



FUTURE OF TIGERS

Sariska's Tigers' diet: 77% of them consume livestock, 13.6% fall upon Sambar deer, 3.6% capture Spotted Deer, while 2.4 can catch Bluebull, and only 0.95% can procure Wild Boar. This study has been undertaken by Dr. G.S. Bhardwaj, Additional Chief Conservator of Forests, Rajasthan, at Sariska Tiger Reserve and is available at: <http://www.scirea.org/journal/PaperInformation?PaperID=3461>

Future of Indian Tigers is arguably assured within the Tiger Reserves. Ironically, nearly 1/3rd of the 50 Tiger Reserves in India are facing such problems that managing them as per conservation scruples is unthinkable.

One third of total Indian Tigers are roaming outside the designated Reserves (an item appears in this issue). Owing to successful breeding and additional cubs born, the new adults are forced to seek pastures anew – they are elbowed out of parental habitats by dominating males. So they have to settle in nearby scrub zones, and remain surrounded by human beings and their livestock – countryside survival. Human-wildlife-conflicts continue unabated. Poaching comes to the fore.

Is it not true then that Tigers' breeding rate success inside the Reserves is getting negated by uncertain fate of their new generation forced to feed for themselves in non-designated Reserves, and meet their fate untimely? Is it because the existing Reserves cannot be geographically expanded to accommodate increasing population of this wild cat? The new entrants have been reported breeding in alien zones, forest authorities confirm. Will there be another set of Reserves, non-designated, to have Tigers in good numbers, without adequate prey-base and shorn of management cover?

Tigers are under direct charge of forest authorities in each State in India.

--Editor.

TIGER, NOW A CASH COW

Tiger is now icon in global conservation. More visitors/experts follow its pugmarks and derive newer strength. A humongous amount is generated in its name. Goes where? Does Tiger receive any dollar/rupee? The 3rd issue of The Conservation Times outlines economic benefits from Tiger Reserves and inks the stakeholder community that receives the direct brunt, remaining bereft of tangible gains.

– Editor



Water is consequential for survival of Tigers, photo by Hemraj Meena in Ranthambhore Tiger Reserve.

An estimated Rs 650 crore (about \$100,000 US dollars) turnover is netted by five Tiger Reserves in India through fees charged on entry of visitors, safari vehicles, camera, guides etc.

Five times more (Rs 3,250 crores or about \$490,000 US dollars) is the likely turnover of the tourism sector being provided by visitors at these reserves.

The fee is deposited with the Government as annual revenue. It is not considered as determining factor while budget is finalized for a reserve.

The five Reserves are: Ranthambhore, Bandhavgarh, Tadoba, Pench and Kanha, where Tiger sightings are the best.

What does the Tiger get? Nothing. Likewise, the forest employees receive nothing, the Reserve gets nothing, and stake holders in surrounding villages also get nothing – out of the tourism revenue. Its major part goes to hoteliers.

Of late the forest department has taken over tourism management in Tiger Reserves. Priority appears to have been shifted from conservation work to tourism.

Research on Tiger related aspects is carried out by outside agencies who find it hard to receive permissions to carry out the same.

Maximum research has been executed by the Wildlife Institute of India, an autonomous body of the Ministry of Environment, Forest and Climate Change. --Editor

ECONOMIC VALUATION OF TIGER RESERVES IN INDIA

Dr. Madhu Verma,
Head of World Resource Institute,
email:madhu.verma@wri.org.

1st such indepth study in world: Madhu Verma, Dhaval Negandhi, Chandan Khanna, Advait Edgaonkar and Ashish David from Indian Institute of Forest Management (IIFM), Bhopal, India, have brought out brilliant facts on what services are received from Tiger Reserves to people – tangible and non-tangible. Here are excerpts from their study. – Editor.

While the underlying objective of establishing tiger reserves under Project Tiger is to ensure continuity of natural evolutionary processes in the wild, tiger reserves also provide a range of associated economic, social, cultural and spiritual benefits, also termed as ecosystem services.

The study provides quantitative and qualitative estimates for as many as 25 ecosystem services from selected tiger reserves. The study findings indicate that the monetary value of flow benefits emanating from selected tiger reserves range from Rs 8.3 to 17.6 billion annually. In terms of unit area, this translates into Rs 50,000 to 190,000 per hectare per year. In addition, selected tiger reserves protect and conserve stock valued in the range of Rs 22 to 656 billion.

70% Tigers in India: India holds over seventy percent of the world's tiger population and is considered to have the best chance for saving the population of this magnificent animal in the wild. Tiger is an umbrella species whereby its protection also conserves habitats of several other species, thereby ensuring continuity of natural evolutionary processes in the wild. The Project Tiger, launched in 1973 by the Government of India, now includes 50 tiger reserves across the country, covering over 2 per cent of India's geographical area.

Besides conserving wild, tiger reserves also provide a range of associated economic, social, cultural and spiritual benefits, which are also termed as ecosystem services. Tiger reserves support human life by protecting fish nurseries and agricultural genetic material (wild cultivars) and providing

cheap, clean drinking and irrigation water from forests.

Tiger reserves not only help in mitigating natural disasters such as floods and cyclonic storms, but the genetic material is also a source of many medicines and drugs. Natural and cultural resources in tiger reserves are important drivers of tourism, supporting local earnings and employment. In addition, these natural landscapes play an important role in ecosystem-based approaches to climate change adaptation and contribute to mitigation by storing and sequestering carbon.

The current study provides conservative estimates of the economic value of six selected tiger reserves in India. These tiger reserves have been selected from different tiger landscapes of the country to provide indicative economic values associated with tiger conservation in India in various ecological and socio-economic contexts.

Corbett Tiger Reserve

It is estimated that the Corbett Tiger Reserve (CTR) provides flow benefits worth Rs 14.7 billion (Rs 1.14 lakh / hectare) annually. Important ecosystem services originating from CTR include gene-pool protection (Rs 10.65 billion), provisioning of water to



On-the-tail as you cannot be over its face, Tiger Tourism at its zenith but what the Tiger receives back, photo by Harsh Vardhan.

downstream districts of Uttar Pradesh (Rs 1.61 billion) and water purification services to the city of New Delhi (Rs 550 million). Other important services emanating from Corbett include generation of employment for local communities (Rs 82 million), provision of habitat and refugia for wildlife (Rs 274 million) and sequestration of carbon (Rs 214 million).

Kanha Tiger Reserve

A typical geo-physiographical representative of the Central India Highlands, Kanha is internationally renowned for successful conservation of two endangered wildlife species, viz. the Royal Bengal Tiger and the Central Indian Barasingha. It is estimated that the Kanha Tiger Reserve (KTR) provides flow benefits worth Rs 16.5 billion (Rs 0.80 lakh/hectare) annually. Important ecosystem services originating from KTR include genepool protection (Rs 12.41 billion), provisioning of water to downstream regions (Rs 558 million) and provisioning of fodder in buffer areas (Rs 546 million). Other important services emanating from Kanha include recreation value (Rs 384 million), provision of habitat and refugia for wildlife (Rs 319 million) and sequestration of carbon (Rs 219 million).

Kaziranga Tiger Reserve

Kaziranga is a World Heritage Site inhabited by the world's largest population of one-horned rhinoceros. In addition, it also supports the

population of tigers and elephants. It is estimated that the Kaziranga Tiger Reserve (KZTR) provides flow benefits worth Rs 9.8 billion (Rs 0.95 lakh/hectare) annually. Important ecosystem services originating from KZTR include habitat and refugia for wildlife (Rs 5.73 billion) and gene-pool protection (Rs 3.49 billion). Other important services emanating from Kaziranga include recreation value (Rs 21 million), biological control (Rs 150 million) and sequestration of carbon (Rs 17 million).

Periyar Tiger Reserve

Periyar Tiger Reserve is a representative of the southern western Ghats with high endemism. It is estimated that the Periyar Tiger Reserve (PTR) provides flow benefits worth Rs 17.6 billion (Rs 1.9 lakh/hectare) annually. Important ecosystem services originating from PTR include gene-pool protection (Rs 7.86 billion), provisioning of water to districts of Tamil Nadu (Rs 4.05 billion) and provision of habitat and refugia for wildlife (Rs 3.55 billion). Other important services include generation of employment for local communities (Rs 25 million), water purification services to nearby towns and districts (Rs 483 million) and recreation value (Rs 425 million).

Ranthambhore Tiger Reserve

Ranthambore is undoubtedly the most popular tiger reserve and marks the



How much do I give you daily, what you give back to me, photo by Harsh Vardhan.

TIGER ENTREPRENEURSHIP

By Anand Mishra

President, TWSI,

email: anandmishra@trimurty.com



I am proud to appreciate that my colleagues have proven how distance-edit-management should be actively executed.

So the 3rd Conservation Times is in hands, thanks to all the editors on board, led by Ed J McCrea based in USA (details are on the last page).

It is devoted to Tiger, India's National Animal. A species as charismatic as India is? Looks like, first time the economics of Tiger Reserves has been outlined with startling, nay questionable, approximate data on cash-flows.

