

Hungarian Meadow Viper (*Vipera ursinii rakosiensis*) – Hungary



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Conservation status	IUCN Global: Endangered HU : U2 (+)
Protection status	HD: Annex II and IV Bern Convention: appendix II
Population (2007-12)	EU27: 600 – 1,000 individuals HU: 500 – 700 individuals
MS with genuine improvement	HU
Other MS	RO

Summary: The Hungarian Meadow Viper is a rare species of snake that has been endangered in Europe since the mid-20th century especially due to the destruction of its habitat. Although conservation measures have been implemented since the 1970s, it now only occurs in small areas in Romania and Hungary. To arrest its decline, strong protection and intensive conservation efforts have been implemented in Hungary, including a national recovery programme and two LIFE projects dedicated to the conservation of the species: HUNVIPURS - Establishing the background of saving the Hungarian Meadow Viper (from 2004-2007) and CONVIPURSRK - Conservation of Hungarian Meadow Viper in the Carpathian basin (2009-2013). Conservation measures included the purchase of land, habitat re-creation and protection, the implementation of viper-friendly management, the reinforcement of viper numbers through captive breeding and release of young snakes, population monitoring and detailed scientific research, and public awareness activities.

The LIFE projects resulted in the remaining populations of Hungarian Meadow Viper being on state-owned land that is now subject to protection and management for the species, a substantial increase (400 ha) in the area of continuous suitable habitat for the species and a total of 242 Hungarian Meadow Vipers successfully reintroduced into their natural habitats at three sites. In addition, awareness of the conservation status of the species and attitudes towards it have also significantly improved. Consequently, although the assessment of the conservation status of the species for Hungary for 2007-2012 was unfavourable–bad, trends were considered to be positive.

Background

Status and EU occurrence

The Hungarian Meadow Viper¹ formerly occupied a huge lowland range in the Pannonian steppe region, from eastern Austria (where it is now extinct), across the Great Hungarian Plain to western Romania. The species may have been found once in adjacent areas of Croatia (Slavonia) and Serbia (Vojvodina) (Edgar and Bird, 2005). Now, within the EU, it only occurs in 12 sites in Hungary (Pannonian biogeographic region) and four in Romania (in the Continental biogeographic region).

The Hungarian Meadow Viper population has declined greatly since the mid-20th century, but has been protected since 1974 in Hungary, where it constitutes the most endangered vertebrate. Since 1982, the species has received the most rigorous protection possible in Hungary (Halpern and Péchy, 2002). At least 30 populations were still in existence in the 1950s (Dely and Janisch, 1959). In 1995, the population of the species was estimated to be 2,500 mature individuals (Korsos, 1995), while in 2008 studies indicated less than 500 individuals in Hungary in two small and isolated populations: one in Hanság (north-western region) and the other in Kiskunság (plains between the Danube and Tisza rivers). Both areas have protection designations, but the species continues to experience declining population trends (Halpern, 2008). In 2016, a new population of Hungarian Meadow Viper was discovered in south Transylvania, Romania (Milvus Group, 2016).

Some 70% of the species' habitat in Hungary is located in protected areas such as Kiskunság National Park established in 1975 (Janisch 1993) and the Fertő-Hanság National Park, established in 1994. The remaining 30%

¹ Natura 2000 species code 4121

is on military training land, which was leased for conservation purpose to BirdLife Hungary (Halpern and Péchy 2002) and is now managed by local farmers, following a 'viper-friendly' management plan.

According to the Member State Article 17 reports for 2007-2012, Hungary assessed the species' conservation status as unfavourable-bad, but with an improving trend (ETC-BD, 2018; Annex 1). Romania reported that the species conservation status was favourable, but the Romanian population was reported to be only 100-300 individuals in two separate populations, and the trend in most parameters was reported as decreasing (ETC-BD, 2018). Furthermore, serious habitat destruction through ploughing of key areas of habitat has been reported since (Halpern pers comm, 2018).

