Conservation Times

Vol 5 no 1 : January-March 2024

Honouring Nature Conservation

30-YEAR PLAN FOR TIGERS

From Conservation Times Desk

A male Tiger at Kanha tiger Reserve, David Raju

Is it first ever? Yes. A Long Term Action Plan for Tiger Conservation in Rajasthan has been scripted to ensure the predator should sustain better. The 30-year-long perspective strategy is prepared by Arindam Tomar, Chief Wildlife Warden and principal Chief Conservator, Forest, Rajasthan.

It has been made possible through consultation with several experts and institutions like Wildlife Institute of India, WWF – India, National Centre for Biological Studies (NCBC), among others. It received consent of the Government of Rajasthan during October 2023.

Gene-pool: Genetic diversity is the core aspect included in the document. It says there are two schools of thoughts. It has been emphasized that connectivity for Rajasthan Tigers with Central Indian population is the key factor. National tiger Conservation Authority (NTCA) has been tasked to initiate studies of genes of predators across the states in question.

There are 3 National Parks, 26 Sanctuaries and 30 Conservation Reserves located in Rajasthan.

At present, the denser forest areas of the State are mainly located in sanctuaries and national parks, many of which are under immense biological pressure from the villages situated inside and in the vicinity.

Pressures: These biological pressures reduce the availability of habitat for wildlife and create competition between large carnivores and humans over the use of natural resources.

In order to reduce this stress, buffer areas (primarily multiple use area surrounding the core areas) adjoining Protected Areas are planned to be developed so that essential habitat elements like water, habitat and food are available for wildlife.

The distribution of Tigers in Rajasthan has been studied and debated by researchers and conservationists. The State is known for its arid and semi-arid landscapes. Historically, Tigers were found in different parts of Rajasthan. So the region was considered a part of the historical range of the Bengal Tiger (*Panthera tigris*). However, due to habitat loss, human-wildlife conflict, and hunting, tiger populations in Rajasthan declined. By the mid-20th century, Tigers were confined to Sariska and Ranthambore.

Irony: Conserving Tiger provides an umbrella for conservation of biodiversity. Being an apex predator, Tigers are the indicators that a habitat has sufficient resources and ample biodiversity. Tiger bearing Protected Areas and forests harbour sizable populations of major prey species of large carnivores, i.e., Chital, Sambar, Wild Boar, Nilgai, Chinkara, among others.

However, the premise that saving Tigers ensures conservation of all species found in that ecosystem is increasingly being challenged as:

*Tigers now also reside in areas with low natural prey base so they survive on feral and domestic livestock

* several species hitherto found in Tiger habitats have disappeared, most notably, Wild Dogs, Sloth Bears, etc.

Meta-population: The meta population concept is the cornerstone of this exercise. The plan has identified sources or cores

A Tiger crossing main road in Umred Karnhandla landscape, forest source

and sinks as well as corridors connecting the sources to ensure long term sustainability of the whole Tiger population. The 12 cores have been identified as areas which can sustain a viable population of about 50 Tigers with appropriate sex and age distribution. Considering that an area of 100 sq km can sustain a minimum of 5 (1 male and 4 female) Tigers in the arid climes of Rajasthan on an average, the whole state was scanned to identify contiguous forest areas of 800 to 1000 sq km.

Key suggestions: Ensuring genetic diversity in Tigers is crucial for their long-term survival and health as a species. It refers to the variety of different genes within a population. Maintaining a diverse gene pool is essential because it helps populations adapt to changing environmental conditions, reduces the risk of inbreeding, and improves overall resilience to diseases and other threats. Some key strategies to ensure genetic diversity in tiger populations are:

*Monitoring and Data Collection

*Genetic Testing and Pedigree Analysis

*Maintaining Connected Habitats

*Translocation and Reintroduction

*Captive Breeding and Management

*Minimizing Human-Induced Threats

Questions: There is a school of thought which is of the opinion that there is no need of interaction for maintaining genetic diversity as deleterious genes are naturally purged. While, the other view point is that given the genetic bottleneck through which the tiger population of Rajasthan has gone, active management is required.

It would be prudent to act before hand to discount any possibility of in-breeding. The approach in this regard needs to be finalized looking at scientific evidence. However, in the interim, providing connectivity with Central India population of tigers is the ideal option. It aims at revival of historical corridors. The question is: will other States share their Tigers with Rajasthan? Did Rajasthan ever donated its tigers to other States?

Gene-loss: Significantly, the

Continued on page 3

THEME FOR THE NEXT ISSUE

In addition to our ongoing emphasis on the tiger this year, we will also continue to focus on a different theme for each issue of CT. The theme for the next issue is Conservation education and action programs built around key species.

As usual, we welcome good articles on any wildlife or environmental topic in addition to those on the theme for the upcoming issue. If you would like to write an article, please request a style sheet for Conservation Times from emccrea@eecg.org.

The deadline for submitting articles for the next edition is the 15 February 2024.

Tigers vs Birds

Anand Mishra,
President, TWSI
Email: anandmishra@trimurty.com

Having devoted four editions of Conservation Times to tiger conservation, it is time to turn to birds which are more easily observed in all Tiger Reserves. They are all around, homes, office space, and open areas. A new study (State of India's Birds) has come out on avian species. It does not convey good news: bird species are on severe decline in India. The study has listed species facing threats and comes up with suggestions how to reverse the trend.

It is alarming to know that the global Red List assessments conducted by the International Union for Conservation of Nature (IUCN) show declines in the conservation status of all facets of biodiversity.