Another dimension to conservation as I like to laud initiative of Dr. Madhu Verma, who piloted first study of its kind in the world, while she taught at the Indian Institute of Forest management (IIFM), Bhopal, an autonomous body set up by India's Ministry of Environment Forest and Climate Change. Excerpts from the study are presented in this issue.

Fifty Tiger Reserves in India today which at start of this challenging mission in 1973, were only nine.

Phenomenal success, it has been hailed as. Behind it are the forest authorities who have to be constantly on heels to face ongoing man-wildlife conflicts, village communities suffering the most, and receiving almost nothing out of massive proceeds accruing out of Tiger sightings.

Think of the day when all 50 Tiger Reserves will answer the questions being raised over their performance. MoEFCC has listed 600+ National Parks and Sanctuaries in India.

They are capable to generate a new revenue – incalculable as it is today to estimate. If India is able to set out a new equation between Conservation and Tourism. Is it a big if?

No, it is not.

transition zone between the true desert and seasonally wet peninsular India. It is estimated that the Ranthambore Tiger Reserve (RTR) provides flow benefits worth Rs 8.3 billion (Rs 0.56 lakh/hectare) annually. Important ecosystem services originating from RTR include gene-pool protection (Rs 7.11 billion), provisioning of water to the neighbouring region (Rs 115 million) and provisioning of habitat and refugia for wildlife (Rs 182 million). Other important services emanating from Ranthambore include generation of cycling of nutrients (Rs 34 million) and sequestration of carbon (Rs 69 million), apart from housing the Ganesh Temple visited by about 10 lakh pilgrims every year.

Sundarbans Tiger Reserve

Sundarbans forms the largest contiguous track of mangrove forest found anywhere in the world and is the only mangrove forest inhabited by tigers. It is estimated that the Sundarbans Tiger Reserve (STR) provides flow benefits worth Rs 12.8 billion (Rs 0.50 lakh/hectare) annually. Important ecosystem services originating from STR include nursery

function (Rs 5.17 billion), genepool protection (Rs 2.87 billion), provisioning of fish (Rs 1.6 billion) and waste assimilation services (Rs 1.5 billion). Other important services emanating from Sundarbans include generation of employment for local communities (Rs 36 million), moderation of cyclonic storms (Rs 275 million), provision of habitat and refugia for wildlife Rs 360 million) and sequestration of carbon (Rs 462 million).

Total Gains

The study findings indicate that the monetary values of flow benefits emanating from selected tiger reserves range from Rs 8.3 to 17.6 billion annually. In terms of unit area, this translates into Rs 50,000 to 190,000 per hectare per year. In addition, selected tiger reserves protect and conserve stock valued in the range of Rs 22 to 656 billion. In the light of growing awareness of life-supporting functions of many ecosystem services and advanced technology to make use of genetic diversity, the economic value of this stock is likely to appreciate rapidly.

Study findings also indicate that a large proportion of flow benefits (as well as

stock) are intangible, and hence often unaccounted for in market transactions. Economic valuation can help in recognizing these intangibles and hence have them considered in policy actions. Further, adequate investment in natural capital contained in tiger reserves is essential to ensure the flow of ecosystem services in future, and is economically rational based on the study findings.



Camera-trap device: it is a tiny camera with flash and an auto-click system to photograph any moving object passing in front of its lens. It is tied at low height (same height as of a mammal) over a tree-trunk. A miracle device to enable identification of tigers.



High-end visitors extract the best out of Tiger Reserves, generating huge economic gains, for whom, photo by Harsh Vardhan.

CHARISMATIC MEGAFAUNA

By Ed McCrea

email: emccrea@eecg.org

What do you think that even mean, and why is the term important in wildlife conservation? Charismatic--exercising a compelling charm and/or generating high interest. Movei stars have it. Some politicians have it. You and I probably don't have it. Megafauna—mega means big and fauna means animals rather than plants. So, charismatic megafauna means large animals that have compelling charm and/or generate high interest.

Around the world, perhaps the Giant Panda is the best example of charismatic megafauna. Everyone loves the panda and thinks it is cute and charming. People's interest in the panda is extremely high. So much so that the Director of the National Zoo in Washington, DC thought that the presence of pandas would increase attendance at the zoo by 20 percent.

Authors of a 2018 journal article (<https://doi.org/10.1371/journal.pone.0199149>) went to considerable lengths to determine what the general public and other sources thought were the 20 most charismatic megafauna in the world. The top 20 were--tiger, lion, elephant, giraffe, leopard, panda, cheetah, polar bear, wolf, gorilla, chimpanzee, zebra, hippopotamus, great white shark, crocodile, dolphin, rhinoceros, brown bear, koala, and blue whale.

By my count, you can find half of these animals in India—tiger, lion, elephant, leopard, great white shark, crocodile, dolphin, rhinoceros, brown bear, and blue whale. With the possible exception of China, I can't think of any other country in the world that has more

species of charismatic megafauna, can you? Thus, by this list, India is the charismatic megafauna leader of the world. (Even if China and India are tied, I give India the nod because some experts are currently discussing the possibility of reintroducing the cheetah to India.)

That fact may be interesting to you, but is it just a bit of trivia, or is it important? Actually, the concept of charismatic megafauna is important in the world of wildlife conservation. Take the example of the tiger. It is number one on the above list, and, I think, number one by far in India and around the world. Because of this high interest, people have founded many nongovernment organizations for its conservation. And, the public has been willing to donate millions of dollars to conserve this charismatic carnivore. They donate money that can be used for land acquisition, prey species management, research, etc.

These tiger conservation efforts also benefit a wide variety of other plants and animals. What is good for the animal atop the food pyramid is also good for all the plants and animals on lower levels of the pyramid. Government agencies can also take advantage of the charisma of an animal to build political and public support for needed conservation action. Project Tiger is a well-known and effective example.

In addition, people's strong interest in some highly popular species has produced wildlife tourism activities generating millions of dollars. This is money that can be used, in part, for conservation efforts. As one of the articles in this issue of Conservation Times documents, tiger tourism is a major revenue generator:

An estimated Rs 650 crore (about \$100,000 US dollars) turnover is netted by five Tiger Reserves in India through fees charged on entry of visitors, safari

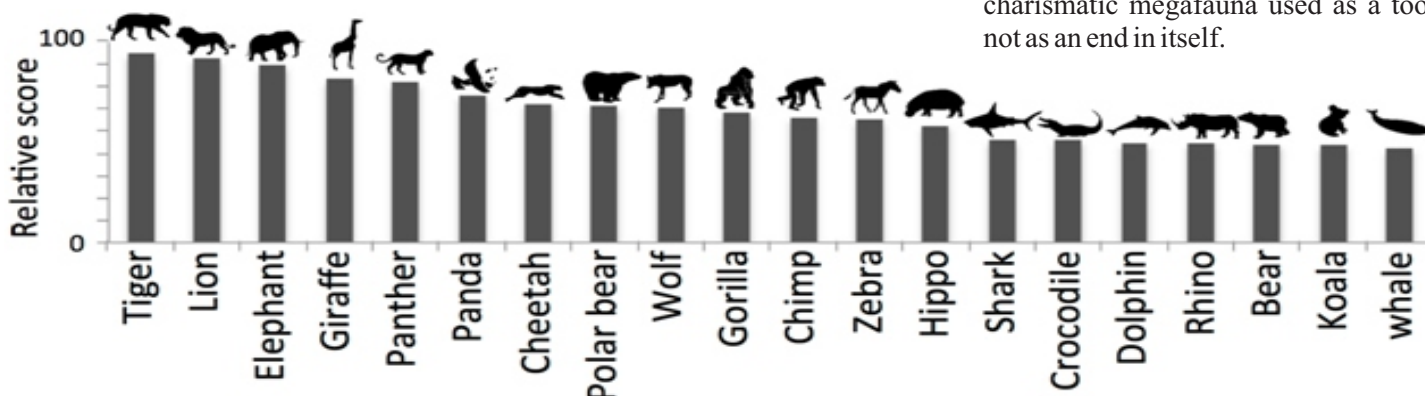
vehicles, camera, guides etc. Five times more (Rs 3,250 crores or about \$490,000 US dollars) is the likely turnover of the tourism sector being provided to visitors at these reserves.

So then, is an emphasis on charismatic megafauna the best idea that has ever happened to wildlife conservation? You might think so, but some experts in the field feel differently.

They point out that there usually is only so much money to be spent on wildlife conservation in a given year. Charismatic megafauna may turn budget allocations into a popularity contest rather than the allocations flowing from a serious research-based planning process. How can an endangered mouse species or a rare type of grass compete with the tiger for funds? And how about areas with few or no charismatic megafauna? The Thar Desert in Northwest India has leopards, but none of the other 20 species of high interest. Should we ignore this area of importance for conservation of species like the Great Indian Bustard when money for conservation is budgeted?

