

Large herbivores on the move....

A ghost from the past or an indispensable element of the future Eurasian landscape?



A herd of Mongolian Gazelles (*Procapra gutturosa*) is roaming the Mongolian steppe (© WWF-Canon / H. Jungius)



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A herd of Kulan (*Equus onager kulan*) runs over the extensive Central Asian steppes (© Olga Pereladova).

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1. Introduction

Thousands of Wildebeest and Zebra roaming over immense plains, blindly crossing broad rivers and avoiding hungry packs of lions.... Who does not know the heroic pictures of individual Wildebeests, struggling to cross a river, trying to avoid the trampling feet of other animals, in their crusade for water and food? For many people these images of migrating animals represent Africa in its wildest form. Areas like the Serengeti and the Kalahari owe their fame and reputation to a large extent to this phenomenon.

Words like Saiga and Dzeren, however,

These scenes are less well known as the African ones, but certainly not less dramatic.

There has always been a strong relationship between the migratory behaviour of large herbivores and the behaviour of man. For a long time human beings and their ancestors have been dependent on large herbivores as a source of food and raw materials, like hides and antlers. When these animals migrated, the humans had to follow and lived a nomadic life. This relationship can



Wildebeests struggling to cross a river (© WWF-Canon / Martin Harvey)

generally do not summon the same kind of pictures in people's minds. At the same time it is these same species that are responsible for the fact that such African-like mass scenes can still be found on the Eurasian continent. They are the Wildebeests and Zebras of Eurasia. Large herds of Saiga in Central Asia and Mongolian Gazelles (Dzeren) in Mongolia congregate at certain times in the year to travel great distances in search for more favourable environmental circumstances.

still be found in some parts of the world, e.g. the Kung Bushmen in the Kalahari Desert in Botswana and the Saami people in Scandinavia.

With the development of agriculture, the relationship between migrating large herbivores and humans began to change. Humans started to live a more settled life and the wild herbivores, which they used to follow, were domesticated and became part of human culture. Instead of an important source of food and raw



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materials, the wild herbivores became competitors with their domestic relatives for food and space. More importantly, the development of agriculture catalysed a worldwide process of cultivation of natural areas. In many parts of the world this meant that migration routes of herbivores became blocked. Often, this had disastrous effects. Mark and Delia Owens have described an impressive example in their book 'Cry of the Kalahari' (1984). They write about the mass mortality of Wildebeest and other large ungulates in the Kalahari Desert during the 1960s and 1970s. During this period, fences blocked migration routes and consequently

This report shows the phenomenon of migration on the Eurasian continent and its relation with man. Its diverse aspects are brought to light in three chapters. Chapter two describes the situation in Eurasia from the time when the influence of human beings was still minimal up to the more recent past. It gives insight into how migration played an important role in the Eurasian landscape and which processes are responsible for the large-scale disappearance of migration patterns. Chapter three discusses the current situation, showing several cases on the Eurasian continent where large-scale migrations still occur. Additionally it



A group of Mongolian Gazelles is finding its way on the eastern steppes of Mongolia (© WWF-Canon / H. Jungius).

hundreds of thousands of animals died during droughts because they were isolated from water sources. The fences were erected to separate domestic livestock from the wild herbivores to control the spread of diseases from these wild animals to the domestic ones. A positive effect of the fence on controlling diseases has never been shown, the effect on the migrating large herbivores, however, has been disastrous.

discusses problems and threats concerned with the pre-existence of these large-scale migrations.

Finally, chapter four focuses on the role of migration of large herbivores in the Eurasian landscape of the future. The importance of restoring and conserving this ecological process are discussed. Finally, several existing initiatives that focus on the restoration and conservation



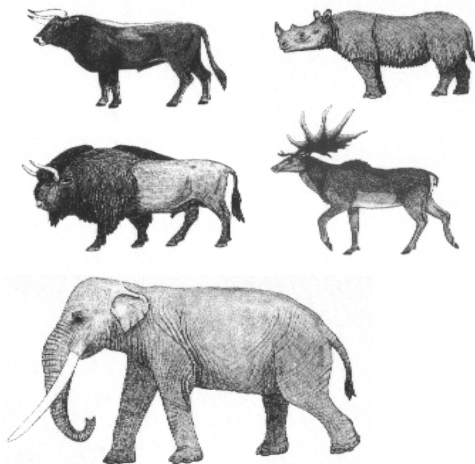
of migration patterns of large herbivores are discussed.

This report is a product of the Large Herbivore Initiative (LHI) to raise awareness among the general public on the importance of conserving large herbivores and the ecosystems and

processes with which they are related. Different concrete projects will be discussed which have been initiated by the LHI to restore the role of large herbivores in the landscape. The emphasis is on the restoration and conservation of migratory behaviour.

