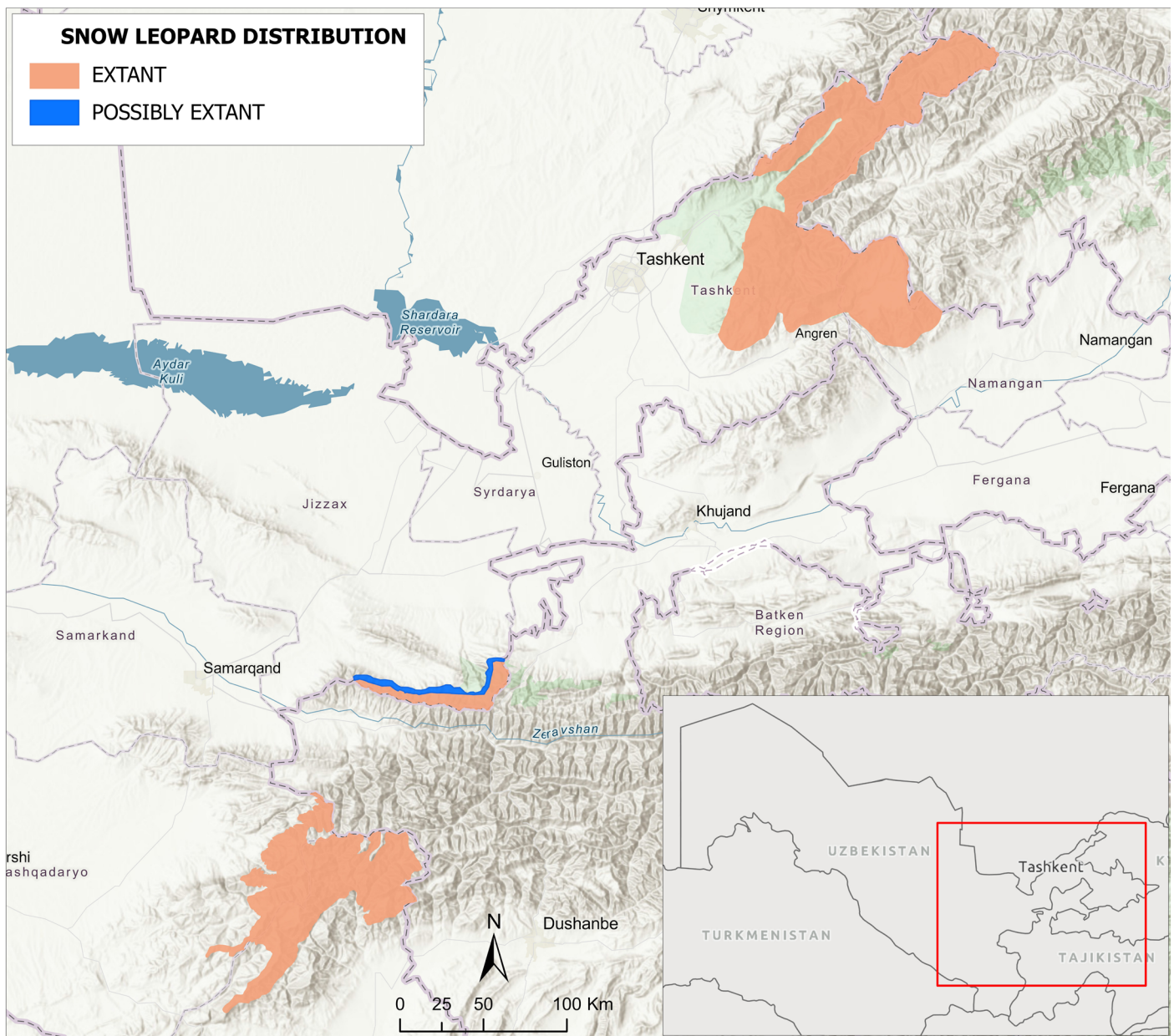
### 1. Distribution

Snow leopards (*Panthera uncia*) inhabit two mountain systems in Uzbekistan: the Western Tien Shan (including Ugam, Maidantal, Talass Alatau, Pskem, Chatkal, and possibly the Kuraminskyi ranges) and the Western Pamir-Alay system (comprising the Gissar, Baysun, Zarafshan, and Turkestan ranges). These populations are transboundary, shared with the Republic of Kazakhstan, the Kyrgyz Republic, and the Republic of Tajikistan. The total area of snow leopard habitat in Uzbekistan is estimated to be approximately 10,000–11,500 km<sup>2</sup> (Palsyn et al., 2022; Gritsina et al., 2023; Esipov et al., 2024).

### 2. Population

The total snow leopard population in Uzbekistan is estimated at 96–107 adult individuals. Of these, approximately 46–47 individuals inhabit the Western Tien Shan, and 50–60 individuals are in the Western Pamir-Alay. Seasonal transboundary movements contribute to variation in observed population sizes (Palsyn et al., 2022; Gritsina et al., 2023; Esipov et al., 2024). However, coordinated cross-border monitoring remains absent.

Several areas within the snow leopard's historical range, such as Zaamin Reserve (Turkestan Range), the Gissar Range outside Gissar Reserve, and the Baysuntau Range, still lack recent data (i.e., within the last 20 years) due to



**Figure 1.** Snow leopard (*Panthera uncia*) range in Uzbekistan. Areas shown in orange represent regions with confirmed or inferred current presence of the species, while blue areas denote regions where occurrence remains uncertain but plausible based on suitable habitat and nearby records, consistent with IUCN Red List range definitions.

limited or no research effort. In February 2025, snow leopard presence was confirmed in the Tupalang River Valley (Gissar Range).