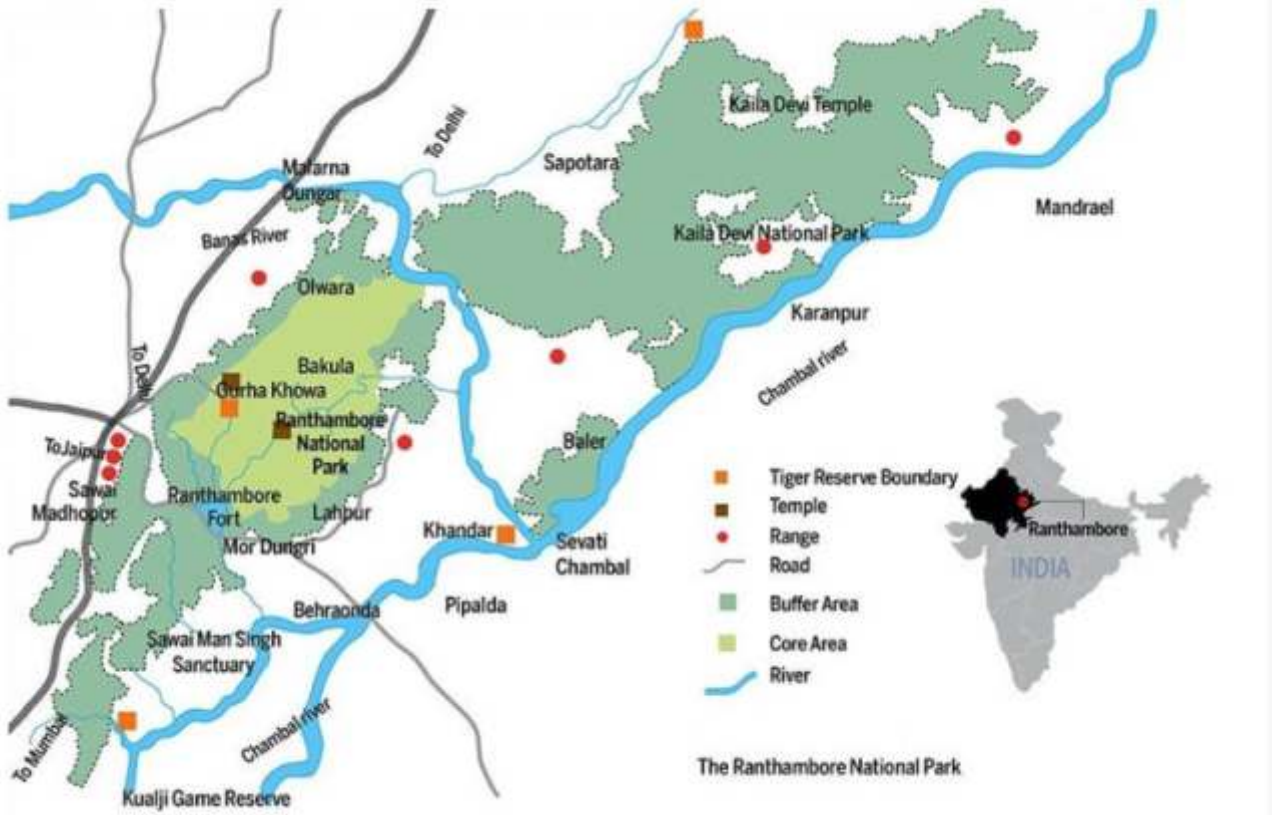
The latest Living Planet report concludes that populations of mammals, birds, reptiles, amphibians, and fishes have declined by an average of 69% since 1970.

The India Report states that 178 species are of High Conservation Priority: 94 based on both abundance trends and range, 45 based on range being Very Restricted, and an additional 39 based on a combination of their range and IUCN Red List status.

The assessments in this report are built on about 30 million records from about 30,000 birdwatchers across India.

Fourteen Indian organizations, mostly non-governmental, assumed this role.

That they shook hands together proves the country's positive trend towards biodiversity conservation related aspects.



Map shows access to Ranthambhore Tigers in its North-East and south West, corridors now to be relinked. Corridor map

genetic diversity present in the now extinct Sariska tigers has been lost. It is a matter of scientific investigation as to whether Sariska tigers were genetically different from Ranthambhore tigers and to what extent. If significant difference is found, then genetic rescue could be contemplated. Genetic examination of tiger trophies can provide answers to this question.

The long term plan has identified potential tiger habitats in Northern Rajasthan, Southern Rajasthan, Eastern Rajasthan. There are two more potential tiger reserves (Baran Tiger Reserve and Southern Rajasthan Tiger Reserve). Four existing tiger reserves are: Ranthambhore, Sariska, Mukundara Hills and Ramgarh Vishdhari. Two new tiger reserves are in process of establishment: Dholpur-Karauli and Kumbhalgarh.

There are three Critical Corridor Elements (Gol, Shergarh & Bassi). Twelve major corridors serve for the predators. Some corridors along Chambal river are already in use by tigers.

Operationalizing this long term plan requires sustained effort and careful planning adopting a dynamic approach with frequent review of the milestones achieved. That is the major challenge.

The long term plan is floated by Arindam Tomar, Chief Wildlife Warden, who would retire mid 2024. His name is poised to sustain over the new strategy. However, wonder if the next lot of forest officers would care to take this strategy to ground in a grandiose way as he outlined it.

CHEETA vs TIGER AT KUNO

From Conservation Times Desk

Battle lines appear to have been drawn. The African Cheetahs introduced in India's Kuno Reserve now face a mighty Tiger around their habitat. Confrontation is likely, example of which had seldom been heard during all these decades.

The T-136 male Tiger was reported having disappeared at Ranthambhore Tiger Reserve. It was last observed on 14 August 2022. Foresters tracked it in Karauli forest, about eighty km north east of Ranthambhore. They were happy to know it reached a safe habitat. Several Tigers had moved from Ranthambhore to this forest in course of past fifteen years.

However, the Tiger was found missing in Karauli after a few weeks. Foresters observed it next in Dholpur region. It was believed it would establish its territory there as two other Tigers had settled there along with a Tigress. They commenced breeding there during 2022 – 23.

The news came on 28 November 2023 that the same Tiger had crossed over the Chambal river to be found on fringe of Kuno forest reserve in Madhya Pradesh. It is at short distance from Cheetahs living in captive enclosures as well as in open forest in Kuno.

Forest authorities at Kuno disbelieve that a male Tiger had reached Kuno's outskirts. Ranthambhore based forest officers claimed the T-136 was doing all right at eastern parts of Kuno, having reached there via Morena.

Kuno hosts 20 Cheetahs for past year and a half. The first lot was brought from Namibia. Next lot came from South Africa. Will the two predator species be face to face? If so, when and what will be the result?

ALL IS NOT WELL WITH BIRDS

From Conservation Times Desk

A latest document, The State of India's Birds, has issued warning. Most bird species are not faring well owing to causes set in motion by people and their governance system. With their ubiquity and ecological importance, birds are excellent indicators of the state of natural world and are potent cultural symbols of nature.

The report is a periodic assessment of the distribution range, trends in abundance, and conservation status for most of the bird species in India.. As a comprehensive, national-level assessment, the report points the way towards conservation needs of India's birds.

A Great Indian Bustard, critically endangered species, consuming Brilliant Agama in Lathi landscape in the Thar Deseet, Nigel Hacking

Grim: The world's biodiversity is in a grim state. The global Red List assessments conducted by the International Union for Conservation of Nature (IUCN) show declines in the conservation status of all facets of biodiversity. The latest Living Planet report concludes that populations of mammals, birds, reptiles, amphibians, and fishes have declined by an average of 69% since 1970.

The Report states that 178 bird species are of High Conservation Priority: 94 based on both abundance trends and range, 45 based on range being Very Restricted, and an additional 39 based on a combination of their range and IUCN Red List status.

A majority of bird species in this criterion is declining in both Long-term and Current Annual Trends, and there is an urgent need to research the reasons in order to formulate mitigation strategies to arrest the declines. At a broad level, the major causes for these declines are destructive land use, direct exploitation, climate change, pollution, and invasive species.

