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**Special: Wildlife-Human Conflict**



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#### Special

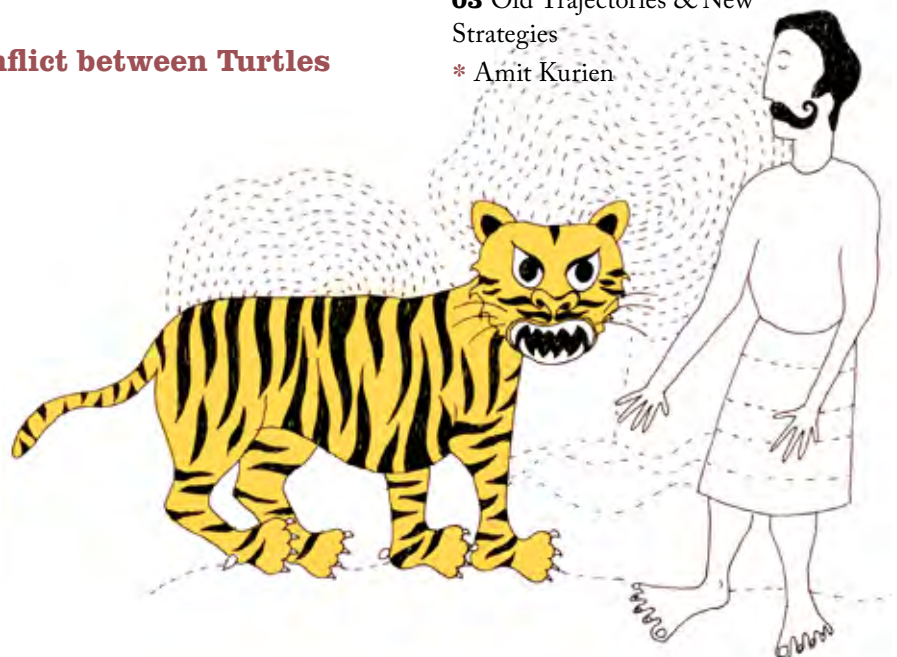
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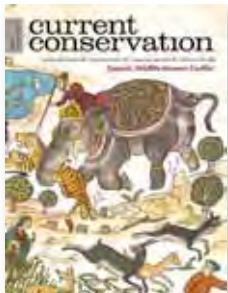
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## editor's note |



Cover Artwork: Pencil Sauce

Can we actually turn landscapes of (wildlife-human) conflict into landscapes of co-existence, ask John Linnell, R. Sukumar and Kartik Shanker, the editors of this special issue on wildlife-human conflict. The studies showcased in this issue illustrate that while there is no easy solution, there are case-specific measures that can help mitigate or sometimes prevent conflict situations.

In this issue, financially assisted by the Royal Norwegian Embassy, New Delhi, Norwegian Institute for Nature Research, and the Research Council of Norway, we present over a dozen case studies of conflict (elephants, big cats, turtles, etc.) across diverse landscapes in India and Norway (page 04). Janaki Lenin asks how leopards in central India manage to live with humans (page 22), Rohan Arthur and Kartik Shanker explore the conflict between fishing communities and turtles in two diverse parts of India (page 28), and Arati Rao summarises research on blackbuck conflict and the disconnect between wildlife, farmers and bureaucrats (page 18).

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# Old Trajectories & New Strategies

## Global analysis reveals that changing causes of tropical deforestation are slowly shifting patterns of available tropical forests for biodiversity conservation.

This meta-analysis of 227 case studies undertaken between 1975–2002 on deforestation by Thomas Rudel and colleagues suggest that the growing role of well-capitalized agricultural enterprises in driving deforestation in the tropics could weaken the historically negative relation between population densities and net forest cover.

They identified two periods of change in the historical trajectory of deforestation from these studies, which is particularly pronounced in the lowland forests of Brazil and Indonesia. The first period saw state-enabled, small holder deforestation (1965–1985), where the relationship between population rise and deforestation was strong — a result of political turmoil, post World War II technological advances combined with rural insurrections in forest rich regions in both Southeast Asia and Latin America. Besides this, a combination of agrarian reforms, land colonization programs, small sized urban labour markets and large rural-rural migration ensured deforestation in forest frontiers. The second period (post-1985) was the enterprise-driven deforestation phase. Fiscal austerity measures and the debt crisis post 1980s lessened colonization schemes and road building during this period. Highly capitalized enterprises with a small work force and well organized associations of farmers represented the private ranchers, timber loggers, and oil palm and soybean plantation farmers, shifting the relationship between

population densities and forest loss. Demand from international markets and the debt crisis caused both small farmers and private owners to convert old-growth forests to cattle ranches and oil-palm plantations in the Latin America and Southeast Asia thus intensifying deforestation. Rural population declined and an urban population with increased consumption of agricultural products emerged particularly in Africa. Although African rates of deforestation

strategy, an example being the “Heart of Borneo” network. However, the generality of upland reforestation and viability for conservation is yet to be examined thoroughly. They feel that well-funded and networked conservation organizations along with an environmentally informed public can now bargain with the industrialized agricultural and extractive enterprises to promote lowland stewardship agreements, thus spurring a greater potential



have remained low, the debt crisis drove smallholders to cater mostly to the international markets. Policy changes or business cycles have also changed the agents of deforestation between years, shifting from smallholders to large-scale enterprises.

Rudel and colleagues inform that an expansion of secondary forests in all three continents is currently occurring because of reforestation in abandoned farmlands or in the form of exotic species plantations particularly in the upland areas. They suggest that creating new conservation reserves in upland areas is thus a politically palatable

for environmental certification to reduce corporate impacts on tropical forests.

*Thomas K. Rudel, Ruth DeFries, Gregory P. Asner, and William F. Laurance. 2009. Changing Drivers of Deforestation and New Opportunities for Conservation. Conservation Biology 23(6): 1396–1405.*

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# Wildlife-Human Interactions

## From Conflict to Coexistence in Sustainable Landscapes

### Norway: 2 sub-projects

1: This project has summarized the large amount of research conducted in Southeastern Norway on conflicts between wildlife and humans.

Investigators: John Linnell (Norwegian Institute for Nature Research) and Ketil Skogen (Norwegian Institute for Nature Research)

2: This project has conceptually explored the impacts that human-wildlife conflicts have on the challenges to implement international biodiversity conservation conventions such as the Convention on Biological Diversity.

Investigators: John Linnell (Norwegian Institute for Nature Research) and Jorn Thomassen (Norwegian Institute for Nature Research)

Wildlife-human conflicts (WHC) are a serious obstacle to wildlife conservation and the livelihoods of people worldwide and are becoming more prevalent as human population increases, development expands, and global climate changes and other human and environmental factors put people and wildlife in greater direct competition for a shrinking resource base. In addition, as some wildlife conservation activities succeed, wildlife expands into human-dominated areas. In this context, a project on 'Wildlife-human interactions: from conflict to coexistence in sustainable landscapes' was initiated by the Centre for Ecological Sciences, Indian Institute of Science, Bangalore, in collaboration with the Norwegian Institute for Nature Research, in February 2007. Funding was obtained from the Royal Norwegian Embassy in New Delhi and the Research Council of Norway.

The main objective of the four-year project was to conduct a multi-dimensional analysis of wildlife-human interactions in a sample of Indian multi-use landscapes and one Norwegian landscape, with a view to understand conflicts and sustain mechanisms of coexistence. The studies span diverse contexts and landscapes where loss of livelihood (crop or livestock) is the main source of conflict, and cases where loss of life occurs, as well as instances where conflict is primarily over shared spaces. The project includes both social science and ecological studies on a range of species from herbivores, such as elephants, blackbuck, nilgai and wild pig, carnivores including leopards and wolves, and marine species such as olive ridley and green turtles.

This is a collaborative project involving the Centre for Ecological Sciences, Indian Institute of Science, Bangalore (CES, IISc), Ashoka Trust for Research in Ecology and the Environment, Bangalore (ATREE), Asian Nature Conservation Foundation, Bangalore (ANCF), Indian Institute of Science Education and Research, Pune (IISER), Kalpavriksh, Pune and Nature Conservation Foundation, Mysore (NCF) from India and the Norwegian Institute for Nature Research (NINA), Norwegian University of Life Sciences and Hedmark University College in Norway. The Norwegian partners have been involved in the joint planning of most of the cases, but mainly involved themselves in cases 3, 5, 6, 8 and 9. The project was coordinated by CES, IISc in India and NINA in Norway, who also liaised with the Royal Norwegian Embassy.

# India: 14 sub-projects

3: Canids in western India: Rabies as a driver of human-wolf conflict and the role of free ranging domestic dogs as carriers of the disease

Investigators: Abi Tamim Vanak and Aniruddha Belsare (ANCF)

4: Blackbuck in western India: A study of ecological mechanisms and measures for mitigation of crop damage by a wild Indian ungulate

Investigator: Kavita Isvaran (CES, IISc)

5: Leopards in western India: The ecology of human-leopard conflicts in Maharashtra

Investigator: Vidya Athreya (ANCF & Kaati Trust)

6: Wolves in western India: The ecology of human-wolf conflicts in Akole, Maharashtra

Investigator: Vidya Athreya (ANCF & Kaati Trust)

7: Crop raiding by wild ungulates in Tadoba-Andhari Tiger Reserve, Maharashtra: A study of ecological patterns and remedial measures

Investigator: Milind Watve (IISER)

8: A sociological study of human-large carnivore interactions in Akole, north-western Maharashtra

Investigator: Sunetro Ghosal

9: Crop damage by wildlife in a Garhwal Himalayan village

Investigators: Vijay Jardhari, Prabhakar Rao, Ayushman Choudhary (Kalpavriksh)

10: All India questionnaire survey and mapping of wildlife-human conflicts in various states of the country

Investigators: R. Sukumar (CES, IISc and ANCF) & Jayant Kulkarni (Envirosearch)

11: Towards an assessment of the management of Protected areas and Reserve forests in the context of the Recognition of Forests Rights Act, 2006

Investigator: Nitin Rai (ATREE)

12: Elephants in Eastern India: A study of elephant-human conflict in West Bengal and Orissa

Investigator: R. Sukumar (CES, IISc and ANCF)

13: Sea turtles, fishers and shared spaces: Understanding the roots of conflict in Lakshadweep and Orissa

Investigators: Kartik Shanker (CES, IISc, & ATREE), Aarthi Sridhar (Dakshin Foundation) and Rohan Arthur (NCF)

14: Comparing perceptions and attitudes towards human-wildlife conflict across two landscapes in Andhra Pradesh and Gujarat.

Investigator: Kartik Shanker (CES, IISc)

15: Wildlife-human conflict in the Nilgiris Eastern Ghats landscape

Investigator: R. Sukumar (CES, IISc and ANCF)

16: Understanding cultural, politico-legal and ecological contexts and consequences of Toda conflicts with tigers and leopards on the Nilgiri pastures, Southern India.

Investigator: Siddharth Krishnan (ATREE)



*Pencil Sauce*



# Elephants, People & the Battle for Peaceful Co-existence





*There was an overlord of Anga, famed  
under the name of Romapada.*

*Once he was seated on the banks of the  
Ganges in the city of Campa,  
when some people reported to him  
that all the crops of grain were being  
destroyed by wild elephants. The king  
reflected: 'Now what can I do?'*

**—*The Elephant-Sport (Matanga-Lila) of  
Nilakantha (translated by Edgerton 1931)***

Motor Vehicle Inspector (MVI) is an unusual name and an equally inconceivable profession for a 45-year-old wild elephant. Obstructing every truck on the shimmering Joda-Barbil road, in Orissa, the tusker would demand for food by tapping incessantly on the windscreen. He would also brandish his dexterous trunk to raid vehicles for food while his behemothian appearance would inject fear in the minds of even the heftiest of truck drivers. It is not as though MVI had actually hurt anyone. But, behind this display of awe and majesty, there lies a gripping tale of a forestland having been eroded from under his feet by humans. And the fate is not MVI's alone to battle.

Over the last several millennia, people have made steady inroads into the elephants' natural habitat through agriculture and settlements along river valleys. With their habitats now fragmented, degraded and compressed, these mega-herbivores spill into human settlements thereby setting the stage for a highly volatile combat.



Kalyan Varma

The ensuing conflict is often characterised by destruction of crop, house or property by elephants, human injury and mortality, and retaliatory killing of elephants by people. On an average, in India, nearly 400 humans are killed annually by elephants while about 100 elephants are killed in retaliation. The Elephant Task Force (ETF), of the Ministry of Environment and Forests, in its report *Gajah*, calls the resultant stress, suffering and loss “all too real”.

Incidents of crop damage have been occurring ever since man took to agriculture within elephant habitats. One of the earliest references to crop-raiding by elephants could be found in Nilakantha's *Matanga-Lila* (The Elephant-Sport), when anguished people report to the king of Anga, Romapada, that all their crops of grain were being destroyed by wild elephants.

Cut to the present day and farmers continue to lose millions of dollars each year in crop-raids, apart from the real risk of losing their lives.

A pressing question that arises is “why do elephants raid crops?” For mega-herbivores such as elephants, that have home ranges

of the order of anywhere between 100 and 1,000 sq km., as revealed by collaring elephants with radio-transmitters, a fragmented habitat or a severed traditional migration path makes their movement between forest patches inevitable. When they do so, however, they cause extensive damage to the cultivated lands en route.

Moreover, cultivated crops are a concentrated source of forage for the elephants and crops like the succulent finger millet or the sweet sugarcane, are not only highly palatable but they also contain much more protein and other nutrients such as minerals as compared to the coarse, wild grasses. Why should then the elephant settle for plain bread when it has a feast in the form of sweet cakes on offer, and that too all in one place? This follows from Foraging Theory, which states that animals tend to feed in a manner that maximises their nutrient intake in the minimum possible time.