### National Monitoring Framework

In 2018–2019, with support from the UNDP/GEF project “Sustainable Use of Natural Resources and Forestry in Key Mountain Regions Important for Globally Significant Biodiversity Species,” a national snow leopard monitoring system was initiated. The approach was based on a 5x5 km spatial grid, covering potential snow leopard habitats identified via spatial modelling.

Two monitoring approaches were used:

- Occupancy estimation through transect surveys (5–7 km) within each grid cell.
- Population density estimation via Spatial Capture-Recapture (SCR) using camera traps and DNA analysis of faecal samples.

A total of 510 cells covering 12,750 km<sup>2</sup> were identified in the Western Tien Shan and Western Gissar-Alai (Paltsyn et al., 2022). Between 2018 and 2019, field teams conducted surveys over 145 field days, amounting to a total of 904 person-days of effort, and covered 113 survey cells. Snow leopard presence was detected in 34 cells (30%), with track densities ranging from 0 to 0.33/km of transect. The

highest detection rates occurred from October to May, correlating with higher densities of wild ungulates (2.9–5.8 individuals/10 km<sup>2</sup>), lower livestock densities (0–67 animals/10 km<sup>2</sup>) and presence of snow cover. Fieldwork across seasons helped identify optimal survey periods (Paltsyn et al., 2022; Gritsina et al., 2023; Esipov et al., 2024).

### Western Tien Shan

Altogether, 203 spatial cells (5,075 km<sup>2</sup>) are considered suitable habitat in the Western Tien Shan. Snow leopards were confirmed in 22 cells, with at least 5 individuals identified. The overall density was 0.23 individuals per cell (0.0092/km<sup>2</sup>), equating to a total estimate of 46–47 individuals in Western Tien Shan (Gritsina et al., 2023; Esipov et al., 2024).