2. The Past

A long time ago, when the human influence on the landscape was still minimal, the Eurasian landscape looked very different. The period from 2 million up to 10,000 years ago, also called the Pleistocene, consisted of a series of ice ages, interrupted by warmer interglacial periods. During the ice ages ice sheets covered large parts of Eurasia. Most of the other parts of the continent consisted of an open steppe-like landscape. This period was characterised by a highly diversified mega-fauna, including many species of large herbivores. The last ice age, the Weichselien, started some 115,000 years



Examples of some of the giant herbivores of the last Ice Age (Bunzel-Druke, 1997). From left to right; Aurochs, Woodland Rhino, Steppe Bison, Giant Deer, Woodland Elephant.

ago, lasting up to 10,000 years ago. During this period tundra covered large parts of Eurasia. The southern part of the continent had a more temperate climate and a landscape with open steppes and forested area. Large herds of herbivores of a wide variety of species (Box I) were roaming the Eurasian steppes and tundra's during this period. These herds

were constantly on the move, searching for more optimal conditions, probably much like the herbivores in the Serengeti and Kalahari in present day Africa. Many populations must have showed migrations with a fixed seasonal pattern. It must have been an impressive sight, seeing these large mixed herds of animals wandering over the plains.

At the end of the Pleistocene, some 35,000 years ago, modern man appeared in Eurasia. At this time he not only lived among the described herbivores, he depended on them for his survival. Humans in this period were specialised big game hunters. Elephants, Rhinos, Reindeer, Bison and Horses were hunted for their meat. Their bones and hides were used to make tools and clothes. In the Tundra areas, which covered most of Eurasia during this period, people were specialised in hunting Mammoths and Reindeer. These hunters lived a nomadic life, following the Mammoths in their rambles and building huts of Mammoth bones, Reindeer antlers and hides from both. Human life was totally determined by the way their large prey species lived their lives. During the few summer months the herbivores lived on the tundra, which during this period was rich with herbs and grasses. During the winter months the animals probably migrated to more forested areas, where there was better shelter and food. Humans followed this pattern.

This slowly changed...

Around 10,000 years ago the climate started to change into the warmer climate we know today. This was the start of the period that we currently live in, also known



as the Holocene. As a result of climatic changes, temperatures rose and the ice sheets in northern Eurasia melted. The tundra and steppe landscapes that covered large parts of Eurasia during the Pleistocene started to change in to the landscapes that would have been present today, if human influence had not been so large. From south to north, Mediterranean deciduous forests, temperate deciduous forests, taiga forests and tundra could be found. More to the east, in areas with less annual rainfall, there were large steppe and desert ecosystems. During the same period massive extinctions of especially large mammals occurred. These were at its severest on the American continent, but were also clearly visible in Eurasia. Species like the Woodland Elephant, Woodland and Steppe Rhino and Giant Deer experienced severe population declines and eventually died out at the beginning of the Holocene. Mammoths and Woolly Rhinos were possibly still found in isolated places of northern Eurasia but eventually went extinct. Next to the climatic changes, severe hunting by man was probably the main reason for these mass extinctions.

All these changes had an important effect on the way humans lived. Their

environment changed from open tundra into a forested landscape and the extinction and disappearance of their main prey species forced them to adopt a new lifestyle. They specialised on prey species of the forested landscape, mainly Red Deer, Wild Boar, Aurochs and Woodland Bison. These species were much more steadfast and probably hardly migrated over larger distances. This led to the evolution of permanent human settlements. Humans no longer had to follow roaming herbivores.

After the disappearance of the last traces of the ice age, a new development could be seen in southern Europe. A development that has been very influential with respect to the present Eurasian landscape and that has had an enormous impact on the populations and migrating behaviour of large herbivores, the development of agriculture. The first signs of agriculture have been found in north-eastern Africa and some 8,000 years ago agricultural colonists settled in southern Europe. Around 4,000 years ago farming people inhabited most of the suitable parts of Eurasia. An important part of the development of agriculture was the domestication of the wild herbivores. Wild

Box I

Bunzel-Drüke (1997) describes several species of the mega fauna of the last ice age in Europe. In the warmer regions of Europe, south of the Alps, the Woodland Elephant (*Elephas antiquus*) could be found, larger than the present African Elephant, but with much of the same behaviour. Furthermore, two rhino species were found in this region, the Woodland Rhino (*Dicerorhinus kirchbergensis*) and the Steppe Rhino (*Dicerorhinus hemitoechus*), possibly much like the present Black and White Rhino species in Africa: the Woodland Rhino browsing in the thickets and the Steppe Rhino grazing in the open landscapes. In the colder regions of Eurasia you would find the Mammoth (*Mammuthus primigenius*) and the Woolly Rhino (*Coelodonta antiquitatis*). Through all ice-free regions herds of Wild Horses (*Equus ferus*) and Wild Asses (*Equus hydruntinus* and *Equus hemionus*) could be found roaming through the landscape. Besides the present species of deer, which were widely distributed, the Giant Deer (*Megaloceros giganteus*) was still found in some parts of Eurasia. This species of deer was of the same size as the present Elk, but had spectacular antlers, which could span more than 3 meters. Reindeer (*Rangifer tarandus*) were abundant during the last ice age and were found in large herds through the whole tundra region often together with Mammoths and Woolly Rhinos. Another species that was widely found in these communities is the Musk Ox (*Ovibos moschatus*). Of the smaller species, the Saiga (*Saiga tatarica*), presently found in central Asia, was found over the whole steppe region, from eastern Europe to Mongolia. In the mountainous regions Ibexes (*Capra ibex* and *Capra pyrenaica*) and Chamois (*Rupicapra rupicapra*) were found. These species are still present in most mountainous areas of Eurasia. Finally, several Bovid species could be found throughout the continent. Steppe and Woodland Bison (*Bison priscus* and *Bison bonasus*) and Aurochs (*Bos primigenius*) lived throughout the ice-free regions. The Steppe Bison probably lived much like the American Bison in large, wandering, herds. The Woodland Bison lived in the forested areas, as the European Bison of today, and the Aurochs probably utilized wetter, riverine habitats.