Make no mistake, however. The “marauders” face a risk from hostile farmers who may injure them badly or even kill them. Some elephants persist in their (usually) nocturnal forays as they also have much to gain—a better diet implies a healthier



animal that is more likely to live longer and reproduce successfully. This is especially true of bulls that have to be in healthy condition to come successfully in musth and attract the attention of females; in many places the male elephants are thus the more tenacious and frequent raiders. Where the habitat is fragmented the family groups also indulge more and more in raiding cultivated fields as they move from one forest patch to another. Many other factors may also explain crop raiding, including extreme climate events such as a drought that leaves some elephants with no choice but to leave their native habitat and seek greener pastures, or the poorly-understood role of learning in this highly intelligent creature.

On an average, according to Gajah, elephants annually affect crops over an area of 0.8 to 1 million hectares in India, and affect the livelihoods of at least 500,000 cultivators by way of these persistent attacks. The logical question therefore is, why conserve elephants then? Strong ethical, ecological and economic reasons provide the necessary backbone for conserving this majestic animal. The Asian Elephant, being a keystone species of the biologically rich forests of the continent, plays a dominant role in the ecosystem by virtue of its biomass.

Disappearance of this key species implies disruption of ecosystem functioning and perhaps result in the eventual extinction of other species. Moreover, listed as “Endangered” in the IUCN Red List of Mammals, today there are about 27,000 Asian Elephants in the wild in India. Not only are elephants indigenous and iconic to the Asian continent, they are also revered by the Indian farmers who are normally reluctant to harm them. However, frequent conflicts result in decreased tolerance levels among local community and trigger antagonism towards elephant conservation.

“The reality is that Human-elephant conflict has increased in its intensity and spread over the last two decades,” reads the latest report of the Elephant Task Force. Conflict levels are especially high in the Indian states of West Bengal, Assam, Odisha, Jharkhand and Chattisgarh.

In a bid to understand the nature of this conflict in some of the “hot spots” and help reverse the trend, the Indian institute of Science (IISc) in collaboration

with the Norwegian Institute of Nature Research (NINA), has been investigating elephant-human interactions at some of these places. The objectives of this four-year project include building a comprehensive database of conflict hotspots in the country, designing and evaluating mitigation measures, and capturing the attitudes of stakeholders towards the conservation of elephants.

The present research efforts are focussed in the Indian states of Odisha (previously Orissa) and West Bengal, and in the Nilgiri-Eastern Ghats region of southern India. These regions were preferred due to their dissimilarities in rainfall, vegetation, cropping pattern, mitigation measures, intensity of conflict and varying levels of habitat fragmentation.

With a relatively low degree of conflict, the Nilgiri-Eastern Ghats was chosen as the control site or baseline for the project. The northern region of West Bengal, on the other hand, is characterised by a deeply dissected landscape with a perilously high rate of conflict and intensity. Sandwiched between the two extremities and beginning to manifest symptoms of habitat fragmentation is the state of Odisha which is still in a more “primitive” phase of human occupation of forests. With other conflict-prone regions in India falling into one or the other aforementioned categories, it is envisaged that the present



*Divya Mudappa*



investigation could be extrapolated to paint the larger scenario of conflict across the country.

Field biologists undertook ground surveys, including village studies and attitude surveys, in these landscapes. Visits to conflict-ridden villages were made to record data on crop damage, extent of damage, house and property damages, human injury and death by elephants. Data obtained from compensation records were also utilised in understanding and analysing conflict trends over the last five years.

To understand the people's perspective better, surveys were also carried out to capture the outlook of forest department staff, farmers and other villagers in the region. Demographic profiles of stakeholders were obtained and their knowledge of elephant-human conflict intensity, its mitigation measures, status of laws and compensation payment rules were recorded.

### *Increasing fragmentation, increasing conflict*

In northern West Bengal, a history of conversion of forest into tea plantations and agricultural lands, going back to colonial times, has resulted in a much-transformed landscape for elephants. "Increasing fragmentation of forests in northern West Bengal results in increasing levels of conflicts in this region," explains biologist Mukti Roy. The rise in the ex-gratia payment, made towards crop depredation and human casualty, is a clear index of the overall increasing trend of conflict across the last two decades. Shedding light on the elephant deaths in the state, he adds, "Of the 229 elephant mortality cases reported in the state between 2000 and 2008, 28% died due to conflict-related incidents while 9% perished in train collisions," as memories of a recent train-hit killing seven elephants gush in. The study has shown that the more fragmented western part of the landscape clearly faces more intense conflict with elephants as compared to the more intact eastern part where the Buxa Tiger Reserve and the Jaldapara Sanctuary are located. A crucial elephant corridor, identified by the research team in the tea gardens linking Buxa and Jaldapara has been the attention of the research team. The idea is to seek possible innovative funding for converting a part of the tea plantation into mixed forest plantation for the elephants using carbon credits under climate change obligations. If this becomes a reality this is expected to provide some relief to these otherwise gentle giants.

### *Eroding habitats*

Odisha presents a somewhat unique situation in that the elephant's habitat, spread over a large part of the state, is a diffused mosaic of various land uses. In the 43 forest divisions sampled across Odisha between 2006 and 2008, on an average, 69 people were killed every year by wild animals and the elephant was responsible for nearly 74 % of these. Rourkela forest circle



appears to be the hotbed of elephant-human conflict in the state. This region, particularly Keonjhar and Sundergarh, accounts for over 50% of the state's mining areas—an activity that has caused direct destruction of elephant habitats. The highest number of elephant deaths during the sampling period was reported from Keonjhar & Bonai territorial divisions (9 each). Research Scientist, Dr C K Sar, puts forward a striking paradox, "Interestingly, Elephant Reserves which embrace more number of elephants in comparison to other areas of the state show less intensity of conflict, while fragmented habitats like Keonjhar despite harbouring fewer elephants, witness higher number of elephant and human casualties each year."

### *A more promising landscape*

Speaking about conflict in the Nilgiri-Eastern Ghats landscape, field researcher Govindaraj Kannan says, "The region, besides being large and contiguous, also holds a large percentage of elephant-preferred habitats and a good network of Protected Areas. In spite of harbouring one of Asia's largest elephant populations, due to these reasons, it reports a relatively low degree of conflict." On an average, about seven human mortalities and





## Alleviating elephant-human conflict and promoting co-existence

In the Arthashastra or the Science of Statecraft, an ancient Sanskrit treatise, Kautilya prescribes the setting up and guarding of elephant sanctuaries on the periphery of the kingdom to protect the elephants.

Nearly 2500 years later, a pressing need has arisen to both conserve the elephant and to minimize its impact on human lives. The ETF recommends a fund allocation of about USD 22 million, nearly one-sixth of the total financial outlay, towards the mitigation of elephant-human conflicts in India's 12<sup>th</sup> Five Year Plan. It also proposes the establishment and management of ten Elephant Landscapes, including those that are being studied under this project, through which it hopes to ameliorate the issue to a large extent.

But solutions that seek to alleviate conflicts and promote peaceful co-existence between elephants and people, should receive adequate participation from the local community. Their motivation, attitude and effort would determine to a considerable degree the effectiveness of the methods employed. This calls for their effective participation in elephant conservation as equal stakeholders in a transparent, democratic manner. Indeed, the Manasollasa, another ancient text that postdates the Arthashastra by over a millennium, clearly prescribes as much.

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fewer elephant deaths per year were reported from a survey area of approximately 3,000 sq km. Thus, this region is one of the most promising landscapes for the long-term conservation of elephants in the country. It also reinforces the view of scientists that elephants need as intact a home as is possible for them to live in peace with humans.

## Attitudes matter

The surveys of people's attitudes, conducted in Odisha, have revealed that the villagers continue to revere the elephant and have grown to accept the inevitability of some crop damage near forest areas.

However, only a small percentage of the respondents were aware of strategies for the conservation of elephants in the state, or for addressing their problems vis-a-vis the elephant. Reflecting on the importance of education in elephant conservation, Dr Sar concludes, "People want to conserve (elephants) but they do not know how to go about doing it. If we can educate these local communities, then they could be the stakeholders of the conservation process."





# MIND THE MOOSE: Tales of Conflict from the Land of the Midnight Sun

**A hundred years ago, humans almost exterminated all large mammals in Norway. Government protection has since ensured the overwhelming return of species, only to result in a newer problem: CONFLICT.**

Norway lies over 7,000 km to the north and west of India. There can be few greater contrasts than flying from Norway where we are sitting and writing to Bangalore for example where the editor of this special issue is looking at the clock wondering when it is going to arrive as the deadline ticks closer! Currently there is a meter of snow outside the window and the trees are covered in white. The internet says that Bangalore is now at 28C and sunny.

Flying over Norway presents an impression of a landscape consisting entirely of endless forest and wild rugged mountains—in fact less than 5% of the land area is given over to agriculture. A brief glance at the vital statistics of Norway will inform any reader that we have one of the world's highest standards of living, one of the cleanest environments and the lowest population density of Europe (only 15 people per square kilometer, compared to India's 360!). Surely this is a place where people and wildlife can live together without

conflict? Surely there is enough space here for everybody to get along?

If we turn back the clock just 75 or 100 years then Norway was a land almost lacking in large wildlife. The large ungulates (moose, roe deer, red deer, wild reindeer) had been over hunted to the very edge of local extinction. The large carnivores (brown bears, wolves, Eurasian lynx and wolverines) along with many birds of prey like the golden eagle were likewise pushed to the edge, and in the case of the wolf were actually totally exterminated, in government sponsored campaigns where all methods were used, including poison. The forest was very heavily harvested and people were scratching out a living in just about every corner of the land. At these latitudes with their low productivity you need a lot of space to survive—and the few Norwegians had just about filled up their country—with little space for the wildlife that had lived here since the ice age ended.







Writing this in 2011 much has changed. The large ungulates are certainly back—with combined numbers of close to a million individuals. One or two species are found just about everywhere in Norway. The birds of prey have made a dramatic recovery and even the large carnivores have rebounded. Lynx and wolverine can be found across much of the country, bears are making a return on several fronts, and even wolves have returned, recolonising from Finland. The reason for the recovery of this wildlife is largely through improved legislation. The bounties and extermination campaigns have passed into the history books, poison and harmful pesticides were banned, and hunting is regulated with tight enforcement of quotas.

While many are happy with this dramatic recovery of wildlife, many are not! Norway suffers under many conflicts, just like virtually everywhere else, and several of these are increasing. Just like in India, the range of conflicts between wildlife and humans is wide and complex.

Let's start with the “simple” ones. According to last year's statistics 7,300 wild ungulates (4,200 roe deer, 2,200 moose and 700 red deer) were involved in collisions with motor vehicles and trains. Hitting a moose when travelling at 80 kmph is about the same as hitting a cow! Such collisions are associated with a huge economic cost with damage to the vehicles, and frequent injuries and sometimes death for the passengers. In response large amounts of money are spent on fencing highways along particularly exposed stretches and clearing the forest along the roadside to increase visibility. Despite these measures, ungulate – vehicle collisions can occur just about anywhere at any time – and are a constant source of risk for anybody travelling. However, most people simply relegate this to part of the background “normal” risk that surrounds us every day and don't think twice about it.

## **The wild ungulates are also involved in a range of other conflicts—mainly with forest owners, but also with farmers.**

The wild ungulates are also involved in a range of other conflicts—mainly with forest owners, but also with farmers. Norwegian forests are extensive, covering about 40% of the country, and are managed for timber production. Through a system of clear-cutting and replanting/regeneration, the entire forest is given over to what is one of the world's most mechanized and intensive forestry systems. From the point of view of timber production at least it may even be sustainable (but if we consider a lot of the forest's biodiversity a different view would emerge). This forestry system has also benefited the wild ungulates, creating a mosaic of early successional stages with abundant food. However, moose, roe deer and red deer also



cause substantial damage to timber production through their browsing and bark stripping of trees. Moose for example will happily use young pine trees as a major source of winter food. Forest owners (and most forest is in private ownership in Norway) therefore regard moose especially as a major source of lost revenue. Farmers are also exposed to a certain degree of crop damage by deer. However, the loss they experience is countered by the fact that hunting rights for wild ungulates are attached to landownership. This means that the landowner experiencing the damage to his trees or crops can offset some of this loss up against the sale of hunting permits or the ability to take part in the culturally important hunting season and shoot a moose to fill his freezer with meat for the winter. In 2009 the hunting bag consisted of 36,000 moose, 37,000 red deer, 31,000 roe deer and 7,300 wild reindeer. Although not perfectly balanced this system has led to an internalization of the costs and benefits that reduces the ungulate—forestry conflict to a discussion about what levels the ungulate populations should be managed at to limit their damage—as no one seriously questions their right to exist in the Norwegian forests.

The same cannot be said for the large carnivores! Their return during the last 20–30 years has created a huge number of challenges for the well established system of wildlife management which developed around the wild ungulates. The first challenge consists of their depredation on domestic sheep. During decades without large carnivores a system of husbandry evolved where sheep were released into the forests and mountains in spring with only minimal supervision, before being collected again in the autumn. When large carnivores encounter these sheep the result is predictable. Compensation is currently paid for over 30,000 sheep per year. Although there is much uncertainty around the correct numbers because fewer than 5% of those compensated are actually verified, research has confirmed that the compensation payments are largely within the appropriate range. There are many potential

mitigation measures that could be used, but all of these require a transition from free-ranging grazing to a more controlled form of husbandry, and so far the industry has shown a very limited will to change, preferring to accept compensation payments and lobby for a reduction in large carnivore numbers.

