LINEAR INFRASTRUCTURE IN SNOW LEOPARD LANDSCAPES

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GSLEP

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Introduction

Linear infrastructure—including roads, railways, canals, powerlines, pipelines, and fences—is crucial for human economic well-being. However, if developed without appropriate environmental and social considerations and measures, it can also have substantial negative impacts on biodiversity and ecosystems. In this policy advisory, we discuss the implications of linear infrastructure impacts on snow leopards, their prey, and mountain habitats and suggest a way forward to address the challenges that linear infrastructure poses to biodiversity.

This advisory was developed for the Global Snow Leopard and Ecosystem Protection Programme (GSLEP), a unique platform that brings together governments of the 12 snow leopard range countries in the form of an intergovernmental conservation alliance. The GSLEP's operations are governed by a Steering Committee that is represented by Environment Ministers from the 12 snow leopard range countries and supported by non-government and multilateral organizations. Over the past 10 years, the GSLEP has played a pivotal role in mainstreaming snow leopard conservation through high level political statements, declarations, and resolutions, and supporting their implementation. So far, the GSLEP has produced 13 policy advisories that have been approved by the range country governments.

During the Seventh Steering Committee Meeting in Bishkek in October 2022 (Fig. 1), the GSLEP members endorsed a resolution, that, among other important points, stated that the GSLEP and its supporting organizations,

"Recognize the multipronged threats that linear infrastructure poses to snow leopard ecosystems and advise the GSLEP Secretariat to set up a dedicated working group to develop policy guidelines and strategy to help mitigate such threats." In July 2023 a Working Group composed of GSLEP members and snow leopard and linear infrastructure experts was formed for this purpose. As a first step toward the production of the policy guidelines, this linear infrastructure advisory specifically discusses the threats that linear infrastructure projects pose to snow leopards, based on relevant published literature. We also provide a brief conceptual toolkit that can help policy makers to think through the different risks posed by linear infrastructure which can help mitigate their negative impacts while also ensuring they bring benefits to people. Proceeding this document, the Working Group will develop the guidelines described above.

Figure 1. *Luncheon during the GSLEP Steering Committee meeting in October 2022 to specifically address the threats of linear infrastructure to snow leopards.*
Credit: Koustubh Sharma

What is Linear Infrastructure?

Linear infrastructure can take different forms and can be managed in various ways. Linear infrastructure impacts landscapes primarily in the form of fences or transport and energy transmission infrastructure. Roads are the predominant form of transportation infrastructure and can be internationally, federally, provincially, or locally managed by governments or by private entities. Toll roads are privately managed roads that allow public use, while roads within mining or forestry concessions or on large agricultural plots may have restricted use. The other forms of transport infrastructure, railways and canals, may also be publicly or privately managed. Linear energy transmission infrastructure, on the other hand, includes pipelines and transmission lines. Energy infrastructure experiences little to no vehicular traffic, but can cause many of the impacts described below. Finally, a form of linear infrastructure that receives less attention but can produce similar barrier effects as roads and rail, is fencing and walls. Fencing and walls are installed to prevent human international border crossings,trespassing on private land, to contain livestock and to prevent humans and animals from entering specific areas, like roads, rail lines, or runways.

Linear infrastructure is important to human connectivity and economies. This is particularly true in snow leopard habitat landscapes, where local communities are often in remote, poorly connected spaces. A study in rural Pakistan, in snow leopard range, reported that local communities had largely positive perceptions of linear infrastructure, because they perceive it to improve socio-economic conditions, provide access to new employment and livelihood opportunities, and increase mobility and accessibility (Khan et al. 2021). Snow leopard ranges encompass many international borders and some of these borders and border areas are contested, and from national security perspectives, linear infrastructure is vital (Sultan et al. 2020).