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Bovide species, horses, sheep and goats were all tamed and made a part of human society. After the evolution of permanent settlements, agriculture and domestication of animals made man even less dependent on the wild herbivores. For a long time wild species stayed an important supplementary source of food for the poor people in particular. But it is clear that after the described developments wild herbivores became far less valuable than during the first periods of human evolution. This was the beginning of an accelerated decline of wild large herbivore populations. Not only were they still hunted for meat, but, moreover, agriculture resulted in a direct loss of their habitat. Furthermore, agriculture and growing infrastructure, which connected the human settlements, resulted in a fragmentation of the surviving populations. Migration routes were blocked. Apart from hunting for meat, the wild species were, from then on, also hunted because they were seen as pests, competing with the domestic herbivores and depleting the agricultural lands. This led to the extinction of the Aurochs of which the last individual probably died in Poland in 1627. The last wild European Bison died in 1927 in the Caucasus, but the species survived in captivity and is

currently reintroduced in its former range. Wild horses and Asses were the last survivors of the variety of Eurasian large herbivores that once roamed the landscape. They, however, have been reduced to relict populations in central Asia. In Europe, the wild horses and Asses died out in the 18th century in Poland and Russia. Of the smaller migrating herbivores, the Saiga was still present in Eastern Europe during the first part of the Holocene, but by the 18th century it had been restricted to populations in central Asia.

During the Middle Ages the whole region of temperate grasslands, deserts and semi-deserts, from Hungary to Mongolia, still showed scenes of roaming herds of wild horses and antelopes, like the Saiga. A trip to the plains of Hungary or Romania during these times could have resulted in some spectacular pictures. These scenes would still be found there, if the human influence on the landscape had not been so large. Nowadays, the herds are restricted to a couple of places in the remote parts of central Asia. Examples of these will be given in chapter 3.

In the forested regions the story is a bit different. In these areas, as explained in



Some Mongolian Gazelles (© WWF-Canon / H. Jungius)



the introduction, mass migrations don't take place. The species of these regions, like the deer species, the Aurochs and Bison, move over short distances. Often they were moving from lower summer ranges near rivers to the more forested winter ranges higher up. These kinds of movements were less susceptible to human influences and still exist in large parts of Eurasia. However, this behaviour is threatened and has already disappeared in many areas, especially in Europe.

The tundra areas have for a long time been home to herds of Reindeer and Musk Ox. Not too long after the disappearance of Mammoths and Woolly Rhinos from these areas, the Musk Ox disappeared during the early Holocene. Wandering large Reindeer herds stayed a familiar sight in these regions for a long time. Humans in these northern parts of Eurasia depended on these herds for hunting

throughout much of the Holocene, because the area is unsuitable for agriculture. Nowadays, there are still people in northern Eurasia with this lifestyle. Large-scale Reindeer migrations are still a part of the tundra systems, but this phenomenon has also been severely diminished by human actions during the last hundreds of years. The situation of the Reindeer will be discussed in more detail in the next chapter.

For further reading see:

Bunzel-Drüke, M. (1997). Klima oder Übernutzung – Wodurch starben Großtiere am Ende des Eiszeitalters aus? *Natur- und Kulturlandschaft* 2: 152-193.

Clason, A. T. (1977). Jacht en Veeteelt. Van prehistorie tot middeleeuwen. Fibula-Van Dishoeck, Haarlem, The Netherlands.

Price, T. D. & G. M. Feinman (1993). Images of the past. Mayfield Publishing Company, Mountain View, U.S.A..

3. The Present

As shown, scenes of migrating herds of large herbivores were widely distributed in the past. However, what many people do not know is that these scenes can still be found in some remote corners of the Eurasian continent. The coloured windows show cases describing these scenes.

Case I describes the behaviours of the Mongolian Gazelle and the Mongolian herdsman. Mongolia is one of the most untouched places of Eurasia. Traces of the once widely distributed migrations can still be found on the vast Mongolian plains. The ongoing migrations of Reindeer in northern Eurasia are illustrated in case II. The impact Reindeer still have on humans in these regions will come to light. Finally another example from central Asia will further show the existing richness of Eurasia, the large scale migrations of Saiga antelopes in Kazakhstan and surrounding countries (case III).

The cases show the beauty of the Eurasian continent. It is different, but certainly as impressive and spectacular as the famous African and North American parks, like the Serengeti and Yellowstone. This should be reason enough to regard

these Eurasian areas with a considerable amount of pride and to conserve and honour them nowadays and in to the far future.

For further reading on the cases see:

Bekenov, A. B., Iu. A. Grachev & E. J. Milner-Gulland (1998). Saiga in Kazakhstan. *Mammal Review* 28: 1-52.