Another livestock conflict is associated with the domestic reindeer that are herded by an indigenous people, the Sami, throughout central and northern Norway. In most of these areas, their reindeer represent the only wild ungulate prey of appropriate size for lynx and wolverines to prey on. The result is a very high conflict, originating from the many reindeer that are killed, but fueled even further by the challenge of documenting these losses and the resulting difficulty in setting appropriate compensation levels. This conflict also pits competing conventions against each other as the Sami's rights are protected by a range of international agreements on the rights of indigenous people and ethnic minorities and the carnivores are protected by many biodiversity agreements. There are few suitable mitigation measures for reindeer, and the most used action is to regulate the size of the carnivore populations.

Lastly, a large conflict has arisen between hunters who fear that large carnivores, especially lynx and wolves, will become competitors for their shared prey—roe deer and moose respectively. The reality of this competition varies greatly from region to region but may be significant. An additional aspect is that wolves often kill their prized hunting dogs.

On top of these conflicts that have a material or economic basis are a whole range of social, cultural and political conflicts. Although issues like economic loss and fear for personal safety are often cited, a large part of the background lies with a fundamental disagreement between rural people and those living in cities, and between rural community leaders and more central authorities, about who should make decisions and about the fundamental right of large carnivores to exist in our modern landscapes. Despite our entire landscape consisting of forest and mountains it is not viewed as a wilderness, rather it is viewed as a culturally developed production landscape that produces timber, grazing and hunting opportunities. Many segments of the rural communities are simply not able to imagine a place for large carnivores in these landscapes.

To those familiar with India's efforts to conserve tigers, leopards, and elephants in their crowded landscapes it may seem ridiculous that Norwegians claim that "there is not enough room" for a few wolves or lynx in their landscape—but the situation is very serious. Our parliament regularly discusses large carnivore management and in the face of the existing conflicts they have imposed severe constraints on the acceptable number of large carnivores that are allowed to live in Norway. Anything above these limits is shot – and these goals are just a

fraction of what the habitat could potentially carry. The power of the rural hunting and agricultural lobbies has so far succeeded in winning over the opinion of the majority of the public who support large carnivore conservation.

The one experience that shocked most was a few days ago when, in the middle of a discussion with our Indian partners about conflicts with leopards, tigers and elephants where people

## **A large conflict has arisen between hunters who fear that large carnivores, especially lynx and wolves, will become competitors for their shared prey.**

regularly are killed, we were asked if we could get involved in a local discussion here in the city of Trondheim about a conflict between roe deer and some sub-urban dwellers. The issue, which was presented as a "major" human-wildlife conflict, was that roe deer were nibbling some of the flowers that people were planting in their gardens in summer—and they were demanding that the animals be shot.

This underlines the bottom line in human-wildlife conflicts. Although there is a fundamental core to the conflicts which is related to economic and material issues, the most important factors lie with the way that we perceive these conflicts, which in turn relate to the way we perceive our own place as humans in the wider world of nature. When comparing the Norwegian and Indian situations there is a startling difference. Norway has plenty of habitat, a very well established wildlife management system that can manage wildlife in a range of human-dominated landscapes, and an enormous platform of both research and experience based knowledge to draw on. What is often lacking is a willingness to tolerate wildness and to make personal sacrifices to allow nature some space to live alongside us. In India we see many problems with a legislative and management system that is more designed for a protected area approach than for being operational in human-dominated landscapes, and in general a lack of supporting research from these landscapes. But what India does show is an incredible tolerance for wildlife, even when it causes conflicts that go far beyond the level of being an "inconvenience". We clearly have a lot to learn from each other!

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# WHOSE RIGHT IS IT ANYWAY? THE FARMER- UNGULATE CONFLICT

**Pushing ever closer to protected areas and wild lands are farms and settlements, the porous margins becoming the frontlines of human-ungulate conflict. Arati Rao explores the dynamics at these edges, the main players and how their perceptions affect reality.**

The people of Sunkesula village are not happy. 500 families in the tiny village in the southern Indian state of Andhra Pradesh gave up 860 acres of their land to the forest department for the expansion of the Great Indian Bustard Wildlife Sanctuary (famous for the endangered blackbuck). The reservoir that was their source of stored-water now lies within the sanctuary. Access to it is denied. No promised compensation has come their way. On the flip side, a thriving population of blackbuck calls this small sanctuary home. Hemmed in by fields, in times of want, they step out of the protected areas looking for forage and are in grave danger of being poisoned by the already disgruntled locals.





## Conflict Here Is Rife

Jostling for resources and elbowing the human bulge all over the tropics, is wildlife. The increasing human demand for natural resources, forests, grasslands, and water brings animals and man in direct competition with one another. And when policy to resolve this situation is crafted, borders carved and laws laid down by a few people in high-ceilinged rooms without the buy-in of the affected communities, the seeds of conflict are sown.

In India, this face-off between humans and wildlife has been escalating steadily given that 69% of the protected areas also support estimated human populations of over three million (1995 figures). The conflict is especially stark at the ever-shifting, porous margins of these protected areas. People living here deal with livestock and crop depredation by wildlife as a part of their lives—with some communities being more tolerant than others. But when there is a perceived injustice towards them, or losses are truly incurred and bankruptcy stares them in the face, knee-jerk reactions sometimes come at a deadly cost to the already endangered wildlife.

Human-wildlife conflict tends to be complicated and nuanced: what factors play out at the margins, who are the players, what precipitates conflict—is it real or perceived—and what drives those perceptions, are all questions worth exploring thoroughly. And, most importantly, what solutions work for the communities without undermining wildlife conservation efforts?

There have been several documented cases around the world where human-wildlife conflicts have arisen and have been resolved or at least mitigated to some state of equilibrium. However, each case tends to be particular to the region, religious and cultural demographics, species involved and social settings. Adopting those measures in other situations might be iterative at best, but exploring it is still worthwhile as it provides a framework of possibilities.

We look at human-ungulate conflict in this article through the lens provided mainly by three studies conducted in peninsular India: Kavita Isvaran and Chaitanya Krishna's study of blackbuck foraging patterns in Nannaj; Kartik Shanker's research on perceptions of conflict in Rollapadu and Kutch; and Milind Watve's research on nilgai and wild boar foraging patterns on the outskirts of Tadoba-Andhari Tiger Reserve.

## Factors Contributing To Crop Depredation

All over the tropics, settlements—urban, suburban, and rural have pushed ever so close to protected areas and areas with significant wild animal populations. While in some cases the wildlife are

habituated to areas outside protection, and therefore directly coexisting with human populations and in other cases sanctuaries are surrounded by settlements and the interaction takes place on the margins. If the main source of income for the communities in either case is livestock or agriculture, the chance of conflict is the highest.

Factors leading to crop depredation by ungulates as shown in these studies are mainly three-fold. Local overabundance of species, seasonal dips in forage quality within protected areas and the lure of better forage on the margins, changes in land use patterns, encroachments and species habitat loss.

## Local Overabundance Of A Species

The conflict at The Great Indian Bustard WLS (Rollapadu) is a prime example of conflict arising from such a situation. Just 6.14 sq km of grasslands is surrounded by villages and supports a robust population of blackbuck and wolves. While wolf attacks on livestock have actually declined, damage to crops by blackbuck—the villagers contend, has seen a sharp rise since the establishment of the “protected area.” They say that hunting and predation by wolves used to keep the blackbuck population in check. But since declaring the Rollapadu area as protected, blackbuck populations have thrived and they claim that crop-raiding by the ungulates has resulted in steep losses.

Local overabundance of a particular species, thanks to successful conservation programs (like in Rollapadu), could be an issue. While the species numbers may have recovered, the area and quality of the habitats they are housed in have not increased or improved—and the existing habitat may not be able to sustain the new numbers. This could necessitate the ungulates to look beyond the boundaries of the park for food.

## Land-Use Patterns, Seasonal Variations And Crop Choice

According to a 1997 study, 73% of Indian parks and about 39% of protected areas have livestock grazing within them. Intense livestock grazing could have two effects on wild ungulates. Alien competition for food within the park could drive wild ungulates to look for more nutritious diet in the fields surrounding the parks. This is not always the case and sometimes the livestock actually act as lawnmowers, improving the quality of the forage in the parks and allows the ungulates to stay within and forage. Studies from Tadoba and Nannaj have shown that when food is plentiful within the park—like during monsoons—the ungulates seldom venture out.

In fact, the Nannaj study showed that the blackbuck prefer the





Ramki Sreenivasan

relative security of the grasses far from human activity. They tend to avoid areas with heavy human and livestock activity. Crop depredation by blackbuck was most severe near the margin delineating agricultural and non-agricultural habitats. The ungulates tended to foray no more than a few tens of meters in to the agricultural habitat, possibly due a perceived higher risk in agricultural habitats (more human and livestock activity, more dogs). When the nutrition of the forage is high (monsoons), blackbuck tend to keep to protected grasslands. But in the dryer season they tend to step out farther, venturing in to marginal agricultural lands. The Tadoba study has showed that depredation does decrease with increasing distance from the park boundary.

However, when open grasslands at the edges of the forests and protected areas are converted into crop fields, as is the case around Tadoba, the ungulates lose any buffer zone that they forage in. Moreover, blackbuck like cereal. In lean times, the nutritive value of staple (cereal) crops serves as a huge draw for foraging wild ungulates. Moreover, in summers, crop fields around the parks are better sources of water and food, attracting ungulates to raid the fields.

Each ungulate species has its own favorite crop, as evidenced by the study in Tadoba. Wild boar, partial to sugarcane, would raid throughout the season whereas nilgai, favoring soybean, would raid only after fruiting. Soybean was found to be the most frequently raided crop around the Tadoba-Andhari Tiger Reserve (TATR) by nilgai. Yet, farmers there grew soybean the most. Why? Because it had great market value.

Saffola oil seed (*karadai*) on the other hand tended not to be raided by nilgai or wild boar and had good market value. Yet farmers resisted planting karadai because of the difficulty in harvesting it and in “reaching the right market channels.” This

showed that market decisions—rather than susceptibility to raids, also seemed to govern choice of crops.

## The Importance Of Buffer Zones

There are distinct advantages—not least that the soil moisture content is higher. The water table was much higher close to the park and yields were higher, but losses due to raids were higher too. Net losses were almost 50% or more near the park and gradually reducing over a distance of about 5-6km. Given that raiding mostly happens at the margins and that certain crops are preferred over others, could a buffer of an inedible or less-preferred crop like karadai help decrease depredation? Can these studies help the local communities with strong data that can inform better crop planning and management? Can organizations address the access issues of the farmers and help them reach their crop to the right marketing channels?

## Is Perception Reality?

Perceptions of conflict, as well as religious and cultural bias, seem to play a big role in the psyche of the farmers and herders. More importantly, as evidenced in Tadoba, Rollapadu and Kutch, perceptions of loss (what season and the extent) and raiding behavior were often at odds with observed data. For example, villagers around Tadoba contended that raids started post-monsoon and hence began guarding their fields then. According to data, though, there was no difference in frequency of raids between the two seasons. But taking perception into account, maybe their heightened vigilance is caused by a previous severe raid that might have resulted in bankruptcy. A single event, even if not borne personally could lead to such perceptions.

Religious bias too is strongly ingrained in these communities. In Kutch, nilgai in spite of causing significant losses through crop



depredation were tolerated by the farmers. They believed nilgai “belonged in nature.” This could well be, the researchers feel, due to the fact that nilgai is somehow thought of in the same vein as the sacred cow and hence absolved. The wolf, which also shared the landscape with the livestock herders, cultivators and pastoralists, was not accorded the same leniency. Even if the losses due to the wolf were lesser.

## Direct And Hidden Costs Of Crop Depredation

Beyond the direct loss of crops (which could, in some cases, be over 50%), there are other hidden, indirect costs to crop raiding. In Tadoba, farmers undertake strict guarding of the fields at night, especially post-monsoon. Even if farmers might not employ and “pay” for the vigil, they are out all night every night

guarding the fields. Their women at home complain of this pressure hurting the family structure.

But even more telling is the perception of loss and the threat of bankruptcy due to frequent crop raids. The researchers note that there is a distinct reluctance to invest in better technologies or farming practices. This is a high, lost opportunity cost.

And then there is the cost of conflict with the animal itself. The reaction in communities around the world to crop-raiding spans a range of emotions. In some cases, the villagers actually do not hold the depredation against the animals, recognizing their right to subsist in that area as well. On the other hand there are villages where nothing can absolve the ungulates. For example, the villagers in Kutch want hunting reinstated and echo sentiments heard in Rollapadu. The villagers who claimed they couldn’t use pesticides said that should any blackbuck die, the forest department would blame the villagers, given the endangered status of the ungulate. The history here is that there have been cases of blackbuck poisoning by the villagers around Rollapadu in 2003. In other cases, around Kutch, villagers just wanted their crops safe from raiding ungulates at any cost—they were more radical, advocating killing the itinerant animals, or translocating them—just anything to keep their crops safe. Their view was that people came first, not wild animals. Or else they wanted compensation.

## The Missing Compensation

This is another contentious issue. Some communities cared about and demand compensation for losses—especially in places where this scheme has been introduced and crop-raids are frequent with huge losses, while others do not believe it



covers their costs or is a long-term solution. In communities in Kutch where wolves and blackbuck are in conflict with humans, communities resent the compensation scales. When a wolf takes a goat, they claim, compensation more than covers loss. Not so with crop depredation, they say and are disillusioned by the schemes in place. When the authorities do not disclose compensation obligations or fail to fulfill them, the situation gets exacerbated. Surrounding the Rollapadu areas, bureaucratic corruption and lack of timely payment (in spite of significant damage claims) turns the local communities against the authorities, the park itself and, by proxy, the animals. This brings us to what is likely the crux of it all.