Linear infrastructure development is expanding rapidly across the globe. Dulac (2013) estimated that globally, 25 million paved road-lane-kilometers would be needed by 2050 to support the traffic necessary to meet human economic growth needs. This is a 60% increase from 2010 in the length of global road-lane-kilometers, and ninety percent of this expansion is projected to occur in developing countries,

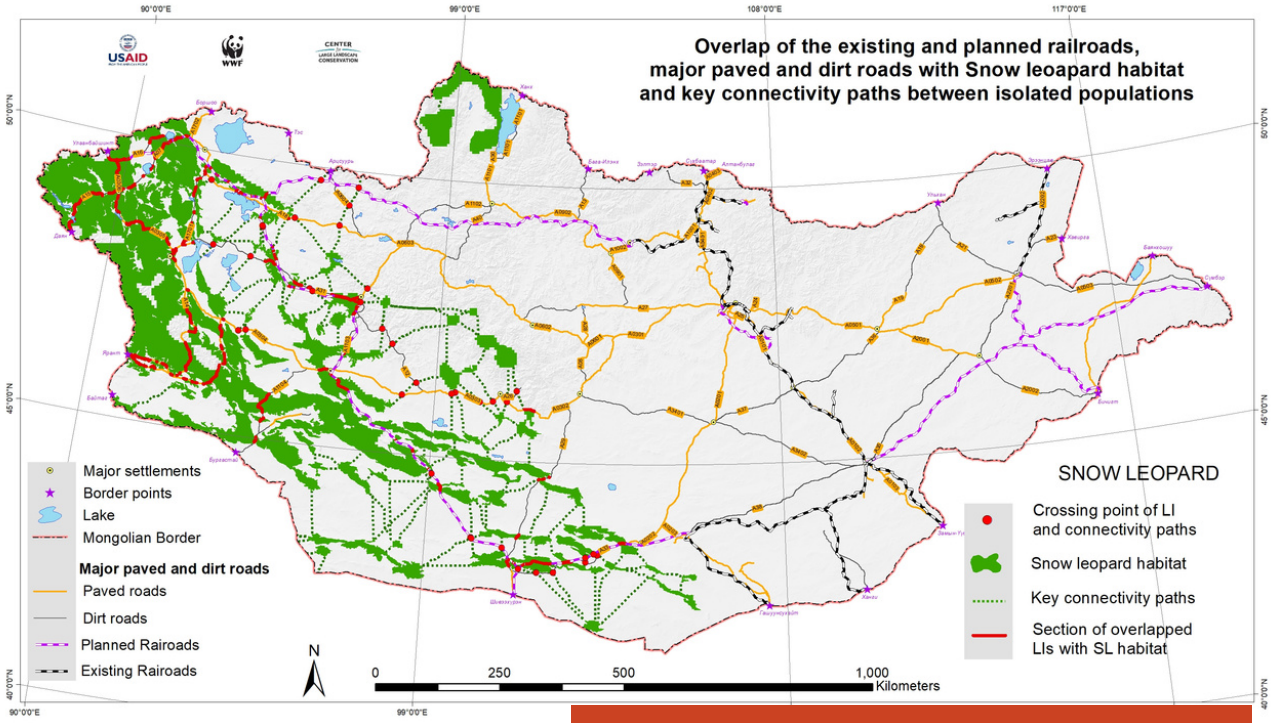

Figure 2. *Existing and planned linear infrastructure in Mongolia and impacts on snow leopard habitat connectivity. © WWF-Mongolia*

including many of the snow leopard range countries (Dulac 2013). In a more recent evaluation for Asia, the Asian Development Bank (2017) estimated the need for USD 1.7 trillion of infrastructure investment annually until 2030 to keep pace with regional growth, to approach poverty issues, and to address climate change. The two largest sectors contributing to this investment were power and transport—the two main sources of linear infrastructure—at 56% and 32%, respectively, of total necessary investment (ADB 2017). This development explosion presents a major challenge for snow leopard populations across their range (Figure 2).

The Challenge of Linear Infrastructure

Linear infrastructure can have adverse impacts on biodiversity, ecosystems and their services, and the culture of local and indigenous peoples (Khan et al. 2021). With regard to biodiversity, infrastructure has been identified as the single biggest threat to low-density and wide-ranging species (World Bank 2010). Linear infrastructure poses direct risks to wildlife via vehicular collisions and indirect risks such as increasing access for illicit hunting and wildlife trade. It can also impede wildlife movement and cause habitat fragmentation, which can reduce available habitat, resources and isolate wildlife populations, exacerbating extinction likelihood (ADB 2019; CMS 2021; WII 2016). Such barriers to wildlife movement can also impact human communities and their livelihoods by aggravating conservation conflicts. Climate change also exacerbates the threats posed by linear infrastructure, especially when linear infrastructure is planned without factoring in the impacts of the changing climate (Moretti and Loprencipe 2018).