Priority species: Highest priority is suggested for these species: Nicobar Megapode, Nicobar Sparrowhawk, Narcondam Hornbill, White-headed Starling, Lesser Florican, Terek Sandpiper, Jerdon's Courser, Green Munia, Sclater's Monal, White-bellied Heron, Snowy-throated Babbler, Bugun Liocichla, White-winged Wood Duck, Baer's Pochard, Bengal Florican, Swamp Grass Babbler, Northern Pintail, Lesser Adjutant, Greater Adjutant, Bank Myna, Sirkeer Malkoha, Common Redshank, Sulphur-bellied Warbler, Spot-winged Starling, Tufted Duck, Great Crested Grebe, Yellow-crowned Woodpecker, Thick-billed Flowerpecker, Forest Owlet, Blue-capped Rock Thrush, Grey Plover, Eurasian Curlew, Slender-billed Gull, Caspian Tern, Black-bellied Tern, Indian Skimmer, Great White Pelican, and Isabelline Shrike, Yellow-eyed Pigeon, Great Indian Bustard, Macqueen's Bustard, Demoiselle Crane, Pied Avocet, River Tern, Indian Vulture, Griffon Vulture, Tawny Eagle, Eastern Imperial Eagle, Great Grey Shrike, White-naped Tit, Stoliczka's Bushchat, Isabelline Wheatear, Desert Wheatear, Variable Wheatear, and Green Munia.

The Global Biodiversity Framework (GBF), adopted in December 2022, pledges to halt biodiversity loss and restore ecosystems. One of its four goals is to halt human-induced extinction of threatened species. Birds are everywhere, they can be identified relatively easily, and they have deep cultural significance.

They can also act as indicators of biodiversity as a whole because they are mobile and responsive to change.

Citizen-science: Bird assessments are typically based on a combination of information generated from large scale citizen science monitoring, supplemented by more specialised monitoring schemes that are more limited in geographic or taxonomic scope.

For example, the UK Breeding Bird Survey results are based on annual monitoring carried out by over 2,500 volunteer birdwatchers at nearly 4,000 pre-defined 1×1 sq. km squares. The IUCN Red List shows that 49% of bird species worldwide are declining in population, compared with only 6% increasing.

Many of the declining species are common and widespread, and although they may not yet be threatened with extinction, reduced populations are likely to have significant ecological consequences.

Long-term surveys have estimated that there are nearly one-third fewer birds in North America than there were in 1970—which translates into a loss of 2.9 billion individual birds. Similarly, it is estimated that Europe lost one-quarter of its birds between 1980 and 2016.

Indian Pitta, Rajaram Meena

An Indian spotted eagle taking off in the Thar Desert, Nigel Hacking

Million records: In 2020, India joined the set of countries that regularly assess the status of their birds, with the launch of the first report on the State of India's Birds (SoIB) at the Conference of Parties to the Convention on Migratory Species in Gandhinagar, Gujarat.

The assessments in this report are thus built on about 30 million records from about 30,000 birdwatchers across India. The overall outcome of these assessments largely reflects the global trend: several species are doing well, while a number of others show various degrees of decline. The report summarises implications that flow from the findings, and makes broad recommendations for bird conservation in the country.

This report assesses the status of 942 bird species largely using data uploaded by birdwatchers to the online platform eBird. The assessments are based on three indices: one of change in abundance: Long-term Trend (i.e., change over c. 30 years), second of Current Annual Trend (i.e., annual change over the past eight years); and the third is a measure of Distribution Range Size within India.

Threats: Birds in open habitats have to navigate a number of threats that are often unique to such landscapes. Broadly, these birds face two categories of threats: those from conversion of open to closed habitat, and those that directly cause mortality and lower survival.

The 'openness' of open habitats is severely compromised by the spread of invasive, drought tolerant woody plants, as well as wind turbines and power lines. Prosopis juliflora has rendered vast areas unsuitable for open habitat specialists. Another threat to 'openness' is the concept of planting woody species—native and non-native. In the high altitude grasslands of the Western Ghats, some planted exotic trees like Wattle are now invasive, threatening the future of birds like Nilgiri Pipit.

Some IUCN Threatened species are protected by law in India. However, situation for their habitats is different. Many have large stretches of riverine nesting habitat lacking protection. In particular, there is an urgent need to identify and protect breeding sites of Indian Skimmer and Black-bellied Tern. Monitoring of such sites during the breeding season should be done through partnerships among local communities, NGOs, forest

CRANES CELEBRATE GOLDEN JUBILEE

"OPTIMISM, FAITH AND INTELLECT" – THE PRIMARY ASSETS

From Conservation Times Desk

The International Crane Foundation (ICF) started as an idea hatched in 1973 by a pair of 20-something college graduates, George Archibald and Ron Sauey. The original quarters was a stable on a horse farm. The primary assets were optimism, faith and intellect.

Most crane species worldwide were declining in the early 1970s. Only about 50 whooping cranes remained in the wild, for example, and many biologists expected the species to go extinct.

Global leader: And no group had been so audacious as to try to work on all of the world's 15 crane species.

But from its humble beginning Baraboo-based ICF would become the global leader in crane conservation.

Among its accomplishments: the ICF was the first to breed Siberian and hooded cranes in captivity; it has had a key role in whooping crane recovery; it has established conservation partnerships in nearly 60 countries and protect millions of acres of wetlands; it has established an education and research center as well as a home for all 15 crane species at its headquarters in Baraboo. Perhaps only Archibald and Sauey were not surprised.

At Cornell: The story of the International Crane Foundation began in 1971 at Cornell University with two students who shared a passion for cranes. Ornithology students Ron Sauey and George Archibald envisioned an organization combining research, captive breeding and reintroduction, landscape restoration and education to safeguard the world's 15 crane species.

In 1973, with the generosity of the Sauey family – who rented their horse farm to Ron and George for $1 a year! – the International Crane Foundation "hatched" in Baraboo, Wisconsin.

Ron Sauey and George Archibald at ICF, Ron passed away in 1987, ICF source.

George Archibald says: "Over nearly 50 years, we have developed unique collaborations and led effective community-based conservation programs, important research projects and innovative captive breeding and reintroduction efforts."

"These endeavours have inspired international cooperation, helped improve people's livelihoods, and protected millions of acres of wetlands and grasslands on the five continents where cranes live."

The Mission The International Crane Foundation works worldwide to conserve cranes and the ecosystems, watersheds and flyways on which they depend. We provide knowledge, leadership and inspiration to engage people in resolving threats to cranes and their diverse landscapes.

Today, the International Crane Foundation's impact reaches across the globe. We have offices and staff in China, Uganda, Kenya, Zambia, South Africa and Texas. We work through strong partnerships with local organizations, governments, universities, businesses and others in these regions. Our more than 125 staff and associates work with a network of hundreds of specialists in over 50 countries on five continents.

All species: Our nearly 300-acre global headquarters in Baraboo, Wisconsin, hosts a captive flock of approximately 100 cranes, including the only complete collection of all 15 species worldwide. Our site, which features live crane exhibits, guided and self-guided tours, a research library, a welcome center and four miles of nature trails, is visited by more than 25,000 people annually.