Fancy, S. G., L. F. Pank, K. R. Whitten & W. L. Regelin (1989). Seasonal movements of caribou in arctic Alaska as determined by satellite. *Canadian Journal of Zoology* 67: 644-650.

Fox, J. L. (1998). Finnmarksvidda: Reindeer carrying capacity and exploitation in a changing pastoral ecosystem – a range ecology perspective on the reindeer ecosystem in Finnmark. S. Jentoft (editor). *Man and the biosphere series*, volume 22. UNESCO, Paris, France.

Germeraad, P. W. & Z. Enebish (1996). The Mongolian landscape tradition: a key to progress. Nomadic traditions and their contemporary role in landscape planning and management in Mongolia. Germeraad and Enebish, Rhooen, The Netherlands.

Kalstad, J. K. (1998). Pastoralism and management of common land in Saami districts. *In: Commons in a cold climate: coastal fisheries and reindeer pastoralism in North Norway: the co-management approach*. S. Jentoft (editor). *Man and the biosphere series*, volume 22. UNESCO, Paris, France.

Lhagvasuren, B. & E.J. Milner-Gulland. The status and management of the Mongolian gazelle *Procapra gutturosa* population. *Oryx* 31: 127-134.



Case I: Migration in Mongolia. A story of Mongolian Gazelle and migrating herdsmen

Mongolia is home to some of the most remote and untouched places on the Eurasian continent. Vast plains cover large parts of the country. Particularly in the eastern part of Mongolia, the plains are relatively undisturbed and wild. A characteristic animal of these steppes is the Mongolian Gazelle. The Mongolian Gazelle, *Procapra gutturosa*, is a medium sized herbivore that used to roam over the steppe area from central Asia in the west, through Mongolia, to southern Siberia and northeastern China. Mining, agricultural activities, fragmentation by railway tracks and competition with livestock combined with commercial hunting and poaching have severely diminished the numbers of this species. Nowadays, the Gazelles are mainly found in the eastern part of Mongolia and few small populations in western and central Mongolia and the border areas of Chinese Inner Mongolia. Mongolian Gazelle are a nomadic species, constantly on the move to find fresh pastures and water, and thus avoid overgrazing. Around October the animals gather in groups of thousands and sometimes tens of thousands of individuals. These herds start their migration in a generally eastern direction, which may even be to the northeast, depending on snow conditions. Around April they undertake a return migration. During these migrations some populations of the Gazelles cross the Mongolian-Chinese, Mongolian-Russian and Russian-Chinese borders. The border fences, sometimes as high as 240 cm., do not block these migrations. However, large numbers of animals are often severely wounded by the barbed wire, leading to high mortalities amongst the Gazelles, already weakened through the harsh climatic circumstances. Besides this eastern migration, the Gazelles used to migrate over long distances in western direction. This migration, however, was blocked by the construction of the Ulaanbaatar-Beijing railway in the 1950s. In the last few years gazelles started to cross the railway again. Despite these declines, however, at this moment magnificent scenes of thousands of Gazelles wandering over the steppes can still be found in Mongolia. To safeguard the phenomenon of mass migration for future generations, the LHI, WWF Mongolia, other international agencies like UNDP and the Mongolian government have teamed up in the eastern Daurian steppe project. Initial results of this cooperation include a ban by the Mongolian government on the commercial hunting of Gazelles from the winter of 2000 and a plan to develop joint long-term management plan for gazelle and the eastern steppes.

Not only the Mongolian Gazelles migrate from summer to winter pastures. This behaviour traditionally, also forms an important part of Mongolian society. Prior to 1990 the communist government tried to restrain people from migrating. The herding tradition, however, has been kept alive. Traditionally several households live together in a *khot ail* (nomadic herding camp), distributing tasks, like building a camp and herding the animals. 4-20 of these groups form a *neg nutgiinhan*, an institutional level on which issues like distribution of lands and migration routes are arranged. The main form of subsistence for these groups in the harsh Mongolian environment is animal husbandry. Because of the severe climatic conditions these groups developed a nomadic way of living with a typical seasonal migration.



A Mongolian herdsman follows a small group of domestic Bactrian camel's. Wild Bactrian camel's still roam the Mongolian and Chinese steppes, but the survival of this majestic animal in the wild is at stake. Limitation of their natural migration routes is one

Generally the herdsmen live in warmer pasture regions during wintertime. In the spring a migration takes place to areas that provide protection against storms and floods. Then in summer, they live higher up in the mountainous regions. Finally, preparing for the winter, they move to the steppes with abundant fodder during the autumn. Of the current population of Mongolia of about 2.4 million people, only some 600.000 live as herdsmen. This number is declining, however, as people move to towns and cities. The traditional knowledge on the sustainable use of the steppes is also disappearing. The communist government kept the livestock market at an artificially low level. This made sure that the effects of livestock grazing on the ecosystem were limited. Currently, during the building of a new democratic and capitalist Mongolia, the effects of the ban of the artificial market and the loss of traditional knowledge become apparent. The main result has been an unprecedented growth in the number of livestock. This in turn has resulted in structural overgrazing of the steppe and shortage of winter fodder. The impact of harsh winters in the last two years, so called *Zud's*, on the herds and herders has reached alarming proportions, making headlines all over the world. However, such winters are part of Mongolian climate. The effects of the harsh winters have only been so dramatic, due to overgrazing in the steppe system.

