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Kalyani Ganapathy

editor's note |

Cover art by Pencil Sauce

The dog is a gentleman, said Mark Twain, a sentiment many people would endorse. Dogs have been a part of human cultures for over 15,000 years as protectors and companions. In many parts of the world, the domestic dog is now feral, and as an invasive species in these habitats, causes a cascade of negative effects. In this issue, three pieces examine how the dog is an introduced predator that harasses and affects local wildlife. Janaki Lenin introduces us to killer dogs—that kill for food or play, but also because they are rabid. Kalyan Varma's photographs of dogs chasing and being chased by wildlife in Kutch, Gujarat, supplement these narratives. But are non-native species always detrimental to local ecosystems? Ema Fatima thinks not, and in her summary of a research paper, she outlines the many positive effects that foreign species have on the ecosystems around them.

In two other pieces, we feature anthropogenic noise, an intrinsic element of contemporary life. While we have long known that noise affects humans, Caitlin Kight and Madhusudan Katti tell us how noise impacts birds. Our noisy lives cause all kinds of changes in animals that live around us, impacting behaviour, physiology, longevity and even survival. To know more about the human footprint and how we have affected the ecology of the world around us, read TR Shankar Raman's revealing summary of a book on environmental history.

erratum | In 'Discovering wildlife in Cambodia' in the print issue of 5.1, photograph credits go to The Society for Environmental Exploration, not Elise Belle. Elise Belle was Research and Development Manager at the Society for Environmental Exploration at the time of publication. research@frontier.ac.uk

What the sea nomads know

** Ema Fatima*

USING TRADITIONAL ECOLOGICAL KNOWLEDGE AS A NEW TOOL TO DESIGN BETTER CONSERVATION STRATEGIES

To some, traditional knowledge implies information frozen in time, while ecological knowledge is considered more rational—separating the biological from the social and spiritual. Indigenous people often consider both kinds of knowledge to be synonymous. Berkes, in 1999, defines Traditional Ecological Knowledge (TEK) as "a cumulative body of knowledge, practice, and belief, evolving by adaptive processes, and handed down through generations by cultural transmission," that describes the relationships of living beings (including humans) with one another and with their environment. Indigenous communities are often highly dependent on local natural resources like oceans, and could therefore become sources for information that might not be available in scientific literature.

Stacey and colleagues combined TEK and new technology in Indonesia to develop whale shark management strategies. One of the major communities involved in the study, the Bajo, also known as sea nomads, are highly dependent on resources in the waters of eastern Indonesia. The investigators conducted interviews with the Bajo and other communities on many islands, to gather information about presence and local migration routes of whale sharks, with a view to also determining ecotourism potential for the region.

The Bajo contributed extensive natural history observations of whale sharks, including locations of the sharks, their social patterns, timing of movement around their islands and their habits (feeding etc). They also had culturally driven prohibitions and customary beliefs protecting whale sharks.

Long-lived, wide-ranging large animals like whale sharks are difficult and expensive to study, and this study is an example of integrating local sources of knowledge with scientific studies to better understand a complex system. The authors suggest the use of community-based monitoring based on TEK to effectively keep records of this rarely-sighted migratory species. Further, this information could be used to develop ecotourism opportunities with the involvement of the local communities.

Stacey NE, Karam J, Meekan MG, Pickering S & J Ninef. 2012. Prospects for whale shark conservation in Eastern Indonesia through Bajo traditional ecological knowledge and community-based monitoring. Conservation and Society 10(1):63-75.

** Ema Fatima is a research scholar at the Centre for Ecological Sciences, Indian Institute of Science, India. fatimaema@gmail.com*

Chue Leng Sing

Check(ing) lists

* *Sandhya Sekar*

AN OBJECTIVE METHOD TO EVALUATE THE WILDLIFE PROTECTION ACT; BY CALCULATING CONSERVATION STATUS OF BUTTERFLY SPECIES

In 1972, the Indian government passed a landmark legislation, the Wildlife Protection Act (WPA), to dictate the levels of legal protection for Indian animals. The WPA has since been very effective for some species, especially charismatic large mammals, but not as effective for invertebrates, feels Krushnamegh Kunte, in an article published in Current Science in 2008.

The invertebrate listings are especially inaccurate, including species that are either wrongly named or that have not been chosen objectively, while leaving out endangered species.

Using butterflies of the Western Ghats as an example, Kunte illustrates the shortcomings of the current listings, and proposes an objective method that can be used to improve their quality.

Starting with an exhaustive list of 333 species from the Western Ghats, he collated information about them—where they are found globally, whether they are restricted to some areas within the Western Ghats, what kind of habitat they prefer and how easily they are found. He then divided each characteristic into sub-categories, which were assigned numbers so that common species got low scores and ones found rarely (only in specialised habitats) got high scores. Finally, he totaled the scores for each species to get the 'mean conservation value,' a number between 9 and 40. Higher the value for a species, the more endangered it is.

Only very few species that got high conservation values in this study are listed in the WPA, showing that these listings are inadequate, at least for butterflies. For instance, it covers only 3% of the species in the butterfly family Hesperiidae (skippers). The study demonstrates the need for objectively assessing WPA lists for other groups, and revising them where necessary. Also, Kunte provides an easily workable framework for future studies, in which pre-existing information on species can be used, coupled with some careful analyses.

Kunte K. 2008. The Wildlife (Protection) Act and conservation prioritization of butterflies of the Western Ghats, southwestern India. Current Science 94(6):729.

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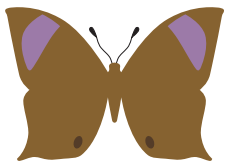
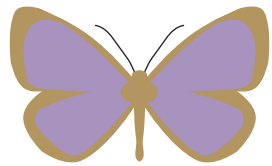
High Conservation Scores



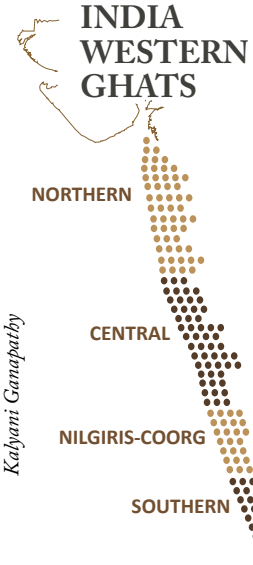
Parantirrhoea marshallii
Southern, Nilgiris & Coorg
Rare, patchy distribution. Low & mid-elevation evergreen & semi-evergreen forests only.

Eurema nilgiriensis
Nilgiric & Coorg. Rare, patchy distribution. Montane habitats including shola & grasslands.

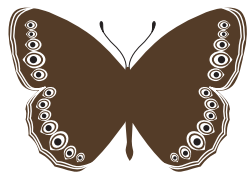
Low Conservation Scores



Zizerria karsandra
All 4 zones. Globally common, widespread, diverse habitats.

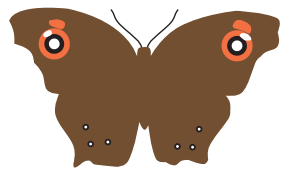


Kalyani Ganapathy



Mycalesis davisoni
Southern. Rare, patchy distribution. Low & mid-elevation evergreen & semi-evergreen forests only.

Cynthia cardui
All 4 zones.



Melanitis leda
All 4 zones.

Measuring the success of grassland restoration

** Eszter Deri*

COLONISATION OF RESTORED GRASSLANDS BY ARTHROPODS FROM NEARBY AREAS IS KEY TO THE SUCCESS OF SUCH RESTORATION EFFORTS

Grasslands are in danger in most parts of the world and agricultural intensification is one of the biggest threats. Agriculture promotes degradation as well as conversion of grasslands to cultivation lands. Increasingly, grassland restoration efforts in many countries focus on converting arable lands back to grasslands.

In most cases, grassland restoration is carried out by sowing species-rich seed mixtures containing seeds of target grass and forb species to speed up the natural regeneration processes. In this study, however, we used low-diversity seed mixtures (two or three species) after soil preparation and managed the sites by mowing and grazing from the first year after restoration. To gain a better understanding of the short-term effects of restoration, we compared the arthropod assemblages (spiders, true bugs, orthopterans and ground beetles) of one and two-year-old grasslands, using cultivated lands and natural grasslands as references.

A measure of species richness (number of different species in a community) is one of the most commonly used indicators to monitor changes after restoration. However, in conservation, the identity of the species is as important as or even more important than the number of species. Thus, we used species richness along with recently developed measures of habitat affinity (based on how specific a species is to a given habitat type [specificity], and on how stable the presence of a species in this habitat is [fidelity]) to assess the progress of grassland restoration in the Hortobágy National Park, the oldest and largest national park in Hungary.

Our results showed that changes in vegetation after restoration were quickly followed by changes in species composition of arthropods. We found that arthropod species richness did not change in the first two years following restoration efforts. However, close examination demonstrated that the list of arthropod species in the communities changed due to the replacement of generalist species (not favouring any particular habitat type) by grassland-specialist species.

Our study suggests that grassland restoration using only two or three foundation grass species can lead to rapid colonisation of arthropods from

João Pedro

Alopecosa pulverulenta *(also known as the common fox spider), is one of the wolf spiders, and is widely distributed in western and central Europe, and was recorded in native grasslands in Hortobágy National Park during this study. This spider is found in many open habitats, including heathland, grasslands, moorland, dunes and old quarries and pits.*

nearby areas. These results challenge existing views that advocate against restoration, citing restoration as time-consuming and a waste of money, both of which are debunked by the results of this study.