George's message: "We don't have any plans of slowing down now. With 10 of the world's 15 crane species facing extinction, our future promises to continue growth and innovation to meet the growing challenges. We thank you for being a part of our history and supporting our future as we work to protect cranes and the ecosystems, watersheds and flyways on which they depend."

Ron and George have been to India since the seventies to Keoladeo National park, Bharatpur, where Siberian Cranes used to winter until 2002 when their last pair was observed. India did not receive the birds again. Thanks to their dedicated initiatives Satellite Transmitters were applied on Siberian Cranes and Eurasian Common Cranes at KNPark.

Ron passed away in late 80s. His parents continued to support ICF. George is an extra ordinary leader offering his experience and intellect to all conservationists all over the world. It is most challenging work to take care of such birds in large enclosures to ensure that they live healthy life and breed. This correspondent had the opportunity to visit ICF couple of times to understand crane-culture and learn the practical nuances of wetland conservation.

Like to support: Your continued support will make it possible to protect all 15 species of cranes the world over. Your gift makes a difference.

Contact: savingcranes.org/get-involved/donate

WHO BENEFITS FROM WILDLIFE TOURISM?

From Conservation Times Desk

Shepherds and similar rural folk bear the brunt of wild life but receive no benefits from tourism, Sunny Shah

When it comes to Tourism, one needs to consult WTO (World Tourism Organization). It maintains an over view of tourism across the globe. It states: 7% of world tourism relates to wildlife tourism, a segment growing annually at about 3%.

A World Widlife Fund (WWF) report shows that 93% of all natural heritage sites support recreation and tourism and 91% of them provide jobs.

Biodiversity: Wildlife represents biodiversity, essential for our health and the well-being of the whole planet. Around 40,000 species of animals, fungi and plants benefit humans. More than the third of our pharmaceuticals originate from wild plants.

Wildlife Tourism is at a gallop in India. Nearly 3 million visitors enter Ranthambhore Tiger Reserve annually, 82% are domestic. Keoladeo National Park, known for birds, receives about 1.5 million visitors. Thirty five percent come to know about Tigers by hearsay while 24 per cent through newspapers.

10% GDP: Tourism contributes about 10 per cent of GDP in India. The country has 53 Tiger Reserves, more than 100 National Parks and about 600 Sanctuaries. Not all receive as many visitors as six Tiger Reserves register. Reasons?

Lack of appreciable sightings of wild animals, birds, etc! Also lack of tourism facilities at rest of the reserves. All the reserves are administered by Department of Forest which has been unable to develop needed facilities.

Push? India can attain a new high once all designated reserves start hosting more visitors. It can be a game changer for economy of people. Number of overseas visitors has doubled within past decade.

The WTO is now mooting Green Finance for Tourism sector. At global level, it is campaigning by inviting IFC (International Finance Corporation) on board. Little is known as to what is happening at local level.

I have been in to wildlife conservation for past forty three years. I am a witness to growth of tourism. And feel proud for the private sector captains who have set new milestones in hospitality.

Stake-holders? I am tempted to state that nearly 90 per cent of the turn over in Wildlife Tourism goes in to pockets of private hands. Little is received by stake-holder community living around all the reserves.

How to better balance this equation? Stake-holders' aspects have been published in Conservation Times, like to read and respond.

What do Tigers receive out of wildlife tourism, Harsh Vardhan

WHERE EASTERN COMMON CRANES BREED & MIGRATE?

Common Cranes, Russian sorce

By Baasansuren Erdenechimeg, Gankhuyag Purev-Ochir, Amarkhuu Gungaa, Oyunchimeg Terbish, Yajie Zhao and Yumin Guo, serving at avian institutes in China, and Mongolia
Email: baasansunen@mbcc.mn

Studies on the migration patterns, habitat use, and conservation of the Eastern Common Crane (*Grus grus lilfordi*) in East Asia are insufficient. Most of the summering, breeding, wintering, and stopover sites are located outside the current protected areas boundary, so it is necessary to pay attention to these areas for the future protection of this subspecies.

Scarce: Studies on the subspecies Eastern Common Crane (*Grus grus lilfordi*) are still scarce, especially in Southeastern Siberia, the far east of Russia, Eastern Mongolia, and Northeastern China. This study explores the migration pattern, habitat use, and conservation status of the Eastern Common Crane. Using GPS/GSM tracking data, 36 complete migrations of 11 individuals were obtained from 2017 to 2021.

The cranes migrated an average of 1,581.5 km in autumn and 1,446.5 in spring between their breeding site in Eastern Mongolia and the following wintering sites: the Xar Moron River, Chifeng; the Bohai Bay; the Yellow River Delta; Tangshan, Hebei; and Tianjin.

During the autumn and spring migrations, the cranes used three critical stopover sites. The subspecies spent 60.3% of their time in rangeland, 18.1% in cropland, and 14.2% in water.

Areas reached: The tracking data determined that, of the areas used by cranes, 97–98% of the summering sites were in Russia, 96% of the breeding sites were in Mongolia, and over 70% of the stopover sites and 90% of the wintering sites in China lay outside the current protected area boundaries.

Consequently, establishing and expanding protected areas in summering, breeding, stopover, and wintering sites should be a central component of future conservation strategies.

The population size of the eastern subspecies is estimated at 125,000–130,000 individuals, of which more than 100,000 migrate from Western Siberia and Kazakhstan to the wintering grounds in India and Central Asia in the Amudarya River Valley.

Central/Eastern Siberia, Mongolia, and Northeastern China provide the main breeding sites of the Eastern common crane, with the population estimated to be about 12,000–20,000 individuals. There are also several major wintering sites such as the middle and lower reaches of the Yangtze River, the Yellow River Delta wetlands, Poyang Lake, the Shengjin Lake wetlands, the Mengjin Yellow River tidal flat wetlands, the Yancheng coastal wetlands, and the Beijing Wild Duck Lake wetlands.

Habitat loss: In the last century, due to population growth, social and economic development, construction, and the use of wetlands, the habitat of the Eastern common crane has changed significantly, and suitable habitat has been lost.

We accrued 109,224 bird locations from 11 individual Eastern Common Cranes, covering 36 full migration trips (20 autumn migration trips and 16 spring migration trips) from July 2017 to November 2021. Cranes spent an average of 150 days (±10) in breeding sites in Eastern Mongolia, departing on average on 8 October (±44 days), and migrating for an average of 49.6 days.

Speed: During autumn migration, the flight speed averaged from 10.2 to 144.7 km/h. The earliest time when individuals started to migrate in a day was between 06:00 and 08:00, and the latest time was

Common Crane's migration path, WII

between 21:00 and 23:00. During spring migration, the flight speed averaged 0.5 to 145.3 km/h.

The earliest time when individuals start to migrate in a day was 06:00, and the latest time was between 23:00 and 00:00. Although the nocturnal flight speed was relatively slow, there was a significant difference between the hour of the day and the flight speed for autumn migration and spring migration.

The average altitude at which the cranes flew was 639 m; however, they tended to fly higher when crossing the Khingan mountain range.