From 2019–2022, camera trap surveys in the Pskem sub-region accumulated 9,368 camera trap-days. Snow leopards were photographed by 11 cameras across 6 cells, resulting in 31 capture events and 243 images. Analysis confirmed at least 4 individuals: 2 males and 1 female with a cub. Estimated population density was 0.3 individuals per cell (0.012/km<sup>2</sup>). Out of 113 suitable cells (2,825 km<sup>2</sup>) in Pskem, this suggests a population of approximately 34 individuals. In the Chatkal sub-region, snow leopards were recorded 11 times during the same period. Image quality limited individual identification, but snow leopard presence was confirmed in 7 cells. Estimated density was 0.14 individuals per cell (0.0056/km<sup>2</sup>) across 90 suitable cells (2,250 km<sup>2</sup>), indicating a population of 12–13 individuals.

### Western Gissar-Alai

Camera trapping has only been conducted within the Gissar State Reserve, with regular observations of snow leopards. According to B. Aromov, two individuals were recorded each year in 2018–2019. In 2020, 28 photos and video records were obtained from which 16 individuals were identified (Gritsina et al., 2023).

## 3. Threats

### Traditional snow leopard hunting

Historically, snow leopards were hunted for their skins, which were valued for clothing and as a status symbol. Killing a snow leopard was considered prestigious, reflecting the hunter's skill. During the Soviet era, red-listing and hunting bans were introduced; however illegal hunting continued. From 1960 to 1995, 11 snow leopards were killed near the Gissar Reserve (Aromov, 2001). A survey of the local population (Bykova et al., 2004) documented hunting by local communities between 1975 to 2003. Six of ten recorded incidents involved hunting snow leopards for skin or for sale to private zoos. The estimated annual

offtake during the survey period was 3–4 individuals in the Tien Shan; 2 in the Turkestan range, and 1 in the Sangardak range. The most recent confirmed illegal hunting incident occurred in 2004 in the Akbulak river basin (Western Tien Shan), where an individual attempted to sell a skin for USD 1,000 (A. Nuridjanov, personal communication). No subsequent confirmed cases have been officially reported.

In summary, an estimated 170–180 individuals have been killed from 1960 to 2004. There is no evidence of snow leopards being killed from 2004 to 2024. Since 1999, there have been no recorded cases of snow leopard skins, derivatives, or live individuals seized at international borders.

### Live capture of cubs and adults

Although there were no records of cub captures during the Soviet era in Uzbekistan, live captures for private zoos became more common in the early 2000s. A snow leopard cub could fetch approximately USD 1,000 on the illegal market, while an adult would be worth USD 5,000–10,000. In 2012, a male cub from the Hissar Ridge was brought to a veterinary clinic in Samarkand, reportedly purchased from hunters. Between 2014 and 2024, there were unverified reports of at least two cubs captured from the Gissar Reserve and one from the Western Tien Shan for sale and captivity.

### Conflicts with local herders

Perceptions of snow leopards as a threat to livestock are widespread. Depredation reports suggest snow leopards primarily attack goats and sheep, with occasional attacks on cattle, horses, and donkeys. Between 1960 and 1995, a total of 82 incidents of livestock depredation have been recorded in the Gissar Range, outside the reserve. One depredation incident involved the loss of 35 animals, although the average number per event is 5.5 (Bykova et al., 2004). These events can lead to retaliatory killings. Such depredation incidents may be linked to reduced availability of natural prey, potentially caused by disease outbreaks, overhunting, or habitat degradation. Under these conditions, it is hypothesized that snow leopards may shift their foraging behavior toward alternative prey sources, including domestic livestock.

More recent data from the Ugam-Chatkal National Park (Western Tien Shan) further illustrate the extent of livestock depredation. According to a questionnaire survey conducted in 2025 and covering the period 2015–2025, nine respondents reported snow leopard attacks, with a total of 58 livestock affected. Of these, 47 animals (81.0%) were killed and 11 (19.0%) injured. Nearly all incidents occurred at night (98.3%), with only one case recorded at dusk or dawn and none during daytime. Most attacks took

place on pastures (82.8%), although 17.2% occurred within corrals, indicating insufficient protection. Young animals constituted the majority of losses (75.9%). Cattle and sheep were most frequently involved (seven incidents each), followed by goats and horses (three incidents each), and a single reported case involving a dog. Survey responses also indicated that one snow leopard was reportedly killed in retaliation during the study period (Gritsina et al., 2025).