Ecological requirements

The Hungarian Meadow Viper's habitat is lowland meadow-steppe grasslands, up to a maximum altitude of 800m but usually below 300m. Unshaded areas of structurally diverse cover of grasses and other low herbaceous plants is a crucial habitat component, as this provides both basking areas and adequate shelter in close proximity. A particularly essential habitat feature appears to be the presence of grass tussocks and low shrubs as most of their time is spent foraging under cover (Corbett *et al* 1985; Ujvari *et al* 2000) (Edgar and Bird, 2005).

They generally have two separate niche requirements:

- marshy ground, dried out ditches and low-lying damp areas (often prone to winter flooding) that provide more humid and therefore cooler habitats, and are mainly used by snakes in the summer; and
- higher areas typically with dry, sandy substrates that are required for successful hibernation, such as rodent burrows on local elevations.

Such areas must be found fairly close to each other, preferably within the same undulating meadow.

Although an inhabitant of open habitats, in Hungary the species has also been recorded utilising a wet willow mire during hot weather (Ujvári and Korsós 1997).

The Hungarian Meadow Viper, especially young individuals, feeds heavily on Orthopterans (locusts, grasshoppers, crickets) and lizards, which form an important part of the diet at certain times of the year (Corbett *et al*, 1985). Beetles, insects and frogs may also be eaten (Corbett *et al* 1985). Adults can also consume small rodents and young birds.

The venom of the Hungarian Meadow Viper is not lethal for humans; its infrequent bite causes quickly disappearing, bee-sting-like symptoms.

Pressures and threats

According to Hungary's Article 17 Report, the three main pressures on the species are the modification of cultivation practices, grazing by livestock, or other human intrusions and disturbances.

The physical destruction of their habitat has been the principal cause of the Hungarian Meadow Viper's decline, especially cultivation of habitats. This is especially the case in the lowlands, where almost every population of the species has now been eradicated (Corbett 1989, Korsós and Ujvári 1998, Halpern and Péchy 2002). Most of the Pannonian steppe grasslands have been converted to monoculture agriculture or forestry plantations (Halpern and Péchy 2002), or lost to various developments and roads, associated with such land-use changes. Large monocultures of maize, sunflowers and mixed crops plus orchards and vineyards have replaced many steppe grasslands in Hungary, Romania and Austria (Corbett *et al* 1985). Much of the region of northwest Hungary, close to the Austrian border has been converted to agriculture and forestry on an enormous scale. Although, about 6,000 ha has been protected the distribution of the Hungarian Meadow Viper declined to 9 ha (Corbett *et al*, 1985, Ujvari *et al*, 2000). Since 2000, the distribution of the species has been extended to a 35 ha site (Halpern pers comm, 2018).

Lowland habitats have also been lost to urban expansion and the suburbs of Budapest swallowed a large part of the central Hungarian range of the species, including the type locality for this subspecies (Corbett *et al* 1985).

Despite the high level of protection of the species, illegal collecting remains a serious threat. Most cases of Hungarian Meadow Viper bites between 1970 and 1986 were inflicted on amateur keepers (Takács *et al*, 1987).

Drivers of improvements: actors, actions and their implementation approaches

Organisers, partners, supporters and other stakeholders

Two LIFE projects have played a key role in the conservation of the species: 'HUNVIPURS - Establishing the background of saving the Hungarian Meadow Viper' and 'CONVIPURSRK - Conservation of Hungarian Meadow Viper in the Carpathian basin' (Annex 2). Both were coordinated by the NGO MME Birdlife Hungary (the Hungarian Ornithological and Nature Conservation Society), and the Ministry of Environment and Water Affairs of Hungary co-financed the projects.