Also, based on our study and several others, we recommend the use of the recently-developed habitat affinity indices, because they are useful measures in detecting biodiversity changes following conservation actions.

Déri E, Magura T, Horváth R, Kisfali M, Ruff G, Lengyel S & B Tóthmérész. 2010. Measuring the short-term success of grassland restoration: the use of habitat affinity indices in ecological restoration. Restoration Ecology 19(4):520-528.

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Where are primates poached?

** Sartaj Ghuman*

PROXIMITY TO RESEARCH AND TOURISM ZONES DETERS PRIMATE POACHING

Primates are regularly hunted for bush-meat in tropical forests, and poaching, along with other human activities that lead to habitat modification, can drastically reduce the probability of persistence of primate populations. Though Tai National Park, Côte d'Ivoire, covers a massive area of 5363 square kilometres, ongoing deforestation of the remaining forest fragments outside the park has left it an isolated forest block surrounded by rapidly increasing human population.
In a study conducted by Paul K N'Goran and colleagues, the density and spatial distribution of eight species of monkeys in the park were estimated and the factors affecting them were determined. Though the data were not enough to show if law enforcement directly affects monkey densities or deters poachers, they found that monkey densities decreased with higher human pressure, measured by a composite of proximity to villages and roads, and density of humans and villages. The monitoring data on human activity and poaching also helped effectively guide law enforcement to areas where hunting was concentrated. Remarkably, the density of monkeys was higher closer to the research station and the tourism site as these places are likely to deter hunting activity. The study concludes that if poaching can be deterred by targeted patrolling in the park, it may eventually lead to recovery of monkey populations.

In the larger context, when studied along with other factors like demography, behaviour and physiology, such studies can allow us to identify factors associated with the persistence of primate populations.

N'Goran PK, Boesch C, Mundry R, N'Goran EK, Herbinger I, Yapi FA & HS Kuhl. 2012. Hunting, law enforcement, and African primate conservation. Conservation Biology 26(3):565-71.

**Sartaj Ghuman is a PhD student at the National Institute of Advanced Studies, India. batalaland@gmail.com*

A new look at non-native species

** Ema Fatima*

NON-NATIVE SPECIES: POTENTIAL SURVIVORS IN CHANGING CLIMATIC CONDITIONS

Conventional biological thought states that non-native species cause loss of biological diversity (genetic, species, and ecosystem diversity) and threaten the well-being of humans when they become invasive. However, recent studies have shown that not all non-native species cause biological or economic harm, and only a fraction become established and have an effect that is considered harmful. In some cases, however, this study shows that some exotics can also provide conservation benefits.

A subset of non-native species will undoubtedly continue to cause biological, economic, and social harm. But other non-native species could become increasingly appreciated for their tolerance and adaptability to novel ecological conditions and their contributions to ecosystem resilience and to future speciation events. A research paper by Schlaepfer and colleagues outlines their roles and advantages. The ways in which non-native species were found to contribute to conservation objectives were:

- By providing shelter and food for native species
- Catalysts for restoration
- As ecosystem engineers
- As ecosystem service providers

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• By taxon substitution within ecosystems

ECOLOGICAL ROLES IN RAPIDLY CHANGING ECOSYSTEMS

Non-native species are potential survivors of future climatic scenarios given their ability to tolerate and adapt to a broad range of biotic and abiotic conditions, as well as to expand their ranges rapidly. They can contribute to ecosystem resilience and stability. They can also be expected to contribute to some of the putative benefits of species-rich ecosystems, such as increased productivity and stability.

NOVEL EVOLUTIONARY LINEAGES

Given sufficient time, non-native species can increase global species richness through speciation. Non-native species can also contribute to the formation of novel evolutionary lineages among native species. They can also catalyse hybridisation events between native species that result in novel evolutionary lineages. Speciation events can also result from hybridis`ation between certain non-native and native species and between pairs of non-native species.

Thus, it becomes essential to manage non-native species well. The management of non-native species and their potential integration into conservation plans depends on how conservation goals are set in the future. A fraction of non-native species will continue to cause biological and economic damage, and substantial uncertainty surrounds the potential future effects of all non-native species. Nevertheless, the prediction is that the proportion of non-native species that is as benign or even desirable will slowly increase over time as their potential contributions to society and conservation become well recognised and realised.

POSITIVE EFFECTS OF INTRODUCED SPECIES

PACIFIC OYSTER | *Crassostrea gigas*

CATALYST FOR RESTORATION

Biofiltration rates of this species in estuaries may reduce production of phytoplankton caused by anthropogenic nutrient loading

NIAOULI / BROAD LEAVED PAPERBARK | *Melaleuca quinquinervia*

PROVIDING HABITAT FOR NATIVE SPECIES

Provides habitat for Snail Kites (*Rostrhamus sociabilis plumbeus*) in the Everglades, Florida, USA

AFRICAN HONEY BEE | *Apis mellifera*

ECOSYSTEM SERVICES

Pollinate native plants in fragmented forest landscapes in Brazil and Australia

ZEBRA MUSSEL | *Dreissena polymorpha*

CATALYST FOR RESTORATION

Filters water and control toxic cyanobacteria in shallow eutrophic lakes

ALDABRA GIANT TORTOISE | *Aldabrachelys giganteas*

TAXON SUBSTITUTION

Replaces the ecological role of extinct giant *Cylindraspis* tortoises in the Mascarene islands

BLACK LOCUST | *Robinia pseudoacacia*

CATALYST FOR RESTORATION

Provides cover and restores soil fertility on mined lands

Kalyani Ganapathy

Schlaepfer MA, Sax FD & JD Olden. 2011. The potential conservation value of non-native species. Conservation Biology 25(3):428–437.

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Pencil Sauce

Anthropogenic Noise

What are the biggest threats faced by wild animals living in human habitats? Ask a random sampling of people, and you'll be sure to hear a few culprits mentioned repeatedly—habitat destruction, pesticides, hungry domestic pets, poachers.

ALL OF THESE ARE CORRECT, AND INCREASING AWARENESS OF THESE ISSUES HAS LED TO THE DEVELOPMENT OF MANY SUCCESSFUL LAWS AND MITIGATION MEASURES AIMED AT PROTECTING A VARIETY OF SPECIES, GREAT AND SMALL. HOWEVER, DESPITE THE FACT THAT IT IS PERVASIVE, THERE IS ANOTHER IMPORTANT THREAT THAT MOST PEOPLE ARE UNAWARE OF; NOT ONLY CAN IT IMPACT ANIMALS THROUGHOUT THEIR LIVES, BUT IT CAN ALSO HAVE EQUALLY NEGATIVE EFFECTS ON HUMANS. THIS THREAT IS NOISE – SPECIFICALLY, ANTHROPOGENIC NOISE, OR NOISE CAUSED BY HUMANS.

Loud noise damages hearing abilities. Probably the most obvious impacts of noise are hearing impairment and deafness—as anyone who has stood too near the speakers at a loud concert will tell you. These maladies result when sound waves cause physical damage to one or more parts of the inner ear. Injuries may stem from single, extreme acoustic traumas (which are not often a problem for wildlife), or from chronic exposure to moderate to high intensity noise. Over time, this can lead to perforated eardrums and the irreplaceable loss of hair cells, which are required to detect the presence of sound waves. In nature, even short-term hearing deficiencies—such as those caused when a passing vehicle "masks" other sounds—can be problematic; animals that can't detect predators will be easy prey, while those that fail to hear a potential mate might miss out on a breeding opportunity.

Loud noise influences behaviour. As demonstrated by the pivotal great tit study, animals in noisy environments may act differently than those in quieter areas, and this may not always be to their advantage. Among acoustically communicating animals, individuals may attempt to counter the effects of noise by vocalising at a different pitch, at a higher volume, over a different length of time, or even, as seen in European robins, at a different, quieter time of day. This sounds like a clever solution to the noise problem until you consider the fact that the males of many of these species use acoustic signals to attract mates; variations in signal properties might make them seem less attractive to females, and therefore might reduce their breeding success. This possibility is receiving increasing support from both laboratory and field studies on a variety of species.

Michael Meinhardt

In nature, even short-term hearing deficiencies—such as those caused when a passing vehicle "masks" other sounds—can be problematic; animals that can't detect predators will be easy prey, while those that fail to hear a potential mate might miss out on a breeding opportunity

Because animals often rely on acoustic cues to alert them to the presence of a predator, many species seem more nervous in noisier environments. Both rats and chaffinches, for instance, spend less time eating and more time scanning for potential danger when exposed to ambient noise. Over extended periods of time, this could lead to nutritional deficits. Predators may also be adversely impacted by noise; studies on bats have shown that highway traffic noise reduces their foraging efficiency. Recent work among avian communities breeding near natural gas extraction facilities found that nest predation rates were lower in noisier sites due to the absence of predatory western scrub jays. Thus, the presence of sound

Pencil Sauce

From a conservation perspective, the most important question is whether noise pollution reduces the health and reproductive success of wildlife—the two factors responsible for maintaining the success and stability of populations over the long-term. Studies on great tits and eastern bluebirds suggest that, for these species at least, the answer is "yes."

pollution seems to cause some species to completely vacate affected habitats—to the benefit of those who stay behind.