Reports indicate that livestock depredation increases during the winter months, when snow accumulation can limit the accessibility of wild ungulates such as ibex (*Capra sibirica*), making livestock potentially comparatively easier to hunt. During the summer, domestic herds are often left unattended during the daytime or supervised by children, who may not be able to effectively deter predators. Poorly constructed summer corrals further elevate predation risk; these enclosures typically consist of low walls without roofing, allowing easy entry by predators while restricting livestock from escaping. In winter, snow leopards have been reported to enter livestock pens through roofs made only of reeds or other insufficient materials.

Proximity to human settlements presents additional challenges in managing conflict. For example, Gissar Reserve is bordered by eleven Uzbek and Tajik villages. Long-standing tensions between the reserve administration and the predominantly unemployed residents of nearby Tashkurgan and Chopukh villages were ultimately addressed through a government-led relocation of approximately 500 individuals to lower-elevation farmland in the 2000s.

### **Armed human conflict**

Minefields, remnants of the civil war in neighboring Tajikistan, are located along the border near the Gissar and Zaamin Reserves, areas frequently used by migratory animals. There have been documented instances where large mammals, including brown bears (*Ursus arctos*), ibex, and other species, triggered landmines. These mines have recently been deactivated.

### **Natural mortality**

The Western Tien Shan region experiences deep snowfalls during winter, with avalanches being a common occurrence. Local reports indicate that at least three snow leopards have been killed by avalanches while hunting ibex in the Pskem River Valley in recent years.

### **Decrease of prey species populations**

The decline of wild ungulate populations, particularly ibex, represents a significant threat to snow leopards. The ibex is extensively hunted illegally throughout its range, with an estimated 30 ibex hunted illegally annually from

Pskem Village alone in the Ugam-Chatkal National Park (Kashkarov, 2002). Even within protected areas, such as the Gissar Reserve, ibex populations remain vulnerable to illegal hunting. In addition to hunting, disease outbreaks have caused significant declines in prey populations; for instance, an outbreak of sarcoptic mange in the 1970s led to a dramatic decrease in the ibex population. Similar pressures affect other wild prey species across parts of the snow leopard's range, reflecting broader anthropogenic impacts on mountain ecosystems.

### **Subsistence hunting**

Subsistence hunting for meat, pelts, and other body parts by local residents remains illegal but is challenging to quantify. Commonly targeted species include ibex, wild boar (*Sus scrofa*), and marmots (*Marmota*), hunted for consumption, fur, and traditional medicinal uses. In addition to direct hunting by local residents, marmot populations are also affected by predation from free-ranging shepherd dogs accompanying livestock. The expansion of seasonal grazing areas increases the frequency of encounters between dogs and marmots, further contributing to local population declines. Despite regulations limiting access to hunting areas and restricting firearm ownership, weak law enforcement combined with economic hardship in remote mountain communities contributes to the persistence of illegal hunting. Additionally, residents in these areas often have limited awareness of hunting regulations and conservation objectives. Over time, a decline in ungulate populations, degradation of marmot habitats, and reduced numbers of ground-nesting birds have been documented across the snow leopard's range in Uzbekistan.

### **Sport hunting**

Sport hunting, primarily carried out by urban residents, is generally legal, though illegal practices persist. Birds are the main targets, with ungulates hunted to a lesser extent. Legal hunting has nonetheless contributed to declines in some ungulate populations. For instance, commercial hunting of wild boar in the Western Tien Shan during the late 1980s disproportionately affected breeding females, resulting in a sharp population decline. Although wild boar numbers are now recovering, they have not returned to historical levels. While wild boar are not preferred prey for snow leopards, this case exemplifies how overexploitation can significantly impact once-abundant species.