Linear Infrastructure Threats to Snow Leopards

Snow leopard landscapes, until very recently, were remote, with little linear infrastructure presence. However, especially over the last decade, these regions have become increasingly connected and have seen more investment in linear infrastructure projects. Such projects increase accessibility to these once remote habitats and lead to threats to snow leopard populations, their prey species, and the ecosystems in general (Fig. 3). Some threats are caused directly by the linear infrastructure such as wildlife death or injury through vehicle collisions or movement impediments. In other cases linear infrastructure exacerbates existing threats by increasing accessibility, such as increased illicit hunting, settlements, agriculture, or grazing pressures.

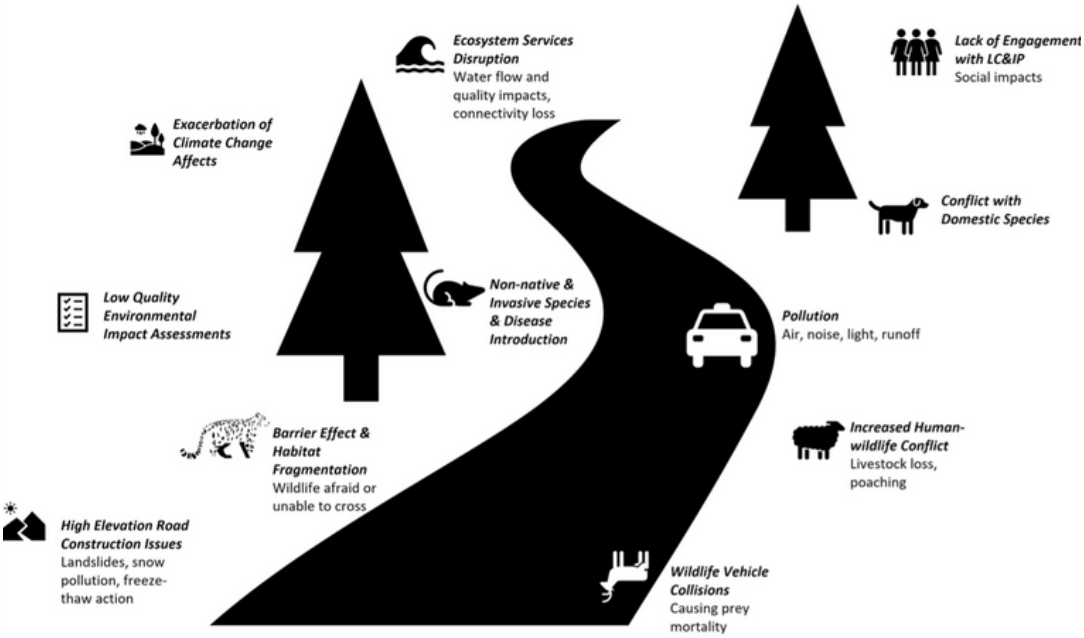

Figure 3. *Threats to snow leopards, their prey, and their habitats caused and exacerbated by linear infrastructure. Credit: WWF-US*

Wildlife Vehicle Collisions

Wildlife collisions with vehicles such as cars, trucks, and trains is a common cause of wildlife mortality globally (Fig. 4 and 5). In the Hindukush-Himalayan Landscape in Pakistan, a recent survey on the impacts of roads in snow leopard landscapes found that snow leopard prey species, particularly the Asiatic ibex *(Capra sibirica)*, were substantially impacted by vehicle collisions (Khan et al. 2021).