Restoring the sustainable use of the steppe system is a huge challenge that Mongolia faces. Restoration of the traditional seasonal migration system for herds and herdsmen could be part of a long-term sustainable solution. The steppe should of course also provide enough 'room to move' for the wild large herbivores that evolved and belong there. The Mongolian government fortunately not only recognizes the problem, but also considers its solution of major importance for the sustainable development of the country. Many international agencies have been asked by the Mongolian government for support and advise. Amongst them are UNDP, World Bank, WWF and (in a modest role) the LHI.



Case II: The Saiga. Nomad of the Eurasian continent.

The Saiga, *Saiga tatarica*, is a Gazelle-like herbivore with a very atypical nose, resembling a short elephant trunk, and strange, small horns. It is a nomadic species and used to inhabit the whole steppe and desert region of the Eurasian continent from Hungary in the west up to Mongolia in the east. Human action, however, rapidly reduced this huge geographical distribution. In the eighteenth century it was still found in southern Ukraine, but nowadays it is restricted to 5 populations; one in Kalmykia (Russia), three in Kazakhstan and one in Mongolia.

Kazakhstan contains around 80% of the total population size of Saiga. Like all Saiga, the Kazakhstan Saiga performs mass seasonal migrations. In Kazakhstan there are three separated populations, each having distinct summer and winter ranges. Spring and autumn migrations are undertaken to find new pastures and to escape deep snow. Early March animals start to congregate in groups of up to 500 animals. Some of these groups exist for 100% of males that migrate earlier to the summer pastures. At the same time the other groups, existing of females, young animals and some males, congregate in the calving areas. Here they form groups of several thousands of animals. During calving the females disperse, to congregate again around May to start the second part of the spring migration to the summer ranges, where they arrive during June. During the summer, the Saiga live in smaller groups of up to 50 animals, moving around through the pastures of the northern semi-deserts. In September they again form large herds of several thousands of individuals to start their return migration to the winter pastures in the southern deserts. Generally the spring and autumn migrations last 2-4 months, covering distances varying from 200-1200 kilometres. Magnificent scenes of massive herds of Saiga can be seen during this time.



Two fighting Saiga antelopes in their beautiful winter coat (© Pavel Sorokin)



Young Saiga antelope
showing its unique nose
(© Pavel Sorokin)

Since prehistoric times, Saiga have been intensively hunted by man. The Saiga still play an important role in the life of many people in central Asia. Since the 1950s hunting for commercial purposes has been allowed in Kazakhstan. Governmental hunting companies used to organise these hunts during communist times. Nowadays they are organised by commercial enterprises. Tens of thousands of animals are killed each year, mainly for their meat, some of which is exported. The skin is used to make suede. The horns of the Saiga are a highly valued raw material in Chinese medicine. For this reason, the Saiga are heavily poached. Poaching forms the main threat to the survival of the Saiga, especially to the most western sub-population in Kalmykia, Russia. Like in Kazakhstan, hunting in Kalmykia used to be controlled and regulated by communist state agencies, which kept the population at fairly stable levels. However, already during soviet times competition with livestock and the resulting overgrazing became a serious problem for the steppe system and the Saiga. Since the breakdown of the Soviet Union, the herding and livestock grazing system has almost disappeared in Kalmykia. This has not benefited the Saiga, however, for intensive, organised poaching has increased during the last few years, leading to a dramatic decline in Saiga by more than 80%. The LHI, together with the Russian UNESCO MAB programme, is providing the local government and the ranger system in the area with means to counter poaching activities. Emergency support in 2000 (radio equipment, motor bikes, etc.) has had initial success, leading to a sharp decrease in poaching. These measures are now succeeded by more structural activities, like training, education, public awareness and captive breeding programmes. Migration of the Saiga between Kalmykia and Kazakhstan is crucial for its conservation in the current range states and eventually for expanding its range to the West again. Migration plays an important role in keeping the total population size large, because migration makes sure that the pastures are not threatened by overgrazing. Only then can the relatively high level of subsistence hunting be made sustainable. Ideas to create core areas, corridors and spatial linkage of different populations will need to be developed. Moreover, creative solutions are needed to reopen old migration routes, that are blocked by the presence of railways, roads and gas and oil pipes.

For the Saiga, as with the Mongolian Gazelle, it will be a challenge to incorporate the ancient phenomenon of migration into the development of modern societies, like Kazakhstan and Mongolia. Additionally, the biggest challenge for the Saiga is to restore its original migrating routes and distribution range all the way up to Romania and Hungary. As a first step the LHI, together with WWF Russia and regional National Park authorities, is considering the possibility of reintroduction of Saiga in the protected areas of forest steppe near Orel-Briansk in Russia. This may show us how we could get back scenes from the past, which have been lost for a long time. Moreover, the Saiga will be able to reclaim their role in the steppe system and contribute to the recovery of this threatened landscape.



Case III: The Saami and the Reindeer. An ancient, nomadic symbiosis of northwestern Eurasia.