Noise can alter community structure. The story of the western scrub jays has one additional complexity: These birds are a key disperser of pinyon pine seeds, and therefore play an important role in shaping the habitat. Areas abandoned by these birds will have fewer new pine saplings, likely allowing other species to take root instead. This could ultimately lead to a complete restructuring of the community.

Despite the length of time over which noise research has been conducted, this threat is not understood nearly as well as, for instance, habitat loss or poaching. That's because much of the work has been done by scientists working in isolation, and on a diverse array of focal organisms. Further, many studies have been conducted under laboratory conditions, and investigate the effects of noises unlike those that would actually be experienced in anthropogenic environments. As a result, while our current knowledge offers tantalising glimpses of the effects that noise may have, more work is needed to connect the patterns reported in scientific literature to what is actually happening in the wild, and to which species.

From a conservation perspective, the most important question is whether noise pollution reduces the health and reproductive success of wildlife—the two factors responsible for maintaining the success and stability of populations over the long-term. Studies on great tits and eastern bluebirds suggest that, for these species at least, the answer is "yes." This indicates that managers and conservationists need to take noise into consideration when approving land use schemes and developing mitigation plans. For instance, they might veto installation of a noisy road near or through a national park, or at the very least require that it be flanked by sound-reducing walls. Lawmakers might consider imposing volume restrictions—a tactic that has been employed in industrial settings in order to improve employee welfare. Engineers could possibly redesign machinery so that it meets desired noise standards. In wilderness areas, humans and their noisy activities might even be banned during the breeding season, when animals are likely to be most sensitive to acoustic disruption.

There are a variety of potential solutions to the noise problem, and given human sensitivities to sound pollution, many will likely benefit us as well as wildlife. In order to develop good plans for minimising noise, it will be vital for researchers to collect more data on noise-exposed animals living in the wild. Perhaps even more important, though, is making people aware of the harmful effects of their acoustic activities. Rachel Carson's 1962 book Silent Spring helped protect wildlife by alerting the public to the harmful effects of pesticide use; a campaign to highlight the negative impacts of sound pollution might be similarly effective in avoiding an equally dangerous noisy spring.

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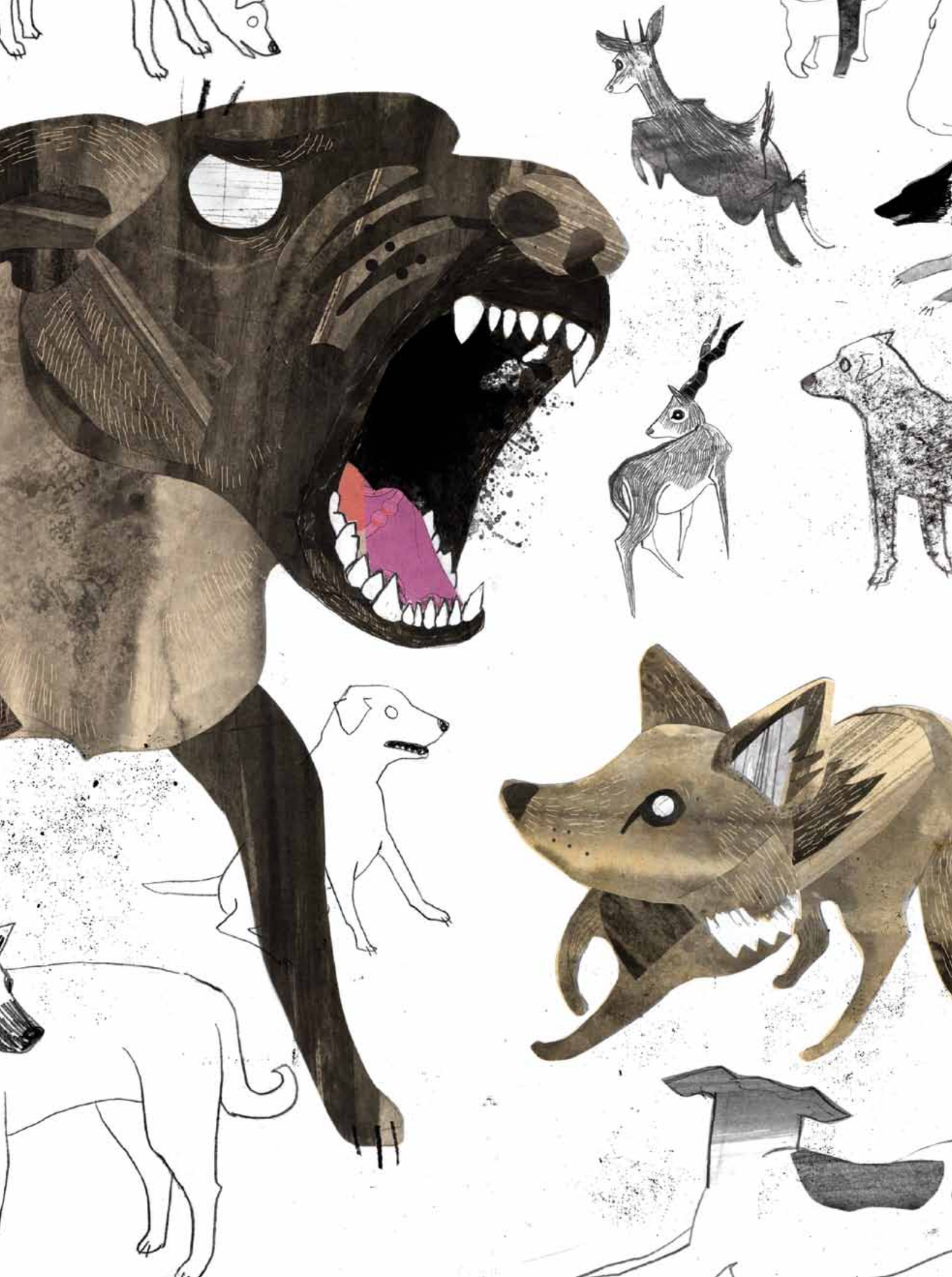
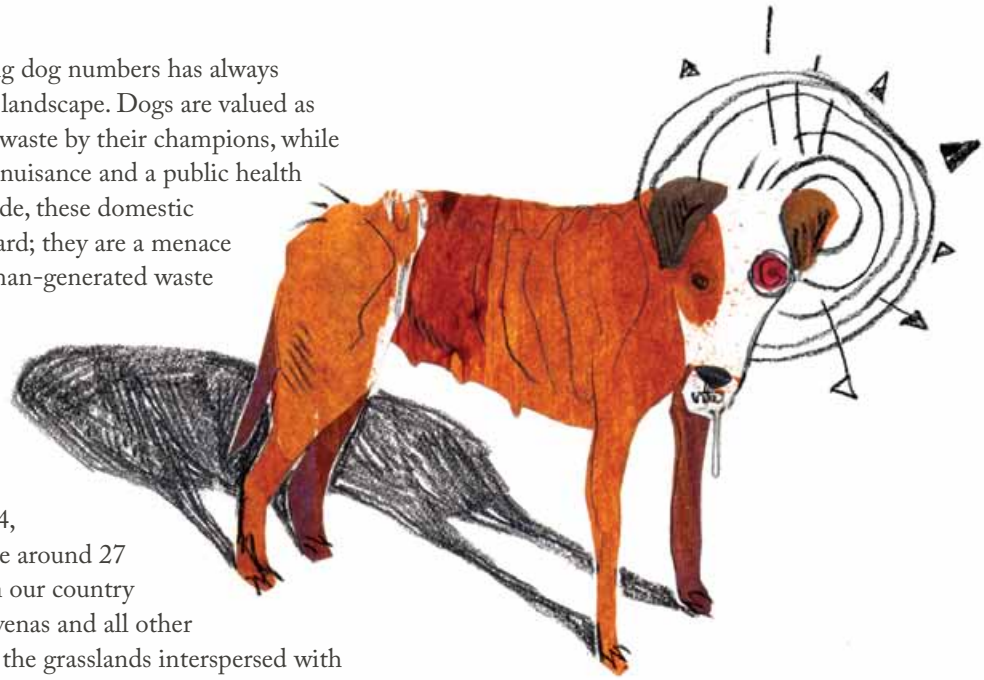
How dogs have played a part in killing wildlife

THEY MAY BE MAN'S BEST FRIENDS, BUT THEY ARE ONE OF THE WORST ENEMIES OF WILDLIFE.





Pencil Sauce

The controversy about the rising dog numbers has always been framed around the urban landscape. Dogs are valued as companions and scavengers of waste by their champions, while their critics see them as a civic nuisance and a public health problem. In the rural countryside, these domestic canines pose an additional hazard; they are a menace to wildlife. Freeloading on human-generated waste and largesse, they outnumber local fauna by many orders of magnitude.

India arguably has the highest dog population in the world; at the last count, in 2004, the number was estimated to be around 27 million. There are more dogs in our country than tigers, leopards, wolves, hyenas and all other wild predators put together. In the grasslands interspersed with agricultural fields of Nannaj in southern Maharashtra, Dr Abi Tamim Vanak studied the impact of dogs on a smaller wild canid, the fox.