The flight speed showed that the tracked cranes mostly migrated during the daytime, but three individuals (CC061, CC116, and CC201) migrated at night.

This study precisely quantified the migration patterns (migration routes, stopover sites, flight speed, and flight altitudes), habitat use, and conservation status of the Eastern Common Crane. The migration distance of the Eastern Common Crane was shorter than its Western subspecies (*G. grus*), but the basic migration strategy was similar.

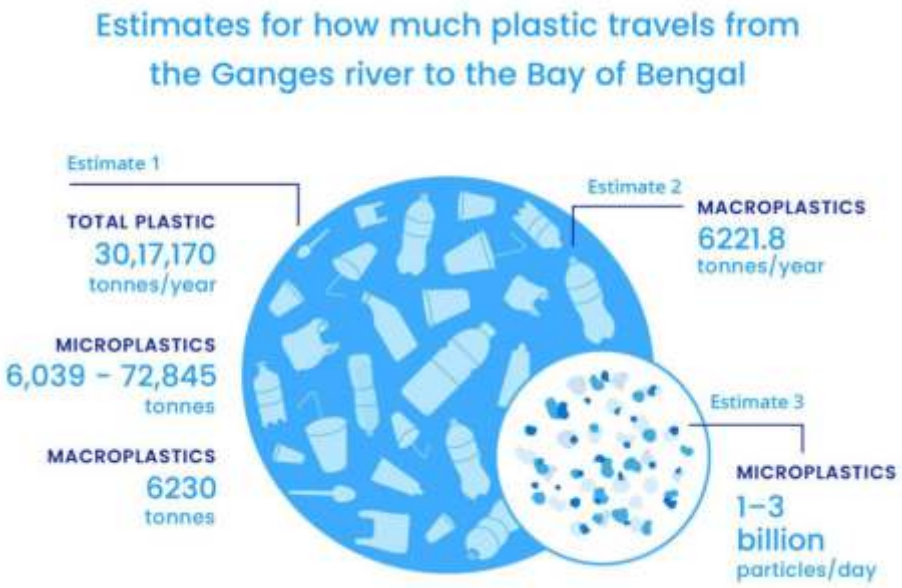
Strategy: The main strategy of the Eastern Common Crane's autumn migration was to travel long distances in a short period, achieved by resting in a few stopover sites for several days to acquire energy for subsequent long flights.

In total, we identified three critical stopover sites along the migration route: the Tashgain Tavan Lakes NR, including its cropland, and the Khalkh Gol Valley, Eastern Mongolia; Xilin Gol, Inner Mongolia; and the Xar Moron River, Chifeng.

Our data clearly show that Eastern Common Cranes rely heavily upon rangeland, cropland, and water habitats.

In addition, most of the wintering, breeding, stopover, and summering sites were outside the current protected area boundaries. Based on these results, we suggest that in order to effectively maintain this species, conservation interventions targeting crucial sites along the whole migratory path are needed.

GANGES' PLASTIC INTO SEA WHAT REMEDY TO CHECK?



Plastic waste in Ganges

By Kristin Toussaint

Working at ww.fastcomapny.com

How many know that the Ganges River network is the second-largest plastic polluting catchment in the world? It discharges over 0.12 million tonnes of plastic into marine ecosystems per year in India. Throughout its journey, the river accumulates plastic – macro, meso, and micro, from various sources, and transports it towards the sea.

In December 2020, a study used geo-tagged bottles to show how plastic travels along the Ganges. The bottles travelled 1,800 miles in 94 days.

Plastic invasion: The presence of plastic in the Ganges and its negative impact is just one of the many examples of how plastics have managed to invade our ecosystems. The omnipresent material has now reached deep inside our protected areas through wildlife poop and even in the salt we use for cooking. While plastic is a boon to many industries as a versatile material that can be molded into myriad products, the stubborn material does more harm than good. As plastic products are openly burnt, buried, or discarded into overflowing landfills, and leak into terrestrial and aquatic environments, it is important to address how we can beat plastic pollution. Mongabay-India's stories about plastic pollution not only highlight the scale of its impact on our ecosystems, but also discusses the possible solutions to reduce plastic pollution.

Daily waste: While researchers hunt for more sustainable materials as alternatives to fossil-fuel derived plastics, it is also important to properly manage the everyday waste.

Mixed waste: Landfills are the cheapest way to manage waste but are not sustainable as mixed waste has severe ecological effects. Therefore, reducing plastic waste at source or segregating it effectively goes a long way in tackling the problem of plastic waste management.

The idea of dropping a message in a bottle and having it end up on some distant beach seems largely like a myth. But we know that the plastic we put in the ocean does float far from where we dropped it. How far? After researchers put tracking tags in plastic bottles in the Ganges River and Bay of Bengal, they found that the furthest bottle traveled more than 1,700 miles in about three months.

"It moved so rapidly," says Emily Duncan, a post doc researcher at the Centre for Ecology and Conservation at the University of Exeter, and lead author of a study on this research published in PLOS ONE. "It shows that plastics are really a global issue. It doesn't adhere to any geographic, political boundaries."

Ocean litter: The study was led by researchers at University of Exeter and the Zoological Society of London as part of the National Geographic Society's Sea to Source project, which is researching ways to prevent plastic from entering the ocean from river systems, beginning with the Ganges in India. The Ganges is one of the world's most polluted rivers, and a huge source of ocean plastic, including the single-use plastic beverage bottles that make up a large volume of ocean litter.

In the 2019 International Coastal Cleanup, volunteers recovered more than 1.8 million plastic beverage bottles from beaches and waterways across the world, and in at least the past 10 years of those cleanups, plastic bottles have been in the top five most collected items.

Duncan's previous research focused on how plastic pollution affects sea turtles. For years, researchers have used satellite tags to track sea turtles, and if you can track a sea turtle and find out where it goes, Duncan thought, why can't you track a plastic bottle?

New ways: The team put lightweight GPS and satellite tags inside a protective casing, which then went inside the plastic bottles. The casing replicated the buoyancy of a bottle that would still be about half full. With technology always getting smaller and lighter, Duncan

Such a flow is common feature in the Ganges, Wikimedia

hopes in the future to track even lighter debris, like food wrappers.

Researchers released 25,500 milliliter bottles in the Ganges and the Bay of Bengal, which opens into the Indian Ocean, and tracked the bottles using open-source tracking software. Many of the bottles released in the river moved in stages, getting stuck on their way downstream. Some got entangled in fishing gear, some were removed by people who picked them up, and some were trapped on beaches. The longest distance tracked was a bottle dropped in the Bay of Bengal that moved 1,768 miles in 94 days, traveling along the west coast of India. Of the bottles dropped in the Ganges, the farthest journey was more than 500 miles.

Environmentalists already know that rivers are a major source of ocean plastic, so it seems obvious that the bottles would end up in the ocean. But this study reveals just how fast this pollution moves. "It shows us plastic has the ability, once in the aquatic environments, to move very rapidly, so we really need to stop this from the source which is the land," Duncan says.

