

Kaziranga National Park

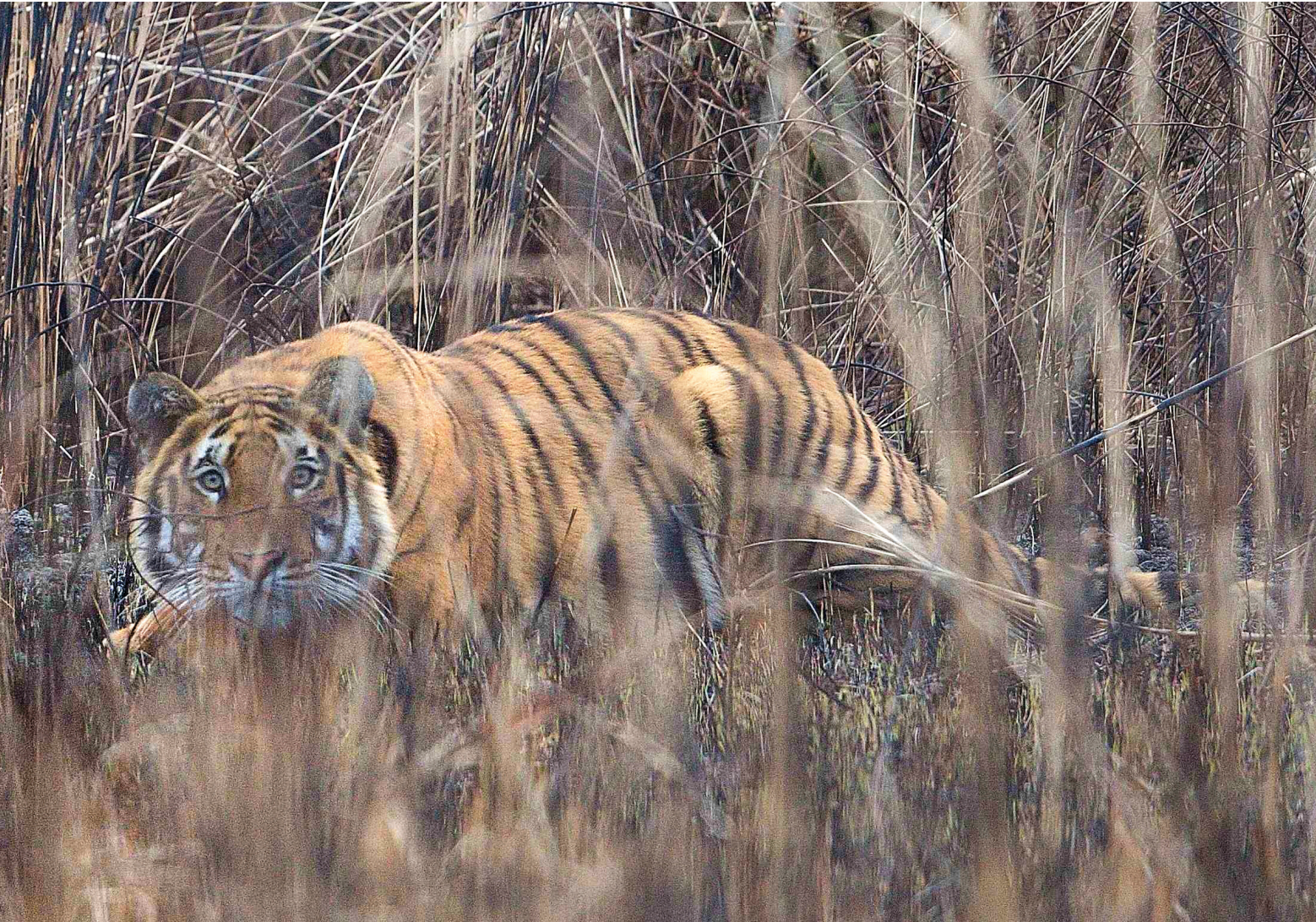
– a Little Miracle in Overcrowded India

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As students, we read Zdeněk Veselovský's book ‘Voices of the Jungle’ describing his stay in Kaziranga National Park. In addition to numerous interesting facts about wildlife bionomics, the reader will find a number of notes on nature conservation half a century ago. A very valuable article on the simplest problems of biodiversity management in this Assam park was published by Douglas Chadwick in National

Geographic (2010). With some worries but also hopes, we visited this area in March 2019. However, the experience exceeded our expectations, despite many problems that persist in the national park. After all, over a hundred of the symbolic Indian rhinoceros (*Rhinoceros unicornis*) have been poached in Kaziranga in the last ten years, and the population around the park has grown by a third.