Figure 4. *Snow leopard killed in a collision with a bus in Mongolia. © WWF-Mongolia*

Figure 5. *A blue sheep killed in a vehicle collision on a road in Ladakh, Western Himalayas, India. Credit: Preet Sharma/WWF-India*

An evaluation of wildlife collisions shared on social media and in local newspapers in the Kashmir Valley of India did not record snow leopards but several other large carnivores such as the Asiatic black bear *(Ursus thibetanus,* Tral Wildlife Sanctuary*)*, Tibetan wolf *(Canis lupus chanco,* Hirpora Wildlife Sanctuary*)*, and common leopard *(Panthera pardus,* Anantnag) (Haq et al. 2022). To date, there have been few reports of vehicle collisions involving snow leopards (e.g., in Western Mongolia in 2017, Fig. 4), but with increasing traffic, especially due to the rapid surge in tourism, direct collisions are likely to be a growing threat (WWF-US 2017).

Barrier Effect

Figure 6. *Ibex assessing whether to cross a road in Lahual, India. Credit: Amir Chand.*

Prey species of the snow leopard also rely on seasonal migration for survival, especially since their landscapes are typically resource-limited (Mallon et al. 2014). For example, Tibetan gazelle *(Procapra picticaudata*) migrates approximately 300 km between their summer and winter pastures (Buho et al. 2011). Linear infrastructure poses significant impediments to this scale of movement, as many roads, railways, fences and transmission lines cross these landscapes. Impacts of impenetrable border fences on prey species, specifically argali (*Ovis ammon*) are documented, for example on the Tajikistan border, where remains of animals have been found entangled in the fence and herds have been observed visibly confused that they could not access previously used pastures (Rosen 2012) (Fig. 7).

Linear infrastructure can interfere with the mobility patterns of wildlife (Fig. 6). It can disrupt established migration routes and movement related to dispersal of young adults to established territories. It can also impede access to vital grazing and water sources and hinder the establishment and defense of territories. Furthermore, these barriers may lead to population isolation, heightening susceptibility to localized threats and diminishing the overarching resilience of the species via inbreeding depression. Connectivity is crucial for facilitating genetic exchange between populations, and this is especially important for threatened and low-density species such as the snow leopard. Snow leopards need to traverse extremely large distances to meet their ecological needs (Zahler 2016). Adult male snow leopards have an average home range of ~200 km2 (Johanssen et al. 2016)

Figure 7. *Dead ungulate killed on a border fence on the Turkmenistan/ Kazakhstan border.*
Credit: Tanya Rosen

but can extend to as much as a few thousand km2 (Rosenbaum et al. 2023, Yu et al. 2022, and Johanssen et al. 2016), with daily movements of individual snow leopards potentially exceeding 12 km (McCarthy et al. 2005).

Habitat Fragmentation and Degradation

The construction and maintenance of transport infrastructure is one of the most significant drivers of vegetation removal, causing ecosystem degradation, habitat fragmentation, and infestations of invasive plants which in turn impacts biodiversity, soil integrity, and carbon sequestration (Ghent, 2018). Removal of vegetative cover from steep slopes makes them more prone to soil erosion, flooding, silting, and desertification along with natural hazards such as landslides (Fig. 8). Habitat degradation also impacts the availability of fodder for prey species and the cascading effects of prey population impacts include shifting ranges, disease, human-wildlife conflicts and ultimately impacts snow leopard viability. While some forms of linear infrastructure such as fences can be entirely untraversable to some species, even infrastructure that is crossable, in theory, by a species, may be avoided.

Figure 8. *Landslide from unseasonal precipitation causing a mountain trail to be washed away in Nepal, Shey Phoksundo National Park. Credit: Sheren Shrestha.*

Linear infrastructure can cause behavioral changes such as avoidance of the area or activity changes over the course of the day. Extensive field observations in Changthang, indicate that apart from Kiang *(Equus kiang)*, other ungulates such as blue *(Pseudois nayaur)*, argali *(Ovis ammon)*, and urial sheep *(Ovis vignei)* are rarely seen near roads. Tourists and photographers, in their quest for better visuals or entertainment, sometimes engage in activities such as off-road driving and chasing ungulates that are distressing to these animals. This behavior has led to a noticeable trend where ungulates increasingly avoid roads, possibly due to the rising disturbance caused by tourist and vehicular traffic. In regions without roads, ungulates are unafraid of human presence and have longer flight distances as compared to sites with extensive road networks. In addition, a decline in snow leopard signs such as scats, scent and pugmarks has been observed with decreasing distance to roads (WWF India, unpublished data).