It could also help inform the global models of plastic pollution by factoring in information on how much the wind or ocean current affects plastic bottles.

Hope: Seeing where plastic pollution goes is a first step in better understanding it, and it also might help people picture the scale of this issue. Trying to imagine 1.8 million plastic beverage bottles cleaned up from beaches can be difficult, but tracking one bottle moving down a river is potentially easier to grasp.

"We hope in the future it can be used as an educational tool. A group of school children could have ownership over their bottle and really understand how far it's going. We hope it can be a tool."

Since the researchers used open-source technology, they also plan to create an open-source platform where people can follow individual bottles online.

SAUDI ARABIA TO BREED HOUBARA

Courtesy: National Center for Wildlife

The National Center for Wildlife in Saudi Arabiqa has granted the first official permit for the breeding Houbara in the Kingdom to a specialized center in this field. This is the first permit of its kind to date.

Houbara

The center aims, through this step, to accelerate meeting the Kingdom's need for falcons by involving national private sector institutions and their direct contribution to providing scientific and systematic solutions to increase the population of wildlife. This is an endeavor that will positively contribute to enhancing environmental balance and improving biodiversity in the Kingdom.

It is expected that in the coming period, more similar licenses will be granted due to the increased interest from the private sector in centers for breeding targeted wildlife species such as Houbara and other wildlife species.

The entity that obtained the license stated that it operates according to scientific standards and with highly qualified Saudi competencies, aiming to produce 15,000 Houbara by 2026, especially with its extensive experience in wildlife breeding and a project area exceeding 500,000 square meters, providing an ideal environment for the release and breeding of Houbara. Additionally, it takes care of conditioning the Houbara even after their release to ensure product quality and compliance with the standards set by the National Center for Wildlife.

TREE PLANTING vs TREE ESTABLISHMENT

Courtesy: Project Forest, Canada

Women engaged in tree plantation in Umaria region, forest soiurce

"Billions of pounds of taxpayer money could be wasted planting trees that end up dying because government tree targets are focused on planting rather than survival, they argued, amid concern that saplings were dying because they are often neglected."

Helena Horton, Environmental Reporter for The Guardian

And it's not just in the UK. Countries and organizations around the world, eager to plant their way out of climate change, are missing the most important part of successfully deploying trillions of trees—keeping them alive.

Who cares: As anyone who has planted a tree knows, they need care and attention during the establishment period or you risk losing your investment. Water levels, damage to the tree, and other disturbances need to be monitored and addressed early on to ensure your tree survives the critical first five years.

While taking care of a few trees in your backyard seems feasible, how do you maintain a forest?

At Project Forest we conduct annual monitoring surveys at each of our rewilding sites. They begin after the first growing season and continue for up to five years, or until the site is on track to become a mature forest.

Death also: During our annual monitoring survey, a survey team counts and measures trees on the ground to determine the average tree survival rate, makes note of factors affecting tree growth as well as other plants growing in the area. After the survey is completed, Project Forest receives a report detailing the conditions of the site and if any preventive or corrective measures are needed.

Do the trees we plant die? Sometimes.

The 2022 Project Forest Golden Ranches annual monitoring survey recommended a fill plant be carried out due to a tree mortality event identified in four areas, totalling 8.5 hectares of the 55 hectare site. After an inspection of the site, Scott Formaniuk, Project Forest's Chief Forester, suspected a high vole population—supported by previous agricultural crops on the land—was the cause of the higher than expected tree mortality. The previous 18 months of extremely dry conditions, likely also contributed to the challenging early

All plants at nursery stage do not become trees, forest source

establishment conditions at the site.

In the fall of 2023, Project Forest held our Corporate Planting Events at Golden Ranches and our corporate planting partners helped us replant over 4000 trees.

Through our annual on-the-ground monitoring surveys, we are able to act quickly to address factors affecting the growth and health of our forests, and share that information with our partners in our Annual Project Reports.

Re-wilding: With years of rewilding experience under our belts, we know that some tree mortality will occur, that's why we budget for monitoring and fill plants on every project.

Tree planting vs. tree establishment: with us, you don't have to choose.

At Project Forest, we don't just plant a tree and walk away. We plant a tree (well, more than 400,000) and come back the next year, and the next, and the next… We come back until the forest is on track to becoming just that, a big, beautiful, thriving forest.

We want you to be proud of the investment your organization is making in the forest of the future. If you're already a partner, you should feel proud that your investment is not just going to planting forests, but to establishing them. If you're not a partner yet, schedule a call, we'd love to tell you more about how we can work together.

Like to see:
https://www.youtube.com/watch?v=CQbvhU7Gxis
Email: bcallard@projectforest.ca, and tel: 1.780.222.7947

STUDY BUSTS MYTHS ABOUT KING COBRA VENOM

Arathi Menon at india.mogabay.com

King cobra venom is less complex in its composition than the spectacled cobra venom, potentially due to the strict snakes-only diet the king cobra follows, finds a new study. The study, however, warns that despite its apparent simplicity, the king cobra venom is as potent as the spectacled cobra venom. The study busts a commonly-held belief that king cobra yields a high amount of venom to compensate for its lack of potency. Moreover, no anti venom available in the market currently is capable of neutralising the venom of king cobra in South India, where the study was conducted.

58,000 deaths: India is notoriously famous for the number of deaths from snake bites, averaging to about 58,000 a year, as per a study. Venom and anti venom research in India are focussed on the "big four" — the spectacled cobra (*Naja naja*), common krait (*Bungarus caeruleus*), Russell's viper (*Daboia russelii*) and saw-scaled viper (*Echis carinatus*) that are responsible for most of the snakebite deaths.

A King Cobra amidst coffee plantations, forest source

Many other venomous snakes, including the king cobra (*Ophiophagus hannah*), collectively referred to as the "neglected many", are overlooked resulting in anti venoms being ineffective in treating their bites, a previous study found.

Due to increased reporting of king cobra bites and anticipating threats to zoo keepers, herpetologists and snake rescuers, there was a need to understand the venom composition of king cobra to produce effective anti venom, said Gerry Martin of the conservation organisation, The Liana Trust, in Karnataka, who was a part of the study.

Venom ecology: Despite similarities in their appearance and names, the spectacled cobra (*Naja naja*) and the king cobra (*Ophiophagus hannah*) are different species with different venom ecology. The researchers compared the venom ecology, biochemistry, pharmacological activity and potency of the king cobra from the Western Ghats of South India with the more familiar spectacled cobra venom.

The king cobra venom is commonly believed to be not as

Romulus Whitaker and Gerry Martin (right) extracting venom from a King Cobra, Hemanth Byatroy.

potent as the spectacled cobra venom, a reason often cited for its high yield — as much as 900 mg in a single bite. The study, however, revealed that the king cobra venom is superficially simple due to lesser diversity of toxin types. However, it is as potent as the spectacled cobra venom, according to scientist Kartik Sunagar of Centre for Ecological Sciences, Indian Institute of Science, Bengaluru.