Where the Saiga wander through the steppes and deserts of central Asia, the Reindeer, *Rangifer tarandus*, are the nomads of the tundra and boreal forest regions of northern Eurasia. This species used to roam over the whole of Eurasia from Scandinavia and northern Germany, through Russia to northern Mongolia and northeastern China. They survived in Poland until the sixteenth century. Nowadays, small populations of wild Reindeer are found in Scandinavia, northern European Russia and Mongolia. Large populations can still be found in northern Siberia, mainly on the Taimyr Peninsula of northeastern Siberia. Like the Saiga and Mongolian Gazelle, Reindeer are constantly on the move, searching for fresh pastures in groups of 10-1,000 animals. Individual Reindeer in Canada moved up to 5000 kilometres a year. During most of the year the animals move in smaller groups. However, during autumn and spring these groups congregate in larger herds of tens to hundreds of thousands of animals to undertake their seasonal migration. Most herds in Eurasia migrate between their winter grounds in the taiga forests and the summer ranges near the coasts, covering several hundreds of kilometres. Especially in the Taimyr region immense herds of wild Reindeer can be seen migrating from south to north. These herds, however, are threatened due to the blocking of migratory routes by gas pipelines and competition with domestic Reindeer.



Some lone Reindeer on the cold and immense Scandinavian tundras (© WWF-Canon / Mauri Rautkari)



The last wild population of Scandinavia can be found in the Hadangervidda area in southern Norway. Until several hundred years ago, wild Reindeer still dominated northern Scandinavia. During these times the indigenous people of these regions, the Saami (also known as Lapps) lived as nomadic Reindeer hunters. Around AD 200 Reindeer were domesticated in these regions, but it was not until the 1600s that people started to keep domestic Reindeer in large herds. Since then, the appearance of national borders, which divided traditional grazing areas, and the elimination of wolves, made this practice less intensive. However, keeping domestic Reindeer is still an important way of living for the indigenous Saami people of northern Scandinavia and northwestern Russia.

Kalstad (1998) describes the situation of the Saami herdsmen in Finnmark, an area in northern Norway. Here, Reindeer are individually owned, recognisable by an earmark. Groups of owners keep animals together in herds, managing pasture conditions and migration patterns. During spring the herds, totalling some 150,000 animals, start a northward migration towards the coast. Here the animals spend the summer feeding on grasses and herbs. In autumn a return migration takes place to the southern tundra, where the Reindeer graze on lichens during the winter. The seasonal migrations are responsible for magnificent pictures of Saami herding tens of thousands of animals. Norwegian law regulates the distribution of the summer pastures. The winter ranges, however, are still divided by traditional rights. Reindeer and their migration are still an essential part of the Saami culture, despite many changes. Nowadays, only the herdsmen follow the migrating Reindeer herds; their families stay in settled villages. Furthermore, the Reindeer herding has become a commercial enterprise, instead of a subsistence lifestyle. These changes have resulted in overgrazing due to an explosive increase in the number of Reindeer during the last decades. Applying traditional knowledge and rules to modern legislation and valuing and stimulating the traditional Saami culture are important to saving this unique nomadic relationship for the future. Besides, the Saami have lived together with the Reindeer in a sustainable way for centuries, with migration as an essential part of their livelihood.



4. The Future

The degradation of ecological systems during the last centuries has not gone unnoticed by the international community. Especially during the 1960S and 1970S many initiatives arose to halt this degradation. Many initiatives were primarily aimed at conserving species. Some of them, however, paid attention to important ecological processes, and a few specifically mention the importance of conserving and restoring the migration and free movement of animals for the future. These important initiatives are discussed

Box II

In February 1998 the LHI was founded, recognising the important role of large herbivores in ecosystems. It was initiated with help from the World Wide Fund for Nature (WWF). The LHI represents a cooperative effort of a wide variety of interested parties (universities, research institutes, governments, NGO's), created for the benefit of large herbivores in Eurasia. The LHI adopted the following general mission statement, to create:

'A Europe, Russia and Central Asia where people enjoy the benefits from ecosystems and landscapes inhabited by viable populations of all large herbivores of the region, living in the wild.'

This mission includes three major objectives:

1. To conserve ecosystems and landscapes as habitats for large herbivores.
2. To conserve all wild large herbivore species in viable and widespread populations.
3. To increase knowledge and appreciation of large herbivores by people.

The LHI considers the ability to freely move and migrate a necessary phenomenon for viable populations of large herbivore species. Migration is indispensable from the perspective of large herbivores. This brochure shows a few examples of projects that are supported by the LHI and that partly focus on the importance of retaining and enhancing migration routes.

in boxes II-IV.

Box III

The only international initiative that was specifically developed to conserve migratory species is the Bonn Convention. This Convention on the Conservation of Migratory Species of Wild Animals (CMS) was adopted in 1979 in Bonn. The main aim of the CMS is to conserve terrestrial, marine and avian migratory species throughout their range. The Convention represents a framework within which the member countries may act to conserve migratory species and their habitat, mainly by:

1. 'adopting strict protection measures for migratory species that have been characterized as being in danger of extinction throughout all or a significant portion of their range (species listed in Appendix I);
2. concluding agreements for the conservation and management of migratory species that have an unfavourable conservation status or would benefit significantly from international cooperation (species listed in Appendix II);
3. and joint research and monitoring activities'.