When two similar species occupy the same area, competition between them is inevitable. Dogs use their larger body size to advantage. But not all dogs affect foxes the same way. There are three kinds of dogs in the area: ownerless dogs living off garbage in the villages, herding dogs that are out all day with livestock and return home for the night, and finally, semi-owned farm dogs. Although all of them roam free, it is the last category of dogs that is in regular, active contact with foxes. That's because farm dogs live on the periphery of villages and are closer to grasslands, the home of foxes. Each homestead may have three to ten dogs, and across the farming landscape, there are about 24 dogs per square kilometre. Every night these packs roam the surrounding fields and grasslands when foxes are abroad, preventing them from foraging, even chasing and killing them. Dogs don't always prey on foxes, sometimes losing all interest once the fox is dead.

Foxes eat rodents, insects, reptiles like saw-scaled vipers and fruits such as grapes; they don't scavenge garbage or carcasses. So this is certainly not a case of dogs and foxes competing for food. Although grasslands are the primary habitat of foxes, they can also live in fallow agricultural fields where there are more rodents. However, the high risk of encountering dogs discourages foxes from using these fields. When dogs are around, foxes stop foraging and become watchful, ready to flee at the slightest hint of danger.

Dogs also come in contact with other wildlife. They chase blackbuck away from grazing sites, kill fawns unable to run fast enough, and pounce on helpless chicks of endangered ground-nesting birds like great Indian bustards. Every year, in the deserts of Jodhpur, a thousand cases of chinkaras that have been attacked and killed by dogs are recorded. These domestic canines are not predators alone; they are also prey animals, single-handedly sustaining populations of leopards in farmlands.

Dr Vanak reports that wild species comprise only 11 percent of a dog's diet because people feed them and there is plenty of garbage. However, the cumulative impact of numerous

dogs on wildlife can be devastating. In the nearby Great Indian Bustard Sanctuary, during a good breeding season, there are six fledglings. It only takes a couple of dogs to wipe out an entire year's breeding effort.

If predation on wild species was not harmful enough, there is one other major problem that dogs pose—they transmit fatal diseases to wild canids which has serious consequences not just for the conservation of foxes but also public health. Dr Vanak tracked the incidence of canine distemper, canine parvovirus and rabies in the dog and fox populations of his study area. With veterinarian Dr Aniruddha Belsare, and the support of the Maharashtra State Forest Department, dog vaccination camps were held. Saliva swabs and blood samples from the dogs that were brought by villagers were tested for diseases before the animals were vaccinated. The results were startling: 93 percent of the dogs tested positive for canine parvo and distemper viruses. Most had survived an infection early in life and were now immune, while others were actively infected. Although they showed no symptoms then, two tested positive for rabies; the disease could manifest a week, a month or even a year later. During that time, the dogs' saliva is rich with rabies virus, infecting other dogs and any wild fox that survives a bite. The children, who brought these two dogs, were no doubt playing with them, unaware of the serious medical dangers. It is no surprise that kids make up half the estimated 20,000 annual rabies deaths in India.

Death comes rapidly to foxes that contract these diseases, unlike dogs that can survive and develop immunity. Within one month of testing positive for canine distemper, five young and otherwise healthy foxes fell dead. The following year, there were no fatalities, which goes to show that the disease was not circulating among the wild canids. There are simply too few of them to sustain the germs, whereas the vast dog population is a reservoir of vectors. Similarly, in the hinterland beyond Nannaj, wolves have gone on biting sprees; a lot of them are suspected to have been made rabid by contact with dogs.

Over the nine years that the avian influenza (H5N1) threatened public health, millions of chickens and other domestic fowl were destroyed. Its human toll was just 329 people worldwide (an average of 36 people a year). More than 18,000 are estimated to have died from the H1N1 virus over 15 months around the world, and health professionals tackled it as a medical emergency; it is now being debated whether it was ever a pandemic. Yet, our response to a virus that kills 20,000 Indians every year is extremely inadequate. While we spend millions of rupees subsidising anti-rabies vaccines, we don't have a policy to prevent the disease from occurring in the first place. Nor do we have a wildlife management plan to curtail dogs' access to wild ecosystems.

The government's current dog control policy is to vaccinate, sterilise and return them to their haunts. To be effective, more than 70% of the dogs in a population have to be sterilised within six months. Even urban centres do not have the capacity to handle such large numbers, and in rural areas, implementation is non-existent. While sterilising dogs may bring down their numbers over time, it does not prevent them from ranging over conservation areas around Nannaj and elsewhere in India. There is no doubt that the over-population of dogs in India has contributed to a tremendous amount of disruption and killing of wildlife.

Providing veterinary support to villagers to vaccinate and sterilise farm dogs is imperative. Educating villagers to restrict their pets' free-ranging behavior and helping them set up

Priyanka Singh

Providing veterinary support to villagers to vaccinate and sterilise farm dogs is imperative. Educating villagers to restrict their pets' free-ranging behavior and helping them set up hygienic disposal of waste food and garbage is just as crucial.

hygienic disposal of waste food and garbage is just as crucial. It is impossible to vaccinate the large population of ownerless village dogs since it is not a one-time operation. Booster shots have to be administered periodically and with no one particular person responsible for a dog, keeping tabs on these animals is a logistical nightmare. Partial vaccination will only result in increasing dog numbers over time since they will develop immunity and diseases will no longer significantly control the population. There is no option but to remove these ownerless dogs. Unless the departments of health, animal welfare and wildlife come up with a comprehensive plan, we will continue to put our rural people and wildlife in danger.

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This article was first published in FirstPost.

Rabies: a neglected killer

MASS VACCINATION OF DOGS IS RECOMMENDED AS THE MOST COST-EFFECTIVE, LOGICAL AND ETHICAL APPROACH TO CONTROL RABIES, PARTICULARLY IN RESOURCE-LIMITED COUNTRIES.

Rabies, also known as hydrophobia, is a highly fatal viral disease of mammals with widespread distribution, found on all continents except Antarctica. The causative agent is a neurotropic RNA virus belonging to family Rhabdoviridae, genus Lyssavirus. All mammals are susceptible, and transmission occurs mainly via bites of infected animals. This zoonotic disease is transmitted to humans by bites or licks of rabid animals, mostly dogs. Virus in the rabid animal's saliva is deposited in the bite wounds. The virus then travels via the peripheral nerves towards the brain where it replicates. After replication, the virus then spreads to the major exit portal, the salivary glands. This is when the animal begins to exhibit the symptoms of rabies. Hydrophobia (fear of water) is a characteristic symptom of rabies in humans, while rabies in dogs is manifested either as a 'furious' form (typical mad dog syndrome) or a 'dumb' form (predominantly paralytic form). Once the symptoms of rabies develop in an animal or a human being, the patient rarely survives more than a week. Domestic dogs are the main reservoir and vector of human rabies, especially in developing countries. Canine or dog-mediated rabies contributes to more than 99% of all human rabies cases. Half of the global human population, especially in the developing world, lives in canine rabies-endemic areas and is considered at risk of contracting rabies. Rabies is the only communicable disease of humans that is almost always fatal. Though incurable after the onset of clinical signs, human rabies is nearly always preventable. Post-exposure treatment encompasses thorough wound treatment (immediate and vigorous wound cleansing with lots of water and soap), post-exposure vaccine regime, and inoculation of rabies immunoglobulin whenever deemed necessary.

Elimination or control of rabies in dog populations is essential to control and reduce the risk of disease transmission to humans, other domestic animal species, and wildlife. Mass vaccination of dogs is recommended as the most cost-effective, logical and ethical approach to control rabies, particularly in resource-limited countries.

RABIES IN INDIA: PUBLIC HEALTH IMPLICATIONS

As the principal reservoir and vector of rabies, domestic dogs are responsible for an estimated 20,000 human rabies deaths

Prabha Mallya

Aniruddha Belsare

Death due to rabies has been reported in wolf-bite victims who don't receive appropriate post-exposure treatment, or those with bite wounds inflicted on the head and neck. Such attacks on humans by wolves are highly publicised by the local and regional media, and influence the attitudes of people towards wolves, and consequently towards wildlife policies and conservation.

Ramki Sreenivasan

every year in India, which means one person dies every 30 minutes somewhere in India due to rabies transmitted by dog bite. A majority of these deaths (more than 90%) occur in rural areas. Despite the large number of human deaths, rabies remains a disease of low public health priority and is not a notifiable disease in India. A lack of an organised surveillance system for rabies results in under-reporting, and the actual number of human rabies deaths may be significantly higher than the estimated figure. There is no national program for the control and elimination of rabies in India.

RABIES IN INDIA: WILDLIFE ISSUES

Free-ranging rural dogs interact with local wildlife at multiple levels, and a potential exists for spill-over of diseases from the abundant reservoir host (dogs) to wildlife. Elsewhere, many threatened carnivore species have shown population declines and local extirpations due to introduction of rabies from nearby dog populations. For example, the wiping out of the African wild dog population in the Serengeti-Mara landscape (Tanzania / Kenya) in 1989 and the episodic population declines of Ethiopian wolves in Ethiopia in 1990, 1991-92 and 2003 have been linked to a rabies virus variant which is common in dogs. In India, species like leopards, wolves and golden jackals occur in close proximity to humans in many places, and the transfer of rabies from dogs to these species is a possibility. Such events could have other serious implications: rabies might be the most important factor explaining wolf attacks on humans. Most wolf attacks seem to follow the rabid-wolf pattern—a wolf travelling over large distances, biting many people and domestic animals. Rabies is a prime suspect if such a pattern is reported, as wolves are known to develop an exceptionally severe 'furious' phase of rabies, resulting in a 'biting spree'.