## The Disconnect

Pockets of apathy, corruption and lack of follow through by some local authorities charged with compensation schemes for losses, is one thing. But it is only a symptom of a larger issue: how these boundaries, the players, park borders, and tourism revenue-sharing gets decided in the first place.

When decisions are taken in isolation, without involvement of the impacted communities, there tends to be a distinct disconnect and an inherent mistrust among them—this is true of probably any type of governance. When it comes to conservation and protection laws, who gets what is also often not decided by consensus or in consultation with the affected people.

There is another player in all this. The Forest Department. Chartered with a mandate to protect the animals, they are caught between the proverbial devil and the deep sea. Granted that corruption and apathy exist and are the causes of a whole host of problems in this conflict, but there are also ample instances of well-meaning and competent Forest Departments

that find themselves helpless to mitigate the flare-ups. Most times, simply because the way the laws are crafted, the Forest Department's mandate ends at the boundaries of the park or are limited to the animals themselves. The issues that involve the communities in the margins of protected areas, or the management of straying animals resulting conflict then are orphaned issues and conflicts remain unresolved. No one has a mandate to address or solve them because the laws did not take all the parties into consideration in the first place. Decisions about the livelihood of local communities made without their involvement has left all players at a disadvantage. But a more sinister fallout of this exclusion is that conservation itself could be undermined.

## With Malice Towards Conservation Itself?

For example, the people of Kutch, having experienced this exclusion firsthand, have formed a perception: that conservation laws were not useful to society. They are not alone. Even on the other side of the Deccan Plateau, in villages around the Great Indian Bustard WLS (Rollapadu), people are not pro-conservation. They feel that the laws were made taking only one party into account: the animals, and that their own plight was disregarded or simply unheard.

Moreover, establishing the protected area and sanctuaries often seemed to bring in revenue to only a few. As was heard time and again from all the communities around the Rollapadu area, employment in the parks is rarely for the villagers and neither is the revenue shared among them. They perceive the park and the sacrifices they have had to make as going completely unrewarded—and that they instead have had to bear significant losses.

For conflict, and more importantly the perception of conflict, to be minimized, dialogue and collaboration between diverse stakeholder groups that are all involved in and around protected areas seems definitely a necessary if not sufficient condition while drafting policy and laws. Each of these stakeholders (the local communities, the farmers, the park authorities, NGOs, the scientists) has only parts of the story. Involving all of them and constructing management practices mindfully is important. The implicit buy-in from all these players is an absolutely necessary condition for conservation to succeed, which will be in accordance with the Biodiversity Convention's guiding Malawi principles.

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# SUGARCANE LEOPARDS

**How is it possible for large carnivorous cats to live with humans in a rural area? Asking this big question are Vidya Athreya, a wildlife biologist and Sunetro Ghosal, a social scientist.**

Most of Akole valley in the Indian state of Maharashtra was formerly semi-arid and drought prone. When rains allowed, farmers grew crops such as pearl millet, sorghum, and safflower. Intensive cultivation was started in the 1980s with the aid of irrigation. Akole valley was soon transformed from a dust-bowl, into a lush mosaic of pale green blades of sugarcane, rich velvety green of banana fronds and rangy stands of corn. Set amongst them were smaller plots of onion, sorghum, wheat, cauliflower and other vegetables, grown for the wholesale markets of Mumbai. The scraggly hills that form a jagged horizon to the west are dry and sparsely covered in brush, with a few tree plantations. Nothing in this landscape could be remotely described as forest where wild mammals might roam through thick vegetation.

People here make a living through agriculture and animal husbandry. On one end of the spectrum, the richer farmers focus on high income-yielding sugarcane and imported Jersey cattle while at the other, poor tribals survive on marginal rain-fed agriculture and graze goats on the scrubby hill slopes. Nomadic shepherds make seasonal migrations from further afield, to graze their animals on fallow fields. Although little of this landscape is set aside for conservation, in the fertile green valley

prowl predatory animals with golden coats spotted with black rosettes. Locals know there are leopards around, some have seen them, others have heard of them and some have lost calves, dogs or goats. But people here seem largely tolerant of the predator's presence probably because no human life has been taken.

How is it possible for large carnivorous cats to live with humans in a rural area? Asking this big question are Vidya Athreya, a wildlife biologist and Sunetro Ghosal, a social scientist.

Prior to stumbling onto this modern-day Eden, Athreya had spent a few years studying human-leopard conflict in a neighbouring area, where 47 people had been mauled in three years. Throughout the past centuries and across countries in Africa and Asia, leopards have attacked thousands of humans and killed scores.

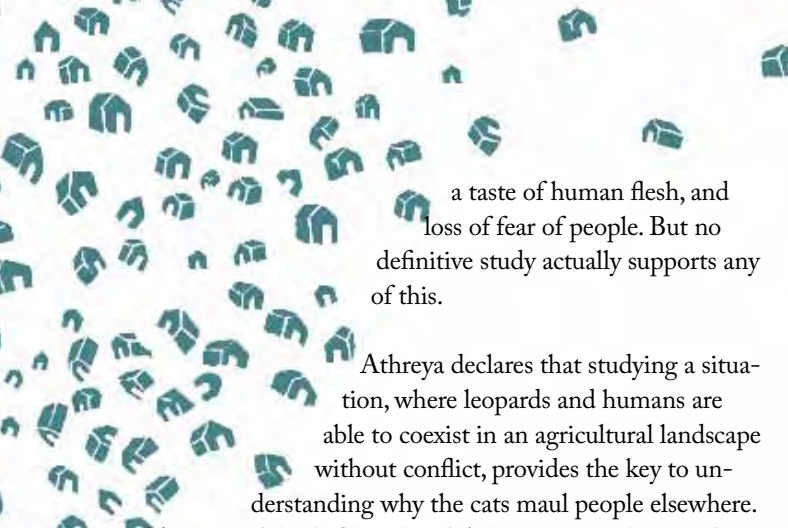
Why do leopards attack people? Are we just easy meat? Over the decades, several explanations were trotted out, such as man-eaters suffered from debilitating injuries, broken canines, too few prey animals and/or little water in the forest, infrastructure development disturbing forest stretches, increasing numbers of leopards, improper disposal of corpses giving the scavenging cats





Pencil Source





a taste of human flesh, and loss of fear of people. But no definitive study actually supports any of this.

Athreya declares that studying a situation, where leopards and humans are able to coexist in an agricultural landscape without conflict, provides the key to understanding why the cats maul people elsewhere.

To this end, both Ghosal and Athreya set up their studies in Akole with funding from the Royal Norwegian Embassy in Delhi and the Research Council of Norway in Oslo. The Centre for Ecological Sciences (CES) and Norwegian Institute for Nature Research (NINA) provided scientific stewardship under their joint 'Wildlife-human interactions: from conflict to coexistence in sustainable landscapes' project.

What do these rural leopards eat? One relatively simple way of answering this is to examine the hair remains found in scats. Leopards, like several other wild cats, defecate on paths. In forests where trails are few, droppings are easy to find. How do you begin looking for leopard excreta in a 300 sq km agricultural area where a maze of paths lead in every direction? Perhaps the cats here keep a low profile by avoiding paths altogether because of human activity. To maximize the search effort, the team of research assistants spread wide and scoured hills, fields, towns, roads, paths, dry stream beds, every type of habitat. To their surprise, it wasn't all that difficult to find leopard scats; they were everywhere!

The hair remains were teased out from the excreta and examined under a microscope. In the absence of usual wild prey such as deer and monkeys, the leopards were living mostly off dogs, feral pigs and livestock. The few wild animals on the menu were mongoose, civet cats and rodents.

How well did leopards survive on this diet and landscape? Could agricultural fields hold thriving populations of these big cats? Estimating the density of leopards in this area would provide a handle on this. Since the pattern of spots is unique to each leopard, photographic identification of individual animals was the method of choice. Twenty pairs of camera traps were set up in 40 sites over an area of 136 sq km for 30 days. Since both flanks of an animal are not identical, a pair of cameras was fixed facing each other.

The cameras were placed in areas where scats were numerous, and there was evidence of leopard activity such as pugmarks, scratches on trees, besides interviews with people. Ghosal found that people who did not own goats or dogs were hardly aware of the presence of leopards. For instance, although one

lady said that she had never seen a leopard and denied that there were any around, one was caught on camera ten feet away from her house!

In the final tally, five adult males, six females and four cubs were recognizable in the photographs. Once the area of the trapping exercise was adjusted, the density came to as many as 5 leopards living in 100 sq km of farmland! More remarkably, that same 100 sq km also supported five striped hyenas and about 35,700 people! Clearly agricultural areas were rich hunting grounds for these wild cats. Other animals that triggered the cameras were rusty-spotted cat, jungle cat and jackal.

When an old leopard (named 'Ajoba') fell into a well, the Maharashtra Forest Department rescued him and Athreya affixed a GPS transmitter around his neck. As is sometimes the practice, he was released about 60 km away at the western edge of the district boundary at Malshej Ghats. Thereafter, every day his GPS location was pinpointed by satellite, and an international SIM card tucked in the collar transmitted this information by SMS to the NINA server in Norway. All Athreya had to do, to access Ajoba's location, was log onto the server. As a backup, the collar also held a traditional short range VHF transmitter, so should the GPS malfunction, the animal could be traced using a hand-held receiver.

A translocated leopard typically returns to the site of its capture, or ranges randomly over long distances, either lost or attempting to find its home; rarely does it settle down at the site of release. A few days after Ajoba's release, contrary to expectations, his GPS tracer began to dot westwards on the map, in the opposite direction from the site of his capture. He crossed the busy Mumbai-Agra National Highway, and the Kasara railway station, giving Athreya several anxious moments. Ajoba didn't linger at either Tansa or Tungreshwar Wildlife Sanctuaries but continued onwards crossing the Vasai Industrial Area near Thane, on the outskirts of Mumbai city. Twenty five days later, he entered Sanjay Gandhi National Park and the GPS points stayed clustered in a 25 sq km area for almost six weeks; he seemed to have settled down.

Then inexplicably he took a swim across the 100 metre Ulhas River into the main section of the Park, but returned. This may have caused the collar to malfunction as all further transmission stopped. Before settling down, Ajoba had traveled 120 km, and at several locations was very close to people. Remarkably not once did anyone notice the leopard. It is only because of his collar that we are aware of this wild cat's extraordinary journey from the Ghats to the coast. Since Ajoba was quite an old animal, and had consistently walked in a single direction before settling down, the team doesn't think he was lost; he was sure of his destination.



A leopardess caught in Nanashi, near Nashik, was collared and named Sita. She was in an advanced stage of pregnancy when she was released 50 km away. For a month she tried to return unsuccessfully. Then she gave birth at the site of release and her mothering instincts overruled the urge to return home. She hid in the forests during the day and prowled through neighbouring villages at night, hunting dogs and goats. Four months later, when her cubs were able to follow, she returned home to Nanashi. Over the subsequent eight months, until the collar dropped off, she prowled a 10-25 sq km area.

The true eye-openers to leopard ecology in agricultural landscapes were Jai Maharashtra, a young leopard and Lakshai, a leopardess. Although these two animals were caught in separate locations, it immediately became obvious that they were related. After being radio-collared, Lakshai (who was missing a canine!) emerged from her drugged stupor and made a beeline for Jai. Eventually DNA testing showed that they were mother and son.

For the first two months after Lakshai had a litter, Jai, the dutiful older son, stayed with the cubs while their mother went hunting. Perhaps leopards are not the solitary beasts we have been led to believe.

Compared to Ajoba and Sita's long distance treks, Jai and Lakshai hardly moved at all. Although the analysis is still incomplete, the preliminary estimate of their home range is approximately 25 sq km. The resident animals holed up in sugarcane fields all day and emerged at night to hunt dogs and pigs. Schooled as I was, in the paradigm that large wild cats belong

in tall undisturbed forests, this revelation came as a shock. Until this moment, I had expected these cats to live in a wilderness area somewhere and make occasional forays into the sugarcane fields. But their GPS points clearly indicated that these leopards lived in farmlands 24 hours a day, 7 days a week. If they were ever sent to a forest, it would seem like an alien world just as it would to any farmer!

So why didn't these leopards attack people? How do leopards use this landscape and when are they active? Do they avoid houses and roads? Do they wait until all human activity on the farms cease at night before venturing out to hunt? To her surprise, Athreya found that the time stamp on the camera trap pictures showed that people and leopards were using the same paths at approximately the same time, often within minutes of each other. Since rural Maharashtra suffers all day power shut-downs, farmers visit their fields at night to turn on their water pumps. And this was also the time when leopards were prowling the pathways looking for prey, or patrolling their territories. So what makes Akole special?

Athreya avers that we still know too little about the drivers of conflict, but offers that inappropriate management such as translocation may only aggravate conflict. Continued collaring of animals, studying their movements and interactions with one another will provide a better understanding of when and why large cats attack humans.

Ghosal's social science study revealed that peoples' attitudes to leopards were coloured by a three-way tension between their religious-social backgrounds, political-legal frameworks, and



*Vidya Athreya*



do not inadvertently bump into a large cat. They also claim that leopards do not confront people but should it happen, they would give space to the feline to walk away. A lot of families confidently sleep out in the open while all the livestock and poultry are secured in enclosures.