Implementation of the LIFE project's conservation measures occurred as a result of collaboration with various public and private actors. The Hungarian National Park authorities carried out habitat reconstruction measures in Kiskunság National Park and Fertő-Hanság National Park. Zoos, including Budapest Zoo in Hungary, were also important partners as they provided veterinary assistance and participated in raising public awareness on the conservation status of the species. The Research Institute of Wildlife Ecology in Vienna was a strong partner during the implementation of the LIFE Project CONVIPURSRK by monitoring tools for the project. T.HU a nature film society recorded every aspect of the project, producing documentaries that had large viewer numbers on national and thematic television channels and online. Local authorities and the Ministry of Agriculture also helped to implement the LIFE Project CONVIPURSRK (Halpern pers comm, 2018).

Contributions / relevance of strategic plans

Conservation planning has played a major part in helping to arrest the decline of the species. This included the publication in 2005 of an Action Plan for the Conservation of the Meadow Viper in Europe, in the framework of the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention). A Population and Habitat Viability Assessment (PHVA) workshop was then carried out for the species in Hungary in 2001 (Kovacs *et al* 2002) and a Species Conservation Plan for Hungarian Meadow Viper was officially approved by the Hungarian Minister of Environment and Water Affairs in 2004.

Measures taken and their effectiveness

Hungary reported that from 2007 to 2012 the following conservation measures were taken for the Hungarian Meadow Viper.

Application of conservation measures for *Vipera ursinii rakosiensis* for 2007-2012 in Hungary

Measure	Type	Ranking	Inside / outside N2k	Broad evaluation
Maintaining grasslands and other open habitats	Contractual Recurrent	High	Inside	Enhance Long-term
Other species management measures	Recurrent	Medium	Inside	Long-term

Source: Hungary Article 17 report 2013

Intensive conservation efforts have been undertaken for this species, including the establishment of a national Recovery Programme, purchase of lands, habitat reconstruction and protection, the implementation of viper-friendly management, the reinforcement of viper numbers through captive breeding and release of young snakes, population monitoring and detailed scientific research (Nechay and Péchy 1994; Péchy *et al* 1996; Liptói *et al* 1999; Ujvári and Korsós 1997; Halpern and Péchy 2002).

The measures taken for the conservation of the Hungarian Meadow Viper under the two LIFE projects that focussed on the species relied on two complementary types of actions: captive breeding and release of vipers into certain sites, and the restoration/re-creation of the species' habitat.

The first LIFE Project, HUNVIPURS, from 2004 to 2007, aimed to bring all sites harbouring the Hungarian Meadow Viper into State ownership in order to recreate grassland habitats in some areas. Within Kiskunság National Park, grassland restoration was carried out on a 26-ha site. This was guided by research into the species' specific habitat requirements and a management plan that aimed to turn Black Locust (*Robinia pseudo-acacia*) and pine plantations into suitable habitat (i.e. sandy pastures). In addition, ecological corridors were created to provide the vipers with a safe environment in which to hibernate through winter, away from areas subject to high groundwater levels.

To reinforce the remaining small viper population, captive breeding was carried out through the creation of the Hungarian Meadow Viper Conservation Centre in Kiskunság, which was started with 10 adult individuals, collected from five different populations of Peszéradacs and Bugac. From 2004 to 2006, the centre had four

successful breeding periods resulting in a total of 161 vipers, including by females originally born in captivity. Initial genetic tests showed that the offspring had higher genetic variability than their parents; a good sign for the future. Regular veterinary support was provided under the umbrella of an exemplary cooperation with Budapest Zoo (HUNVIPURS Life Project Report, 2007). In addition, the project produced information panels and leaflets, and held public forums to persuade the local community to understand and accept the conservation of this rare yet unpopular snake. The HUNVIPURS LIFE project was awarded the title of 'Best of the Best' from a shortlist of 26 'Best' LIFE Nature projects in 2007-2008.