Death due to rabies has been reported in wolf-bite victims who don't receive appropriate post-exposure treatment, or those with bite wounds inflicted on the head and neck. Such attacks on humans by wolves are highly publicised by the local and regional media, and influence the attitudes of people towards wolves, and consequently towards wildlife policies and conservation.

ABOUT THE STUDY

India has a large dog population, consisting mostly of free-roaming, poorly supervised and unvaccinated animals. As reservoirs for important pathogens of humans and wildlife (eg. rabies, canine distemper virus and canine parvovirus), these dog populations are central concerns for public health and wildlife conservation, especially in rural areas. Yet field data on dog demographics, prevalence of important pathogens, and how diseases influence these populations is lacking.

The current project collects this data for multiple dog populations in rural India to fill such voids. Mass vaccination campaigns are conducted for several study populations, while simultaneously monitoring their effects on population growth rates. This information will provide the basis to model impacts of disease control measures, especially mass vaccination of free-ranging dog populations.

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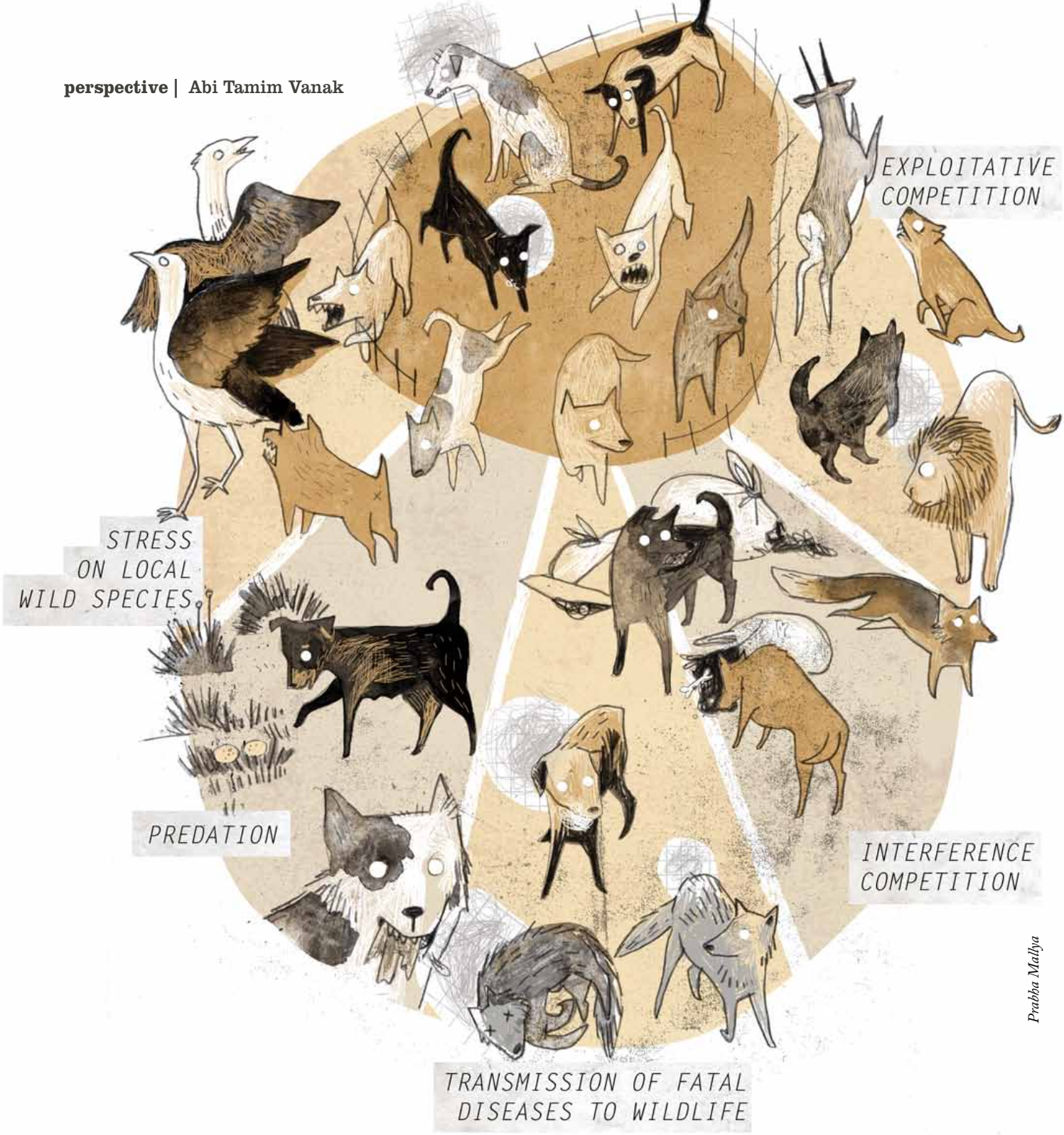

Prabha Mallya

Dogs at the edge

IN RURAL INDIA, DOMESTIC DOGS ROAM WIDELY INTO WILD HABITAT, WITH OR WITHOUT HUMANS, AND INTERACT WITH WILDLIFE. IF BOTH PACK SIZE AND THE DISTANCE THEY TRAVEL FROM VILLAGES INCREASE, THESE DOGS CAN BECOME A RECIPE FOR MANY KINDS OF DISASTER.

Ecological edge-effects can be positive or negative. Edges between two different kinds of habitats create ecological conditions (called an ecotone) that, in some cases, can actually increase biodiversity at the edge. However, when edges are a result of human modifications of habitats, such as when forests are clear-felled for agricultural use or human-settlements, then the subsequent edge can have deleterious effects for the fragmented natural habitats.

Ecological edge-effects can be positive or negative. Edges between two different kinds of habitats create ecological conditions (called an ecotone) that, in some cases, can actually increase biodiversity at the edge. However, when edges are a result of human modifications of habitats, such as when forests are clear-felled for agricultural use or human-settlements, then the subsequent edge can have deleterious effects for the fragmented natural habitats. For example, the creation of roads in the Amazonian rainforest alters the micro-climate of the region, aids in the spread of invasive species and ultimately results in the loss of habitat for edge-intolerant species. It was thought that the negative effects of edges extended to within 10-15 metres inside natural habitats. However, recent evidence shows that some human commensal animals such as generalist predators that occur in high densities in human-altered landscapes can traverse several kilometres into natural habitats. Movement of these animals creates a large-scale edge-effect that can have severe consequences for species inside natural areas, especially when such natural habitats are in small fragments.

In India, most natural and protected habitats are fragmented and are either surrounded by human-settlements or even have settlements enclosed within them. As with other rural areas throughout India, these settlements also harbour high densities of domestic dogs. These dogs roam widely into wild habitats either with or without human accompaniment. The risk that these dogs pose to wildlife is primarily explained by two factors: the density of the dog populations and how far dogs roam from their homestead. Higher densities of dogs increase the probability of pack formation,which makes them more effective when preying on wildlife or confronting other carnivores. Large populations of dogs near villages or households are unlikely to negatively affect wildlife.

Therefore, how far dogs are allowed to range from human settlements is a critical consideration. Dogs that travel several kilometres into wildlife habitat are more likely to come into contact with wildlife and thus have a potentially deleterious effect. Combine large populations with a propensity to roam widely and you have a recipe for a lethal scenario for many species of endangered wildlife.

The outcome of an encounter between dogs and wildlife can also depend on the kind of wildlife they encounter. Dogs are not particularly good at hunting wild animals. Low densities of dogs will succeed in killing large prey such as deer or antelope, but when this happens it appears dramatic and grabs headlines. However, the real cause for concern is when dog densities are high and they are wide ranging. For critically endangered species, such as the great Indian bustard, where every egg and every chick represents a substantial contribution to an alarmingly dwindling population, the risk of predation from even a single dog is unacceptably high. Furthermore, sustained harassment from attempted predation can result in high levels of stress in prey species, which under chronic conditions, can cause lowered reproductive output.

Dogs are also particularly dangerous to other kinds of carnivores, irrespective of their size, so even large tigers are at risk. The nature of this interaction, though, is quite different. For species smaller than themselves, dogs dominate by interference competition: chasing, harassing and in many cases even killing the subordinate predator. Thus smaller carnivores tend to avoid areas frequented by dogs or even abandon food resources that may normally be available to them. For example, golden jackals don't scavenge from carcasses when dogs are found dominating these scarce but rich food sources. Interactions with larger carnivores is more in the form of exploitative competition, where dogs, by virtue of greater population densities, use shared prey resources faster than the native carnivores. In either case, the higher the density of dogs and the wider their ranging behaviour, the stronger these effects are likely to be.

Few dogs in India are vaccinated against common disease-causing pathogens such as rabies, canine distemper virus and parvovirus. These pathogens can be deadly to a variety of wild carnivores, from foxes and wolves to tigers and leopards.