High Elevation Road Construction

In high elevation environments, which characterize snow leopard habitat, construction of linear infrastructure poses additional logistical and environmental risks related to material sourcing, exposure to climate processes, and modification of existing conditions with potential to result in geotechnical failures and hydrological impacts (Ghent 2018). In addition to long-term impacts associated with designing and setting new linear infrastructure, new construction (an influx of workers, sound, vibrations, and habitat disturbance) can have short-term effects on wildlife populations and environmental risks. Failures of linear infrastructure in high elevation environments have precipitating effects on downstream ecosystems by transporting sediment and other pollutants, altering hydrologic patterns, and degrading habitats (Ghent 2018).

Low Quality Environmental Impact Assessments

Typically, Environmental Impact Assessments and Strategic Impact Assessments are conducted to identify and mitigate risks to the environment and biodiversity and foster sustainable development (Alshuwaikhat 2005). In snow leopard landscapes, such procedures are often compromised due to growing economic development needs, limited capacity of Environmental Protection Agencies and consultants, lack of political will, and outdated regulations (Khan et al. 2020). In other instances, assessments are completed too late to be incorporated into decision-making processes, and at such a late point, can be considered too costly to incorporate appropriate mitigation measures (Wingard et al., 2014).

Blue sheep crossing a road in Spiti, India. Credit: Kalzang.

Implementation of necessary environmental protocols can be further complicated by such things as the importance of linear infrastructure to local and regional economies and management regimes that span local to even international decision-making (Zahler and Victurine 2024).

Snow leopard running down a road in Karakoram Highway in Khunjerab National Park (KNP), Gilgit-Baltistan, Pakistan. Credit: RFO Shabbirullah Baig/WWF-Pakistan.

Pollution

The construction and operation of linear infrastructure can generate many types of pollution. Vehicles building and using linear infrastructure create noise, vibrations, light, and air pollution (Fig. 9); road runoff causes water and soil pollution, including contamination of verge vegetation; and vehicles cause soil compaction next to linear infrastructure.

Figure 9. *Trucks moving along a road in Mongolia kicking up dust and sediment. Credit: Chimeddorj Buyanaa.*

Emissions caused by vehicles not only reduce local air quality but increase local greenhouse gas concentrations along with alterations in climate indicators, including mean temperature and precipitation patterns, causing a persistence of pollutants in the air. Valleys, where linear infrastructure is often placed, can be particularly susceptible to these impacts as they are narrow and can experience reduced air movement. For example, in Gilgit-Baltistan, Pakistan, part of the snow leopard range, the present concentration of Particulate Matter 2.5 in the atmosphere ranges from 50 µg/m3 to 60 µg/m3, much higher than the National Environmental Quality Standard for Pakistan of 35 µg/m3. In high-elevation snow leopard landscapes, increasing greenhouse gas effects can accelerate glacier melt, leading to such associated effects as debris flow, Glacial Lake Outburst Floods, and permafrost thawing. This could have serious implications for natural ecosystems and livelihoods and may adversely impact the sufficient flow of freshwater in the downstream rivers.

Ecosystem Services Disruption and Climate Change

Roads cause soil erosion, which is detrimental to maintaining local ecosystems and preserving the land's ability to absorb greenhouse gasses, magnifying climate change effects. Additionally, construction processes involving blasting and drilling, along with the repair of roads, may weaken the geology of the surrounding area and lead to increased incidences of rock falls and landslides, which can further degrade the environment and pose significant dangers to local communities, leaving them without travel routes and/or power.

As the frequency and intensity of extreme weather events increases globally with climate change, intense precipitation and flooding events will become more common. Linear infrastructure is not generally designed for such heavy water flows because it was designed under outdated weather and flow projections. Even current standards may not accurately predict future climate scenarios. Heavy flooding can cause linear infrastructure to fail, creating massive landslides and dangerous conditions for humans and wildlife.