In a like manner, the tourism that charismatic megafauna generate may not be all for the good. Sometimes, private enterprises or the government do not use money generated by wildlife tourism for conservation efforts. The tourist traffic itself may disrupt the lives of the animals involved and result in degradation of their habitats. Infrastructure needed for tourism—roads and lodges, among other things, can also impinge on important habitat areas and disrupt the natural cycles of reserves and protected areas.

So, the idea of using charismatic megafauna to further conservation of species should probably be employed with caution. The needs of the mouse and the needs of the tiger must both be considered, and the concept of charismatic megafauna used as a tool not as an end in itself.



33 PERCENT RISE IN TIGER NUMBERS

India's tiger population has jumped to an estimated 2,967, a rise by 33% over 2,226 reported in 2014. This is also an incredible 210% rise from 1,411 recorded in 2006, according to the all-India estimation — 'Status of Tigers, Co-predators, Prey and their Habitat, 2018'. (In 2014, tigers aged 1.5 years or older were counted. The current report has the cut-off age as 1 year.)

One significant aspect of the latest estimation is the capture of 2,461 individual tigers — 83% of the total estimated 2,967 — in camera-traps. This limits the scope of extrapolation and potential bias or flaws in the process. In comparison, only 1,540 unique tigers — 69% of the total estimated population of 2,226 — were camera-trapped in the 2014 estimation.

The increase in tiger photos is due to the much wider deployment of camera-traps during the present estimation exercise.

For the 2014 estimate, only 9,735 camera-trap points were used. This time, the coverage increased by 275% to 26,838 camera-trap points.

A worrying aspect of the report is the continuing loss of tiger-occupied areas. While net occupancy remains stable at 88,000-89,000 sq km, tigers relinquished over 40,000 sq km since 2014.

Since they also colonized over 25,000 sq km in that period, the report computes the net loss in tiger-occupied area to be 17,881 sq km or 20% of the tiger habitat in four years. This explains the shrinking presence of tigers outside tiger reserves.

In fact, there is bad news from tiger reserves as well. Against the 33% jump in the national tiger population, the report recorded potential loss of all tigers in three reserves.

No tigers were recorded in Buxa (West Bengal), Dampa (Mizoram) and Palamu (Jharkhand) tiger reserves.

ONE THIRD OF INDIAN TIGERS OUTSIDE OF RESERVES?

Will anyone believe that more than one third of India's wild tigers reside outside the 50 Project Tiger Reserves? It has been revealed by the All-India Tiger Population Estimation Report, drafted by the Government:

*as many as 1,923 tigers or 65% the total tiger population was found inside tiger reserves and

*the rest were estimated to have a range that was largely found in neighbouring forest blocks, the government's report on 2018 tiger population estimation showed.

Camera-trap images revealed this as were taken by the National Tiger Conservation Authority (NTCA) and Wildlife Institute of India (WII).

“There is always an issue of defining a number within an area that has a contiguous habitat that can potentially be used by tigers outside of tiger reserves (Tiger Reserves not having hard boundaries but embedded within larger forested areas).

In such cases, tigers that are photo-captured within a reserve could potentially have their activity centres way beyond the boundaries of a tiger reserve but visit and use the Tiger Reserves and thus get photo-captured,” the government report explained.

This estimate of tigers outside the reserves again reinforces the importance of contiguous forest habitats, tiger corridors and sink habitats that ensure the dispersal of tigers between different habitats.

NTCA and WII calculated the estimated numbers and stated that tiger reserves like Corbett, Dudhwa, Bandhavgarh, Pench, Tadoba, Mudumalai, Nagarhole, Bandipur and Sathyamangalam have a sizeable share of such tigers whose home range was largely outside reserves but they also visit the tiger reserve area.

In Corbett, an estimated 231 tigers were found inside the boundaries of the tiger reserve while 35 were found visiting the adjoining forest blocks. While in Kanha, Madhya Pradesh, 88 tigers were found inside tiger reserves and 20

were utilized in the area of the reserve. The Mandla forest division in MP serves as a crucial link for the Kanha-Pench habitat corridor and during the 2018 estimation; nine individual tigers were identified in this division. These forests act as a buffer to Kanha tiger reserve.

Movement of tigers has been regularly observed between Kanha Tiger reserve and Mandla Forest Division. Hence, protection of this area becomes crucial for dispersing tigers.

A large number of tigers roaming outside reserves were found in Uttarakhand, Madhya Pradesh Maharashtra, Karnataka forest divisions, said WII's Qamar Qureshi, a lead scientist and co-authors of the 2018 tiger population estimation report.

YVJhala, lead scientist and co-author of the estimation exercise report, said that activity centers of the tigers were mapped to determine their range. We tried to determine the centre of the tiger's activity to arrive at its range.

The tigers have been captured at various locations on camera traps and using the geographical coordinates we were able to determine if tigers were largely found outside the tiger reserve.



*That is how a Tiger was weighed in India until yester years. Have things improved?
Photo by Harsh Vardhan.*

TIGER FACTS

Adapted from Big Cats Wild Cats - <https://bigcatswildcats.com>



A collared Tiger, photo by Hemraj Meena.

Tigers are an endangered species. In addition to having lost over 90% of their original habitat, they have been aggressively hunted and poached. The current population of tigers in the world is believed to be between 3,000 and 4,000. The largest population of wild tigers is in India.

The tiger is the biggest cat on the planet.

It is the national animal of four countries – South Korea, Malaysia, India and Bangladesh.

They have the biggest canines (long, pointed teeth) of any cat.

Tigers are the third largest carnivore (meat eater).

Tigers like water and swim.

They are the only cat species that is totally striped.

The largest male tigers can grow up to 12 ft. long and weigh as much as 675 lbs.

Tigers could once be found throughout Asia. During the past 100 years, their numbers have plummeted from approximately 100,000 to fewer than 4,000. Within the past 15 to 20 years, their range has also decreased by over 40%. Many tigers live in the forest, but you can also find them in grasslands and places where there are hills and rocks.

They are excellent swimmers and like being near water. Tigers generally lead solitary lives in established territories, although they are also considered “social.”

Tigers have been seen hunting during the day and night. They prefer medium to large, hoofed animals such as deer, boar and buffalo, as well as domestic livestock and, on occasion leopards, dogs, crocodiles and bears. They have also been seen eating vegetation. Sometimes a tiger will share its kill with another tiger. The tiger's hunting success rate is only 10 to 20 percent.

Males and females will typically mate from November to April. There are generally 2 to 3 cubs in a tiger litter, with a range of 1 to 6. Cubs will usually stay with their mother until they are 2 to 2 ½ years old. Sometimes a male tiger will help raise the cubs. Tigers live between 20 and 26 years, both in captivity and in the wild.

The tiger has been hunted relentlessly for its skin and body parts. Most black marketers involved in the tiger parts trade are based in China. There are also “farms” where the tigers are being bred for their parts. It is estimated that there are between 5,000 and 10,000 tigers currently living on these farms – more than the current wild tiger population.

MORE DOMESTIC DOGS THAN TIGERS IN MAJOR INDIAN RESERVES

Camera-traps used in the latest all-India tiger survey captured more free-ranging domestic dogs than tigers in 17 tiger reserves. Presence of both dogs and livestock in significant numbers was recorded in at least 30 tiger reserves.

Experts say the proliferation of dogs and livestock, mostly feral and abandoned, inside forests carries the risk of transmission of various diseases to wildlife. They also compete with wild animals for resources.

While Environment Ministry officials claimed that “these domestic animals were spotted mostly in the peripheral forests away from the core” areas, the quadrennial tiger report does not provide any spatial data on how far

inside the tiger reserves the dogs and livestock were photographed.

“We are aware of this problem. Livestock and dogs are found in certain fringe areas close to villages. In view of threats such as canine distemper virus, etc., we are trying to minimise the interaction between these domestic species and wildlife,” said S P Yadav, member secretary, National Tiger Conservation Authority, which conducts the quadrennial all-India survey.

The 2018 tiger survey data show that more dogs were camera-trapped than tigers in 17 tiger reserves. This includes seven major reserves — Nagarjunsagar-Srisailem (Andhra Pradesh), Sariska (Rajasthan), Pench, Panna and Bandhavgarh (Madhya Pradesh), Bhadra (Karnataka), Sathyamangalam (Tamil Nadu) and Melghat (Maharashtra) — that together house almost 400 tigers.

The remaining 10 — Udanti-Sitanadi and Achanakmar (Chhattisgarh), Kawal and Amrabad (both Telangana), Anshi-Dandeli (Karnataka), Sanjay-Dubri (MP), Mukundra (Rajasthan), Bor (Maharashtra), Palamu (Jharkhand) and Buxa (West Bengal) — recorded few or no tigers.

A study in 2017 found that domestic dogs killed more livestock than those hunted by snow leopards and wolves combined in the upper Spiti landscape of Himachal Pradesh.

Elsewhere, too, they compete with smaller carnivores.

“It is ironic that the so-called ‘inviolable’ areas like tiger reserves were created for wildlife by shifting people out, but policymakers are wary of removing dogs from there. Even critical landscapes such as the breeding areas of Great Indian Bustards are not safe,” said Dr AT Vanak, Senior Fellow at Centre for Biodiversity and Conservation, ATREE, Bangalore.