### **Disturbance factors: Human land use, collection of natural products**

High-elevation mountain regions in Uzbekistan, particularly around Tashkent in the Tien Shan Range, are increasingly under pressure by human activities, including pastoralism, tourism, and recreation (hiking, skiing, paragliding, and rafting). These activities, along with urban

population growth, threaten mountain ecosystems. The Pamir-Alay Mountains face relatively less pressure but are still impacted.

A new threat is the construction of hydroelectric power plants, some near snow leopard habitats. Plans for 20–25 stations in Uzbekistan, along with similar projects in Kazakhstan, Kyrgyzstan, and Tajikistan, pose risks during the construction phase, including displacement of large wildlife, increased mortality in smaller species, habitat loss, and reduced prey availability. Additionally, construction may increase illegal hunting and the risk of fires.

Land seizures that reduce available rangelands may heighten competition for pastures between wild ungulates and livestock. This could lead to increased predation on livestock by snow leopards, prompting retaliatory illegal hunting. Reduced low-altitude winter habitats will concentrate feeding and migration patterns of ungulates, affecting non-constructed areas.

Changes in water levels and ice conditions from construction could prevent wildlife from accessing water and cause entrapment in ice, leading to mortality. Snow leopards may exploit these situations for hunting, but they could also be trapped. Increased infrastructure, including roads, will facilitate illegal hunting, which could increase due to easier access to previously remote areas. The expansion of mass tourism and new development will increase human-wildlife conflict, disturb snow leopard habitats, and further exacerbate these pressures.

### **Competition between wild prey and livestock**

The use of high-elevation alpine meadows for seasonal grazing is widespread in Uzbekistan. During the Soviet era, these pastures were utilized by local pastoralists as well as those from neighbouring republics. However, due to economic hardship, herd sizes have significantly decreased. Currently, pasture use is restricted to Uzbek nationals, and only those who hold a license issued by the relevant authorities are permitted to graze livestock. These licenses specify the type and number of animals allowed. Up until 1990, the Pskem River basin was actively used for agriculture, with alpine territories utilized for grazing from March to September, reaching elevations of up to 4500 meters. This grazing was primarily carried out by Kyrgyz herders under long-term lease agreements. Grazing activity ceased in the early 1990s following the independence of the Central Asian Republics. Since 2025, livestock grazing in this territory has once again been fully prohibited.

In contrast, the Chatkal and Gissar ranges, characterized by higher human populations, continue to face significant

pressure from agriculture, particularly pastoralism. For example, 187,800 hectares of pasture within the Ugam-Chatkal National Park (Western Tien Shan) are currently under use. According to the Management Plan of the Ugam-Chatkal National Park, livestock numbers in the park include 34,208 head of cattle, 41,785 small ruminants, and 2,587 horses. In the regions of Bostanlyk, Parkent, and Kanangra, official figures report 161,900 head of cattle and 364,100 small ruminants (Beshko, 2016).

The absence of accurate information on pasture grazing capacity limits effective pasture management. A preliminary calculation of the grazing pressure on the Ugam-Chatkal National Park's pastures, based on available livestock population data and the park's pasture characteristics, suggests that each head of cattle occupies 0.69 hectares. This value exceeds the permissible stocking density of one head per hectare for these types of pastures, suggesting overgrazing (Mardonov, 2017).