"Another important finding of the study is that the existing anti venoms do not neutralise king cobra venom," he said. People at risk of king cobra bites stock the Thai Red Cross monovalent anti venom (made in Thailand against king cobra venoms in Thailand and Malaysia). But that does ot have an effect on the Indian king cobra bites.

Venom varies: Earlier, biogeographical studies have proven that snake venom compositions vary dramatically across geographies. The Indian polyvalent anti venom too is ineffective since king cobra venom is not a part of the immunisation mixture.

The longest venomous snake in the world, the king cobra is shy and avoids confrontation with humans. Accidental bites and envenoming are uncommon due to its large size and unmissable threat display (hooding and hissing). A Schedule II species, it enjoys high protection under the Wildlife Protection Act 1972, making venom collection for research a tedious process, say researchers. These are some reasons why king cobra venom studies are almost absent in India.

The comparative analysis of the venom compositions for the king cobra and spectacled cobra, revealed a higher venom complexity in the spectacled cobra with a greater number of toxin superfamilies compared to the king cobra venom. Scientists attributed the variation in venom diversity to their distinct dietary preferences with the king cobra being a specialist predator, feeding mostly on snakes.

Sunagar said that this could mean it needs only a limited variety of toxins whereas the spectacled cobra, that feeds on a diverse range of prey, might need a wider repertoire of toxins. The same could be the reason for the high venom yield of the king cobra since it sometimes needs to overpower large, venomous snakes like other king cobras it preys on. It could also be due to the large venom glands it possesses.

Suggestions: He pointed out that these findings are applicable only in the Western Ghats considering the biogeographical variations of snake venoms. He proposes producing a small batch of king cobra monovalent anti venom as a lifesaving drug for king cobra bites in the region as an outcome of the findings. Similar studies should be done in other regions where king cobras are found, he said.

27th INDIAN BIRDING FAIR ON 9-10 FEB 2024

The 27th Indian Birding Fair will be staged at Jaipur's Man Sagar lake on 9 and 10 February 2024.

It will be dedicated to "Re-Wilding" the environment as per ecosystem needs.

Such a topic deserves attention as development projects receive more priority and they cause large scale changes in natural environment.

The Department of Forest, Rajasthan, will lead the Fair

A session at the Indian Birding Fair 2023, HV

through its Deputy Conservator - Wildlife, Sangram Singh Katiyar. Tourism and Wildlife Society of India (TWSI) is the main organizer. It is a citizens' initiative. It is the longest running Fair in India.

The objective of the Fair has been: restoring the aquatic character of Man Sagar lake, located towards northern fringe of city of Jaipur.

It was attained a decade and a half ago. However, the lake is getting polluted again. Hence greater attention should be paid to its "re-wilding," said a TWSI spokes person.

CAMERA TRAPPING RUSTY-SPOTTED CAT

Rusty-spotted cat at Bera scrub habitat, Radheyshyam Bishnoi

By Shuchita Jha
Suchita is correspondent at
mongabay.india

Officials of the Keoladeo National Park in Bharatpur, Rajasthan are actively preparing monitoring strategies after a rusty-spotted cat (*Prionailurus rubiginosus)*, was photographed carrying its kitten in the park last month.

Manas Singh, Deputy Conservator of Forests, posted at this park, said that it was the first sighting of the species in the last five years and the first in 10 years of a mother with kitten. It is perhaps an indication that Keoladeo is a suitable habitat for the species.

Who clicked: The rusty-spotted cat is small in size, weighing about 1 to 1.6 kilograms. With brownish-grey fur tinged with rufous tones and white undersides, the small cat is known to be shy and elusive. This, coupled with lack of census of its population, make it difficult to discern the species' population trend.

After the two visitors photographed the cat in Keoladeo during October 2023, park authorities decided to monitor the presence of the cat and learn about its behaviour to better design conservation strategies. The park authorities have set up 40 camera traps in a 29 sq.km. area and are planning to install 50 more.

It is categorised as 'near threatened' in the IUCN Red List of threatened species. It has also been given the highest level of protection under the Wildlife Protection Act, 1972, in India and under Appendix I of CITES, the Convention on International Trade in Endangered Species of Wild Fauna and Flora.

"The large number of camera traps will allow us to study the behaviour of the species, estimate its population and design conservation measures to protect it," said Singh.

Its habitats: Besides Keoladeo National Park, the rusty-spotted cat has been sighted in many parts of Rajasthan including Sajjangarh Biological Park, Phulwari Ki Nal Wildlife Sanctuary, Jaisamand Wildlife Sanctuary in Udaipur, Sita Mata Wildlife Sanctuary which is in Pratapgarh and Bhainsrorgarh Wildlife Sanctuary in Chittorgarh, among others. Its presence has also been found in other districts of the states such as Baran, Pali, Sawai Madhopur, Alwar, Kota, Bundi, Jhalawar, Dholpur, Bharatpur and Sirohi.

The species prefers deciduous forests, scrub lands and agricultural

Rusty- spotted cat at Nahargarh forest, Raj Kishore Yogi

land holdings. Shomita Mukherjee, Principal Scientist, Sálim Ali Centre for Ornithology and Natural History (SACON) told Mongabay India that the southern part of the Deccan region and catchment areas in Gujarat, areas near Eastern Ghats and in the Himalayan foothills are other suitable habitats for the rusty-spotted cat.

Globally: Globally, the rusty-spotted cat population is limited to India, Nepal and Sri Lanka. The species is now threatened by habitat loss due to land-use change and deforestation. According to the IUCN, 75% of the habitat in the current distributional range of the cat, in India and Nepal, is facing an imminent danger of land conversion, which might lead to a 20-25% decline in its population in the next three generations.

"Many individuals reside outside protected areas, which are such a small proportion of our geographical land. The problem with most species now is they're forced to live in areas that are not their prime habitats. We're testing the boundaries of their tolerance, beyond which they will not survive," said Mukherjee.

She added that India is home to about 80% or more of the world's rusty-spotted cat population. "This puts a responsibility on us to actually save the species," she said.

"Our idea is to protect the habitat from degradation and limit human activities as far as possible. With around 100 camera traps in a 29 sq.km. range, we will be able to study the species' relationship with its environment. If we find any new habitats, like wetland ecosystems, that support its population, we will further reduce the human imprint to ensure habitat conservation," she stated.

Disturbance: Mukherjee, however, said she feels that installing 100 camera traps in a small area might disturb the habitat and prove to be detrimental to the cat's population and habitat.

"Target three of 23 of the Global Biodiversity Targets adopted in December 2022 during the Kunming-Montreal Global Biodiversity Framework at COP15 in Montreal, Canada, states that parties will protect 30% of the terrestrial, inland water and coastal and marine areas by 2030. This (habitat preservation) might be a big step in conserving the population of the rusty-spotted cat, along with other small carnivores," she said.

Not easy to photograph Rusty spotted cats. Raj Kishore, a Forester at Jaipur, and Radheyshyam Pemani Bishnoi in Jaisalmer, have done fairly well. Their contribution is acknowledged with thanks.