In 2017, a global study published in the journal ‘Biological Conservation’ said domestic dogs contributed to 11 vertebrate extinctions and pose a risk to at least 188 threatened species worldwide.

LANTANA SPECIES TO DESTROY 40 PERCENT OF INDIA'S TIGER HABITATS



Lantana flower, smell and you get head ache.

Arriving in India as an ornamental plant in the early 1800s, this plant, *Lantana camara*, is a thicket forming shrub native to tropical America. It has now escaped from gardens and taken over entire ecosystems. It occupies 40 percent of India's tiger range alone.

Multiple hybrid varieties of *Lantana* were brought to India and over the 200 years of its introduction, the varieties have hybridized and formed a complex. The species is now able to climb up the canopy as a woody vine, entangle other plants by forming a dense thicket, and spread on the forest floor as a scrambling shrub.

Lantana is one of the world's ten worst invasive species and a species of High Concern for India. It competes with native plants for space and resources, and also alters the nutrient cycle in the soil.

This invasion has resulted in the scarcity of native forage plants for wild herbivores. If eaten, the leaves can induce allergies on the muzzles of animals. In some cases, extensive feeding on *Lantana* has led to 'diarrhoea, liver failure, and even the animals death.

A recent study published in *Global Ecology and Conservation* reports that *Lantana* occupies 154,000 sq.km forests (more than 40 percent by area) in India's tiger range. Among forests, Shivalik Hills in the North, fragmented deciduous forests of Central India, and Southern western Ghats are worst hit by its invasion.

Lantana as new green: The study has analysed data from one of the most extensive known systematic surveys done for evaluating the status of invasive plants at multi-landscape scale. These surveys were part of the National Tiger Estimation Project. They were conducted both inside and outside of protected areas in India by the forest guards of respective State Forest Departments and a team of wildlife biologists.

During the survey, the forests in 18 tiger states of India were divided into units of 25 sq.km. Each unit was sampled to record native and invasive plants and human disturbance. In this way, 117,104 plots were sampled across 200,000 sq.km of forest area. Along with this information, data on factors known to facilitate the spread of invasive plants (like soil fertility, water

availability, climate, fire, roads, and other human modifications) was used in a model, which was used to predict the spread of *Lantana* in these forests.

This research shows that forests degraded due to human influence and those occurring in warm and humid regions are most affected. Madhya Pradesh, which has the highest reported forest cover in India, was found to have a substantial part of its forests invaded. Likewise, Bandipur Tiger Reserve, which was shown to be 'greening' by another study, was found to be substantially invaded by *Lantana*.

High risk: "Nearly 60% of *Lantana* occurred outside its native climatic niche", mentioned Ninad Mungi, a researcher at the Wildlife Institute of India and the lead author of this study. "*Lantana* can tolerate warmer temperature and more moisture (in India), as compared to its native region. This can help it utilize the changing climate, where most of the native plants are failing," he added.

The models estimate that 3,00,000 sq.km forest area (an extra 44% of forest area) across India is threatened with *Lantana* invasion – which means there is a high risk of biodiversity loss due to *Lantana* invasions in these areas.

While more than 40% of Indian forests are invaded, the remaining 50% holds the potential to conserve the native forms of our forest ecosystems. The study identified such uninvaded forests to be present in northeastern India, and in parts of Odisha (Simlipal and Satkosia), Chhattisgarh (HasdeoArand forests), Jharkhand (Palamau) and Maharashtra (Bander – TadobaAndhari Tiger Reserve). However, most of these forests have been earmarked for developmental projects (like dams, coal mining, etc.).

When human influences are overlaid on forests along with the effects of invasion, the situation becomes grim. Widening of roads, mining, and submergence due to dams lead to forest fragmentation, increased invasion, and ultimately loss of biodiversity. The study reports forest degradation to be one major driver of *Lantana* spread. Unsustainable human modifications of the uninvaded forests can degrade them, which can in turn help *Lantana* invade these forests.

Economics of managing *Lantana*: Eradicating *Lantana* has been practiced

religiously in several protected areas in tropical India, where on an annual basis, hectares of lantana invaded patches are either burnt, or are uprooted. Most of the time, the frontline forest staff works across the summer months in these forests manually uprooting this thorny plant one after the other. But, the impact of dealing with this plant on human health is little known, nor are the wages for these labours promising.

The study also mentions that controlling lantana in one sq.km costs 14 lakh rupees and with the current expanse it would need 10 billion dollars more than the total funds allocated to the Ministry of Environment, Forest and Climate Change (MoEFCC), in the year 2019!

Protecting biodiversity and patrolling the forests against illegal activities becomes difficult with the presence of these invasive plants. Today, some forests (like Bandipur Tiger Reserve) are completely covered with lantana bushes, raising concern for both scientists and managers.

But what leads to such a monstrous spread of this invasive plant? Well! The answer lies in the numerous ways it is propagated. Lantana is mainly dispersed by fruit-eating birds, monkeys, bears, etc., but it also has a capability to grow from its root-stock, and nodes (via vegetative propagation).

Spread by birds: When Geetha Ramaswami and her colleagues studied the dispersal of lantana in Rajaji National Park, they observed that a lot of fruit-eating birds are attracted to lantana.

Bulbuls in particular. “They rapidly disperse lantana seeds from source plants to managed areas. These areas are often not very far from fruiting source plants [of lantana] and they fall well within the median dispersal range of bulbuls!,” said Ramaswami, who is currently with the Nature Conservation Foundation.

In every Tiger Reserve, a few hectares of land is cleared of lantana each year, but the area requires intensive surveillance.

Since lantana seeds are already present in soil and they are also dispersed by many birds from surrounding areas, lantana regrows rapidly. To tackle this,



Lantana grass in full bloom, most invasive.

a follow-up removal of lantana seedlings is necessary for a minimum of two years. It is a mammoth task and results have not yielded much.

Grass replaced: Lantana has replaced grasses (primary fuel for forest fires) from the understory, changing the intensity and spread of fire when it occurs.

“We suspect that controlled fires to destroy seeds in the seed-bank may be an important management tool in controlling rates of lantana re-invasion, but this idea remains to be tested. In my view, using fire to control lantana has to be carefully orchestrated and managed”, Ratnam said.

These forests are rich in native biodiversity and provide ecosystem services worth millions of dollars. Unless prioritized, biodiversity loss due to the presence of invasives and fragmentation can lead to unhealthy ecosystems and may result in ecosystem disservices. Hence, along with early detection and monitoring, there is a need for management-oriented research.

On a priority basis, we need to study how native vegetation responds to

various lantana removal practices like uprooting, weeding, fire, etc. Many countries have informed policy through similar exclusion experiments (e.g., United States, Australia, Hawaii) but evidence from India is rare.

This article was originally published by Mongabay-India.-- Editor



Russian President V. Putin holding the Ussuri tiger being tagged in Russian Academy of Science's reserve in far-east Russia.

CARACAL: NEW FACTS



A Caracal with its prey, photo by Hemraj Meena.

Observing Caracal (*Caracal caracal*) is not easy in India – it is nocturnal, and visitors are not allowed for night inside forests. It is highly secretive. It is territorial and lives mainly alone or in pairs.

It preys upon small mammals, birds, and rodents. It can leap higher than 4 m (12 ft) and catch birds in midair. The main threat to the species is the loss of habitat although there have been reports of retaliatory killing by the goat and sheep herders.

Ranthambhore Tiger Reserve has recorded 7 species of wild cats, of which Caracal is the rarest and least known in terms of its status and ecology. Probably, it is now found only here in any significant numbers.

To estimate its numbers in Ranthambhore, the Reserve officials developed a new practice of assessing Caracal over camera-traps: counted and segregated all caracal photo-captures in a particular camera, checked as to how many individuals were present in a photo-capture, what was distance between camera stations, calculated the time difference of capture, detected any distinguishing feature among different caracals.

Based on such aspects, it was concluded that there were at least 18 different Caracal individuals and the population could range from 18 to 35 individuals.

The locations of caracal presence are marked on a map. It indicates that a sizeable population of Caracals is present in the adjoining forest areas of Karauli, Dholpur and Bundi as well as in the ravines in and around the National Gharial Sanctuary along the Chambal River. It may be largest Caracal population in any Reserve in India.



Most elusive Caracal was once maintained at a residence in Jaipur (60s) by Kishan Gopal Rungta, India's celebrated cricketer and astute wildlife expert. He had picked up cubs from Sariska, then a Sanctuary. A photo of the same is shared by him for readers. Rungta's book, "Stalking Tigers On Foot" was released a few years ago, like to connect: <mukundrungta@gmail.com>

REVIVING RAJASTHAN'S DESERT LANDSCAPE

By Rosamma Thomas

A freelance journalist based in Pune, Maharashtra, India
email: rosammat@gmail.com

If Rajendra Singh is India's award-winning waterman, then Pradip Krishen is the nation's plantman. The former filmmaker has for over a decade been working with the Mehrangarh Fort Trust in Jodhpur, where the Rao Jodha Desert Rock Park now stretches over 70 hectares near the Fort, with over 300 species of plants. Krishen is a champion of “rewilding”, or restoring degraded landscapes by prodding nature along, so it takes its course.