Conflict with Domestic Species

Building linear infrastructure requires large amounts of human labor, encampments for construction teams, and additional supporting infrastructure (Fig. 10). The food waste generated at these sites results in proliferation of free-ranging dogs which is a major threat to wildlife including snow leopards, wild ungulates, and domestic livestock (Home et al. 2017). In Spiti Valley India, feral dogs accounted for more than 40% of livestock mortality (Suryawanshi et al. 2013). Free-ranging dogs compete with snow leopards for their primary prey (Ahmad et al. 2022). For example, in the Chitral Gol National Park, in Pakistan, dogs alone killed 392 markhors *(Capra falconeri)* over 15 years (Khattak et al. 2021). There are also anecdotal reports, and images from camera traps that show groups of dogs chasing snow leopards, and in some cases chasing them away from prey carcasses (Gandhi 2019).

Human Access to New Areas

Linear infrastructure, especially roads, can increase the accessibility to new pasture areas for livestock farmers. This, in turn, increases grazing pressure and competition for snow leopard prey species. This could also open up previously remote, ungrazed areas. For example, the collapse of the Soviet Union, led to large-scale pasture abandonment, especially in remote regions, and one of the primary reasons was due to the difficulty in maintaining roads to these areas as countries moved from state-controlled economies to market-driven economies (Lesiv et al. 2018). In addition to increased range pressures, other human activities, such as collection of firewood, medicinal plants, and other material sold for commercial purposes like the fungus cordyceps *(Ophiocordyceps sinensis)* (Farrington 2024) impact both prey and snow leopard populations. Increased human use of snow leopard and prey habitats also lead to increases in human-wildlife conflicts, where livestock may outcompete wild ungulates for graze and where snow leopards may kill livestock, causing retaliatory killings.

Figure 10. *Himalayan brown bear near a construction sitefor the Gilgit Shandur Road, Pakistan. Credit: Gilgit-Baltistan Parks and Wildlife Department.*

Road accessibility has also been the primary driver of tourism in these landscapes, increasing pressure on pastures through higher footfall, trampling on sensitive grasslands, and off-road driving (Sultan et al. 2022). The collection of medicinal resources, such as cordyceps fungus, can bring thousands of people into snow leopard habitats in the spring. This access is facilitated by new linear infrastructure and puts a major strain on the fragile alpine ecosystems (Geneletti and Dawa 2009; WWF and USAID 2018).

Increased Disease Transmission

Increased accessibility and mobility bring wildlife, domestic animals, and humans in closer proximity, increasing disease transmission risks. Prey species, such as the ibex and the argali, can transmit and/or contract disease from domestic ungulates, given that they are close relatives and share the same pastures and water sources (Mishra et al. 2022). In addition, free-ranging dogs can transmit diseases like canine distemper and rabies to other wildlife and in the case of rabies, to humans (Home et al. 2022), with transmission to snow leopards a possibility.

Livestock vaccination in Pakistan.
Credit: SLF-Pakistan

Roads increase the movement of people and goods between the mountains and low-lying areas. Nearly 42.5% of the world's human population lives in the 12 snow leopard range-countries. Several of these countries include some tropical and temperate areas, which generally harbor more diseases compared to high elevation snow leopard landscapes. Therefore, diseases that originate in other parts of the snow leopard range countries can be transmitted to higher elevations.

Invasive Species Proliferation

Non-native invasive species, including plants, animals, and diseases, can move rapidly along linear infrastructure verges and can be transported—intentionally or inadvertently—by vehicles. A study in the Kashmir Valley in India, near snow leopard habitat, found 136 of 197 vascular plant species collected in road-side surveys to be non-native, with 51 being invasive and with richness and abundance of native species increasing at increased perpendicular distance to the study road (Dar et al. 2015). Non-native invasive species compete with native species and can cause localized extirpation of the native species. This can cause a cascade of impacts on the food web, including snow leopards.

