Cervus hanglu ssp. hanglu, Hangul
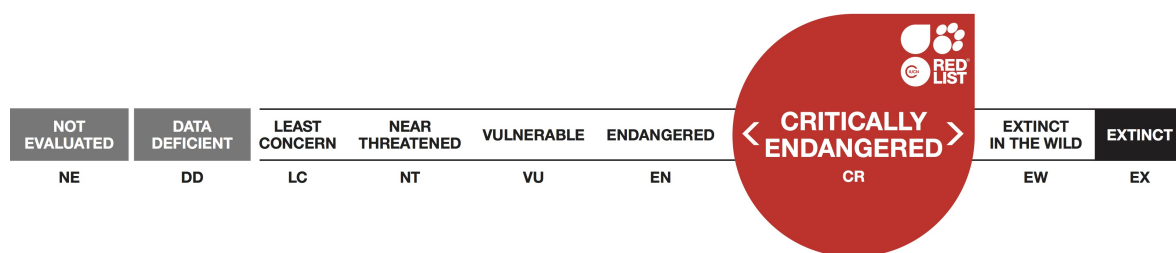
Assessment by: Brook, S.M., Thakur, M., Ranjitsinh, M.K., Donnithorne-Tait, D. & Ahmad, K.

NOT EVALUATED	DATA DEFICIENT	LEAST CONCERN	NEAR THREATENED	VULNERABLE	ENDANGERED	CRITICALLY ENDANGERED	EXTINCT IN THE WILD	EXTINCT
NE	DD	LC	NT	VU	EN	CR	EW	EX

View on www.iucnredlist.org

Taxonomy

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Mammalia	Cetartiodactyla	Cervidae

Taxon Name: *Cervus hanglu ssp. hanglu* Wagner, 1844

Parent Species: See *Cervus hanglu*

Common Name(s):

- English: Hangul, Kashmir Red Deer, Kashmir Stag

Taxonomic Notes:

For many years the Red Deer complex, including European and North African Red Deer (*Cervus elaphus*), Tarim Red Deer and Eastern Asian and North American Wapiti (*C. canadensis*) were considered as one species, *C. elaphus*. Several genetic studies have recently tried to clarify the taxonomy of this species complex, but their results are not always concordant. Although Grubb (in Wilson and Reeder 2005) included *canadensis* in *C. elaphus*, sharing this conclusion with most taxonomists of 20th century, all original scientific papers published since 1995 have concluded that *C. elaphus* and *C. canadensis* are two valid species regardless of whether this conclusion was based on comparison of molecular (Kuwuyama and Ozawa 1999, Ludt *et al.* 2004, Pitra *et al.* 2004, Zhang and Zhang 2012, Liu *et al.* 2013, Lorenzini and Garofolo 2015), or ethological data (Cap *et al.* 2008, Frey and Riede 2013, Pereladova 2013). Based on morphological data this was suggested earlier by several authors, e.g. Lydekker (1898), Flerov (1952) and Geist (1998) and both recent reviews on deer taxonomy are in line with this opinion (Groves and Grubb 2011, Mattioli 2011).

Recent analyses of the *Cervus* group (Mukesh *et al.* 2015, Lorenzini and Garofolo 2015, Kumar *et al.* 2016) have provided the first indications of another, fourth, species (including *Cervus nippon* sensu lato). Mitochondrial complete cytochrome b and control region sequences were analysed under a Bayesian coalescent framework to derive phylogeny, with particular attention to populations from Central Asia. The resultant phylogenetic reconstruction suggested that, after excision of *C. canadensis*, red deer are differentiated into two robust monophyletic clades corresponding to the western and eastern part of the range. At the species level, molecular data suggested this fourth species should be recognised as the Tarim Red Deer from Central Asia, including the populations from the Yarkand-Tarim and Bukhara regions and Indian Kashmir, which were formerly considered as subspecies of *C. elaphus* (*C. e yarkandensis*, *C. e. bactrianu*s and *C. e. hanglu*, respectively).