For the first time in his life, the 70-year-old is now working with a government agency, Jaipur Development Authority. He is working to restore degraded lands at the foot of the Nahargarh Fort in Rajasthan state capital Jaipur. At the foot of the hill, there is an “obstructed

dune” – a sand dune that in the normal course would sweep forward but finds itself blocked by the hill. Sand has now piled up at the bottom of the hill, and water has carved pathways down this dune. Kishan Bagh, the restored landscape here that Krishen has been working on since 2016, is set to be open to visitors soon.

Describing how he came to begin work on this site, Krishen says he was invited by the government to recreate some of his work in Jodhpur in the state capital. He was shown municipal parks; those did not interest him, there's little scope of re-wilding a park. That was when the state government horticulturists took him to the foot of Nahargarh Hill in northwest Jaipur – it looked like the

Chambal ravines, he said. The sight excited him, and he began to think of what he could do there.

While he worked in Jodhpur, Krishen would travel often into the desert areas along the border with Pakistan, and he discovered, from asking a local person who herded camels, that the traditional name for the scrubland in the deserts where camels could feed was “Roe”. The sandy dune landscape was called Thull – in Pakistan, the Thar desert is now called Thal, and it is clear that this local word was the root of the Anglicized “Thar”.

Krishen says he wanted visitors to experience the Roe of the desert, and so he brought elements of the desert to the Kishan Bagh, shifting even a large boulder that had been naturally splintered. Visitors will see now how plants grow through the crevices of rocks.

Desert landscapes these days are highly degraded and fragmented, with the profusion of mining activity and the thinning of natural vegetation. Renewable energy projects – solar panels and windmills -- too have



Gardeners in the early part of the rains spreading seed-bearing soil that has been brought in from the desert. The soil has been collected in (empty cement) 'kattas' and each different kind is marked for identification so that only one type is spread in one particular area.

disturbed the rugged beauty of these landscapes. At Kishan Bagh in Jaipur, a visitor might get a sense of what the Roee was, before human intervention interfered with the natural vegetation.

Most Roees in Rajasthan have three common plants, that locals call Seenio (*Crotalaria burhia*), Bui (*Aerva pseudo-tomentosa*) and Kheemp (*Leptadenia pyrotechnica*), Krishen explains. The plants in the desert change according to the composition of soil; even so, these three plants are quite common. The interpretation spaces in the new park will expose visitors to similar scrublands in other parts of the world – large photographs will allow visitors to see how such areas are conserved in other countries. “If they can do it, why not us?” That should be the question visitors pose.

There is a section of Kishan Bagh that will have the traditional dhok (*Anogeissus pendula*) – a variety of tree found only in the Aravalli range. It can survive with little water in rocky soil on the hill.

“These are clonal forests,” Krishen explains. The trees appear like separate trees, but in reality, their root system is all meshed underneath, so actually the trees are all linked. This is the vegetation on the Nahargarh Hill too, and a section of the park has been



Pradip Krishen (right) with Faith Singh (middle) and Jane Singh (left) at Kishan Bagh, photo by Harsh Vardhan.

planted with dhok so visitors can see it up close.

Pradip Krishen expresses dismay that forest officials in India think of the desert as “wasteland”, and that governments often try and green these areas, channeling water to them from long distances away.

The Indira Gandhi Canal was also planned to bring water from Punjab to the Rajasthan desert. Although the cultivation of crops became possible

with the canal, diseases like malaria, that desert people had never known before, also arrived. The rise in the water table from irrigation caused soluble salts to rise closer to the surface, causing decline in crop yields and creating new wastelands.

The work undertaken in Jodhpur and Jaipur could make people stop and think about the desert and see how this interesting natural landscape waits to be better understood.



Showing the micro-habitats (with different desert soil-types) in the foreground and the Viewing Deck (that overlooks the dunes) to the left, top.

TROUBLED TIMES FOR ANIMALS IN KAZIRANGA

By **Seema Sharma**, a freelance journalist based in Chandigarh, email: seema.atri@gmail.com

The wild animals of Kaziranga National Park and Tiger Reserve (KNPTR) in Assam are having a tough time battling with the deluge these days.

More than 120 animals, including 11 rhinos, have died in the flood which has swept over 85% of Kaziranga. According to official sources, two of the rhinos succumbed to natural causes. Full count of animal casualties will be known only after the flood recedes.

The 880 sq. km Kaziranga comprising a core area of 430 sq. km is surrounded by the Brahmaputra on the north and the hills of Karbi Anglong in the south. The annual flood puts immense pressure on these animal species for survival.

KNPTR, a UNESCO World Heritage Site, is proudly the world's major stronghold of 2400 one-horned rhinos. The park has other impressive animals like about 121 tigers and 1100 Asiatic elephants. It is also home to several globally threatened animal species such as gaur, wild water buffalo, hog deer, and the Hoolock gibbon.

Britain's Prince William and his wife, Kate Middleton, have expressed their concern for the park's animals in a letter sent to park authorities a few days ago. The couple who had visited the park in 2016 expressed their distress about the flood unleashing havoc to the park and its world famous wildlife.

Flood essential for the ecosystem of the park

However, park authorities and many experts believe floods are also essential for the ecosystem of Kaziranga.

"Flood plays a vital role in maintaining the riverine ecosystem of Kaziranga by providing for the essential alluvial deposits from the Brahmaputra and its tributaries." P Sivakumar, director, KNPTR said.

Uttam Saikia, Honorary Wildlife Warden of Kaziranga, reinforced this view saying that floods replenish Kaziranga's water bodies and maintain its wetlands, grasslands, and deciduous forests as well as stocking up the breeding ground for fish.

Bibhab Kumar Talukdar, chief

executive officer of Aaranyak and Asia coordinator of International Rhino Foundation said, "Kaziranga is located in flood plains. Animals have been surviving floods here for over 100 years. Had the floods been too detrimental, the rhinos' number would have gone down."

However, he also emphasised that deforestation in catchment areas, water release by dams upstream and climate change is worsening the magnitude of devastation and taking its toll on the unprepared animals. This is the sixth heaviest monsoon in the state in the last 40 years.

Artificial highlands v/s natural hill highland for shelter

Kaziranga authority has created 144 artificial highlands—of which 33 were sanctioned three years back—to provide temporary shelter to the animals during flood and bring down animal casualty during this yearly tragedy.

But the reality is that about 70 percent of these highlands are in dilapidated



Deer crossing over NH -37 amid heavy road traffic to reach Karbi Anglong Hills for safety during flood in Kaziranga National Park (Uttam Saikia).

condition. Around 33 new ones have been built in the direction flow, along the southern boundary of Kaziranga.

Talukdar added, “Too many highlands are not good for animals as the erosion and siltation caused by them may affect wetland and may change the composition of grasslands. They must be created for short-term and in scientific manner.”

“The artificial highland will lead to more erosion, more siltation in the grasslands and wetlands on which rhinos and other multiple animal species are dependent. Karbi Anglong hills are the natural traditional shelter for the animals”, said Rabindra Sharma, research officer with the park.

Erosion, mining, corridor bottlenecks impacting Karbi Anglong

National Tiger Conservation Authority in their last year's report had mentioned that this landscape connectivity, crucial for the survival of long-ranging species like the Indian elephants and Bengal tigers is under threat from indiscriminate rock mining and quarrying.

“While the southern part of Kaziranga-Karbi Anglong landscape is experiencing fast paced urbanisation coupled with destruction of Karbi Anglong hills due to illegal and rampant mining/quarrying activities, the Kaziranga is also facing another natural threat on its northern boundary,” the report said. “Every year,

the river Brahmaputra is continuously eroding the northern and eastern bank of Kaziranga core.”

Rohit Choudhury, wildlife conservationist said, “It is very unfortunate that due to the disturbance caused in their habitat of Karbi Anglong hills, most of the wildlife like barking deer, hoolock gibbon, rhinos etc have abandoned the area.”

In April last year, Supreme court restrained mining and related activities along the Kaziranga National Park area and in the entire catchment area of rivers/streams and rivulets originating in Karbi Anglong Hill ranges and flowing into the Kaziranga. “No new construction shall be permitted on private lands which form part of the nine identified animal corridors,” the bench said.

Both Kaziranga and Karbi Anglong Hills make an area of 25,000-square-kilometer (9,650-square-mile) as Kaziranga-Karbi Anglong Landscape. Kaziranga and Karbi Anglong were part of the same landscape in the past. Nine wildlife corridors — Panbari, Haldibari, Bagori, Harmati, Kanchanjuri, Hatidandi, Deosur, Chirang and Amguri — have been badly disrupted with the construction of expanded infrastructure like resorts and National Highway 37.

Around 17 animals were killed by speeding traffic during last year's flood, according to the flood report of forest department.

The district administration has imposed a speed limit of 40 km/hr to avoid animal getting killed in road accident. Despite this, around 15 hog deer besides other animals have been crushed by the speeding vehicles, this year.