The population of Bengal tigers in Kaziranga NP reaches about 100 and is therefore one of the highest densities in India, but they are rarely observed by visitors. Photo František Pelc



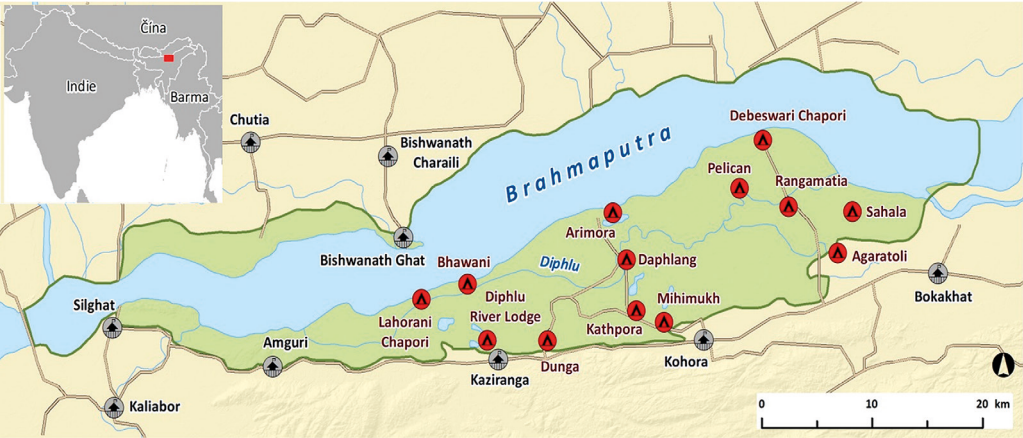
India under a magnifying glass

India, covering nearly 3.3 million km², is the 7th largest country in the world and, due to its geographical location, is sometimes referred to as the Indian subcontinent. Due to its huge area, a wide variety of environmental conditions can be found there, including tropical coasts and wetlands in the deltas of huge rivers, savannah, semi-deserts, tropical and subtropical dry, rain and monsoon forests, as well as the highest mountains in the world – the Himalayas. However, due to the long-term and extraordinarily high population (with nearly 1.4 billion inhabitants, it is a close second behind China); almost all natural communities have only been preserved in fragments. Indian population density reaches over 430 people per km², i.e. almost four times higher than in the Czech Republic. Although the annual population increase has fallen to 1% in recent years, it still means an annual population increase of 14 million people. Almost 60 cities have more than 1 million residents; the largest are the metropolises of Delhi and Mumbai, both of which have populations close to 20 million. Despite the undeniable economic development observed in recent years, India is still a poor country.

Kaziranga National Park: Location, Area, History

Kaziranga National Park (KNP) is located in the north-east of India, in the state of Assam, on the border between the tropics and subtropics. Thanks to the local monsoon climate, however, we can find truly tropical nature there. The rainfall is uneven, with most falling in June–September, and the total exceeding 2,200 mm per year. This geomorphologically rather monotonous landscape lies at 40–80 metres above sea level.

KNP has become a UNESCO World Heritage Site. The roots of its protection date back to 1904, when the enlightened Baroness Mary Curzon, after visiting and finding the territory almost devoid of animals due to mass poaching, urged her husband, working in the colonial administration, to enforce the protection of this magical corner of India. At that time the rhinos and other animals had been hunted almost to extinction. And she succeeded. Already in 1905, a reserve of 232 km² was designated here, which was gradually extended. However, the latest, sixth expansion of the park to include the riverbed and floodplain of the Brahmaputra was the lar-



Kaziranga NP: Map showing the delimitation of the borders after the sixth and largest extension of the park to include the riverbed of the Brahmaputra, which consists of sandy sediments for part of the year. Compiled by Jan Vrba



Wetlands and lakes make up about a tenth of Kaziranga National Park. Photo František Pelc.



The sandy-muddy floodbanks of varying magnitude and the riverbed of the Brahmaputra, up to 10 kilometres wide, make up more than a third of the area of the park. Photo František Pelc



Red jungle-fowl (*Gallus gallus*), the ancestor of the domestic fowl, is a rather slender and shy bird. Photo František Pelc

gest: Thanks to the new 350 km², the total area of the national park has reached 860 km², which is above average in Indian terms.

Landscape and Biodiversity

KNP is part of the Indomalayan (Oriental) zoogeographical region and one of the hot spots of global biodiversity. This term refers to areas with high species richness, a high number of endemic species and a high degree of habitat damage by humans, mainly due to their large-



Monsoon and semi-deciduous forests can be found in about 15% of Kaziranga National Park. Photo František Pelc

-scale disintegration and destruction. In order to be considered a “hot spot” of world terrestrial biodiversity, at least 1,500 vascular plant species (i.e. more than 0.5% of all known species) must grow there, and at least 70% of the original habitats had to have been lost.