Lorenzini and Garofolo (2015) suggest this taxon should be recognised as the Tarim Red Deer *Cervus hanglu* Wagner, 1844, as the name with priority over *C. yarkandensis* or *C.* bactrianus. This group forms a part of the western clade and appears to have diverged from *C. elaphus* during the middle Pleistocene, at a similar time as *C. nippon* diverged from *C. canadensis*. The genetic distinctiveness of the Tarim Red Deer group is supported by previous mitochondrial studies (Ludt *et al.* 2004, Pitra *et al.* 2004, Mukesh *et al.* 2015). Further investigations need to be conducted from additional molecular sources and nuclear coding genes as well as verification of morphology from museum specimens, before the elevation of the Tarim Red Deer to species level can be confirmed (Lorenzini and Garofalo 2015). *Cervus hanglu* was

elevated to species level for the purpose of the IUCN Red List assessment in 2016. However, it should be noted that future clarification on genetic relatedness, especially studies with nuclear markers and a more formal morphological description, may lead to further revisions to the taxonomy of this provisional species, as more information becomes available.

Assessment Information

Red List Category & Criteria: Critically Endangered C1 <u>ver 3.1</u>

Year Published: 2017

Date Assessed: December 1, 2016

Justification:

The Hangul or Kashmir Stag *Cervus hanglu hanglu* is assessed in 2016 as Critically Endangered under criterion C1. In 2015 the total population size was estimated to be 110–130 individuals in Dachigam National Park and 150–200 individuals overall (the number of mature individuals is presumably significantly smaller). Given the current barrage of threats facing the Hangul, particularly the recent increase in poaching pressure and the lack of effective conservation action to mitigate these threats, it is reasonable to estimate that the population is undergoing a continuing decline at the rate of or exceeding 25% within 1 generation (14 years), particularly in the light of the biased sex ratio and very low ratio of fawns to hinds.

The Hangul would also qualify as Endangered under category D (very small or restricted population of <250 mature individuals) and on the basis of its geographic range (B2). Based on range-wide data consolidated in 2013 the area of occupancy of the Hangul is estimated at 228 km² (measured in geocat.kew.org using a cell width of 2 km AOO). Due to the application of different population monitoring methods and the doubt over the accuracy of monitoring data, it is not possible at the present time to apply category A to the Hangul population. Should further clarification on the population status and trend over the last 10 years or three generations come to light, re-assessment of this subspecies would be warranted.

Geographic Range

Range Description:

The Hangul *C. h. hanglu* was once widely distributed in the mountains of Kashmir Himalaya, the Chenab Valley in Jammu and parts of the Chamba district in Himachal Pradesh (Mukesh *et al.* 2015). However, the only viable population is in the Greater Dachigam landscape (*ca* 1,000 km²) north-east of Srinagar, centred in Dachigam National Park and adjoining protected areas (Bacha 2014, Mukesh *et al.* 2015). The catchment area of Dachigam National Park is tucked in between the opposing faces of high mountainous ridges, on the right of Lidder and along the left of the Sindh on its eastern and western boundaries respectively.

Outside Dachigam National Park, range-wide surveys from 2000 to 2009 suggest that the Hangul is restricted to 351 km² of approximately 885 km² of its possible range (Ahmad *et al.* 2013). The Hangul was observed in conservation reserves of Bren-Nishat, including Cheshmashahi Forest Reserve, Khrew, Khanagund, Shikargh and Overa Wildlife Sanctuary. Individuals were also sighted between Surfrao and

Akhal Blocks of the Sindh Forest Division and north of the Holy Amarnath Cave. However, none of the populations outside Dachigam National Park is believed to be viable and all are comprised predominantly of scattered isolated individuals (Ahmad *et al.* 2009, 2013; Qureshi *et al.* 2009; M.K. Ranjitsinh pers. comm. 2016).

For the distribution map, see the species-level assessment: *Cervus hanglu*.

Country Occurrence:

Native: India (Jammu-Kashmir)

Population

Periodic monitoring of Hangul (*C. h. hanglu*) in Dachigam has been in operation, and population statistics have been maintained since the early 20th Century (Ahmad and Nigam 2014, D. Donnithorne-Tait pers. comm. 2016). However, uncertainty regarding the accuracy of many of the official population statistics makes determining the population trend and status over time challenging. A drastic decline in the Dachigam Hangul population was reported soon after 1947, when the 3,000–5,000 animals estimated in the early 1900s suddenly dropped to 180 animals in 1965, although there are considerable doubts of the veracity of the earlier population estimates (Gee 1965, Mukesh *et al.* 2015, M.K. Ranjitsinh pers. comm. 2016). Gee (1965) reported that the Hangul was "definitely declining in numbers" and predicted its extinction in the foreseeable future unless effective action was taken to preserve it. Gee (1965) states that he was told by "experienced Kashmiris" that there may have been 3,000–5,000 animals in the 1900s and 1,000-2,000 animals in 1947, however no data were available to support these estimates. Prior to 1947 Hangul was regarded as "royal game" by the Maharaja and was thus strictly protected. In the 1950s, the total population was estimated at a few hundred animals but this was thought to have been optimistic (Gee, 1965). By 1960, the total population estimate had fallen to 250 individuals and by 1962 to 175-200 animals as estimated by Gee, although official estimates were significantly higher at 360 animals (Gee, 1965). In 1965 the official total population estimate was 250 animals, but Gee (1965) suggests 180 animals may have been more accurate.