Illegal Hunting

Illegal hunting for animal parts—notably fur and bones—is a growing threat to snow leopards (Li and Lu 2014; McCarthy and Chapron 2003; NABU 2002). Globally, around 221–450 individuals are estimated to have been killed annually since 2008, with 55% killed in retaliation for livestock depredation and 108-219 potentially entering the wildlife trade chain (TRAFFIC 2016). Snow leopards inhabit extreme terrains that are not easily accessible, which has likely acted as a natural safety net for the species. Improved connectivity through transport infrastructures may aggravate wildlife crime by easing access for illegal hunters and traders (USAID 2021; Farhadinia et al. 2019; WWF-Nepal 2018). Increased risks of wildlife crime in snow leopard landscapes due to linear infrastructure (World Bank 2010) likely begins as early as the construction phase. Remote linear infrastructure construction landscapes have limited facilities for workers who may be deployed for long periods. Workers brought in from other areas—with no socio-cultural association to the sites and lack of awareness and/or sensitivity to conservation issues, along with weak oversight by companies—may engage in illegal hunting to supplement their diets or incomes. Once operational, new transport infrastructure can also bring global demand centers for wildlife parts “closer” to wildlife population source sites (WWF 2016; Espinosa et al. 2014). This is likely to increase remnants of road kills or even retributory killing entering the trade chain. Conservation stakeholders may also need to be prepared for the possibility of increase in retributory killings of snow leopards, with linkages to demand centers assuring returns to mitigate community’s conflict losses. Such improved access for hunters have also been associated with decline in prey (Espinosa et al. 2018).

Urial sheep crossing beneath a fence design being piloted at the Kazakhstan-Turkmenistan border to allow wildlife movement. Credit: MoEP Kazakhstan KNB/BRCC/ACBK/CXL

Case Studies of Minimizing Impacts of Linear Infrastructure

Border Fences

In 2022, seventy-four border fences or walls were estimated to exist across the globe (Valet 2022). In recent years, there has been a proliferation of border fence construction projects to delineate jurisdictional boundaries. This growth is largely driven by national security concerns (Troubworst et al. 2016). One third of the snow leopard global range is located less than 100 km from international borders of 12 range countries (Zahler 2016), making border fences a potential barrier to movement. For example, in Central Asia, old border fences delineating the boundaries of the former Soviet Union have been replaced in many areas with impenetrable barbed wire fences and mesh wire, making it very difficult if not impossible for medium to large mammals to cross.

Border fences constitute a major threat to wildlife because they can cause mortality, block access to seasonally important habitat and prey, and ultimately impact populations (Linnell et al. 2016). While snow leopards in some border areas are known to climb such fences, injury is a distinct possibility. Mothers can also be separated from cubs, particularly if the cubs or mother are startled by border staff presence and lights. Whether snow leopards cross fences or not, such barriers can negatively alter movement habits and impact hunting success or access to prey.

In the late 1980's a fence line was installed along the northern Mongolian border, impacting a range of species, including the Altai sheep (Ovis ammon ammon) and Siberian ibex *(Capra sibirica)*. When attempting to cross the barbed wire, the animals can get entangled in the fence, leading to injury and death. Governmental lobbying between 2020 and 2021, led to the removal of 22 kilometers of unused border fencing along key wildlife movement corridors.

Linear Infrastructure and Exclusion Fences

Often linear infrastructure is accompanied by fences on either side to prevent collisions with wildlife, people, and livestock. For example, the Trans-Mongolian Railway (TMR), constructed in the late 1950s, is entirely fenced on both sides to prevent collisions between trains and livestock. However, such fences become barriers to the natural movements of nomadic ungulates and snow leopards. The TMR cuts through Mongolian gazelle *(Procapra gutturosa)* habitat and acts as the eastern border of the Asiatic wild ass *(Equus hemionus)* range (with the population to the east of TMR eradicated being extirpated). The TMR has also become a source of mortality for Mongolian gazelles and goitered gazelles *(Gazella subgutturosa)* in the region. To address the impacts of the TMR, the Wildlife Conservation Society initiated a project to remove fencing in three locations. Based on camera trap monitoring data, various nomadic ungulates, including Mongolian gazelles, goitered gazelles, argali sheep, and Asiatic wild ass, utilized these gaps to cross the railway. These findings indicate that removing the fence and creating safe corridors is an effective measure to facilitate the movements of nomadic ungulates across the landscape.