“A flyover will be built over NH-37 to divert the traffic on it to permit animals to cross the road without any difficulty. The project may take a decade to complete,” said Sharma.

New plans to facilitate intrusion-free movement of animals

According to Sivakumar, the park administration is mindful of managing corridor issue including those cutting across NH-37. He said that management will develop three new corridors on 500 hectares of land in near future.

He further added, “This year, the Centre approved and sanctioned a fund of Rs 12.5 crore for a highland and road project that will raise the heights of some of the low roads in the national park to the level of the existing tourist-circuit road. These new additions are meant to give relief to the animals during floods while the heightened roads will be used for patrolling by the forest staff.”

The officials contended that they have heightened the patrolling to ensure protection of vulnerable animals from poaching during flood time.

Community support for animals

Parimal Suklabaidya, minister of environment and forest said, “The forest department is facing a double whammy of protecting the animals in Kaziranga every year, one from poachers and other from natural calamities. The forest department and the government are making all efforts to protect the animals even at Karbi Anglong”.

Saikia talked about community awareness of wildlife rescue. “Regular awareness programmes were conducted in the nearby villages with regard to saving and rescuing the animals during flood situation. Dr. Rathin Barman, Joint Director, Wildlife Trust of India, chipped on this subject saying that the support they are getting from the community in rescue operations is enormous.



Rhino stuck in flood situation in Kaziranga National Park in Assam (Uttam Saikia).

Gulab discovers Science in Gita

What relevance today of Bhagwat Gita, the discourse between Lord Krishna and his relative, Arjun. The Lord goaded him to 'reason' at a time he had lost it.

Numerous interpretations have been attempted on Gita, since time immemorial down to what Dr. S. Radhakrishnan and A.C. Bhaktivedant Swami Pabhapada of International Society for Krishna Consciousness (ISCON) had rendered. Has Krishna been understood in toto?

As though to answer it, an experienced journalist, Dr. Gulab Kothari is treading on a new path: learning Sanskrit daily from a tutor so that he is

better versed to decipher the Bhagwat Gita.

Gulab attained PhD and DLit. He is Chairman of the Rajasthan Patrika, a daily published from numerous places in India. He scripts a front-page edit-piece to hammer out ancestral morality vs contemporary hybrid trends. He questions the loss of values and urges readers to be conscious of their roots. His father, Karpur Chandra Kulish had established the daily during the 50s, and saw science in Vedic scriptures.

Gulab has written more than a dozen books. The latest to hit the stands is "*Samvaad Upnishad*". It runs into 760 pages.

Its glossary is spread over 30 pages, references forming a separate part. Spread-knowledge --- his mantra. The book was formally released on 8 September 2020 by India's Prime Minister, Narendra Modi through a video-meeting lasting nearly an hour. He lauded efforts of this Patrika Group Head.

Only Gita can bring the curtain down on knowledge, he adds wistfully. So learning afresh:

"*Gyabante ham sa-vijnamanidamvaksyamyasesatah*

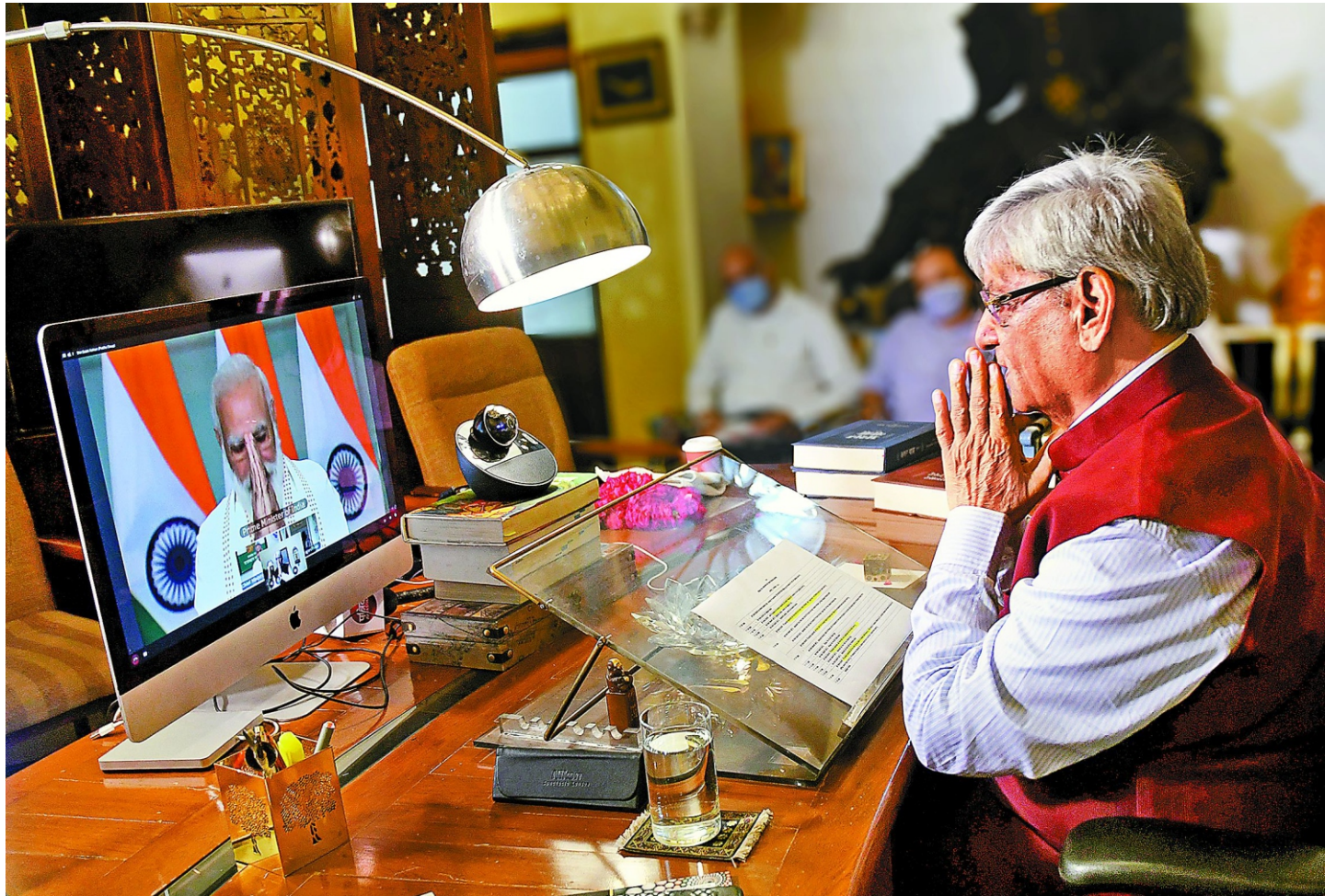
yajnatvanhabhiyo 'nyajnatavyamavasisyate'" (Gita: 7.2).

It means: I shall now declare unto you in full this knowledge ("*vigyan*" ie science), both phenomenal and numinous. This being known, nothing further shall remain for you to know. When the cause of all causes becomes known, then everything knowable becomes known, and nothing remains unknown.

Be cited Gita's 4th couplet in the same 7th chapter: "Earth, water, fire, air, ether, mind, intelligence and false ego - all together these eight constitute separated material energies." More than the 5-Elements of the Universe, summed up as conservation meaning, true to this day.

Not easy to understand or practice this truth. Best wishes to Gulab Kothari for this Himalayan journey.

His writings are available at: <https://www.patrika.com/tags/gulab-kothariarticle/> and his email is: gulabkothari@rajasthanpatrika.com



India's Prime Minister, Narendra Modi (left) and Rajasthan Patrika's, Chairman, Gulab Kothari seen greeting each other over a video-release of Gulab's book, *Samvaad-Upanishad* and inauguration of the Patrika Gate on 8 September 2020.

WHAT DO WADING BIRDS EAT?

Adapted from an article by Rick Simpson

Wader Quest Newsletter, email: waderquest@gmail.com



Black-tailed Godwit (left) and Ruff scurrying aquatic feed at a water body, photo by Harsh Vardhan

So, what exactly are all those wading birds out there on the mudflats eating with such enthusiasm? The answer is benthos, also known as wader food. Benthos is the flora and fauna found on the bottom, or in the bottom sediments, of a sea or ocean.

Wader bills have developed to take advantage of all forms of benthos as prey. (See the definitions of different type of benthos below.)

Long bills that penetrate the mud such as those of Godwits will search for endobenthic organisms.

Species feeding in this way will be doing so without the benefit of sight so their bills are sensitive to touch and pressure.

Their bills have nerve endings known as Herbst corpuscles, which can detect the difference in pressure produced by a solid object in the wet mud.

Many waders that feed in this way demonstrate rhynchokinesis, where the upper mandible can be bent to allow the bird to strike and capture prey.

This ability to forage blind means they are equally able to forage at night as they are during the day.