Several well-established cases of disease-spillover from dogs to carnivores have been documented worldwide. Among the most famous examples was an outbreak of canine distemper virus that killed over a thousand African lions in Serengeti National Park in 1994. Genetic studies confirmed that this virus had originated in the large domestic dog population that resided in the villages on the periphery of the park. Because a minimum threshold population density is required for pathogens to remain active in unvaccinated dog

Vickey Chauhan

populations, low densities of dogs are unlikely to have a large effect, irrespective of their ranging behaviour. However, once populations get large enough for pathogen reservoir status to be achieved, ranging behaviour becomes more important. An unvaccinated wide-ranging dog that is part of a high-density, infected population has a high chance of coming into contact with carnivores and leaving infective materials in the environment. This kind of contact can have the most deleterious and far-reaching effect on wildlife, extending beyond individuals to entire populations.

Imagine a scenario where an epidemic of canine distemper virus, similar to the Serengeti one, were to hit the lion population in Gir. Within a relatively short period of time, a large proportion of the only population of Asiatic lion in the world could succumb to this disease, bringing to nought decades of hard-fought conservation success. Thus, dogs constitute a large-scale edge-effect, extending human-induced disturbances deep into natural habitats and potentially reducing the efficacy of protected areas that are supposed to be inviolate from anthropogenic influences.

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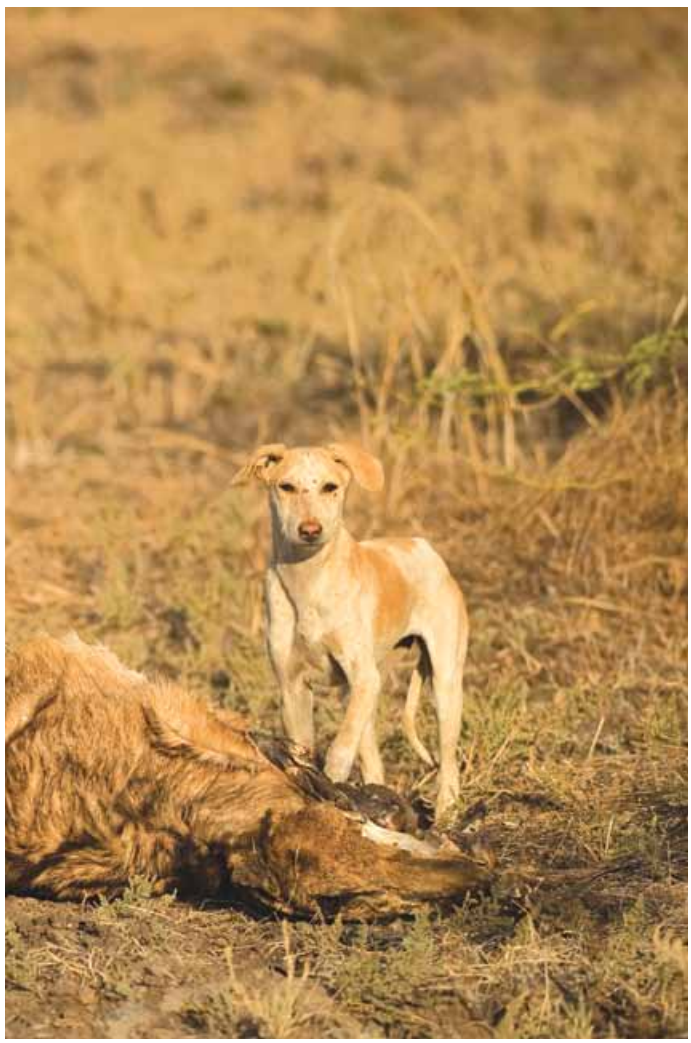
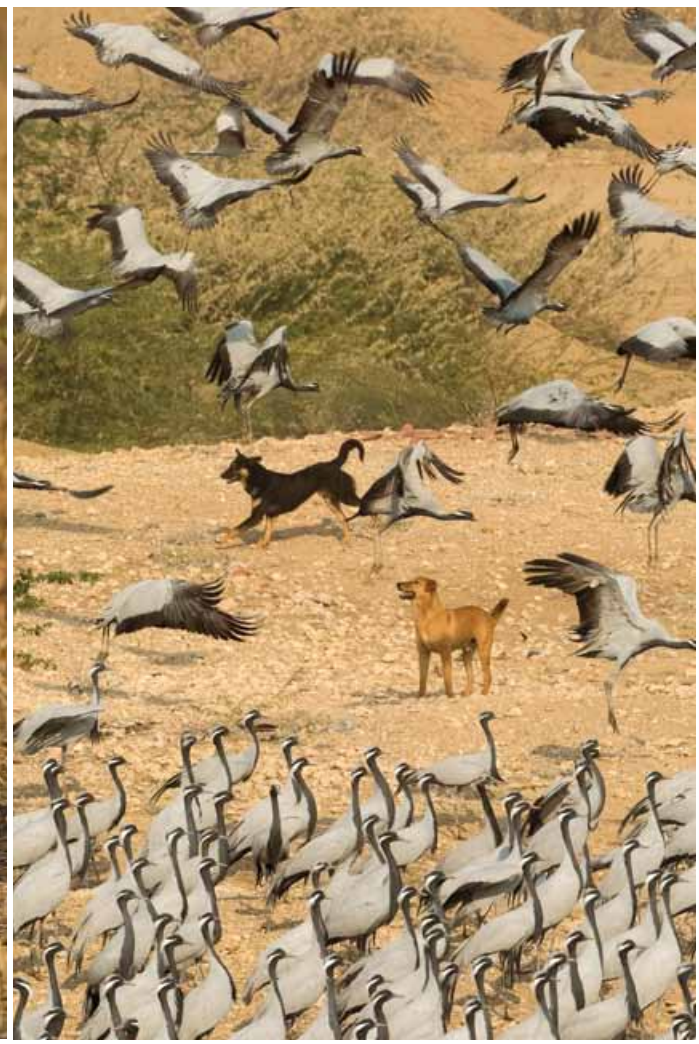
Following pages: More images of dogs interacting with wildlife.
Photographs by: Kalyan Varma





Dogs interacting with wildlife. Photographs by Kalyan Varma

Megha Vishwanath

Lost sounds

DIMINISHED NATURAL ORCHESTRAS ARE A HIDDEN DIMENSION OF BIODIVERSITY LOSS

Deep in the mountains of Arunachal Pradesh, where the mighty Siang river carves its way through the Himalayas, nestled the Adi hamlet of Tuting, amid overgrown green fields, verdant mountains and the river, itself deep green. The very moonlight seemed green as it shone on the ghostly mist rising from the gorge. Nineteen years ago, a search for India's last takin—that strange-looking, mysterious cousin of the musk-oxen—had led me (and colleagues from Wildlife Institute of India) to this remote village, amid dense rainforests that we'd only read about, us kids of the concrete jungle. We were wide-eyed with wonder.

Talom Yaying, an Adi hunter from Tuting, took us to look for takin in the mountains where he hunted regularly. He offered us his cave for the night, in the heart of the rainforest, high up on a ridge overlooking the great gorge. Such wonderful, magical country—and so hopeless my attempts to capture its rapturous beauty on a few frames of celluloid. Put that camera away!

On our way back, Talom told me he felt compelled to spend some nights every week in his cave—away from home and family. For in the village, the only sounds to awaken him at dawn were chicken, dogs and pigs. But up in his cave, he was serenaded by the songs of wild birds and animals! Even in Tuting, a village completely surrounded by

rainforest, he missed the sounds of the forest! Unlike us city-bred wildlifers, he knew exactly what he missed and where to find it. Growing up amid the steady din of city life, most of us don't even recognise those natural sounds—the warbling of birds, croaking of frogs, chirrupping of crickets. How, then, can we hope to recover what we don't even know we've lost?

Years later (many spent studying songbirds in wild and human habitats) I share Talom's sense of loss more keenly as I contemplate how all the noise we make adds another, barely recognised, dimension to the loss of biodiversity that all of us bemoan. While we recognise many overt ways in which cities displace wildlife by destroying/transforming habitats, we are only just beginning to understand less visible impacts, like the steady, growing hum of traffic and industry, which alter the behavior of animals in cities.

Like us, many animals use sound to communicate with their mates, competitors, even enemies—and birdsongs offer the best examples. Birds use a variety of sounds, from simple chirps/whistles to elaborate songs rivaling the finest tunes on your FM radio. More complex songs are used by males to attract mates and warn territorial rivals. Typically, males with bigger repertoires and more complex songs are more successful in courting females and fathering young than those who hum but a few bars of one tune. What's more, avian pop charts also vary from station to local station, resulting in regional dialects. Some birdwatchers can identify different bird species by their voices, even among the duller look-alike warblers (the little brown/green jobs)—while keener ears can tell apart the greenish warblers that spend winters in Andhra Pradesh from their cousins who prefer to settle in Kerala.

How well sound waves carry your message depends, of course, on the medium they travel through—and background noise seriously interferes with communication. As you must know if you've tried making phonecalls while stuck in traffic, or sustaining a philosophical discussion during a dinner party, the noisier the background, the harder it is to convey your message or understand what others are saying. Birds have similar problems: males are unable to show off the full extent of their vocal repertoire, especially subtle vocal modulations, if their habitat is too noisy; and females suffer because they cannot find the best males, thereby losing the chance to produce sons with mellifluous voices and daughters with a keen ear for a good song who will in turn produce the most grandchildren (for that, indeed, is what the evolutionary game is all about). A recent study found that Australian zebra finch females, given the choice between different male songs (in the laboratory where they heard recordings) were quite discriminating when it was quiet, but became rather poor in distinguishing between songs when traffic noise was broadcast alongside. Isn't the audience always quieter—and more touchy about noise—at classical than at pop concerts?