### **Climate change**

The increase in mean annual air temperatures in Uzbekistan has occurred amidst considerable natural variability, resulting in substantial inter-annual fluctuations. The rate of warming in the region exceeds the global average, with an observed increase of 0.27°C per decade. This trend is particularly relevant for water resources, as the glaciation of the entire Aral Sea basin is a critical source of freshwater for Uzbekistan. The rate of glacial retreat within the basin ranges from 0.1% to 1.65% per year, depending on specific regions and time periods. Between 1957 and 2010, significant reductions in glaciated area were recorded in the basins of the Pskem, Kashkadarya, and Surkhandarya rivers, including areas in neighbouring countries within these river basins. The total decrease in glaciated area in these basins amounted to 50.12 km<sup>2</sup>, or 24% of the original area as of 1957. Across Uzbekistan, the reduction in glaciated area during the same period was 41.63 km<sup>2</sup>, representing a 29.5% loss compared to the original extent (Third National Communication of the Republic of Uzbekistan under the UN Framework Convention on Climate Change, 2016).

## **4. Conservation**

### **National legislation**

The legal and legislative framework governing nature conservation in Uzbekistan comprises over 130 laws and by-laws, many of which directly or indirectly pertain to biodiversity conservation (Yunusov et al., 2015). The snow leopard is listed in the Red Data Book of the Republic of Uzbekistan (2019), an official state instrument for the conservation of rare and endangered species.

## Recovery of fine and compensation for damages

Fines for damage to flora and fauna are imposed in accordance with Order No. 290 of the Cabinet of Ministers of the Republic of Uzbekistan, titled “On the regulation of the use of biological resources and the implementation of permit procedures in the field of natural resource use.” The fine for the killing of a snow leopard is set at 3,000 basic calculation units (BCU) for Uzbek citizens and legal entities, and USD 400,000 for foreign citizens, as per the Central Bank’s exchange rate. The fine is levied for each individual animal or its part (e.g., head, skin, or other body parts), regardless of age, size, weight, or sex. In cases of serious offenses, criminal liability may also be imposed under the Criminal Code. However, arrests of snow leopard poachers are virtually unheard of in Uzbekistan.

## Action plan and methodology for snow leopard monitoring in Uzbekistan

The “Action Plan for Snow Leopard Conservation in the Republic of Uzbekistan (2021-2030)” was approved by the Cabinet of Ministers. This document is subject to regular monitoring and control. Additionally, the “Methodology for Snow Leopard Monitoring in the Republic of Uzbekistan,” adopted by the Ministry of Ecology, Environmental Protection, and Climate Change and the Academy of Sciences of the Republic of Uzbekistan in March 2022, outlines the regular collection and updating of data regarding snow leopard populations across various regions within Uzbekistan.

## Protected areas

The snow leopard is protected within seven designated protected areas (PAs), comprising three state reserves and four national parks (one established in 2022). Upper Tupalang National Park (IUCN Category II), covering 27,851 hectares, was established in the Gissar Ridge in 2022. A 2,000-hectare buffer zone was also designated within the Gissar State Reserve to support conservation efforts.

To strengthen protected area management, the SMART (Spatial Monitoring and Reporting Tool) patrolling system has been implemented. It is currently operational in the Chatkal State Biosphere Reserve and Gissar State Reserve and is being introduced in the Ugam-Chatkal National Nature Park.

## Raising awareness of the importance of the snow leopard and its ecosystems

Within the framework of the UNDP/GEF/Ministry of Ecology project, “Sustainable Natural Resource and Forest Management in Key Mountainous Areas Important for Globally Significant Biodiversity,” a baseline study was conducted on environmental awareness among local populations regarding mountain ecosystems, biodiversity,

and state conservation efforts. Surveys were conducted in villages in the Tashkent region (Kumushkon, Nevich, Chetsuv, Tanga Topdi, Pskem) and Kashkadarya province (Almati, Hisorak, Suvtushar, Gilan), covering 386 individuals. The findings emphasized the need to prepare and disseminate information to school teachers to improve local awareness.

The organization ‘EKOMAKTAB’ has developed educational programs for the celebration of ‘International Snow Leopard Day’ and ‘International Biodiversity Day,’ and has prepared work plans for environmental education in protected areas and collaboration with local communities. However, after the completion of the UNDP/GEF project, these activities have ceased.