New values, such as seen in wildlife programs on television, also exert a positive influence on people's perception of the wild cat. Many take pride that leopards live in their midst and that researchers are studying them. All this has promoted tolerance of these cats in this landscape. For instance, some women who were weeding at noon, watched a leopard walk past. Moments later, in the next farm, workers threw stones and sent the feline scurrying for cover. In the melee, one or two of them were scratched and they complained to the Forest Department. When the local official approached the first farm owner for

permission to place traps to catch the leopard on his land, he flatly refused. None of his family or workers was hurt by the feline, he argued.

economic loss-insecurity (both personal and livelihood). Tribal and pastoral communities worship Waghoba and Waghjaimata, the god and goddess of large cats. Combined with this, religious ethnic tribals see themselves embedded with leopards in a single dynamic landscape and do not apply for compensation even when they lose livestock. By taking greater care of their animals, loss is minimized.

However, they feel powerless when the Forest Department takes away their access to grazing on the hill slopes. They also believe that the Department releases leopards in the hills to prevent them from grazing and collecting firewood! It should also be worth mentioning that fewer leopards are found in the marginal areas used by tribals where there is little shelter or prey. Despite their weak politico-legal leverage, the strength of their religio-social backgrounds and ability to prevent losses, has led to a positive attitude to leopards.

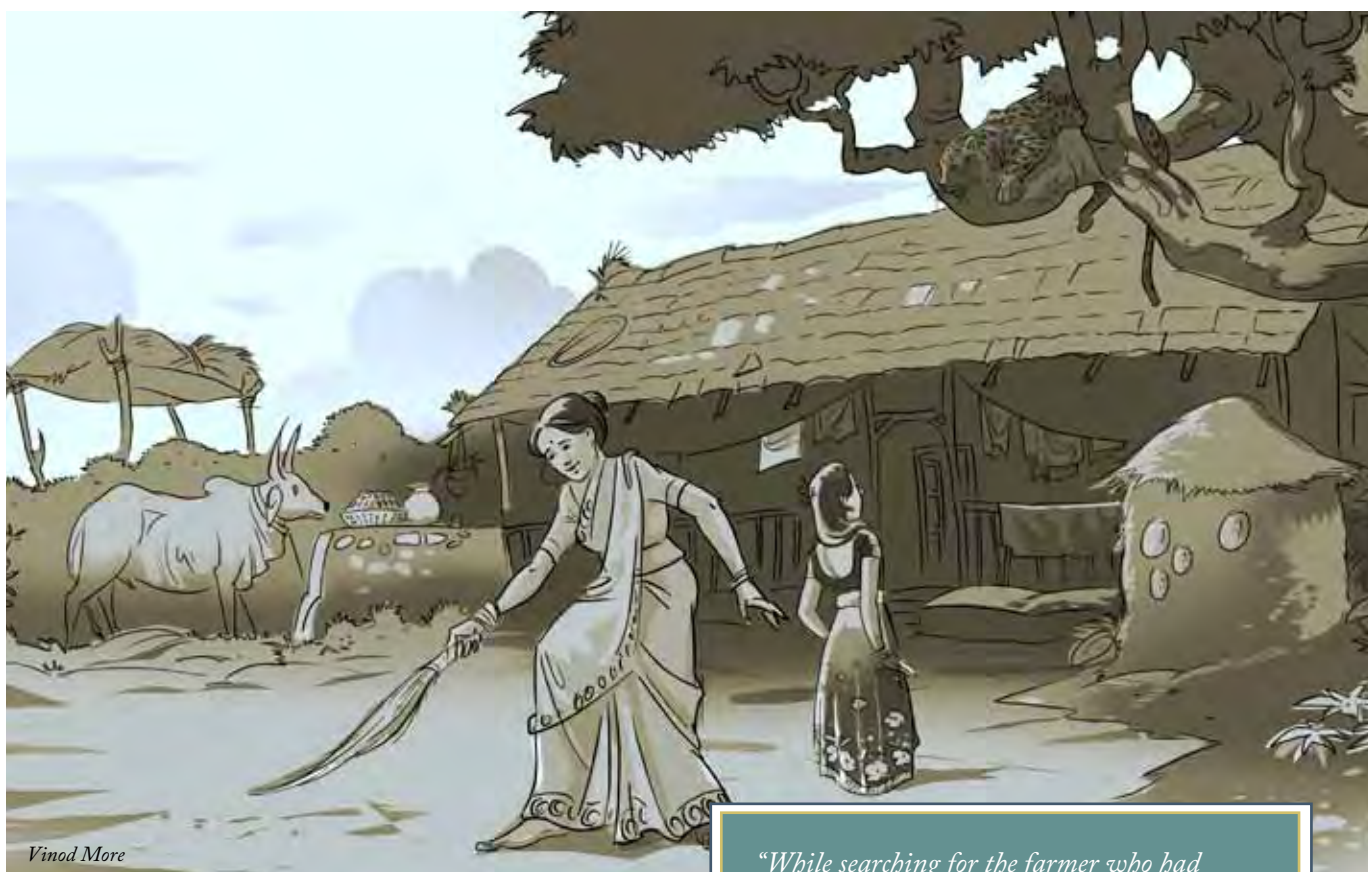
Rich farmers on the other hand, generally feel that these cats have no place outside protected forests and instead of securing their calves and goats, occasionally use their political clout to pressurize the Forest Department into removing them. Since they suffer more losses to leopards and feel they are being forced to live with these "government-owned" predators, their disaffection is inadequately appeased by compensation. Yet, leopards thrive in these sugarcane fields because farmers leave them unmolested. Some others have adapted to the presence of leopards in the landscape; they say they walk after dark in groups, armed with torchlight, and usually talk loudly so they

What this study underscores is that leopards are being sustained in high densities in rural areas because of the easy availability of stray dogs and feral pigs. There are an estimated 128 dogs per sq km in Akole town and around 3,000 pigs in the township.

With such easy pickings in abundant supply at their doorsteps, these fat wild cats do not need to undertake strenuous walks, and therefore their home ranges are small. Since the density of dogs is higher near towns, so too are leopard densities. On numerous occasions, both Lakshai and Jai were within the town, walking between houses. Although DNA analysis of samples obtained from the scats is yet to be completed, Athreya made a preliminary identification of 20 individuals. Not surprisingly, six adult leopards were stalking and hunting dogs and pigs in a 4 sq km town of 20,000 people. There were more leopards lurking around Akole town than in the surrounding countryside.

Further, Athreya has found other agricultural areas in India where leopards live with people without attacking them. It could even be the norm rather than the exception. Clearly when there are so many wild animals living outside protected forests, a policy for their conservation and management needs to be drafted. If these numbers of leopards are deemed too high, the most appropriate management measure would be to clean up towns, thus reducing the stray animal population. Local Forest





*"While searching for the farmer who had reported that a leopard had killed his calf, we stopped at the first little house to ask for directions. When they came to know we were interested in leopards they told us that one day a leopard had been sitting on the tree under which we were standing. The mother had come out to clean the courtyard at sunrise when their little kid pointed out to a cat sitting on the nicely branching tree. The mother was shocked to see a leopard and as soon as she noticed the animal, it ran down the tree and vanished into the nearby shrubbery. A few months later when we were setting up camera traps to assess leopard populations, we decided to place one pair near the tree. The father had said that leopards were always around their fields and house and indeed we found pugmarks in the nallah near their house. When we drove up the slope to the house, the tree was gone. We asked them what happened to the tree and they said they cut it because yet again, one fine morning the leopard was sitting on top of it!"*

Department officials require crisis and people management training in order to perform their jobs better. Compensation payments should be made less tedious and bureaucratic; it should be linked to effective protection, so that those who take better care of their livestock are rewarded, and support provided to those who lack the resources to adequately protect their animals.

Thanks to Indian cultural and religious traditions, most rural people are amazingly sympathetic to leopards, as long as humans are not harmed nor alienated from resource or land use in the name of conservation. If our management policies can build on this existing foundation, then people may adapt better to living with these large cats. It would then be a win-win situation for carnivore conservation.

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*\*The story showcased in the box is an excerpt from a Marathi book written by a local farmer who worked on Vidya Athreya's project in Akole. The book is targeted at other farmers in the sugarcane areas. Translation by Vidya Athreya.*

*\*Artwork by Vinod More [www.vindowart.blogspot.com](http://www.vindowart.blogspot.com).*



# Olive and Green: Shades of Conflict Between Turtles & Fishers in India

The drivers of discord between humans and wild species often lie deeper than the shallow measuring implements of science can reach. We explore the lived experience of conflict between fishing communities and turtles in two very different socio-ecological contexts in the Lakshadweep Islands and the Orissa coast.



Kalyani Ganapathy



The uneasy interface between people and wild species is increasingly becoming the new conservation battleground as resources dwindle and the human footprint on wild spaces increases. There has been a significant body of work over the last few decades documenting this conflict and it is as varied and diverse in context and intensity as the ecosystems, species and socio-cultural situations it spans. The vast majority of these studies quantify conflict in terms of losses incurred to humans and wild species as a direct result of this conflict—a long litany of loss of life or livelihood that seeks to accurately account for the intensity of this conflict. While useful, these neat quantifications sometimes fall short of justifying the often apparently disproportionately negative responses that communities harbour towards wild species. In many instances of human-wildlife conflict, there is a large unexplained gap between what scientists can measure as conflict and the

perception of that conflict by the communities that experience it on a daily basis. On the other hand, there are a range of contexts where conflict is absent despite all the ingredients that cause it elsewhere. In order to explore the gap that separates mensuration from perception, we need to go beyond a balance-sheet accounting of conflict. It is this lived perception that ultimately drives a community's response against wild species, and any attempts at mitigation must clearly deal with managing these perceptions.

Looked at this way, we may find that the tap roots of human-wildlife conflict lie deeper than the direct negative interactions that animals and humans have on each other. While these direct interactions (crops raided, lives lost, animals persecuted, etc) may often be the flash point for conflict where it manifests itself, this may be only a small part of a story that embraces a much larger narrative. We



classify these interactions as ‘first order conflicts’, and they result from a clear, direct set of impacts that wild species and human communities have on each other. Beyond these, however, there are often a whole class of interactions which we term ‘second order conflicts’ that are the outcome of a complex suite of indirect pathways that may, at first glance, be invisible. Because they do not involve directly palpable losses, they may be difficult to quantify, but are, nonetheless equally significant drivers of discontent.

The following narratives come from opposite sides of the subcontinent, the Lakshadweep Islands and the coasts of Orissa. In both locations, turtles and fishers are pitted in a fierce conflict over the loss of livelihood. In both instances, indirect, second order interactions drive the conflict. In the Lakshadweep, the pathway of conflict is primarily ecological, and involves the complex interaction between green turtles and the ecosystems they use and modify. In Orissa, the pathways have more to do with socio-politics than ecology, where the over-ardent efforts of conservation itself could be playing an important role in fuelling second-order conflicts between olive ridleys and fisher communities.

## The Mydas Touch: Fishers, Turtles And Ecologically-Driven Second Order Conflict In The Lakshadweep

The Lakshadweep atolls are unusual in having some of the highest population densities in rural India cramped onto a mere 23 sq km of land. Fishing is the primary occupation here, and is dominated by a pole-and-line fishery for the pelagic skipjack tuna. Fishing on reefs and lagoons is, by contrast, fairly artisanal, and limited to local consumption, supplying the evening meal. During the monsoons, the lagoon and reefs take on an added significance, since tuna fishing stops, and these more protected habitats become the primary sources of fish for the island communities.

On the island of Agatti, one of the 12 atolls in the archipelago, conflict between fishers and turtles hinges on the firmly held belief that green turtles (*Chelonia mydas*) are chiefly responsible for reductions in lagoonal fish catch. At first glance, this perception appears to be based on a naive, even fanciful, understanding of green turtle biology, since adult green turtles are principally herbivorous. More detailed interviews with lagoon fishers reveal a more sophisticated set of perceptions. Fishers identified several mechanisms by which they see green turtles reducing their fish catch. Some of these are very clearly first order interactions—turtles disturb fish away from nets, and can often break nets by swimming through them. Almost every fisher we spoke to in our surveys had experienced these first order interactions, and were

vehement that it caused them significant losses. Replacing a broken net represents not merely the considerable price of a new net (approximately INR 1,800), but a raft of lost opportunity costs over several days before the gear can be replaced.

Additionally, and more importantly, fishers also identified green turtles as being responsible for causing reductions in their fish catch by overgrazing seagrass growing in the lagoon, thus reducing adult fish usage of meadows, and reductions in fish recruitment to lagoon environments. What the fishers were reflecting here were a series of relatively involved ecological mechanisms driving an eventual reduction in their livelihood.

Validating these second-order interactions required a series of descriptive and experimental studies which are still ongoing. We started by documenting the densities of green turtles in the Agatti lagoon. Fishers began noticing an increase in green turtles numbers in the mid 1990s, and while earlier clandestine culling of turtles helped keep the population numbers in check, the increasingly strict enforcement of conservation laws in Lakshadweep made this more difficult as green turtle numbers grew. Our first surveys of green turtle populations in



Kartik Shanker



## Conflict between turtles & fishers

### direct interactions (1st order)

turtles damage gear

turtles disturb fish  
away from nets

### indirect interactions (2nd order)

green turtles  
overgraze seagrass

reduced fish  
recruitment in  
seagrass meadows

reduced adult  
fish abundance

Kalyani Ganapathy

2005 showed a startlingly high density of green turtles in the shallow meadows of Agatti, among the highest congregation densities recorded anywhere. These densities corresponded to rates of herbivory, and at the highest density locations, green turtles were consuming more than 80% of the primary production of the dominant seagrass in the lagoon. It is unclear whether seagrasses can cope with such high levels of grazing. When we examined the population structure of seagrasses across this gradient of turtle grazing, the impacts were clear—the highest grazed locations had highly skewed populations, dominated by younger age groups. The seagrass here were also much shorter in overall length, narrower in width, and with significantly longer vertical rhizomes. Taken together, it was clear that seagrass in the high herbivory areas of Agatti were stretching themselves to the limits of their growth, doing all they could in order to keep up with intense and sustained green turtle herbivory. Reports published a decade earlier indicated that the dominant seagrass in Agatti was *Thalassia hemprichii*, a relatively slow-growing seagrass species that is characteristically a later successional species in seagrass meadows. By 2005, *T. hemprichii* had been all but replaced by *Cymodocea rotundata*, a much faster growing species, potentially better able to cope with higher levels of herbivory.