Mining Roads and Rail

Extractive industries and related linear infrastructure development have been a substantial threat to snow leopards, which is particularly evident in Mongolia. Such development can directly destroy the habitat of snow leopards, displace wildlife in surrounding areas, and divide habitat areas with fences or with pressure from the movement of heavy trucks and trains for transporting extracted minerals. The impacts of mining activities on snow leopards and their main prey species can be reduced or mitigated with a well-informed and effective legal environment. For example, i effect since 2015 and 2018 respectively in Mongolia, two wildlife friendly passage standards have been developed for the steppe and Gobi region and for the montaine and forested areas for paved roads and railroads. When passages are built in adequate numbers and are well positioned, they can allow sufficient wildlife movement to continue. Across the 12 snow leopard range countries, it is critical to identify the main habitat areas and connectivity zones linking those habitats to inform linear infrastructure planning. Recently, Mongolia identified these areas, and that information is being used for linear infrastructure planning through the Ministry of Environment and Tourism and the Ministry of Road and Transport Development.

Addressing Linear Infrastructure Impacts

Ibex crossing a road in Lahaul India. Credit: Amir Jaspa.

There are many ways to address linear infrastructure impacts. The future guidelines document to be produced by the Working Group will explore these methods in detail. In general, however, addressing impacts involves employing the mitigation hierarchy (avoid, mitigate, restore, and offset impacts; BBOP 2012 and IFC 2012) across the lifecycle of a linear infrastructure project (Fig. 8). To make these interventions effective, it is important to obtain strong scientific data before a linear infrastructure project is developed to understand the present status of the wildlife and ecosystems and how they are likely to be impacted by a project, including various different development scenareios. Mitigation solutions need to consider which measures are most effective and feasible for the local context. In addition, it is important to consult with local communities at all stages of development and use to understand how linear infrastructure impacts their livelihoods and social circumstances. Once the context is well understood, policies can be developed, enacted, and enforced to ensure reduced impacts. Capacity building is vital at all stages of linear infrastructure impact intervention amongst all stakeholders, including engineers and planners, government officials, and local communities.

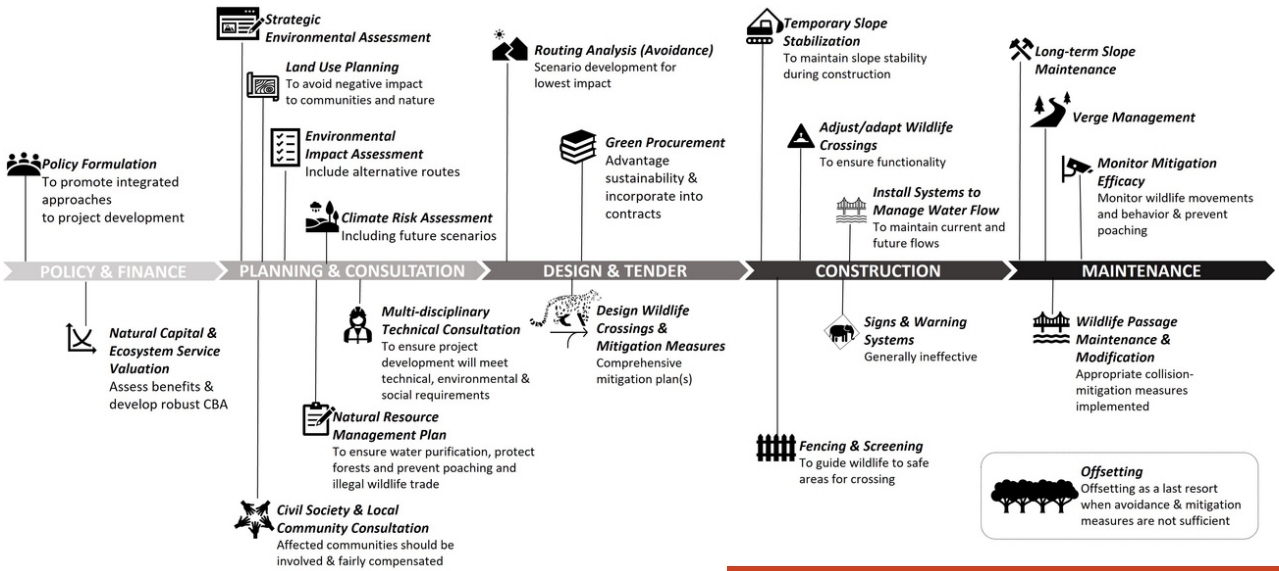

Figure 11. *Examples of methods to address linear infrastructure impacts across the lifecycle of a project. credit: WWF-US*

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