Short bills such as those of the Plovers

will be taking mostly epibenthos and some endobenthos organisms that live near or just under the surface as they forage primarily by sight. This would obviously suggest that feeding at night would be a disadvantage. It is for this reason that Plovers have such proportionally large eyes to maximise light gathering to facilitate night foraging.

There is also a school of thought that suggests they may also be able to forage by hearing prey which would also not be affected by the light level.

Some waders with medium-length bills, such as Red Knot may employ both methods of feeding—mainly tactile on the wintering grounds where it forages for endobenthos and mainly visual on the breeding grounds where it forages for nonbenthic creatures away from the benthic zone.

These species have sensitive bills for tactile feeding and forward-facing vision for visual feeding.

The more delicate recurved sweeping bills of Avocets will be seeking epibenthic prey on the surface of the mud and hyperbenthic organisms that are suspended in the water.

There are two types of benthos:

Zoobenthos: comprises the animals belonging to this group.

Phytobenthos: comprises the plants belonging to this group.

Both types of Benthos can be subdivided by size.

Macrobenthos: Visible organisms of a length greater than 1mm. It includes polychaete worms (worms with bristles like lugworms etc.), bivalves (seashells with two halves like cockles, oysters, clams and mussels), echinoderms (star fish, sea urchins etc.), sea anenomes, corals, sponges, sea squirts, turbellarians (flatworms), crabs, lobsters and cumaceans (comma shrimps).

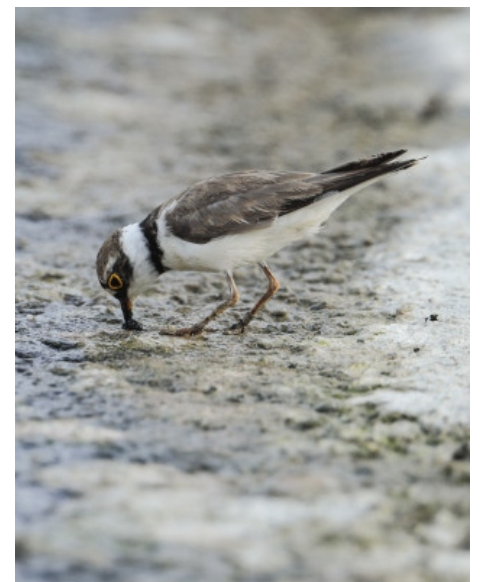
Meiobenthos: Organisms that are between 1mm and 0.1mm in size. It includes nematodes (roundworms), foraminiferas, water bears, gastrotriches (hairybacks), copepods and ostracods (seed shrimps).

Microbenthos: Organisms under 0.1mm in size. It includes bacteria, diatoms (algae), ciliates, amoeba and flagellates.

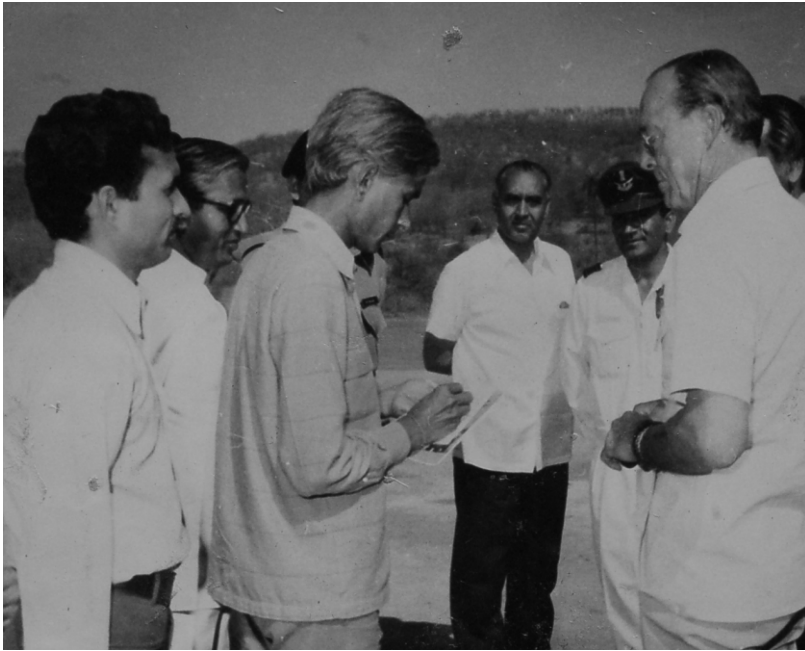
They can also be divided by their location:

Endobenthos: living buried, or burrowing in the sediment.

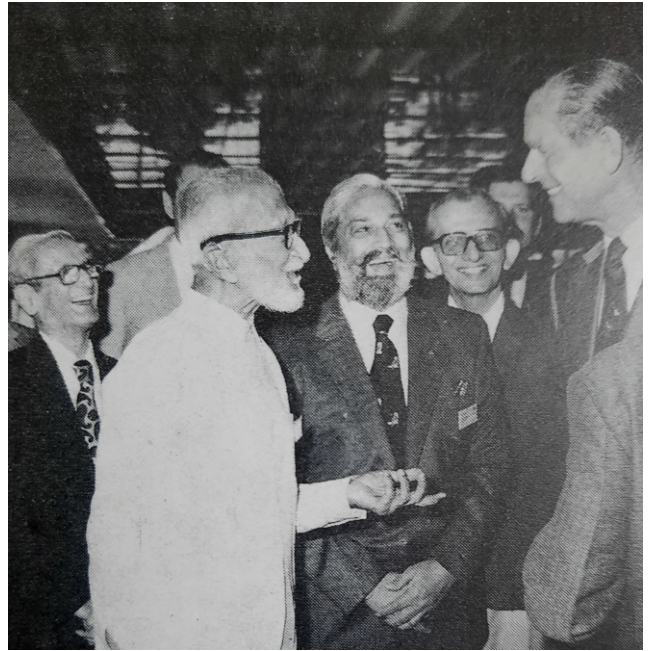
Epibenthos: living on top of the sediments.



Little-ringed Plover feeding over the mud flat.



Prince Bernhard of The Netherlands, then President of WWF-International, at Ranthambhore Tiger Reserve in 1973, after launch of Project Tiger, Harsh Vardhan is on left taking notes.



The 1969 IUCN meet in New Delhi that led to formation of Project Tiger in 1973, Dr. Salim Ali and Maharaja FSR Gaekward having good humour over it.

THE NATURE OF NATURE: WHY WE NEED THE WILD

by Enric Sala (Author), Edward O. Wilson (Introduction)

In this inspiring manifesto, an internationally renowned ecologist makes a clear case for why protecting nature is our best health insurance, and why it makes economic sense.

Enric Sala wants to change the world--and in this compelling book, he shows us how. Once we appreciate how nature works, he asserts, we will understand why conservation is economically wise and essential to our survival.

Here Sala, director of National Geographic's Pristine Seas project (which has succeeded in protecting more than 5 million sq km of ocean), tells the story of his scientific awakening and his transition from academia to activism--as he puts it, he was tired of writing the obituary of the ocean. His revelations are surprising, sometimes counter-intuitive: More sharks signal a healthier ocean; crop diversity, not intensive monoculture farming, is the key to feeding the planet.

Using fascinating examples from his expeditions and those of other scientists, Sala shows the economic wisdom of making room for nature, even as the population becomes more urbanized. In a sober epilogue, he shows how saving nature can save us

all, by reversing conditions that led to the coronavirus pandemic and preventing other global catastrophes.

With a foreword from Prince Charles and an introduction from E. O. Wilson, this powerful book will change the way you think about our world--and our future.

About the Author

Enric Sala is a marine ecologist and National Geographic Explorer-in-Residence dedicated to restoring the health and productivity of the ocean. He is widely recognized for his worldwide conservation efforts, based on solid observational and experimental research, combined with strategic communications and policy discussions. Previously a professor at the prestigious Scripps Institution of Oceanography in California, he founded National Geographic Pristine Seas, a global project that combines exploration, research, and storytelling to inspire leaders and communities to protect the last wild places in the ocean. To date, Pristine Seas has helped to

create 22 marine reserves encompassing almost 6 million square kilometers of ocean, more than half the area of all 50 United States.

Contact:

<https://www.amazon.com/Nature-Why-We-Need-Wild/dp/1426221010>



RETHINKING CONSERVATION CAMPAIGNS

By Rohit Jindal

“Global warming is driving polar bears to extinction,” says a newspaper headline (The New York Times, July 20, 2020). Another points out emphatically, *“Biodiversity in peril, the U.N. warns.”* Statements such as these are common place in national and international media. Ever since the publication of Rachel Carson's “The Silent Spring” in 1962, there is increasing evidence that the industrial revolution has imperiled the planet. The Union of Concerned Scientists, a science-based policy think tank, believes humans are to blame for rising temperatures worldwide (www.ucsusa.org).