In 1968, Schaller conducted a census of the Hangul population during the rut and estimated a total population size of 180 animals, similarly Holloway in 1970 estimated 140-170 animals (Kurt 1978). From the early 1970s onwards the official estimates of the Hangul increased up to a peak of 818 individuals in 1988. However, these official estimates were almost certainly inflated (M.K. Ranjitsinh pers. comm. 2016). Disturbances in Kashmir prevented the monitoring of the Hangul population in Dachigam from 1989 to 1991. When monitoring resumed in 1992, the population had reached the lowest level yet recorded at 120–140 individuals, which is believed to be a reliable estimate (M.K. Ranjitsinh pers. comm. 2016).

From 1994 to 2003 the Hangul population in Dachigam was estimated to be between 150 and 195 individuals with numbers remaining fairly stable over that period. Post-2003, official population estimates were again most likely inflated (M.K. Ranjitisnh pers. comm. 2016). Problems with differing survey methods are also apparent, in 2011, based on the bounded-count method, the total population was estimated to be 260 individuals with the lower and upper ranges of 243 and 432 animals, which are again most likely inflated (K. Ahmad pers. comm. 2017), and based on the raw count method the population was estimated in 2011 at an average of 218 individuals (Charoo *et al.* 2011).

All co-authors of this assessment agree with the population estimate from 2015, of 110-130 individuals in Dachigan National Park, and the overall population including the other relic populations in Kashmir (Tral-Overa, Lidder, Chattergul-Wanghat, Sindh and Diver Inderbug- Lolab, Kishanganga), was estimated to be fewer than 150-200 individuals (Bacha 2014, Bacha *et al.* 2015).

Due to the doubts over the veracity of official Hangul population estimates and differing monitoring methods applied over time, it is very difficult to determine the population trend based on these data. However, additional information suggests that the Hangul population is very likely undergoing a continual decline. The current sex ratio of the Hangul population in Dachigam is 1 stag: 11 hinds (M.K.

Ranjitsinh pers. comm. 2016), stags are more vulnerable to poaching, particularly during the rut, which is the main threat to the Hangul population (Shah *et al.* 2011). In 2006 the stag: hind ratio was estimated at 29: 100, and in 2009 it was estimated at 18: 100 (Qureshi *et al.* 2009) suggesting the situation has worsened quite significantly in recent years and that poaching is taking a considerable toll on the Hangul population.

The number of young is also extremely low with a current fawn: hind ratio of 14: 100 inside Dachigam NP (Ahmad *et al.* 2016) and 6: 100 outside Dachigam NP (Ahmad *et al.* 2014), this is significantly lower than in 2009 when the ratio was estimated at 21: 100 (Qureshi *et al.* 2009). Schaller (1969) reported a stag: hind ratio of 45: 100, above 30: 100 is considered to be a good ratio for Red Deer (Clutton-Brock *et al.* 1982). The summer pastures and only extant breeding ground of Hangul are also occupied by shepherds, sheep flocks and their guard dogs (Shah *et al.* 2011), the latter disturb and depredate the newly born fawns (Qureshi *et al.* 2009, M.K. Ranjitsinh pers. comm. 2016).

Current Population Trend: Decreasing

Habitat and Ecology (see Appendix for additional information)

Cervus h. hanglu inhabits deciduous woodland, upland moors and open mountainous areas (sometimes above the tree-line), natural grasslands, pastures and meadows (Koubek and Zima 1999). Primarily it uses mixed oak forests, followed by mulberry *Morus* and riverine habitats during the winter and mixed oak forests and coniferous forests during the summer, where food availability is greatest (Ahmad *et al.* 2015). In woodland, its diet consists mainly of shrub and tree shoots, but in other habitats it also consumes grasses, sedges and shrubs.