The origin of the Himalayan hot spots is due to several causes. They are points of contact between the foot of the Himalayan ridge and the lowland on the floodplain of the Brahmaputra (translated as the Mother of Rivers), creating extremely varied environmental conditions. In the Tertiary period, the Indian plate crashed into the Eurasian mainland, creating the highest mountains on Earth along the line where the lithospheric plates clashed. A main reason contributing to the high productivity of the local ecosystem is the massive flooding as the Brahmaputra overflows onto its floodplain every year during the rainy season, covering two-thirds of the park, and making the whole park inaccessible to the public, but also bringing a huge amount of nutrients with it. Thanks to this source, we can also find population densities of various wild animals, apparently deviating from ecological assumptions. Last, but not least, long-term protection of the local environment also contributes to the preservation of high biodiversity. In terms of diversity and abundance of fauna, KNP can boldly compete with Africa’s most attractive parks on the savannah.

There are six basic landscapes – vegetation formations – in the park. The vast area of the Brahmaputra floodplain is largely covered by flooded grassland communities, including elephant grass growing up to 6 metres high, whereas flooded savannahs, enriched with non-contiguous shrub and tree vegetation, also appear in the adjacent areas. More than a third of the park area is formed by the river-



The red-breasted eagle (*Spilornis cheela*) is a common representative of the Indian avifauna. Photo František Pelc

bed of the giant river with massive alluvia, with only sparse vegetation. Tropical wet and semi-deciduous forests form an important part of the landscape. Finally, we must not forget the permanent wetlands with lakes and pools of different sizes attracting many migratory and nesting birds.

Thanks to the high diversity of habitats, KNP is also very rich in avifauna. A total of 500 nesting and migrating bird species have been recorded here. In addition to dozens of exotic taxa, for example hornbills, parrots, barbets and flocks of Indian geese (*Anser indicus*), we had the opportunity to observe ‘our’ overwintering Eurasian snipe (*Gallinago gallinago*). This is one of the reasons why the park is classified by BirdLife International as an important bird area (IBA). KNP also hosts 56 reptile species, including 17 turtle species and 25 snake species.

Despite other richly represented groups of animals, however, the extraordinary species diversity and abundance of mammals plays an important role. Monkeys are represented by four species, including the western hoolock gibbon (*Hoolock hoolock*), one of the most endangered primates of all. Four species of deer (sambar deer, barasingha, Indian hog deer and muntjac) are important for the functioning of local ecosystems, both as grazers of vegetation and as prey for predators. Similarly to Africa, India also refers to the ‘Big Five’, but with a slightly different composition. Its representatives include the wild water buffalo (*Bubalus arnee*), sloth bear (*Melursus ursinus*), Indian elephant (*Elephas maximus*), Indian rhinoceros and the Bengal tiger (*Panthera tigris tigris*).

Wild water buffalo are threatened not only by habitat destruction and poaching, but also by hybridization with domestic buffalo. Nevertheless, the local buffalo population is thriving and already exceeds 1,800 individuals, representing about two-thirds of the global population. However, the hybridization has some limitations because it appears that while the male wild buffalo is able to mate with the domestic buffalo cow, female wild buffalo can only rarely mate with a male domestic buffalo, due to significantly different body parameters, so the introduction of domestic animal genes into the wild population may not be so dramatic.



The Indian rhinoceros is out of immediate danger due to systematic protection in Kaziranga NP, and unlike its African relatives, it loves to stay in the water. Photo František Pelc



The Indian water buffalo in Kaziranga NP forms one of the last strong populations in the wild. Photo František Pelc

The vital population of Indian elephants in the park reaches about 1,300, and is a frequent cause of conflicts between wildlife and nearby farmers, whose labour-intensive agricultural crops can be significantly damaged by the elephants.

The Indian rhinoceros, along with the white rhinoceros (*Ceratotherium simum*), is one of

the largest terrestrial mammals after the elephant and its weight normally exceeds 2 tonnes. KNP has a unique position in the protection of this archaic-looking species. After all, in the last census at Kaziranga, there were about 2,400 rhinos, or about 80% of the world population. We can say that observation of this species has been practically guaranteed for

India and Protected Areas

Protected areas make an important contribution to the protection of fragments of the natural environment, including biodiversity, in India. There are currently 104 national parks in India with a total area of 40,500 km² (about 1.25% of the country's area) and an average area of 400 km². Not surprisingly, the most common size of national parks tends to be dozens or a few hundreds square kilometres. Only a few of them exceed 1,000 km². The largest is Hemis NP in Ladakh with an area of 4,400 km² and one of the largest is the world-famous Corbett NP (1,300 km²). These protected areas are also under enormous pressure from surrounding human populations and are subject to frequent conflicts between nature conservation and rural agriculture. National parks are designated by generally binding regulations of individual federal states.



The Indian hog deer is the most common deer in the park. It is a frequent prey of the tigers. Photo František Pelc



The development of ecotourism is key to a good level of nature protection. Photo František Pelc

every ecotourist in recent years, which was not always the case.