Similarly, in its latest annual report, the World Wildlife Fund declares that *“Human activities have caused the world's wildlife populations to plummet by more than two-thirds in the last 50 years”* (the Living Planet Report, 2020). Conservation campaigns have repeatedly used statements such as these to spur humans to stall this widespread degradation and replace it by regeneration of natural ecosystems. They hope that once people know how dire the environmental crisis is, they will rise to action. The patchy success of conservation campaigns to reverse biodiversity loss or reduce carbon emissions has belied this hope. Another news headline aptly describes the situation, *“Biodiversity loss is urgent. Spreading the message is hard”* (The New York Times, May 9, 2019). Why is this so? And what can be done about it?

I believe that many, if not most, conservation campaigns are focused on creating guilt amongst people. They make people feel bad about the loss of environmental quality. Since humans are responsible for the current wave in the extinction of species, the campaigns work on the premise that the guilt will lead to remorse, and finally to remedial action. It seems that shame leads to an immediate emotional response, but hardly any long-term effort. No doubt, millions of people respond to these messages, as evidenced by large sums



A moment of reflection in Jespar National Park (author sitting there), Canada, photo Mamta.

of money donated for pro-environment charity work. However, there is little that most people change in their daily behavior. No doubt, information is useful, but beyond a point, it becomes overwhelming. Some campaigns may generate perverse effects whereby people disbelieve these campaigns and continue wasting resources around them.

As a recourse, I would call upon campaign managers to integrate more “experiential learning” in their work plans. Many of us are aware of slogans such as, “learning by doing.” Or of inculcating environmental values in children by “catching them young.” The idea is for people to experience nature in their daily lives directly and slowly become guardians of this way of life, thereby contributing to sustainable conservation. Why might it work?

In 1979, Kahneman and Tversky published a paper positing that instead of being rational calculators, human brains are mired in biases (Kahneman, D., and Tversky, A. 1979. Prospect Theory: An analysis of decision under risk. *Econometrica*). One such bias is *loss aversion*: people hate to lose what they already have much more than they love to get what they don't have. In other words, the joy that we obtain from finding \$100 on the roadside is less than the pain we feel when robbed of \$100. Over the years, the finding has withstood rigorous testing in varying contexts. For example, we routinely value our possessions more than what we are willing to pay for the same items when buying them afresh. Or we find it easier to incur the pain of taxes (when deducted at source), then being taxed after we have received our salary. The discovery of loss aversion and other related biases was honored with a Nobel Prize in 2002. So how does the

theory of loss aversion help our cause?

The idea is that when people come in direct contact with nature, over time, they start seeing it as a valuable possession. The joy in experiencing nature becomes ingrained in their minds. So, when the environment deteriorates, they feel the pain of an incalculable loss. At

that point, they are more sensitive to listening about environmental damage and take action to restore nature. This explains why the erstwhile hunters became the first band of modern conservationists when they saw the wildlife quickly disappearing. Does this mean that we must take every individual to Antarctica before doing something about the polar ice sheet? Not necessarily. However, people do accommodate more quickly to gains than to losses. As a result, once they deepen their relationship with nature in one form, they see more interconnections among ecosystems and are possibly more open to protecting them. Experience-based conservation campaign, however, is not the silver bullet to address all kinds of existential threats. It is more likely that experiential learning as a way of conserving nature works best at the local level. Once people wade in their local pond or get used to hiking in surrounding woodlots, chances are they will be prone to saving these resources from destruction. However, many times, people may also choose to suppress their instinct to protect nature when confronted by economic challenges.

Helping people to experience nature is not going to work always. But, when integrated into conservation campaigns, the process of enjoying and acknowledging nature as a valuable endowment may catalyze people to make long term changes in their behavior. When that happens, we can thank Kahneman and Tversky and their theory of loss aversion for that.

Rohit Jindal is a professor in Decision Sciences at MacEwan University in Edmonton, Canada. His recent research explores the morality of using economic incentives in promoting environmental conservation. He can be reached at: JindaLR@macewan.ca



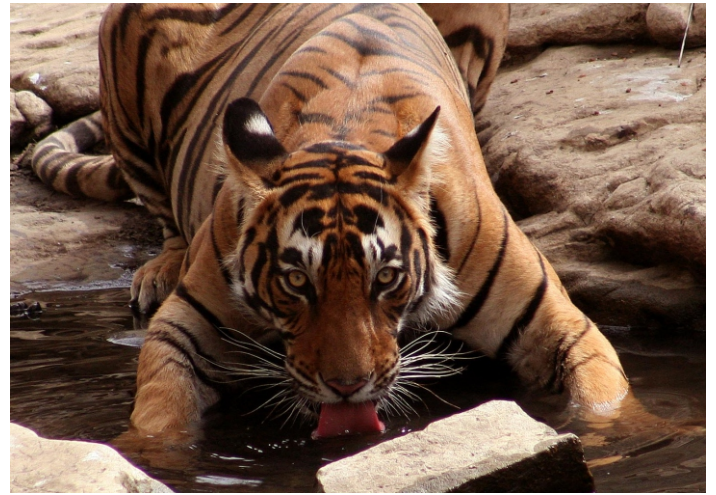
He has to quench thirst where ever water may be available, photo by Hemraj Meena.



T19 (Krishna), daughter of Ranthambhore's famed Tigress, Machhali (her second litter in 2014) with four cubs. Photo by Hemraj Meena .



Yawning, a trait not deciphered totally for Tigers.



Undaunted by human presence, he continues licking water.



Cautiously licking water and keeping an eye on human intruder.



She was rearing four cubs and demonstrated to them how to lick.



He keeps an eye on the photographer while having his drink.



Tigers stretch body and scratch barks, a trait interpreted variously.

All photos by Hemraj Meena



LIVE A LIFE CLOSE TO NATURE

Find yourself in the midst of the most luxurious lifestyle enveloped in nature, peace & convenience. Ariana is a home surrounded with lush green aesthetic architecture to bestow its residents with a mindful, beautiful life. It is the Pre-certified First Platinum rated green home project.

TRIMURTY'S

ARIANA
LIVE LAVISH

2 | 3 | 4 BHK & 3 BHK DUPLEX
PREMIUM RESIDENTIAL
APARTMENTS

RAMNAGARIA
JAGATPURA, JAIPUR

GREEN HIGHLIGHTS

- 74 % open area
- Surrounded with thick green plantation to create a pleasing environment for the residents as well as to attract pretty birds around.
- Installation of ample bird nests and bird feeders have been done offering natural habitat to the birds with nearly 80 trees planted at the project.



RERA REG. NO.: RAJ/P/2017/017 | www.rera.rajasthan.gov.in

FOR MORE INFORMATION: **+91 95095 00800**

EDITORS for Conservation Times



Anderson, Hartley

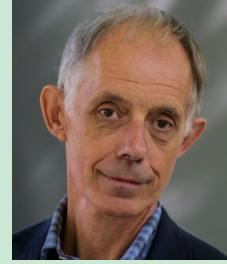
Hartley Anderson is a Sydney, Australia resident who, after more than fifty years in sales and marketing roles, has decided it was time to pursue leisure activities.

His recent and new activity which is relevant to conservation is beekeeping. He has a strong interest in India.



Binita Pandey

Binita Pandey is a researcher in entomology with a keen interest in insect taxonomy, behavior, conservation, and plant preference of pests. She has conducted a Bumblebee research project in Nepal. She is the founder and manager of the Nepal Pollinator Network.



Goodman, Martin

Martin Goodman is an award-winning writer and publisher based in the UK. His book *Client Earth* told the tale of eco-lawyers on their global battle to save the planet from environmental collapse. He is Emeritus Professor of Creative Writing at the University of Hull.



McCrea, Edward

Chairman of Editorial Board

Ed McCrea is President of Environmental Education and Conservation Global, a US nonprofit conservation organization. Over the last fifty 50 years, he has worked in environmental education and biodiversity conservation at the local, state, national, and international levels.



Sharma, Manoj

Manoj Sharma worked for the Indian Statistical Service for 10 years and then immigrated to the USA to pursue graduate studies in statistics. Currently he is the Director of Biostatistics at Adaptive Biotechnologies in the field of immune-driven medicine.



Sharma, Satish

Authored 11 books on forest, wildlife management and biodiversity, specialized in ethnobotany and ethnozoology, did PhDs on Plant life of Weaver Birds (1991) and Study of Biodiversity and Ethnobiology of Phulwari WL Sanctuary (2007), former Forest Officer, based at Udaipur.



Sharma, Seema

Seema Sharma is an independent journalist based in Chandigarh. She was formerly with the Tribune and the Times of India. She writes on wildlife conservation and environment and is a fellow of CMS-IHCAP fellowship on impact of climate change in Trans Himalayas.



Thomas, Rosamma

Rosamma Thomas is a freelance journalist based in Maharashtra, India. She has worked in radio and print journalism. She has only ever lived in cities, despite being a wild creature at heart. She has supported by writing on a unique cause like House Sparrow ex situ breeding initiatives.



Vardhan, Harsh
(Editorial Coordinator)

Wildlife conservationist and writer, served for Bustards, Siberian Cranes, started the Indian Birding Fair, held annually at Jaipur's Man Sagar lake, worked with US Fish & Wildlife Service, International Crane Foundation, IECG, and is Honorary Secretary of TWSI, based at Jaipur.