It is generally found in mountainous areas, where it spends summers in alpine meadows and winters in valleys (Ahmad *et al.* 2015). On more level terrain, it seeks wooded hillsides in summer, open grasslands in winter.

Surveys suggest that Surfrao, Akhal and Kangan blocks of the Sindh Forest Division are particularly important for Hangul in summer, when the upper subalpine reaches of Dachigam National Park are under intense pressure form local people and livestock (Ahmad *et al.* 2013).

Systems: Terrestrial

Use and Trade

The species is illegally hunted. The illegal hunting is one of the main reasons for the species' decline in the past and present.

Threats (see Appendix for additional information)

Poaching, by both civilian and military personnel, was identified as the main cause of the decline of the Hangul in the past and present (Shah *et al.* 2011). The Wildlife Department are at present not patrolling and implementing protection activities adequately due in part to the occupation of Dachigam National Park by insurgents and the armed forces, thus poaching may very likely have increased as a result (M.K. Ranjitsinh pers. comm. 2016), and also likely due to the lack of commitment by protected area staff (K. Ahmad pers. comm 2017). Incursion of nomadic livestock herders and predation of fawns by their guard dogs is reportedly also a significant problem that is not being effectively dealt with. Furthermore,

competition for grazing grounds with livestock and the associated risk of disease transmission are also potential threats to Hangul (Ahmad *et al.* 2009, Qureshi *et al.* 2009).

The Hangul population in the Dachigam landscape now appears to have low genetic variation compared with other species and thus could be susceptible to the effects of inbreeding (Mukesh *et al.* 2013, 2015). An imbalance in the male-female and ratios has been documented although a population viability analysis (PVA) suggests that the population has the potential to recover if stringent protection and other conservation measures are implemented (Mukesh et al 2015). The low recruitment rate could be attributed to a number of factors, such as poaching, breeding failures, poor survival rates due to predation and grazing competition and disease transmission from domestic livestock (Ahmad *et al.* 2009, Qureshi *et al.* 2009, M.K. Ranjitsinh pers. comm. 2017), resource restrictions which may be concentrating the population into small groups, further exacerbating the potential for inbreeding (Mukesh *et al.* 2015). Reported predation by Leopard *Panthera pardus* and Asiatic Black Bear *Ursus thibetanus* may exacerbate an already fragile situation (Shah *et al.* 2011; Ahmad *et al.* 2009, 2013).

Conservation Actions (see Appendix for additional information)

Dachigam National Park is the stronghold for the Hangul containing the only population larger than a few individuals. Despite some conservation efforts, poaching is clearly the biggest threat to the Hangul. Ensuring that poaching is no longer a threat to the Hangul is the highest priority conservation intervention. Secondly, preventing incursion of nomadic livestock herders will reduce competition with livestock for grazing grounds, reduce the potential for disease transmission and will likely increase the survival rates of fawns by reducing depredation by herding dogs (Ahmad *et al.* 2009, Qureshi *et al.* 2009).

Discontinuing the release of problem Leopards and Asiatic Black Bears in the area could also help reduce predation on Hangul fawns and increase survival and recruitment (M.K. Ranjitsinh and K. Ahmad pers. comm. 2017).

Ahmad *et al.* (2013) concludes that the Hangul's range needs to be expanded by ensuring the subalpine and alpine meadows of upper Dachigam and other formerly occupied areas are kept free of livestock and other anthropogenic pressures such as poaching.

Mukesh *et al.* (2015) suggest that mapping, protecting and enriching forest patches where Hangul habitat remains should be undertaken, however before further resources are invested this should be confirmed to be an appropriate activity. A comprehensive management plan would help to further determine priority conservation and research activities to ensure the effective conservation of Hangul and its habitat (Shah *et al.* 2011).

A 'mega preserve' of Greater Dachigam has been proposed to strengthen the protection in the Buffer Zone by upgrading conservation reserves and securing an Eco-sensitive Zone, through extending protection to the remaining Shikargah subpopulations of the Tral and Sindh areas.

Conservation breeding is recognized as a high priority (Ahmad *et al.* 2009, Shah *et al.* 2011) to safeguard the Hangul, increase recruitment (Mukesh *et al.* 2015) and possibly re-stock former localities, in particular the Overa Wildlife Sanctuary and Shikargah Conservation Reserve, which are "almost free of human interferences" and reportedly held the largest populations of Hangul in the past (Ahmad *et al.*

2009, 2013). Park staff provide supplementary food (salt and willow leaves) at fixed points in winter (Ahmad *et al.* 2015). Involvement and increased awareness of local communities in the management of areas where the Hangul occurs will be necessary to ensure effective management and recovery of the Hangul in the long-term (Ahmad *et al.* 2013, Shah *et al.* 2011).