The second LIFE Project, from 2009 to 2013, CONVIPURSRAC, aimed to increase the population of the species through various direct measures such as increasing habitat area through grassland restoration and releasing vipers into natural habitats. Grassland restoration involved the removal of invasive plant species and a reduction in the area covered by tree plantations, with grass being reseeded in cleared areas. This increased the area of continuous potential viper habitat to over 1,600 ha in Hanság. In Kiskunság National Park, important land was purchased within a core viper population area. As a result these areas can be managed by extensive grazing by livestock, and are subject to environmental regulations (e.g. prohibiting use of agricultural machinery and requiring extensive grazing), which are included in the official permits issued for land users. Also, since farmers rent these lands from the National Park, these regulations have been included in the rental contracts as well.

The captive breeding center established under the first LIFE project was renovated and an exhibition centre added for the general public. Further and improved breeding success was achieved, with nearly 1,700 vipers bred by 2013. Accompanying these actions, the project carried out an extensive public awareness programme aimed at reducing concerns about the risks of reintroducing venomous snakes. To this end, zoos were used as partners to boost public support for the project. The project was also awarded the title of 'Best of the Best' from a shortlist of 42 'Best' LIFE projects in 2015.

Funding sources (current and long-term) and costs (one-off and ongoing)

The LIFE Nature Programmes played a significant role in the conservation of the species in Hungary. According to their planned budgets the total cost of LIFE HUNVIPURS was expected to be €649,000 (EU contribution of €324,500) and €2,260,886 for LIFE CONVIPURSRAC (EU contribution up to €1,669,967); but in reality, both projects underspent.

Future actions

The Hungary Prioritised Action Framework (PAF) for Natura 2000 in 2014-2020 identifies the following priority conservation measures of relevance to the Hungarian Meadow Viper as:

- Improving the infrastructure background of habitat management in nature conservation areas maintained with farming methods (purchase of machinery and equipment), infrastructure for grazing animals etc.
- Management infrastructure (grasslands and other areas farmed with a nature conservation purpose).
- Introducing/applying specific and targeted management regimes to ensure the protection of species of grassland ecosystems.
- Introducing/applying general management regimes to ensure the protection of species and habitats of Community interest.
- Small-scale investments to improve the conservation status of grassland habitats and supporting the conservation of species, related to the introduction and application of specific management regimes.
- Compensation for the introduction of specific conditions related to land use and farming to be applied for ensuring the protection of species and habitats of Community interest.
- Controlling populations of invasive alien species (eradication with mechanic and chemical methods).
- Controlling succession processes to prevent the degradation of natural habitats (e.g. controlling populations of indigenous shrubs, preventing the siltation of wetlands).
- Restoration and rehabilitation of degraded or heavily altered habitats, creation of new habitats.
- Measures to improve or restore the natural water regime at catchment level (construction of water retention and supply infrastructure, elimination of unused drainage canals etc.)
- Improving the infrastructure necessary for ensuring the monitoring of species and habitats of Community interest as well as their pressures and threats.
- Developing the infrastructure background required for the implementation of species' restoration plans and for the ex-situ conservation, reintroduction and translocation of animal and plant species of

Community interest as well as of other species that play a key role in the conservation species and habitats of Community interest.

Achievements

Impacts on the target species

During the HUNVIPURS LIFE Project, grassland restoration was carried out by Kiskunság National Park, on a 26-ha site near Kunpeszér. As a result of research and targeted management for the Hungarian Meadow Viper, as described above, in the last year of the LIFE-project, clear signs of repopulation were observed in certain areas of the site.

The CONVIPURSRK LIFE project succeeded in further increasing the population size of the Hungarian Meadow Viper, increasing the area of continuous suitable habitat for the species by almost 400 ha, including through the purchase of more than 80 ha of land that is now under the control of the National Park administrations in Hanság and Kiskunság.

A total of 242 Hungarian Meadow Vipers were successfully reintroduced into their natural habitats at three sites (two in Kiskunság and one in Hanság). Although lower number of vipers were released than foreseen (i.e. 400) the monitoring results have proved the viability of the released vipers.