The Convention encourages member countries to sign international agreements on the conservation of threatened migratory species. Non-signatory parties are also welcomed to take part in these agreements. At this moment most existing agreements regard migratory birds. There is great potential for agreements regarding large herbivores. An agreement has been developed regarding Sahelo-Saharan ungulates. Hopefully, agreements on the conservation of migratory Eurasian herbivores, like the described Mongolian Gazelle and Saiga, will follow. This convention is probably the most important existing international agreement with respect to the protection of large-scale migration. For more detailed information, see:

<http://www.wcmc.org.uk/cms>.



An image of the Kalmykian steppe in the past. In these days the steppes were inhabited by nomadic herdsman and wild species like the Saiga and Goitred Gazelle (© F. Baerselman).



The present-day Kalmykian steppe, an extensive, degraded grass plain. With help of the LHI these steppes will hopefully return to their old glory again

Potential and existing projects regarding enhancement of free movement of large herbivore species.

The Large Herbivore Initiative supports a wide variety of projects regarding the conservation of large herbivores and their habitats. They cover many different species in the whole geographic range of the Initiative, Eurasia from Spain to eastern Russia. Many of these projects in some way regard the movement and migration of large herbivores. Two of these projects are shortly described in boxes V



The European Bison, one of the species that used to roam the Eurasian continent. The LHI supports projects that aim at reintroducing this species throughout its original range again (© H. Jungius).

Box IV

An important initiative within the EU is the European Union Habitat Directive. In full this Directive reads 'Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora'. This Directive is aimed at the maintenance of biodiversity within the territory of the member states of the European Union through the conservation of natural habitats and of wild fauna and flora. A specific outcome of the Directive is the planned establishment of the European ecological network known as 'Natura 2000'. Member States of the European Union are obliged, through this Directive, to draw up a list of sites within their territories, which are of potential EU importance. Member States have to develop conservation measures to avoid deterioration of these sites. These sites, according to the Directive, have to form a coherent European ecological network. In this way the Directive stimulates the reduction of habitat fragmentation and encourages free movement of flora and fauna in Europe through this ecological network. For more detailed information, see:

<http://europa.eu.int/comm/dg11/guide>.

Because the Directive only affects members of the European Union in 1993 a declaration was adopted that aimed at developing a pan-European ecological network (EECONET). This declaration later developed into 'The Pan-European Biological and Landscape Diversity Strategy', which has been adopted in 1995 by 54 countries from the United Kingdom to Uzbekistan. One of the main aims of the Strategy is the establishment of a Pan-European ecological network within ten years. This network would allow large herbivores in Eurasia to freely move through the landscape again. For more detailed information, see: <http://www.strategyguide.org>.

and VI to show the type of projects the LHI is supporting and the potential of restoring free movement to large herbivore species.

The outlined projects are both based in Western Europe and are mainly focused on migration over relatively short distances. The conservation of the unique, mass migrations in eastern Eurasia is without any doubt just as important. Some initiatives are being undertaken to develop projects conserving this phenomenon, e.g. concerning the Mongolian Gazelle. Strong agreements, however, are necessary to



Box V

One project, supported by the Large Herbivore Initiative, concerns the conservation of the Alpine Ibex, *Capra ibex*. After nearly going extinct at the beginning of the 19th century, the Ibex are fairly widespread again throughout most of its original range in the central European Alps due to large-scale reintroductions. Many of the local populations of Ibex, however, are very much isolated. Reintroductions are still occurring, but they have to be better planned to make sure Ibex is reintroduced in suitable habitat. Furthermore, there is a need for an ecosystem approach that reduces the isolation of the individual populations of Ibex and enhances the free movement of Ibex through the Alps. Therefore the LHI supported the project, called 'The Alpine ibex: status, potential distribution and management options for conservation and sustainable development'. This project aims at creating an action plan. This plan describes the potential distribution of the Alpine Ibex and management guidelines arranged with agencies responsible for their management in each of the Alpine countries. In this way the project will strongly contribute to the creation of an Alpine ecological network. Consequently, not only the Ibex but also other large herbivores like the Red Deer, Chamois and Roe Deer will benefit and will be able to freely roam through the Alps again.

conserve these magnificent scenes for the future amongst growing populations of people. The discussed Convention of Migratory Species (CMS) could be a good instrument for the countries that are home of these mass migrations (Mongolia, China and Russia in the case of the Mongolian Gazelle and Russia, Kazakhstan and Uzbekistan in the case of the Saiga) to develop such agreements. Not only conservation, but also sustainable use of the animals, such as hunting for meat, could be a part of such agreements.



The LHI supports projects that aim at restoring the role of the Saiga on the Kalmykian steppes. Projects like this prevent that in the future the Saiga can only be seen as a trophy from the past (© F. Baerselman).