Cervus elaphus hanglu is listed on Appendix I of CITES, under Schedule I of the Indian Wildlife (Protection) Act, 1972 and Jammu and Kashmir Wildlife (Protection) Act, 1978. The Hangul has also been listed amongst the top 15 species of high conservation priority by the Government of India (Mukesh *et al.* 2015, Mukesh and Sathyakumar 2016).

Credits

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Bibliography

Ahmad, K. and Nigam, P. 2014. Kashmir Red deer or Hangul *Cervus elaphus hanglu* at the Brink of Extinction- Conservation Action, the need of an Hour. *IUCN-DSG Newsletter* 26: 37-47.

Ahmad, K., Qureshi, Q., Agoramoorthy, G. and Nigam, P. 2015. Habitat use patterns and food habits of the Kasmir Rd Deer or Hangul (*Cervus elaphus hanglu*) in Dachigam National Park, Kashmir, India. *Ethology, Ecology and Evolution* 1: 85-101.

Ahmad, K., Qureshi Q. and Nigam, P. 2016. Long Term Conservation Plan for Hangul: Part II Hangul Movement Pattern Study using GPS-Satellite Telemetry. Field Technical Report (November 2015-November 2016). Ministry of Environment, Forests and Climate Change, Government of India, New Delhi.

Ahmad, K., Qureshi, Q., Nigam, P, and Suhail, I. 2013. Status and conservation of Hangul (*Cervus elaphus hanglu*) in its relic range areas outside Dachigam National Park, Kashmir. *Indian Forester* 139: 883-887.

Ahmad, K., Sathyakumar, S. and Qureshi, Q. 2009. Conservation status of the last surviving wild population of Hangul or Kashmir Red Deer *Cervus elaphus hanglu* in Kashmir, India. *Journal of the Bombay Natural History Society* 106(3): 245-255.

Bacha, M.S. 2014. Present Status of Hangul *Cervus elaphus hanglu* Wagner, 1844. Report by Chairman, Kashmir Wildlife Conservation Fund.

Bacha, M.S., Zargar, A.R. and Sofi, M.N. 2015. Kashmir Deer [Hangul] *Cervus elaphus hanglu* Enumeration, 2015, in and outside Dachigam National Park, Srinagar, Kashmir, Jammu & Kashmir. A report by the Wildlife Conservation Fund, India.

Cap, H., Deleporte, P., Joachim, J. and Reby, D. 2008. Male vocal behaviour and phylogeny in deer. *Cladistics* 24: 917-931.

Donnithorne-Tait, D., Buxton, J., Harcourt, S., Rudd, K. and Ashcroft, F. 1974. Operation Hangul Final Report. Cambridge World Wildlife Study Centre, Cambridge, UK.

Flerov, K.K. 1952. Musk deer and deer. In: Pavlovsky, E.N. (ed.), *Fauna SSSR*, pp. 1-255. Mlekopitayuschie, Izdatelstvo Akademii Nauk SSSR, Moskva.

Frey, R. and Riede, T. 2013. The anatomy of vocal divergence in North American elk and European red deer. *Journal of Morphology* 274: 307-319.

Gee, E.P. 1965. Report on the status of the Kashmir stag: October 1965. *Journal of the Bombay Natural History Society* 62: 379-393.

Geist, V. 1998. *Deer of the World: Their Evolution, Behaviour, and Ecology*. Stackpole Books, Mechanicsburg, Pennsylvania, USA.

Groves, C. and Grubb, P. 2011. *Ungulate Taxonomy*. The Johns Hopkins University Press, Baltimore, USA.

Groves, C.P. and Grubb, P. 1987. Relationships of Living Deer. In: C.M. Wemmer (ed.), *Biology and Management of the Cervidae*, pp. 21-59. Smithsonian Institution Press, Washington, DC, USA.

IUCN. 2017. The IUCN Red List of Threatened Species. Version 2017-2. Available at: www.iucnredlist.org. (Accessed: 14 September 2017).