– Editors

WHAT ENERGY SECTOR CAN DO?

From Conservation Times Desk

Solar panels being erected over ground, Ram Niwas

As the world grapples with the urgent need to mitigate climate change, there is one sector in particular that plays a pivotal role in facilitating the transition towards a low-carbon future - the energy sector.

Decarbonisation: The removal or reduction of all human-made carbon emissions into the atmosphere is achieved through cross-cutting measures to reduce or eliminate carbon emissions from an organisation's or individual's activities.

Decarbonisation differs from climate neutrality because it seeks to reduce absolute carbon emissions and intensity. Furthermore, climate neutrality does not necessarily include decarbonisation actions, as climate neutrality can be achieved through solely buying carbon credits. Accordingly, decarbonisation is absolutely vital in the transition towards a low-carbon energy sector.

The economic recovery from the COVID-19 pandemic significantly increased energy and electricity use in 2021. The electricity and heat sector emissions increasing by 1.8% to reach an all-time high. Such an increase in electricity and heat generation led to significantly higher emissions of greenhouse gases in the energy sector and an upturn in the carbon footprint of the energy industry.

The energy sector has immense foot prints compared to other industries. Over 40% of energy-related CO2 emissions worldwide are due to the burning of fossil fuels for electricity generation.

In 2021, CO2 emissions from energy combustion and industrial processes accounted for close to 89% of energy sector greenhouse gas emissions globally. Coal-fired power plants were responsible for half of the increase in global electricity demand in 2021, with CO2 emissions from coal power plants rising to a new high.

In the United States, emissions of carbon dioxide (CO2) by the electric power sector were 1,539 million metric tons in 2022, which is about 31% of total U.S. energy-related CO2 emissions.

In the United States, direct industrial greenhouse gas emissions accounted for 23% of total greenhouse gas emissions in 2021, primarily from burning fossil fuels for energy.

Accordingly, whilst recent technological innovations and policies addressing energy usage have proved to be increasingly effective in lowering carbon-intensive energy supply over time; there is still vast potential for the energy sector to further undergo sustainable transition.

In line with the 'Intergovernmental Group of the International Energy Agencys prediction that innovations in key technology like batteries, intelligent grids and carbon capture greatly outweigh the patents in fossil fuel technologies. Following key innovations are driving the decarbonisation of the energy sector:

Renewable technologies: Renewable energy technologies, such as solar and wind power, have made significant strides towards decarbonising the carbon intensive energy sector in recent years. These technologies harness the power of natural resources without producing harmful greenhouse gas emissions.

Solar photovoltaic (PV) panels and wind turbines have become increasingly efficient and cost-effective, making them viable alternatives to traditional fossil fuel-based energy sources. Meanwhile, solar and energy storage innovations are improving the efficiency and reliability of renewable energy systems, allowing for their widespread adoption.

Accordingly, 232 million tonnes of carbon dioxide equivalents were avoided in 2022 via the use of renewables. This is more than eight times as much as the savings in 1990, whereby these emissions would otherwise have been generated through the use of fossil fuels.

Energy storage solutions: Given that one of the key challenges associated with renewable energy is its intermittent nature; energy storage solutions play a crucial role through storing surplus energy generated during periods of high production and releasing it during times of low production.

Photo Feature

A Siberian Crane pair portraiture, study in details (above). Below are Siberian Cranes feeding along with Eurasian spoonbills at Keoladeo National Park, India. The art work is done by the celebrated water colour artist, David Rankin based at Cleveland, US (email: davidrankinwatercolours@gmail.com). His generous support is thankfully acknowledged -- Editors

www.trimurty.com

TRIMURTY
COLONIZERS & BUILDERS
CONCRETING RELATIONSHIP
Since 1995

Homes that Embrace Nature

Trimurty's Eco-Friendly Homes are designed to help you embrace sustainability without sacrificing comfort. Our properties are built on Green Building Principles and are dotted with indigenous trees, shrubs, and bushes that provide a natural habitat for birds. Equipped with rain-water harvesting and solar power systems, our properties help you save on utility bills and reduce your carbon footprint. We believe in managing solid waste and have low maintenance costs so that you can focus on what really matters - enjoying life to the fullest. Join us in our mission to build an environment-friendly world, one home at a time. Come, let's make sustainability the ultimate luxury!

- Thoughtfully constructed keeping the concept of 'Reducing carbon footprint' at core
- Constructed of state-of-the-art materials and technology
- Better lighting and ventilation
- A healthier home
- No additional cost for sustainable solutions
- Reduced water usage
- Saving on energy bills
- Be a part of the few Green Home Projects in the country
- Low maintenance costs
- Better rental/resale value

Go Green with Trimurty.

TRIMURTY
COLONIZERS & BUILDERS
CONCRETING RELATIONSHIP
Since 1995

Hallmark in Ambient Living
601, Geeta Enclave, G-8, Vinoba Marg,
C-Scheme, Jaipur | Ph. **0141 - 2374451**
Email: **sales@trimurty.com**

@trimurtybuilders
/trimurtybuilders

www.trimurty.com

CREDAI RAJASTHAN

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.

Bhatnagar, Nandita

Nandita Bhatnagar is a Clinical Biochemist with a passion for writing. Her articles have been published in local newspapers in the Bay Area. She also authors and narrates her stories for a monthly audio magazine "Suhava" published through Rotary Club of Maharashtra for blind school children.

Bhuvana Ramalingam

Bhuvana Ramalingam is a nature lover, travel enthusiast, long term meditator, and an Ayurveda wellness consultant living in Houston, Texas. She is the founding Director of Befriend Life Foundation, a non-profit based in Bangalore engaged in providing eco-friendly solutions.

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.

Pandey, Binita

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.

Patil, Amit

Amit is an eco-lover based in Dallas, Texas. Believing that a traveler always starts out in his backyard, Amit traveled extensively across India. He kept his passion for nature alive after moving to North America and has traveled extensively around the continent.

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 Grail Inc., supporting the company vision of "Detect cancer early, when it can be cured".

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, Mamta
Co-ordinating Editor

Mamta holds a PhD in Environmental Science and Policy. She has several years of experience working with rural communities in India and East Africa on issues that lie on the intersection of rural livelihoods and natural resources management. Mamta is currently based in Edmonton, Canada where she works as a Research Officer with the provincial Government.

Published for Tourism & Wildlife Society of India (TWSI, email: birdfair1@hotmail.com), C 158-A, Dayanand Marg, Tilak Nagar, Jaipur 302 004, India, wwwbirdfair.org. Design and lay out by Manish Sharma at It's A Design Studio, Adarsh Nagar, Jaipur, email: lavishkadesign@gmail.com.
Managing Editor: Harsh Vardhan
Note: This is the 16th edition, an e-newsletter for free circulation aiming at education and awareness on environmental conservation.
Conservation Times is on worldwide web, like to click: **www.econservationtimes.com**