One way birds cope with all the noise we make is by singing louder when it's noisy—this so-called cocktail party effect is documented in some species. Urban noise also tends to be low-pitched, so an alternative is for birds to get shriller, sing at a higher pitch—exactly what great tits have been found doing in Europe. A more subtle effect is for birds to simplify songs, cutting out some of the fantastic frequency modulations, harmonics, and other vocal gymnastics they are capable of—not unlike how classical music maestros may be forced to stoop to Bollywood tunes or advertising jingles to make a living! If those tricks don't work, one must find relatively quieter times during the busy urban day to sing one's melodies – which may be why that annoying magpie robin wakes you up at 4 in the morning.

Of course, not many species are flexible enough to make these adjustments and continue living in cities. Those that cannot cope likely go extinct locally, leaving behind a poorer urban bird community. Chalk up another reason why cities worldwide seem to be occu-pied mostly by the depressingly familiar contingent of pigeons, starlings and crows—usual suspects in the homogenisation of urban wildlife that's part and parcel of the globalisation package (or so we are told—but I'll save the discussion of this homogenisation question for another column). In the long run, if our cities keep growing, and remain noisy, we will chase away most of our more discriminating singing friends, while those that remain will sing impoverished urban dialects. And we all lose the symphony of biodiversity to a homogeneous urban cacaphony. We must all share Talom Yaying's sense of loss—although some of us just don't know it yet.

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A tale of two Souths

Kalyani Ganapathy

TRAVELLING ACROSS TWO COUNTRIES WITH VERY DIFFERENT CULTURES RESULTS IN VERY DIFFERENT WILDLIFE EXPERIENCES. NOT SO STRANGE? BUT WHY SHOULD THE EXTENT OF WILDLIFE NOT REFLECT THE POPULATION OR THE SPACE AVAILABLE? GEOFFREY HILL COMPARES THE SOUTHERN US AND SOUTH INDIA IN A HUMOROUS VEIN, AND ASKS: WHY DID THE MORE CROWDED COUNTRY HOLD MORE WILDLIFE?

I recently had a chance to visit southern India and tour some of the forest reserves and parks that are scattered across this large region. Since I am from the southern portion of another continent (I live in Alabama in the southeastern United States), I was anxious to compare the wildlife of the two regions. From my first days in India, I was struck by two obvious – and somewhat paradoxical – differences: India was vastly more crowded than the southeastern US, but it had far more large species of animals. Why did the more crowded country hold more wildlife?

The American southeast was not always depauperate in large animals. In 1773, when William Bartram began his famous four-year trek across what were then the Southern Colonies, he explored a region with a magnificent and varied fauna. Over the preceding centuries, the indigenous human populations had been drastically reduced by disease, and across an unpopulated landscape roamed a megafauna that included black bear, red wolves, mountain lion, woodland bison, eastern elk, and white-tailed deer. Wetlands played host to huge flocks of whooping cranes and trumpeter swans in the winter, and during migration, the skies were filled with millions of passenger pigeons. Observers of that era routinely commented how rich this land was in wildlife.

During the same period, British colonists pushed into a landscape in southern India that was much more densely populated than anywhere in North America. Indeed, in the late eighteenth century, most parts of southern India were more densely populated than England. Unlike North America, southern India was not a remote wilderness and yet it held an animal fauna that was every bit as diverse and fantastic as that of the American southeast. The forests teemed with tigers, Asian elephants, leopards, sloth bear, gaur, sambar, and spotted deer.

What transpired over the next century is a lesson in humanity's capacity for consumption. The natural resources of the southeastern US were extracted and the wildlife slaughtered at a pace unprecedented in the history of the planet. All of the largest mammals—bison, bear, lions, wolves, and elk—were driven to extinction within the region. White-tailed deer hung on only in small numbers in a few areas. Whooping cranes and trumpeter swans were shot out and very nearly went extinct. Passenger pigeons were reduced from the most numerous birds in the world to a memory. When the century of carnage ended, the fields and forests stood emptied of large animals.

A similar story did not play out in southern India. The British brought new forms of agriculture and in particular, cleared large areas of forest for tea plantations, but the fauna was not exterminated. All of the largest species of animals—elephants, tigers, bear, gaur, and deer—persisted in the south in stable populations. The largest and most conspicuous birds—hornbills, pelicans, storks—all survived in good numbers. Wildlife co-existed with a large human population in India before the nineteenth century, and this wildlife resource was relatively little changed at the end of the nineteenth century.

Why was the history of human interaction with wildlife so different in southern India and the southeastern US? Differences in culture certainly must be considered in any attempt to explain the different treatment of wildlife. The diverse cultures of southern India all taught respect for animals. It is not surprising that a people who tolerate cattle roaming the streets of the largest cities also are not inclined to exterminate populations of wild animals. The people of European descent in North America came from dozens of distinct cultures, and in the melting pot of the New World, in contrast to the ancient cultures of southern India, there was no tradition to provide a model for respect of the natural world. Among this mix of people in this new land, a new culture emerged: the way of the gun.

There was no more important factor in the decimation of American wildlife than widespread, nearly universal, access to fire arms. Before the mass production of the repeating rifle in the nineteenth century, humans had few means by which to rapidly kill large animals. The repeating rifle, however, is a weapon

of wildlife mass destruction, giving anyone the power to kill even the most massive animals in large numbers. In America, nearly every adult male living in the rural south carried a rifle, and these tens of thousands of shooters took out nearly every large animal. In India, owning a gun was uncommon and shooting was largely left to the British and the nobility. These few wielders of guns in India did an amazing amount of damage to Indian wildlife, but without an entire population armed, animals withstood the onslaught. Not a single species of vertebrate was shot out of southern India.

I think there are at least two lessons to be learned from the differences in how wildlife was treated in India versus America in the nineteenth century. First, we should never underestimate the speed and thoroughness with which people can eradicate populations of wildlife. With modern weaponry, it

doesn't take long for entire populations of large animals to be exterminated. Second, now that there is a cheap and accessible technology that allows a few humans to decimate entire populations of large animals, the only hope for the survival of large animals is a collective effort to keep them alive. If we don't, as a society, set aside wild lands for animals and stop people from coming into those areas and killing the animals, then there will be no large animals.

Somewhere in the early decades of the twentieth century, we entered a new age with a new wildlife dynamic in southern North America and southern India. In America, people realised and began to regret the devastation that was wrought from unregulated shooting. A new conservation ethic emerged, pushed as forcefully by hunters, who wanted sustainable populations of animals to hunt, as by any group. Not only was the unregulated shooting of large animals halted completely, but large amounts of money were invested to recover populations of remaining wildlife species. As a result, in the twenty-first century, whooping cranes and trumpeter swans again wing across the skies. White-tailed deer are so abundant that they are a nuisance on roads and in farm fields. Black bear populations are increasing, and coyotes have filled the niche of red wolves. The forests of the south once again harbor some large wild animals.

Sadly, in many areas of southern India, the fortunes of large animals are moving in the opposite direction. The huge human population seems to finally be taking its toll. Forests are being cut; poaching is on the rise; species that survived the hunting pressures of the nineteenth century are now dwindling in numbers due to habitat loss. The future of the magnificent megafauna of southern India rests on the will of the people of southern India. Protecting the magnificent wildlife of the region must be a priority or it will be lost in a generation.

It would be sad indeed if the animals that survived the era of extinction in the nineteenth century fade away by attrition in the twenty-first century.

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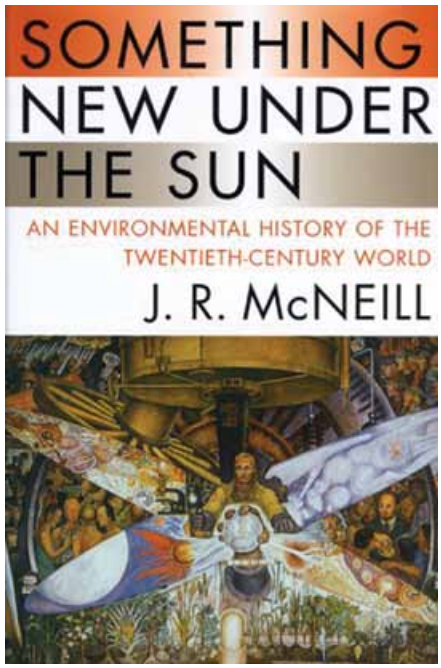
Kalyani Ganapathy

Deep impact

A FASCINATING ACCOUNT OF 20TH CENTURY ENVIRONMENTAL HISTORY AND THE HUMAN FOOTPRINT ON THE PLANET



Something New Under The Sun: An environmental history of the twentieth-century world.
J R McNeill

W. W. Norton & Company
ISBN: 0-393-04917-5 2000
http://www.amazon.com/Something-Under-Environmental-Twentieth-Century-ebook/dp/B001YWN9YW/ref=tmm_kin_title_0

This book, which aims to present an ecological history of the 20th century, but which does more than that, is one of the first really comprehensive global environmental history books I've read. It is balanced, mostly neutral in tone, and has a historian's caution in interpreting past and recent events and prognoses for the future. While generally well written, it is a little less engaging in the beginning but becomes better towards the end.