Besides agreements on the conservation of the species that are still able to migrate, Saiga and Mongolian Gazelle, there people should also investigate how to restore large-scale migration of other large herbivores in this region, like the Wild Camel and Wild Horses. The Large Herbivore Initiative plays an important role in encouraging parties to come to such agreements. As a result of these efforts the LHI hopes future people will be able to enjoy the images of large herds of

migrating Gazelle and Saiga and possibly Camels and horses.

Then we could truly talk about a Eurasian Serengeti.

These examples show that it is certainly possible to restore the free movement of large herbivores in the Eurasian landscape. It is important to explore these possibilities throughout Eurasia, not only in Eastern Europe, Russia and central Asia, but also in the crowded regions of Western Europe. It is a huge challenge to transform these human made environments into more natural environments where humans as well as other organisms can freely move through the landscape. Multifunctional use of the landscape may provide a solution for integrating natural values into the industrialised society of Western Europe. The river systems of the Rhine and the Meuse form an example. The outer marshes of these rivers have long been used for intensive agricultural practices. Dikes embank the rivers. Ongoing problems with floods, however, start to change people's minds on how to manage these rivers. Instead of embanking the rivers, a rising policy is to return the outer marshes to natural floodplains. For this purpose old gullies are reopened and agricultural practices disappear or become much less intensive. In addition to buffering the river systems, the outer marshes become much more natural and can function as corridors for moving large herbivores, like Red Deer, particularly when they are reconnected to higher sandy areas. Consequently, the rivers form an excellent starting point for



Box VI

Another project, which the Large Herbivore Initiative supports, is entitled 'Present status and perspectives for re-establishing the European bison (*Bison bonasus*) over its former natural range in the Carpathians and Ukraine'. The bison was once an important large herbivore in these regions. Around the 1920s it was exterminated in the wild. During recent decades it has been reintroduced again in several areas of its former range. The reintroduced herds, however, are generally small and there is little opportunity for animals to move freely between herds. This makes the herds very sensitive to inbreeding and degradation of their habitat, because they have to stay in one place. The goal of the mentioned project is to look for possibilities to connect the existing herds in the Polish, Ukrainian and Slovakian Carpathian mountains, ultimately creating one Carpathian Bison population. This would allow the herds to freely move through the Carpathians again. In this way the Bison are used as a model species to create an ecological network for the whole region of the Carpathian Mountains. Many other species will benefit from this initiative, like the Red Deer and Chamois but also carnivores, like the Bear and Wolf.

the creation of a European ecological network.

Another important multidisciplinary use of the future landscape is the combination of nature conservation and tourism. Tourism is the second largest economical sector in the world and within tourism, nature

with PAN Parks. PAN Parks is a new initiative of the World Wide Fund for Nature (WWF) and the tourism concern, the Molecaten Groep. This initiative combines high-level nature conservation with high-level tourism, to create parks all over Europe. The parks carry the PAN



Wandering Heck Cattle in the Oostvaardersplassen Reserve in the Netherlands. Does this represent a view on the future European landscape? (© Hans Kampf)

orientated activities are a strongly growing market. The discussed mass migrations form an excellent base for future tourism activities. Forming a European ecological network presents new possibilities for nature-based tourism. In this respect the Large Herbivore Initiative works together

Parks hallmark and are subject to regular control to check if nature conservation and tourism facilities are on a high level. At this moment there are 6 PAN Parks. The ultimate goal is to form parks throughout Europe, which form the basis of an ecological network through which



organisms can move freely and people can relax and enjoy themselves.

In conclusion, there are several reasons to pay attention to migration and to conserve and restore it for the future. An important reason has only been mentioned indirectly. The phenomenon of migration is beautiful and amazing enough to conserve unto itself. It is an essential part of our own natural and cultural heritage. Conserving it

For further reading on migration and migratory species see:

Heptner, V. G., A. A. Nasimovich & A. G. Bannikov (1989). Mammals of the Soviet Union. Volume 1, Ungulates. Amerind Publishing Co. Pvt. Ltd., New Delhi, India.

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Nowicki, P., G. Bennett, D. Middleton, S. Rientjes & R. Wolters (1996). Perspectives on ecological networks. ECNC publications series on Man and Nature, volume 1. European Centre for Nature Conservation, Tilburg, The Netherlands.

Owens, M. J. & D. D. Owens (1984). Cry of the Kalahari. Houghton Mifflin Company, Boston, U.S.A..

UNEP/CMS. ed. (1999). Proceedings of the CMS Symposium on Animal Migration (Gland, Switzerland, 13 April 1997). CMS Technical Series Publication No. 2, Bonn/The Hague.

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For the LHI partners see:

Pan Parks:
<http://www.panparks.org>

Large Carnivore Initiative:
<http://www.largecarnivores-lcie.org.uk>

World Wide Fund for Nature:
<http://www.wwf.org>

Herbivores on the move

would lead to the ultimate goal of the Large Herbivore Initiative: 'a landscape where people enjoy the benefits from ecosystems and landscapes inhabited by viable populations of all large herbivores of the region, living in the wild'. A landscape where people as well as all other organisms can freely wander. A landscape, where people are an integral part of the living environment and not an artificially sustained, separated part of it.



A herd of camels is drinking in a remote waterhole on the Mongolian steppes. These animals are committed to a life-long of wandering over the steppes, looking for fresh pasture and water (© F. Baerselman).