The Bengal tiger is another treasure of Asian fauna. According to the latest official data, a

total of 2,970 individuals are found in various scattered Indian protected areas, called ‘tiger reserve’. Nevertheless, the number of tigers in KNP has increased in recent decades, and now reaches around 100 individuals. Although

it is one of the largest tiger population densities, not only in India, with each tiger occupying 8 km² of parkland, ordinary tourists rarely encounter a big cat.

Dangers from the Surroundings

The densely populated area around the National Park is covered by rice fields and tea plantations. Island-like remnants of declining forest formations only remain on the surrounding slopes. However, in times of flooding, when most of the park disappears underwater, they are a very important refuge allowing many animals to survive for several months. That is why the Assam government is trying to protect them more consistently from further destruction. Wildlife populations must migrate through populated and intensively cultivated areas, and the number of conflicts is increasing. On the road along the northern edge of the park, we saw dozens of signs confirming this fact and urging drivers to significantly reduce their speed to 20 km/h, which nobody adhered to while we were watching.

Overall Impressions

Kaziranga National Park is faced with many problems related to the surrounding dense population, intensive agriculture and poaching. Despite this, thanks to roughly 600 professional rangers, the park is managing to cope admirably. This is also due to the employment of a further 2,000–3,000 local people in ecotourism. Kaziranga NP is the destination of about 50,000 tourists annually, of which less than a tenth come from abroad, and many spend several days here. Rangers are armed and use an uncompromising approach against poachers.

What message can be found for nature and landscape protection in the Czech Republic? Although each comparison requires some simplification, following the way our hunters and farmers deal with the return of a few dozen wolves to our country, the wilderness co-existence model between Kaziranga NP and the neighborhood in densely populated and poor India can be of inspiration. The existence, care and development of the environment in Kaziranga NP are undoubtedly among the successes of not only Indian nature conservation; which is not such a common thing at present.



BioLog <http://biolog.nature.cz>

Species recording is a crucial source of data for nature conservation. The recording needs to be effective, precise and comfortable. Recent technologies are suitable environment to do so.

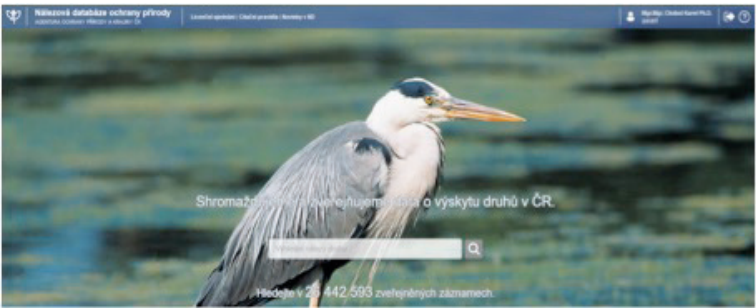
The BioLog Android application by Czech Nature Conservation Agency, serves as an effective way to collect records in the field or just while hiking in nature. BioLog provides an off-line notepad for your observations of animals, plants or fungi in the nature of Central Europe.

The application enables automated localisation (via Google maps) and recording in structured form, which is possible to be imported into Species Occurrence Database of NCA (<https://portal.nature.cz/nd>) or to be exported.

BioLog could be used as a hint source for species search or species local distribution atlas, from the opposite side. Through filtering of Species Occurrence Database via the Around Me function you can get the records collected near to your position on the screen. Your new records through BioLog can then easily enrich this distribution atlas.

The app is connected to the Species Occurrence Database and therefore collected records could be used in wide spectrum of conservation practice based on species presence: as a ground of administrative issues, for management of the specific areas for assessments on local and regional levels.

Species Occurrence Database <https://portal.nature.cz/nd>



Species Occurrence Database is a valuable information resource for experts and all interested in species in Czechia. It is a central species data repository on the national level.

Database encompasses more than 26 million of localised and dated records of 24 thousand species. Three quarters of data are of plants, animals are making a fourth quarter, fungi and lichens do not reach one percent of the data volume. Most of the data are results of expert

research and monitoring, but the involvement of public in the citizen science project shows a growing trend.

Former intention to build a database for expert and official use made the growing public interest and open data policy outdated. The data (except of sensitive records) are today available under the Creative Commons License for any registered user.

Public are grid maps of species distribution (available at <https://portal.nature.cz/kartydruhu>), which are generated on a day-to day basis on the actual state of database, the published knowledge is very recent. The grid maps enable the comparison with published and digitized species distribution atlases. Data are available also in BioLog, the Android app in Around Me function.

Full records are accessible through Filter (at: <https://portal.nature.cz/nd>), the main gate to the database: just put the species name or other conditions. If you are interested what species you can find in your home municipality (if it is in Czechia), just try to search...