Koubek, P. and Zima, J. 1999. *Cervus elaphus*. In: A. J. Mitchell-Jones, G. Amori, W. Bogdanowicz, B. Kryštufek, P. J. H. Reijnders, F. Spitzenberger, M. Stubbe, J. B. M. Thissen, V. Vohralík and J. Zima (eds),

The Atlas of European Mammals, pp. 388–389. Academic Press, London, UK.

Kumar, V.P., Thakur, M., Rajpoot, A., Joshi, B.D., Nigam, P., Ahmad, K., Nigam, P., Ahmad, K., Kumar, D. and Goyal, S.P. 2016. Resolving the phylogenetic status and taxonomic relationships of the Hangul (*Cervus elaphus hanglu*) in the family Cervidae. *Mitochondrial DNA Part A*: 1-8.

Kurt, F. 1978. Kashmir Deer (*Cervus elaphus hanglu*) in Dachigam. In: Threatened Deer. *Proceedings of a working meeting of the Deer Specialist Group of the Survival Service Commission, IUCN, Washington, USA*.

Kuwayama, R. and Ozawa, T. 2000. Phylogenetic relationships among European Red Deer, Wapiti, and Sika deer inferred from mitochondrial DNA sequences. *Molecular Phylogenetics and Evolution* 15: 115-123.

Kuwuyama, R. and Ozawa, T. 1999. Phylogenetic relationships among European red deer, wapiti and sika deer inferred from mitochondrial DNA sequences. *Molecular Phylogenetic Evolution* 15: 115-123.

Liu, Y.H., Zhang, M.H. and Ma, J.Z. 2013. Phylogeography of red deer (*Cervus elaphus*) in China based on mtDNA cytochrome B gene. *Research Journal of Biotechnology* 8: 34-41.

Lorenzini, R. and Garofalo, L. 2015. Insights into the evolutionary history of iCervus (Cervidae, tribe Cerini) based on Bayesian analysis of mitochondrial marker sequences, with first indications for a new species. *Journal of Zoological Systematics and Evolutionary Research* 53: 340-349.

Ludt, C. J., Schroeder, W., Rottmann, O. and Kuehn, R. 2004. Mitochondrial DNA phylogeography of red deer (*Cervus elaphus*). *Molecular Phylogenetics and Evolution* 31: 1064–1083.

Lydekker, R. 1898. *The deer of all lands*. Rowland Ward, London.

Mahmut, H. Ganzorig, S., Onuma, M., Masuda, R., Suzuki, M. and Ohtaishi, N. 2001. A preliminary study of the genetic diversity of Xinjiang Tarim Red Deer (*Cervus elaphus yarkandensis*) using the microsatellite DNA method. *Japanese Journal of Veterinary Research* 49: 231-237.

Mattioli, S. 2011. Family Cervidae (Deer). In: D.E. Wilson and R.A Mittermeier (eds), *Handbook of the mammals of the world*, pp. 350-443. Lynx Edicions, Barcelona.

Mukesh, Kumar, V.P., Sharma, L.K., Shukla, M. and Sathyakumar, S. 2015. Pragmatic perspective on conservation genetics and demographic history of the last surviving population of Kashmir Red Deer (*Cervus elaphus hanlu*) in India. *PLoS ONE* 10: e0117069.

Mukesh, Sharma, L.K. and Sathyakumar, S. 2016. Hangul cry for discrete conservation status. *IUCN/SSC-Deer Specialist Group Newsletter May 2016* 28: 13-18.

Pereladova, O. 2013. Restoration of Bukhara Deer (*Cervus elaphus bacrianus* Lydd) in Central Asia in 2000-2011. *Deer Specialist Group News* 25: 19-30.

Pitra, C., Fickel, J., Meijaard, E. and Groves, C.P. 2004. Evolution and phylogeny of old world deer. *Molecular Phylogenetics and Evolution* 33: 880-895.

Qureshi, Q., Shah, N., Wadoo, A.R., Naqqash, R.Y., Bacha, M.S., Kitchloo, N.A., Shah, J.N., Suhail, I., Iqbal, S., Ahmad, K., Lone, I.A., Mansoor, M., Zargar, R.A., Hussain, S., Baba, M.M., Parsa, M.A., Latoo, A.R. and Dewan, I. 2009. Status and distribution of hangul *Cervus elaphus hanglu* Wagner in Kashmir, India. *Journal of the Bombay Natural History Society* 106: 63-71.