Other impacts (e.g. other habitats and species, ecosystem services, economic and social)

The Hungarian Meadow Viper is considered an umbrella species, meaning its conservation also benefits many other species of similar semi-natural sandy grassland ecosystems, including other protected species such as the European Ground Squirrel (*Spermophilus citellus*).

Conclusions and lessons learnt

The key targeted conservation measures that led to the improvements

- Data collection, mapping of the Hungarian Meadow Viper's habitat.
- Creation of ecological corridors in order to connect isolated populations and enable snakes to access suitable safe areas for hibernation.
- Restoration/re-creation of the species' grassland habitats.
- Land purchase to secure the areas known to still have viper populations.
- Captive breeding and release of vipers.
- Radio-tag monitoring of the released vipers.
- Public awareness actions : creation of the Hungarian Meadow Viper Conservation Center.

Factors that supported the conservation measures

- The establishment of a 'European Meadow Viper group' in 2005, which collected all existing data on the species' distribution and set up a central database for survey records and other information on the species.
- Cooperation with diverse stakeholders, such as the Romanian Institutions including the Danube-Delta Institute of Research and Design in Tulcea, Alexandra Ioan Cuza University in Iasi and the Romanian Herpetological Society in Cluj-Kolosvár. The latter had a LIFE-project, targeting the subspecies.
- Cooperation with a similar French LIFE-project in the building of a European network of scientist working on the species.

Factors that constrained conservation measures

- Problems related to the re-creation of the species' grassland habitats as most of the viper habitat was on state property, but some were still owned by farmers. Therefore it was necessary to get the right land in order to create a large continuous area of habitat on state property and guarantee its long-term management.
- Some legal changes constrained the project, such as the Forestry Law in 2008 that changed redemption fees (thus increasing the required budget to change cultivation from forest to grassland reconstruction), that are not-eligible expenditures under LIFE-funding, therefore they had to be funded outside the projects.
- Negotiations with local owners for land acquisition.

- Unexpected increases in property prices made it more difficult to secure diverse acquisitions.

Examples of good practice, which could be applied to other species

- Habitat re-creation and management measures for similar species.
- The use of captive breeding to bolster small and vulnerable populations and recolonise areas of recreated suitable habitat.
- Awareness raising actions for species that are often disliked by the general public (e.g. snakes).

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Authorship

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Annex 1 Status of the Hungarian Meadow Viper (*Vipera ursinii rakosiensis*) at Member State and biogeographical levels

Favourable	FV	Unknown	XX	Unfavourable - inadequate	U1	Unfavourable - bad	U2
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	2001-06	2007-12				
	Overall	Range	Population	Habitat for species	Future	Overall (with trend)
RO (CON)	XX	FV	FV	FV	FV	FV
EU overall (CON)	XX	U1	U1	FV	FV	U1 (=)
HU (PAN)	U2	U2	U2	U1	U1	U2 (+)
EU overall (PAN)	U2	U2	U2	U1	U1	U2 (+)

Source: Member State Article 17 reports as compiled by ETC-BD on EIONET <https://bd.eionet.europa.eu/article17/reports2012/species/summary/?period=3&group=Reptiles&subject=Vipera+ursinii+rakosiensis®ion=>

Annex 2. LIFE Nature Projects in Hungary that aimed to help conserve the Hungarian Meadow Viper (*Vipera ursinii rakosiensis*)

Project Title	Project N°	MS	Type Of Beneficiary
CONVIPURSRK – Conservation of Hungarian Meadow Viper in the Carpathian-basin	LIFE07 NAT/H/000322	HU	NGO-Foundation
HUNVIPURS – Establishing the background of saving the Hungarian Meadow Viper from extinction	LIFE 04 NAT/HU/000116	HU	NGO-Foundation

Source: Life Programme database, with *Vipera ursinii rakosiensis* as keywords