It was apparent from our investigations that green turtles

could, and were, having a clear impact on the meadow itself. In retrospect, given the high densities of green turtles in the lagoon, this was hardly surprising. Like elephants, green turtles are classic ecosystem engineers, modifying the very structure of the environments they inhabit. Whether these modifications could change fish populations communities themselves as the Agatti fishers claimed required us to broaden the scope of our studies. To validate this, we compared lagoon fish populations in Agatti with the meadows of Kadmat, an atoll that is comparable to Agatti in almost every respect apart from having very low densities of green turtles. This makes Kadmat an ideal comparison. Its meadows are a mix of *Thalassia* and *Cymodocea*, and, in the absence of green turtles, the seagrass grows taller, thicker and denser. And it became immediately clear that this difference in seagrass structure was vital for fish communities. These control meadows harboured a biomass of fish nearly four orders of magnitude higher than the grazed Agatti meadows. Several species present in these control sites were completely absent in Agatti, and fishers we spoke to confirmed that these species were once abundant in the meadows before turtle numbers increased.

While several elements of the mechanisms we are describing here still need to be validated with further ecological studies, what is evident is that green turtles, at the densities found in Agatti, are causing ecosystem-wide changes to seagrass



Kartik Shanker



Sumer Verma

meadows with dramatic flow-on consequences for fish usage, and, eventually, the livelihoods of the Agatti fishing community.

This raises important and troubling questions for our understanding of conflict and its mitigation. It is possible to envision programmes to compensate fishers for lost gear and opportunity costs as a result of first order interactions. In contrast, handling second-order interactions like the ecological degradation caused by high turtle densities poses a more significant challenge. What happens when a charismatic flagship becomes a problem animal, not merely for fishers, but for the ecosystem itself? If we have to make the fishers of the Lakshadweep constituent partners in conservation, we need to place at least as much value on the vital habitats the green turtle uses as we value the turtle itself.

## The Olive Riddle: Socio-Politically Driven Second-Order Conflict Between Turtles And Fishers In Orissa

Once touted as the worlds largest olive ridley (*Lepidochelys olivacea*) rookery, the rhetoric about this population of sea turtles has revolved largely around considerable exaggerations of their demise. Shortly after the discovery of the rookery in

the 1970s, a couple of film-makers wrote that this population was on the verge of extinction due to the take of turtles for the meat market in Calcutta. Even then, Jack Frazier, veteran of sea turtle conservation, wrote an article about the dangers of crying wolf. He could not have been more right.

In 1982, EG Silas, then director of the Central Marine Fisheries Research Institute, made his prescient statement that if trawling were unchecked, “Orissa will become the world’s biggest graveyard for sea turtles”. The call to arms was taken up by both biologists and conservationists in the 1990s, when Operation Kachhapa was launched, to win protection for olive ridley turtles by reducing mortality from trawl fishing. The battle was launched on many fronts, including enforcement and legal action, but also through the media. Over a few years, trawl fishing was demonised in the media as murder and slaughter of ‘innocents’. For their part, trawl fishing associations dug their heels in and insisted that they were only a small part of the larger problem that affected the Orissa coast.

In the Gahiramatha marine sanctuary, where the Forest Department focussed its efforts, a forest guard was kidnapped by fishermen, and drowned when thrown overboard. A year later, when approached by a fishing boat, forest officers opened fire, killing a fisherman from the community. The die was cast. Conflict was entrenched.





*Roban Arthur*

Unlike other instances of human wildlife conflict, olive ridley turtles do not directly harm the people they come into contact with. Nor do they consume their resources. Traditional communities either revere turtles or consider them harmless. How then did this climate of mistrust and ill feeling come about? How did it become so vitriolic and pathological that reasonable dialogue became impossible? For example, when pushed to a corner, trawler owners claimed that sea turtle mortality must have been because of migration fatigue, pollution and labour pain. Olive ridley turtles migrate each winter to the coast of Orissa in the thousands to breed in the offshore waters of Gahirmatha, Devi River mouth and Rushikulya within about the 5 km of the shore. They come ashore to nest solitarily from December to April, and mass nesting occurs typically during February and March, when 50,000 to 150,000 turtles nest together over 4-5 days. Over the last two decades, more than 10,000 dead turtles have been counted along the Orissa coast each year, drowned in both trawl and gill nets, totalling more than 100,000 turtles or more in the last decade.

The zone of contact is in near shore fishing areas, reserved for traditional fishing through the Orissa Marine Fisheries Regulation Act in the early 1980s. While the Act was created to protect traditional fishing, it was invoked by conservationists in the 1990s and 2000s to protect sea

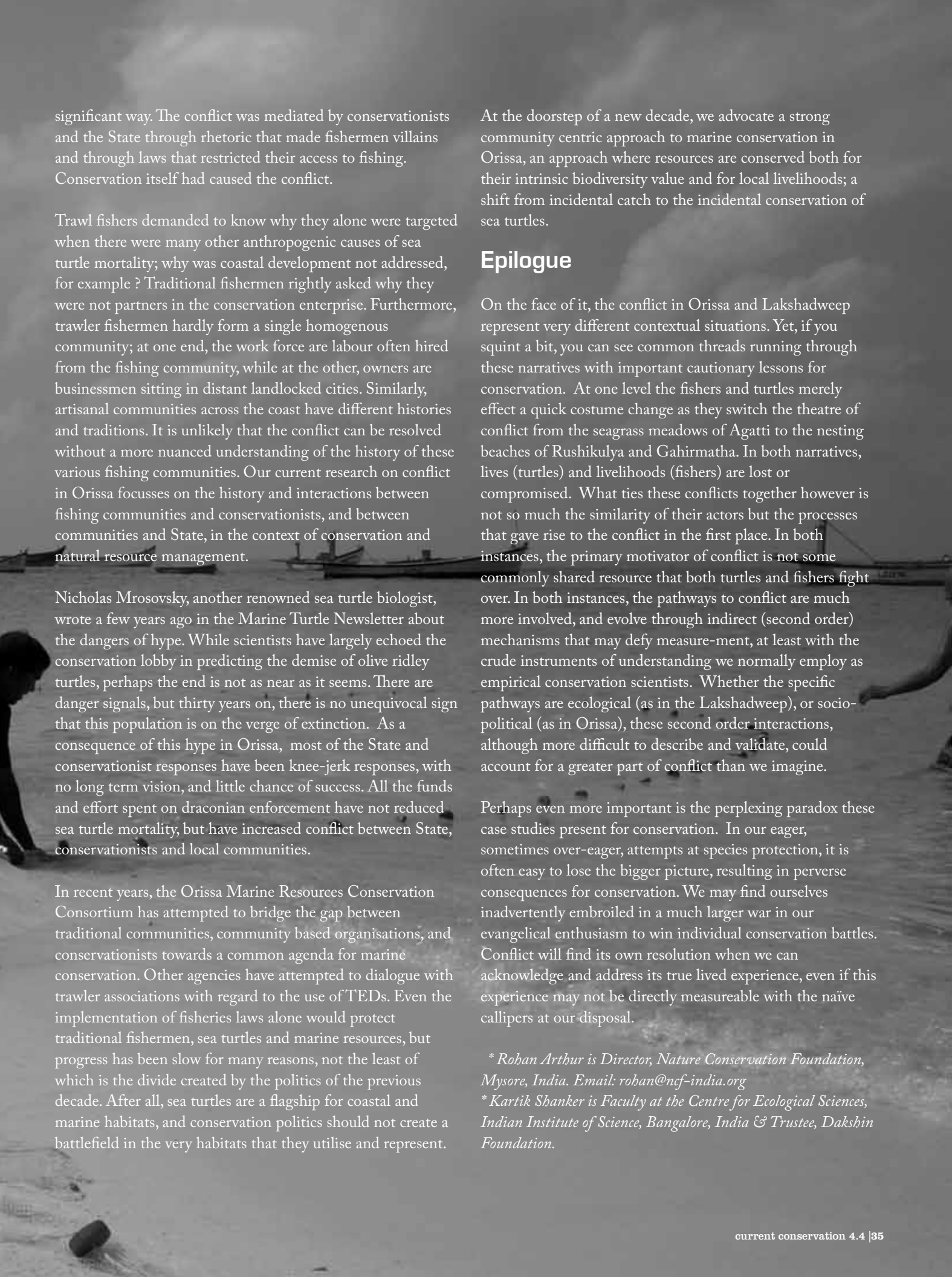
turtles. In a few years, the Act and turtle conservation came to be seen as anti-people, and in some areas, gill net fishermen joined trawler associations in their protest against sea turtle conservation. During these years, further laws were passed to protect the offshore waters of the mass nesting beaches, to implement Turtle Excluder Devices, and to establish a marine sanctuary at Gahirmatha. In principle, these Acts affected local communities to varying degrees, but lack of awareness of the law, indiscriminate enforcement by the forest department, and strongly worded rhetoric from conservationists and the media meant that these served to further drive a wedge between community and conservation.

The story of Turtle Excluder Devices in India is too long to be told here in its entirety. Briefly though, they were introduced in Orissa through a workshop in 1996. At the time, the US had passed a law requiring all shrimp exporting nations to use TEDs. After protests in the WTO by a few countries including India against unfair trade practices, the US position was eventually upheld. In Orissa, the TED came to be seen as a symbol of unfair conservation imposition by the State and by western powers.

Though many turtles were killed, the deaths were incidental. Sea turtles did not themselves harm in any fishermen in a





A person is seen from the side, standing on a sandy beach and looking out towards the ocean. The background is a vast, calm sea under a clear sky. The person's shadow is cast on the sand.

significant way. The conflict was mediated by conservationists and the State through rhetoric that made fishermen villains and through laws that restricted their access to fishing. Conservation itself had caused the conflict.

Trawl fishers demanded to know why they alone were targeted when there were many other anthropogenic causes of sea turtle mortality; why was coastal development not addressed, for example? Traditional fishermen rightly asked why they were not partners in the conservation enterprise. Furthermore, trawler fishermen hardly form a single homogenous community; at one end, the work force are labour often hired from the fishing community, while at the other, owners are businessmen sitting in distant landlocked cities. Similarly, artisanal communities across the coast have different histories and traditions. It is unlikely that the conflict can be resolved without a more nuanced understanding of the history of these various fishing communities. Our current research on conflict in Orissa focusses on the history and interactions between fishing communities and conservationists, and between communities and State, in the context of conservation and natural resource management.

Nicholas Mrosovsky, another renowned sea turtle biologist, wrote a few years ago in the Marine Turtle Newsletter about the dangers of hype. While scientists have largely echoed the conservation lobby in predicting the demise of olive ridley turtles, perhaps the end is not as near as it seems. There are danger signals, but thirty years on, there is no unequivocal sign that this population is on the verge of extinction. As a consequence of this hype in Orissa, most of the State and conservationist responses have been knee-jerk responses, with no long term vision, and little chance of success. All the funds and effort spent on draconian enforcement have not reduced sea turtle mortality, but have increased conflict between State, conservationists and local communities.

In recent years, the Orissa Marine Resources Conservation Consortium has attempted to bridge the gap between traditional communities, community based organisations, and conservationists towards a common agenda for marine conservation. Other agencies have attempted to dialogue with trawler associations with regard to the use of TEDs. Even the implementation of fisheries laws alone would protect traditional fishermen, sea turtles and marine resources, but progress has been slow for many reasons, not the least of which is the divide created by the politics of the previous decade. After all, sea turtles are a flagship for coastal and marine habitats, and conservation politics should not create a battlefield in the very habitats that they utilise and represent.

At the doorstep of a new decade, we advocate a strong community centric approach to marine conservation in Orissa, an approach where resources are conserved both for their intrinsic biodiversity value and for local livelihoods; a shift from incidental catch to the incidental conservation of sea turtles.

## Epilogue

On the face of it, the conflict in Orissa and Lakshadweep represent very different contextual situations. Yet, if you squint a bit, you can see common threads running through these narratives with important cautionary lessons for conservation. At one level the fishers and turtles merely effect a quick costume change as they switch the theatre of conflict from the seagrass meadows of Agatti to the nesting beaches of Rushikulya and Gahirmatha. In both narratives, lives (turtles) and livelihoods (fishers) are lost or compromised. What ties these conflicts together however is not so much the similarity of their actors but the processes that gave rise to the conflict in the first place. In both instances, the primary motivator of conflict is not some commonly shared resource that both turtles and fishers fight over. In both instances, the pathways to conflict are much more involved, and evolve through indirect (second order) mechanisms that may defy measurement, at least with the crude instruments of understanding we normally employ as empirical conservation scientists. Whether the specific pathways are ecological (as in the Lakshadweep), or socio-political (as in Orissa), these second order interactions, although more difficult to describe and validate, could account for a greater part of conflict than we imagine.