Shah, G.M., Jan, U., Bhat, B.A. and Ahanger, F.A. 2011. Causes of decline of Critically Endangered Hangul deer in Dachigam National Park, Kashmir (India): a review. *International Journal of Biodiversity and Conservation* 3: 735-738.

Sharma, L.K., Kumar, V.P., Charoo, S.A., Mohan, N., Goyal, S.P. and Sathyakumar, S. 2013. Loss of genetic diversity and inbreeding in Kashmir red deer (*Cervus elaphus hanglu*) of Dachigam National Park, Jammu & Kashmir, India. *BMC research notes* 6(1): 326.

Wilson, D.E. and Mittermeier, R.A. 2011. *Handbook of the mammals of the world. Vol. 2. Hoofed mammals*. Lynx Edicions, Barcelona, Spain.

Wilson, D.E. and Reeder, D.M. 2005. *Mammal Species of the World*. Johns Hopkins University Press, Baltimore, MD, USA.

Zhang, W.-Q. and Zhang, M.-H. 2012. Phylogeny and evolution of Cervidae based on complete mitochondrial genomes. *Genetics and Molecular Research* 11: 628-635.

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External Resources

For Images and External Links to Additional Information, please see the Red List website.

Appendix

Habitats

Habitat	Season	Suitability	Major Importance?
1. Forest -> 1.4. Forest - Temperate	-	Suitable	Yes
4. Grassland -> 4.4. Grassland - Temperate	-	Suitable	-

Threats

Threat	Timing	Scope	Severity	Impact Score
2. Agriculture & aquaculture -> 2.3. Livestock farming & ranching -> 2.3.1. Nomadic grazing	Ongoing	Majority (50-90%)	Unknown	Unknown
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation		
		2. Species Stresses -> 2.3. Indirect species effects -> 2.3.2. Competition		
5. Biological resource use -> 5.1. Hunting & trapping terrestrial animals -> 5.1.1. Intentional use (species is the target)	Ongoing	Majority (50-90%)	Unknown	Unknown
	Stresses:	2. Species Stresses -> 2.1. Species mortality		
		2. Species Stresses -> 2.3. Indirect species effects -> 2.3.6. Skewed sex ratios		
		2. Species Stresses -> 2.3. Indirect species effects -> 2.3.7. Reduced reproductive success		
5. Biological resource use -> 5.1. Hunting & trapping terrestrial animals -> 5.1.2. Unintentional effects (species is not the target)	Ongoing	Majority (50-90%)	Unknown	Unknown
	Stresses:	2. Species Stresses -> 2.1. Species mortality		
		2. Species Stresses -> 2.3. Indirect species effects -> 2.3.6. Skewed sex ratios		
		2. Species Stresses -> 2.3. Indirect species effects -> 2.3.7. Reduced reproductive success		
6. Human intrusions & disturbance -> 6.2. War, civil unrest & military exercises	Ongoing	Unknown	Causing/could cause fluctuations	Unknown
	Stresses:	2. Species Stresses -> 2.3. Indirect species effects -> 2.3.8. Other		

Conservation Actions Needed

Conservation Actions Needed
1. Land/water protection -> 1.1. Site/area protection
1. Land/water protection -> 1.2. Resource & habitat protection

Conservation Actions Needed
2. Land/water management -> 2.1. Site/area management
2. Land/water management -> 2.3. Habitat & natural process restoration
3. Species management -> 3.1. Species management -> 3.1.3. Limiting population growth
3. Species management -> 3.4. Ex-situ conservation -> 3.4.1. Captive breeding/artificial propagation
5. Law & policy -> 5.4. Compliance and enforcement -> 5.4.2. National level
5. Law & policy -> 5.4. Compliance and enforcement -> 5.4.3. Sub-national level

Research Needed
(http://www.iucnredlist.org/technical-documents/classification-schemes)

Research Needed
1. Research -> 1.5. Threats
1. Research -> 1.6. Actions
2. Conservation Planning -> 2.1. Species Action/Recovery Plan
2. Conservation Planning -> 2.2. Area-based Management Plan
3. Monitoring -> 3.1. Population trends
3. Monitoring -> 3.4. Habitat trends

Additional Data Fields

Distribution
Estimated area of occupancy (AOO) (km²): 228
Population
Number of mature individuals: 100-150
Continuing decline of mature individuals: Yes
Habitats and Ecology
Generation Length (years): 14

The IUCN Red List Partnership

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