The span is impressive: the book examines environmental impacts on soil, water, air, ecosystems, and biodiversity in a historical perspective. It tackles themes of economic growth, industrialisation, farming of land and water and ocean and the so-called Green Revolution, dams and infrastructure, democratisation, coal, oil, and energy, globalisation, changes in medicine and public health, and, of course, environmentalism itself. Its pages encapsulate an amazing range of items and ideas: from the history of chainsaws and tractors to cars and nuclear power, from the history of chemical fertilizers and leaded gasoline to chlofluorocarbons (CFCs) and greenhouses gases.

Most fascinating of all are the accounts of the people responsible and the nations underlying these changes, and how people and nations have changed and been changed by the environment. There are some interesting sidelights to read here. How Fritz Haber, the co-inventor of the Haber-Bosch process that brought us today's urea and nitrogen crisis, also spent World War I creating poison gas for the German military, which led his wife to commit suicide. How Thomas Midgely, the inventor of 'freon', the first of the ozone-depleting CFCs, and of the use of lead in engine performance, "had more impact on the atmosphere than any other single organism in earth history". Midgely later contracted polio and invented a peculiar contraption to get himself in and out of bed, which ultimately went awry and strangulated him to death.

The chapter on air pollution makes fascinating and compelling reading, highly relevant in today's context. The author describes how a London fog of 1873 was so dense that people walked into the River Thames because they couldn't see it. How air pollution killed as many people in the 20th century as were killed in both world wars combined, "similar to the global death toll from the 1918-1919 influenza pandemic, the twentieth century's worst encounter with infectious disease". How, for people "... breathing Calcutta's air after 1975 was equivalent to smoking a pack of Indian cigarettes a day. Nearly two-thirds of the population in the 1980s suffered lung ailments attributed to air pollution, chiefly particulates." How "Coal soon signed its own death warrant as London's fuel by killing 4,000 people in the fog of December 4-10, 1952. Chilly weather and stagnant air meant a million chimneys' smoke...". McNeill writes about urban smog and indoor pollution from burning coal and biomass in the domestic hearth, adding chillingly how air pollution only compounded the environmental crisis brought by water pollution in the twentieth century. "Indoor air pollution, particularly in the poorer countries where biomass and coal served as domestic fuels, produced the same ailments and probably killed millions more. That said, it is well to remember that polluted water caused far more death and disease than did polluted air in the twentieth century."

Fascinating and manifold, McNeill recounts a range of events and issues of great environmental import: the Dutch transmigration of 1905 in Indonesia, the Soviets ploughing into the steppes, the Brazilian push into Amazonia, waste management in Curitiba and Tokyo and

Mexico, Peru's anchoveta collapse and the assault on the world's fisheries, the dam-building boom in the 1960s when at least one dam was being built per day on average in the world, the ecological footprint of cities from Delhi to Beijing and Singapore to others, the oil spills in Nigeria and the history of dependence on coal and oil, about medicine and public health and the impact of small pox and its eventual conquest until only "samples of the virus remain in freezers in laboratories in Atlanta and the Siberian city of Koltsovo" and so on and on. McNeill also has a quirky way of looking at world events. Writing about invasive alien species, he says: "So, in the tense Cold War atmosphere of the early 1980s, American ecosystems launched a first strike with the comb jelly and the USSR's biota retaliated with the zebra mussel. The damaging exchange probably resulted from the failures of Soviet agriculture, which prompted the grain trade from North America: more trade, more ships, more ballast water."

Writing about environmentalism and the global fixation on a single-point agenda of economic growth, he also draws on the Gandhi-Nehru divide, quoting Gandhi: "God forbid that India should ever take to industrial ism after the manner of the West…. If an entire nation of 300 million [this was in 1928] took to similar economic exploitation, it would strip the world bare like locusts.' Gandhi was exceptional: most Indian nationalists, like Jawaharlal Nehru, wanted an industrial India, locustlike if need be." And how independence from colonial powers did little to transform the trend of human impact on the environment: "In environmental matters, as in so many respects, independence often proved no more than a change in flags."

McNeill draws a brief history of the environmental movement and how it was fostered by effective communication of science and ideas, singling out the work of the author of Silent Spring. "Successful ideas require great communicators to bring about wide conversion. The single most effective catalyst for environmentalism was an American aquatic zoologist with a sharp pen, Rachel Carson (1907-1964)." Yet how has the movement fared in bringing change? Mc Neill writes: "When Zhou Enlai, longtime foreign minister of Mao's China and a very worldly man, was asked about the significance of the French Revolution some 180 years after the event, he replied that it was still too early to tell. So it is, after only 35 years, with modern environmentalism."

In the end, McNeill highlights how both ecology and history are highly integrative disciplines (as this book itself highlights) and that they need to understand and work with each other if we are to make sense of our environmental movement, past and future.

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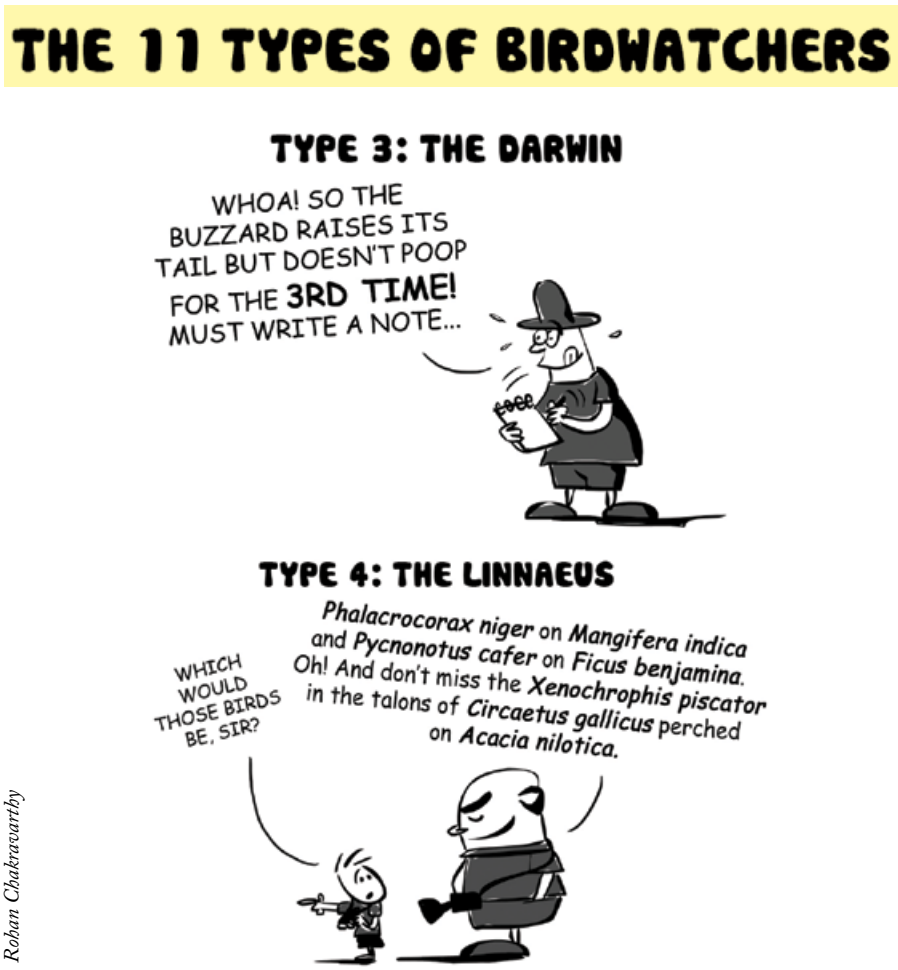

Rohan Chakravarthy

Tea-time story?

A BOOKLET THAT IS MORE AN APOLOGY TO THE TEA INDUSTRY AND ITS HISTORY

Gillian da Silva

The Tea Industry
(India's Great Industries No. 1.)
JC Kydd
Oxford University Press London, 1921
http://www.archive.org/details/teaindus-try00kydduoft

A 1921 booklet meant to introduce the Indian tea industry to children, among others, to stimulate interest in working in that industry (in a series that included cotton industry, shipyards, leather works, iron works and such!). A rather drab and uncritical description of the basic practice of tea cultivation in hill estates, with statements like, "There is only one thing better than one cup of tea and that is two." More a pamphlet than anything, it may be read as a curiousity by people interested in the history of the tea industry.

The book has a few interesting old photographs of factories and workers, including of bare-torsoed factory workers in waist cloths. Child labour was apparently common in the factory, too, as the author says, "The leaf is spread thinly upon these trays – often by gangs of children under the careful supervision of an overseer." It quotes the Commissioner of the Tea Cess Committee, charged with promoting a domestic tea market: "If all Indians habitually drank tea instead of water not only would internal illnesses and the death rate be very much reduced, but the general energy and initiative of the people would be much increased. Besides temperance workers advocate very strongly that the habit of tea drinking acts as a counter attraction to the habit of alcohol drinking."

Hmm, where's my cup of tea, now?

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