Perhaps even more important is the perplexing paradox these case studies present for conservation. In our eager, sometimes over-eager, attempts at species protection, it is often easy to lose the bigger picture, resulting in perverse consequences for conservation. We may find ourselves inadvertently embroiled in a much larger war in our evangelical enthusiasm to win individual conservation battles. Conflict will find its own resolution when we can acknowledge and address its true lived experience, even if this experience may not be directly measurable with the naïve callipers at our disposal.

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# Act Responsible at the Top

**Much of human-carnivore conflict is supposed to be either accidental or caused by old/injured animals, but how do we explain deliberate attacks on people by healthy, mature carnivores?**

Big carnivores scare many of us. They are nature's most efficient killers. But the "threat perception" seems disproportionate to the threat. A very conservative estimate of the big five—tigers, lions, leopards, wolves and crocodiles—will put their collective population at 10,000. Each of them makes a kill every week. There are about 15 crore people living in 1,70,000 villages around India's forests, offering the biggest prey base to pick and choose five lakh kills from every year. Yet, how many people are killed by carnivores? Even accounting for those that go unreported, the numbers do not add up to the 200 mark.

Indeed, the numbers tell interesting stories. In India, more than 30,000 people die of rabies due to dog bite each year. Venomous snakes claim about 50,000 victims. No less than 80,000 die of injuries caused by road accidents. And yet carnivores are considered a far, far greater threat to human safety. On one hand, people are known to overestimate rare and dramatic events. On the other, maybe it is because carnivores consider us food.

So, are we wrong? The etymology—carne (flesh) vorare (devour)—is a giveaway. Obligate carnivores live exclusively on meat. They prefer herbivores but are not fussy about other meat. Technically, that makes us, omnivore humans, carnivore food; just like all omnivore primates are in the wild. Surely, whatever be the numbers, quite a few people still do get devoured by carnivores across the world.





But contemporary science tells us that carnivores do not consider us food. The figures cited above support the claim. Almost three-quarters of a century back, Jim Corbett was quite unequivocal in his *Man-eaters of Kumaon*: “A man-eating tiger is a tiger that has been compelled, through stress of circumstances beyond its control, to adopt a diet alien to it. The stress of circumstances is, in nine cases out of ten, wounds, and in the tenth case old age—human beings are not the natural prey of tigers, and it is only when tigers have been incapacitated through wounds or old age that, in order to live, they are compelled to take to a diet of human flesh.”

To the list of old and injured carnivores, wildlife biologists add inexperienced or alarmed animals as potential man-killers (not man-eaters). A chance encounter with a carnivore, particularly a young one, may result in accidental attacks but such kills are not usually consumed. Some attacks are blamed on mistaken identity when a squatting person is taken for a four-legged prey. Experts have identified another condition—significant loss of wild prey or habitat or both—as a trigger to conflict.

Some biologists, pioneer among them Vidya Athreya in India, have recently pointed out another manmade aspect of conflict. Their research shows that the policy of capturing and translocating so-called problem animals exacerbates, and even creates, conflict because such displaced carnivores, traumatised after prolonged captivity, try to find their way home and encounter people on their way.

Clearly, the consensus is that carnivore attacks on humans are not natural and happen only under a set of exceptional circumstances. Otherwise, given that so many of us are around, the human casualties would surely have been many times higher. But do these arguments settle the issue?

Not quite. Records show that on many occasions, perfectly healthy, undisturbed carnivores in their prime have been killing and feeding on people. So if a few individual carnivores are eating human flesh, and since potentially all of them can, what keeps the rest of them away?

Also, the contemporary assertion—that carnivores, under normal circumstances, do not consider us food—is, well, contemporary. The great apes were very much part of carnivore menu. So were the early humans. Carnivores continued to attack and kill scores of people throughout recorded history. The contemporary assertion gains ground only because few such cases occur in recent times. Of course, the trend is

unmistakable. The frequency of attacks on people by carnivores has been reducing steadily with time. Could it be because large carnivores are getting fewer by the day? Or is it because they have been undergoing a behavioural change?

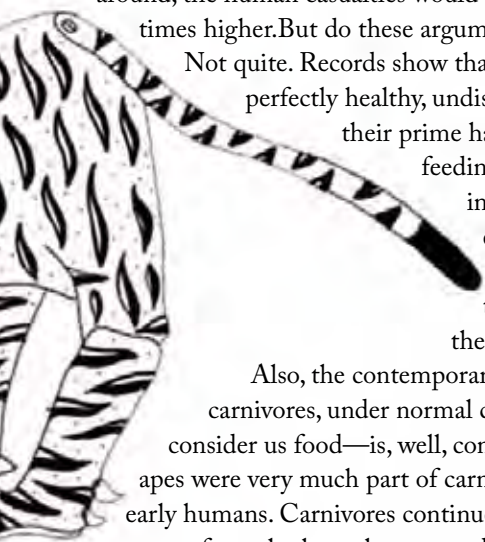
Loss of population does not quite explain it. If we go by the notional number of 40,000 tigers at the turn of the last century (plus easily 100,000 leopards, wolves etc) and the corresponding scale of reported conflict (up to 10,000 in the 18th century), it becomes clear that even 200 years back, carnivores had limited dietary interest in us.

Can we, therefore, attribute the historical trend of consistently reducing conflict to a changing attitude in carnivores that had considered early men as natural prey as anthropoids but slowly learned to drop modern man from the list? If we can, it is important to understand the factors that triggered this change in carnivore behaviour over so many thousand years. It is even more important to explore if such factors can get locally or temporally reversed. Because such reversal may explain why certain individual carnivores that do not fit in the exceptional category (old, injured, alarmed, prey-less or translocated) still go for human prey today. Or why certain areas (eg Sunderbans) record consistently higher casualties or certain pockets (eg Tadoba) suddenly become conflict-prone.

In most human societies, carnivores are not considered food. Early man hunted carnivores mostly to protect himself. From human fossils and cave paintings to scriptures and folklore, there is evidence that carnivores were one of the prime threats to human life. The mighty animals’ larger-than-life presence frequently transformed them into gods and demons alike—entities considered almost as powerful as other great natural forces.

Things were probably slightly more complicated on the other side. As hunter-gatherer humans emerged as a predator species in their own right, it was not easy for carnivores to negotiate with them as just another competitor. Three factors that made (and still make) carnivores wary of us are numbers, tools and motive. Humans hunted in groups. They also used tools. The first factor is traditionally respected in the wild. A solitary large cat, for instance, rarely takes on a pack of wild dogs or an elephant herd. Tools turned the balance of power upside down. Initially, tools substituted for canines and claws. Then tools became technology. From slingshots to catapults, bows-and-arrows to guns, better guns and the arms race was over soon. We all know that story.

In any human society, a carnivore hunter was always a hero. The pride and thrill involved in hunting soon turned it into a



popular sport. Game hunting upturned the fundamental laws of the wild where animals kill either for food or for protection. Over time, the carnivores had to learn how to deal with a species that often killed arbitrarily. This learning process continues and it has not been particularly kind. As humans became increasingly organised and technologically evolved over centuries, these factors probably made carnivores adopt a “no risk” policy vis-à-vis people over time, so much so that it became normal for most to walk the other way when humans were in sight. Many shikar accounts relate how tigers or leopards did not risk charging people unless disturbed or threatened.

But a lonely, unarmed human is still the easiest prey for any large carnivore. To stretch the elephant analogy, we know that tigers, otherwise wary and respectful of elephant herds, do occasionally kill isolated calves. I have known instances of tigers successfully defending kills against smaller wild dog packs, something they will not usually attempt against bigger packs. So, is it possible that even healthy, mature carnivores may seek out lonely, unarmed persons for food? If it is, given that there is still no dearth of lonely, unarmed persons in and around our forests, why are such attempts so few? Probably because a wary carnivore never attempts a human kill unless a meticulous risk assessment assures it of a certain safety threshold.

So what factors determine this safety threshold? Do carnivores balance the risk of attacking humans against the availability and their own ability to get other prey? On one hand, hunger (due to injury, inexperience or lack of wild prey) can push carnivores to target high-risk prey. There are instances of desperate carnivores targeting people in broad daylight in crowded places. But this rule is likely to apply only to certain individual animals in distress and not to a population as a whole. There is no example of a large number of carnivores turning on people even in the most degraded, prey-deficient forests. On the other hand, it is possible that even healthy carnivores will prey on people when they can assess the risk itself to be particularly low. This may explain occasional, deliberate attacks on people by carnivores that are not hungry or injured.

Most instances of sporadic conflict seem to have a few factors in common. First, the victims ventured inside or very close to a forest. Second, they were alone. But many others do so every day and some carnivores, like leopards, even share space with people. Perhaps, a third factor decides the tipping point. Perhaps, the careless victims “unmindfully” allowed the predators enough undisturbed time to stalk, observe and be sure.

But what explains the high conflict zones like Sunderbans or Tadoba? Perhaps, numbers do. Compared to other forests in India, more people venture into Sunderbans (fishing, honey collection etc) and Tadoba (for bamboo). In both places, they also spend a long time inside the forests. Most fishing, honey-collecting or felling expeditions inside Sunderbans last more than a week. Thanks to a recent state law that makes bamboo products legal, villagers around Tadoba not only enter the forests in thousands but also spend long hours cutting down the bamboo to thin strips which are then carried out of the forests.

This means more opportunities for carnivores to stalk, observe and be sure. With more practice, comes more experience. Corbett’s Champawat man-eater reportedly killed more than 400 people (a random assessment only indicative of the long killing spree) and in the process learnt to single out victims in groups. Probably for the same reason, tigers have been reported to have attacked the last persons in groups walking single file in Sunderbans—a strategy that defeats the security of numbers.

Moreover, while there is little scientific evidence of so-called man-eaters developing a taste for human flesh, it may be possible that they learn to appreciate the relative ease with which a human can be hunted down if the risk (numbers and arms) is low. This may explain those cycles of attacks in crowded forests (many potential targets) as very few villagers stay closeted in groups or carry guns (minimal risk) while making forays.

Of course, other manmade factors have created what Jim Corbett called “stress of circumstances” at both Sunderbans and Tadoba and may partially explain such high conflict. Poaching leaves behind orphaned, inexperienced or, injured carnivores. In the past year, five Tadoba tigresses have disappeared—feared poached. A number of faulty interventions like capture-release are rampant in Sunderbans. But, such interventions do not happen on the Bangladesh side where conflict is acute. But then, too many tigers are poached (both for revenge and profit) in Sunderbans which might have created a highly disturbed population.

Ultimately, each local conflict demands to be understood in terms of local factors. We have little data to draw any sound conclusion anywhere and thorough ground research is long overdue. Human-carnivore conflict has always evoked strong emotions. There are greater pressures at play today but we had better act responsibly. We have our right to safety, but that is not secured through exterminating other apex species. It is certainly not safe being alone. Not while walking in the wild. Not at the top of the food chain.

*\* Jay Mazoomdar is an independent journalist and writes on environment, conservation and wildlife issues.*



# Dr. Jekyll & Mr Hyde:

## *The Strange Case of Human-Macaque Interactions in India*

**They say: Pour, pour the milk! When they see a snake image in a stone  
But they cry: Kill, kill! When they meet a snake for real.**

**- Basavanna, 12th AD**

As we hurtle headlong into the twenty-first century creating technologies, breathing development, and grabbing land and resources, most of us will readily acknowledge that we may be harming the natural world by our actions and that we must do what we can to correct this. Judging from the enthusiastic response to most wildlife campaigns nowadays, it would also appear that the human population, or a goodly portion of it, genuinely sympathises with the fate of wild animals today and seeks to preserve them and their habitats. The more difficult choice to accept is that of physical coexistence, or sharing our living space with them. It is relatively easy to think of saving wildlife when it is a matter of conserving their space, infinitely more challenging when the issue is one of sharing our space with them.

Most primate species are constrained by their lifestyles to remain within the small forest fragments that we have earmarked for them; a handful is less decorous in their behaviour, and willfully enters our fields and homes to ravage and pillage them. Many of the Asian macaques fall squarely into the latter

category—hardy and highly adaptable, they have lived in close contact with human beings for centuries.. India boasts a high number of macaque species that are found in most parts of the country; the bonnet macaque and the lion-tailed macaque are found in southern India, the rhesus macaque in central, northern and northeastern India, the Assamese macaque, pig-tailed macaque, stump-tailed macaque and Arunachal macaque in northeastern India and the crab-eating macaque in the Andaman and Nicobar islands. All macaque species in India are threatened by anthropogenic pressures such as hunting, trapping and habitat loss, to greater or lesser degree. In turn, humans also face various disturbances due to macaques, such as crop—and kitchen-raiding, damage to household articles when they enter houses as well as occasional bites and injuries. The main causes responsible for the escalation in human-macaque conflict in the past few decades are: (i) loss of natural habitat due to encroachment of forest lands leading to macaque populations moving into and proliferating in human spaces, (ii) provisioning of macaques by tourists or people driven by religious fervour, leading to an increase of macaques in such areas,



and (iii) unplanned translocation of macaques from urban localities to rural areas, resulting in large populations of unwanted macaques in and around villages and cropfields.

The bonnet macaque, crab-eating macaque, Assamese macaque, pig-tailed macaque, stump-tailed macaque and the Arunachal macaque are known to raid cropfields in some areas and cause major economic losses to farmers. Also, where found in urban areas, the bonnet macaque is considered a nuisance due to its proclivity to enter houses and damage household objects. But the most feared and reviled of them all, in terms of causing hardship to humans, is the rhesus macaque. A sturdy, pugnacious species that inhabits towns, cities, villages and forests with equal ease, rhesus macaques not only cause financial losses to farmers and urban-dwellers due to their crop and kitchen-raiding habits but are also known to grievously injure people during such depredations. They have been labeled 'simian terrorists' in many towns and cities of northern India; Delhi, famously, has tried several measures to confine the monkeys to particular portions of the city, sometimes with monkey-proof fences (as in the Asola Bhatti Wildlife Sanctuary) or by chasing them away from residential areas (even using trained bands of langurs!).