## Establishment of pasture cooperatives

Two pasture cooperatives have been established to coordinate the conservation and rational use of pasture resources among neighboring mountain villages: ‘Hisor Yaylovleri’ (304 ha) and ‘Muminobod Chorvasi’ (702 ha).

## Strengthening international and interregional co-operation

Between 2017 and 2022, the UNDP/GEF/Ministry of Ecology project facilitated transboundary cooperation for snow leopard conservation between Uzbekistan, Kazakhstan, Kyrgyzstan, and Tajikistan. This cooperation led to the development of a Memorandum of Understanding (MoU), which was approved by Kyrgyzstan, Tajikistan, and Uzbekistan in 2021 under the patronage of the Global Snow Leopard and Ecosystem Protection Program (GSLEP). Kazakhstan is expected to accede to the MoU. A draft regional action plan has been developed and is under review by the member countries. In 2018, the 24th transboundary snow leopard landscape, “Western Tien-Shan,” was nominated for inclusion in the GSLEP network.

## Future Conservation Needs

The conservation of snow leopard populations, their range, and associated ecosystems can only be ensured through the development and implementation of a comprehensive set of measures. These are outlined in the *Action Plan for Snow Leopard Conservation in the Republic of Uzbekistan (2021–2030)*, approved by the Cabinet of Ministers. However, due to the long-term and multi-dimensional nature of this task, several additional measures not included in the Action Plan have since been proposed (Gritsina et al., 2023), with some becoming especially relevant in the last two years. The key priorities are summarized below; completed tasks are not included.

To reduce illegal hunting, improving the skills of protected area (PA) rangers and strengthening the material and technical infrastructure of PAs are identified as critical needs. The adoption and consistent monitoring of SMART (Spatial Monitoring and Reporting Tool) reports at the national level is essential for tackling poaching. In parallel, stronger enforcement through judicial measures and awareness-raising campaigns targeting the illegal hunting of wild ungulates are needed. Improved collaboration between environmental inspectorates, conservation agencies, and border guards is also necessary, along with coordinated inspection efforts in snow leopard habitats located outside formally protected areas. A dedicated action program for transboundary snow leopard conservation has also been identified as a key step toward more coordinated and effective regional efforts.

The development of sustainable local livelihoods is a priority, with support for home-based production and eco-tourism recognized as practical ways to provide alternative income sources while advancing conservation objectives. In terms of environmental governance, priority actions include rezoning Ugam-Chatkal National Park, expanding the protected area network to include high-mountain regions, and establishing the proposed Pskem Reserve in the Western Tien Shan. Maintaining habitat connectivity is also a critical goal, requiring the creation of ecological corridors and the implementation of other effective area-based conservation measures (OECMs).

Understanding and addressing human–wildlife conflict, particularly between snow leopards and shepherds, is also a priority. Research and the development of targeted mitigation measures will be vital to ensuring coexistence and balancing conservation with the needs of rural communities.

In addition to these core priorities, several other proposals have been identified to strengthen snow leopard conservation:

- Prohibiting the construction of hydroelectric power stations within snow leopard habitats to protect sensitive ecosystems
- Establishing regular environmental education and outreach programs to increase awareness and foster conservation values among local communities
- Supporting research programs focused on snow leopards and their prey species
- Creating a continuously updated, web-based information platform on snow leopards and their ecosystems
- Establishing a rehabilitation center for predatory mammals

- Monitoring the impacts of climate change on snow leopards and their habitats, and developing appropriate mitigation strategies
- Strengthening international and interregional cooperation, and engaging the industrial sector in biodiversity conservation
- Creating a dedicated organization or NGO focused specifically on snow leopard conservation to ensure sustained and coordinated efforts over the long term

Together, these measures form a foundation for more effective and resilient conservation of snow leopards and the ecosystems on which they depend.

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## 6. Conflicts of Interest

The authors declare no known conflicts of interest.

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