Most prominent among areas badly affected by rhesus macaque-human conflict are the twin hill states of Uttarakhand and Himachal Pradesh in northern India. In Himachal Pradesh, approximately 53% of all crop damage in the state was attributed to rhesus macaques and financial losses to farmers over a three-year period estimated to be around INR 1,00,00,00,000 in agriculture and INR 75,00,00,000 in horticulture. In many instances, villages and agricultural lands have been completely abandoned by farmers, who see no resolution to their problems. The sheer number of rhesus macaques in these states makes it a management issue of gargantuan proportions. Of the approximately 276,000 rhesus macaques found in Himachal Pradesh, about 70,000 individuals abound in the rural and urban regions of the state. The degree of affliction caused by rhesus macaques is reflected in the recent decision of the Government of Uttarakhand to declare primates, along with other wildlife species such as wild boars and nilgai, as vermin so that they can be killed by farmers and ordinary citizens (Letter No. 1953/25-28, dated 15th January, 2007 from the Additional PCCF (Wildlife) cum Chief Wildlife Warden, Uttarakhand).

Mitigation measures proposed to control this major conflict include preventive management measures like surgical sterilisation or immunocontraception of macaques, garbage management and the prevention of provisioning in human-populated sites as well as reactive methods such as the capture of identified problem troops/individuals, development of

monkey sanctuaries and the establishment of insurance schemes/compensation for macaque-caused damage and injuries. Sujoy Chaudhuri, an ecologist-geographer with Ecollage, Pune, has repeatedly campaigned against the often-practiced measure of translocating problem macaque troops to Protected Areas or to other sites of human habitation. Translocation of macaques is the first solution demanded by most people living in macaque-affected areas and yet, unless this is well planned, it merely ends up transferring the conflict to other areas.

Human-wildlife conflict is strongly impacted by people's attitudes towards the offending species and nowhere is this more clearly demonstrated than in the case of human-macaque conflict in India. Macaques hold a position of great religious and cultural significance among Indians and this strongly affects their attitudes towards macaques and, in turn, their tolerance for macaque-caused damage. Raghav Saraswat's study of people's attitudes towards macaques in Bilaspur in Himachal Pradesh showed that although farmers considered macaques to be an agricultural pest and blamed them for huge losses sustained in farming, they also considered them to be a representative of God and therefore exhibited great reluctance in causing any harm to them. Kalpavriksh's study of human-macaque conflict in Garhwal revealed that farmers in Jardhargaon village believe that successful reforestation of the lands surrounding the village and the Forest Department's protection of rhesus macaque has led to an increase of macaques in their cropfields. Insufficient compensation for crop losses and seeming apathy on the part of the Forest Department has soured relations between the people of Jhardhargaon and their forest officials. A central issue of contention is that of responsibility ownership for damages caused by the macaques. The Forest Department has proposed a macaque-trapping program that will rid the village of its macaque troubles. However, the Department's insistence that the farmers pay for the costs of the trapping exercise has enraged the villagers.

These studies demonstrate that conflict mitigation measures can only succeed in our country with a much more nuanced understanding not only of the history of the conflict but also of the lives of the different parties involved in such conflict. The need of the day is thus not only education campaigns that inform people about macaque behaviour and appropriate ways of interacting with them but also research efforts towards a better understanding of the behavioural ecology of problem macaque troops and the sociocultural attitudes and economic realities of people affected by macaque depredations.

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# Space Odyssey: Rephrasing Conflicts over Large Carnivore Conservation

Large carnivore conservation is akin to a multi-billion dollar riddle. Scores of researchers, activists, bureaucrats, politicians, livestock herders, and hunters each hold a clue to the solution, but cannot seem to be able to agree on how to bring it together. The large carnivores themselves are far from cooperative be it the wolf, tiger or leopard. They are constantly making a meal out of someone's coveted animal, wild and domestic. On the one hand, are groups who favour large carnivores and their conservation and on the other, those that detest these red-in-the-tooth-and-claw large carnivores and favour their removal. The battle lines are clearly marked. Or are they?

Our research in areas as diverse as rural India and rural Norway suggests a different story has been playing out, with less clearly marked differences. While conservation practice is complex with multiple interests and dynamics, large carnivores themselves are not necessarily the source of disagreements between different groups. For instance, in rural Norway—where wolves are making a comeback after decades of absence—hunters and sheep farmers actually think about the wolf in much the same way as do biologists and conservationists. They see it as impressive and fascinating, a social and intelligent animal; the very incarnation of “wildness”. However, these two groups clashed on the interpretation of the physical space where these wolves have settled. The disagreement thus boiled down to how these groups perceived the landscapes, and consequently to whether the wolves belong there or not.

A similar story plays out in the Upper Nilgiris in the Western Ghats of South India, where the Todas graze their buffalo

herds on what little is left of the grasslands that dominated a shola (tropical stunted forest thickets) grassland complex. Now, the Todas claim that tigers have started preying on their buffaloes more often, a phenomenon uncommon in a previous grassy era. Ask the Todas about tigers and they respond with similar perceptions of physical space of wilderness being imposed on a pastoral landscape and wildlife appear to have been introduced. So where are the fault lines in these two very different landscapes?

**While conservation practice is complex with multiple interests and dynamics, large carnivores themselves are not necessarily the source of disagreements between different groups.**

The answer lies in how the landscapes are perceived by different groups. For this we turn to anthropologist Tim Ingold who suggested that people's perceptions of a physical landscape is based on the tasks that they perform in that space. In the Norwegian case, a fundamental question is whether the wolves return to a landscape where humans should continue a form of interaction with nature that has been going on for centuries, or if it should become a wilderness again. Social groups with deep cultural roots in traditional land use—and not only farmers—see their surroundings as a production



landscape that has been carefully cultivated through generations. Therefore the wolves threaten not only sheep, dogs and wild game. Their protection, widely seen as emblematic of a drive to change land use from production to protection, is threatening the whole idea of rural landscapes in the eyes of many local people. Conservation threatens traditional economic activities, and is viewed as part of a broader attack on rural communities and lifestyles, entailing centralization, depopulation, and general economic drain in favor of urban areas. Changes in the physical landscape, such as spontaneous reforestation of farmland and abandoned homesteads, are seen as the onslaught of chaos, and not a return to a pristine wilderness state. Removing wolves was necessary for earlier generations in order to turn the land into a carefully managed production landscape, and the current protection of wolves therefore is an attack on the whole rural ethos and a mockery of the toil of the ancestors. The environment agencies and biologists, on the other hand, focus on managing natural resources in the area and perceive this as a conservation landscape, and conservationists may indeed savor the idea of more wilderness. Thus while these groups might have similar views on the nature of the wolf, they disagree on the wolves' place in the landscape: If the landscape is "wild", then the wolves belong there. But if it is not, then it does not belong. To many local people, their landscape is far from wild, and cannot hold wolves.

The Nilgiri story plays along similar lines. The authorities have historically during the colonial period and also during the immediate post independence decades, focused on balancing the aesthetics of a savannah dominated landscape, with a counteracting tendency to address its 'un-productive' and 'wastefulness' in terms of timber value. And gradually since independence the commercial tendency prevailed with eucalyptus and wattle being planted in extents that have transformed the landscape into an exotic and invasive forest vegetation. The shola-savannah architecture that biologists and poets celebrated and the Todas coveted, pastorally and culturally, was permanently altered. For the Todas the Nilgiris Shola pastures are a well defined mix of a sacred and production landscape. A millennia of openness within which the Toda invented, practiced and perfected the rhythms and rituals associated with pastoralism, was to constrict. The 'darkness'

ushered by eucalyptus and wattle is now folklore. In addition, these new forests also provide tigers cover to prey upon Toda Buffalos more often. A phenomenon in terms of its increased frequency—vis-à-vis its occasional occurrence during earlier savannah dominance—is the reason why most Todas speculate that tigers were released from zoos. In terms of behavior that is attributed to 'semi domesticated' tigers the Todas mention instances of tigers coming near habitations, allowing buffaloes to get away etc. No self respecting 'wild' tiger would allow this to happen. Very similar stories are told in the Norwegian wolf areas: The 'new' wolves have allegedly been secretly reintroduced to recreate an artificial wilderness, they are not truly wild and are probably raised in captivity. The parallels to the Toda interpretation of the connection between landscape change and tiger presence is striking.

In both the instances, the groups have similar perceptions of the large carnivore, but their disagreements stem from their perception of the landscape and how it should be used. This insight adds an interesting twist to conservation practice, shifting its centre of gravity from conserving species to managing contested claims in multi use landscapes. Underlying this shift is the case of Akole, the third area of our research. Akole, located in the rain shadow of the Western Ghats in





northern Maharashtra, stands in sharp contrast with the other two areas. Socio-economic and political changes in the last two decades have seen this arid valley transform to a lush agricultural landscape dominated by sugarcane production. These changes have benefitted the residents of Akole, who see the valley as a production landscape. The valley is also home to a stable population of leopards who feed almost exclusively on dogs, pigs and livestock reared by people. Conservation authorities are present in the area but report minimal conflicts between people and large carnivore.

Historically, the leopards lived in the hills surround the valley but moved down into valley with the spread of sugarcane, which provide an ideal habitat for these secretive cats. The same change in the landscape lead to an economic transformation in the area. Thus the landscape change, which facilitated the leopard's presence in the area also benefitted people in the area. Interestingly, conservation authorities in the area too recognise Akole as a production landscape, even if it hosts leopards. There is thus minimal conflict in their perception of the landscape. Furthermore, both groups view the leopard as being part of the landscape rather than being artificially introduced. The conflicts are over the losses caused by depredation, which are managed through cultural beliefs, social negotiations, compensation scheme and a cynical suspicion of the Forest Department.

In all these instances, the large carnivores do cause very real depredation losses and in some Indian cases even physical harm to people. However, this is part of larger matrix of interactions between different interests, people and large carnivores. This research does not disregard these losses or dangers when people and large carnivores share a landscape.

It merely points to an underlying socio-cultural dynamic, which has a very real impact on large carnivore conservation, especially if local people are to participate in it.

This research thus challenges the dominant interpretation of conflicts over attitudes towards large carnivores that has led to a global industry dedicated to conservation education. While this has garnered support for the conservation cause it has had limited impact on actually conserving large carnivores on the



*Todas are one of the few indigenous groups living in the upper Western Ghats (above 2000 metres)*

ground or solving conflicts embedded in such conservation programmes. Relocating the conflict from attitudes towards large carnivores to perceptions of the landscape, shaped by the activities historically performed in it, provides a starting point for dialogues to resolve conflicts. Even compensation schemes have limited impact in resolving conflicts in perception of landscape, though they may be more effective in resolving the economic aspects of conflicts arising from large carnivore conservation.

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# Prioritizing the Tiger: A History of Human-Tiger Conflict in the Sundarbans

Human-wildlife conflict is widespread in today's South Asia and the wider world. Forty-seven elephants, seven leopards and two tigers have been killed in the last twenty months in the forests of northern Bengal. The deaths of elephants were caused in most cases by speeding trains. The problem of human-animal conflict is increasingly featuring in the media and in discussions. Interestingly, human-animal conflict has a rich history and dates back to the pre-historic times. This conflict was an inevitable part of the story of the expansion and development of human civilization and the invention of technology. The structure of the conflict has undergone a qualitative change in the post Second World War era. Modern conservationist ideas have done away with (at least theoretically) subsistence and defence hunting or hunting as sport. Indiscriminate slaughter of animals does not take place in modern times. What bothers us now is not so much the direct killing of animals by humans but the continuous expansion of settlements, industry, new technologies and agriculture by the humans. Elephant-train collision, bird-aircraft collision, and deer-automobile collisions symbolize this fundamental human-wildlife clash. Large carnivores require larger habitats and with the shrinkage of the corridor their paths cross with humans more frequently. It is against this backdrop that the history of the problem of human-tiger conflict in the Sundarbans has to be understood.

## The Beautiful Forests

In the Sundarbans the tiger had always been at the centre of people's economic, social, cultural and religious life. This was the case in the past and still is today. During the Raj, the colonial drive to maximize revenue forced inhabitants of the Sundarbans to come face to face with tigers. In post-colonial India, the introduction of Project Tiger turned the Sundarbans into a local theatre of a larger campaign. The tiger became central to the debate on conservation and this local space thus turned into a global one under the universal campaign for tiger protection.

In the 1960's and 70's environmentalism began to adopt transboundary approaches drawing recognition to problems, such as species loss, that affected more than one country at the same time. European wildlife biologists made a strong case of the fact that only in the forests of India and the mangrove

swamps of the Sundarbans were there tigers in sufficient numbers for an effort to save this endangered species to have any likelihood of succeeding. The rhetoric of wildlife conservation fuelled a universal campaign that disregarded local priorities and knowledge systems. This campaign led to the launching, in 1973, of Project Tiger in nine reserve forests of India, including the Sundarbans.

The Sundarbans has a unique history, nature and landscape. It is half water and half land. It is a terrain where land making has not yet come to an end. It is a place that had been alternately inhabited and deserted. It is perhaps the only place on earth that is threatened at once by cyclones, tidal waves, lack of fresh water, tigers, crocodiles and poisonous snakes. It is the largest mangrove forest and the only mangrove tiger habitat in the world.

WW Hunter's representation of the Sundarbans as a fearful place—a sort of drowned land, covered with jungle, smitten by malaria, and infested by wild beasts—brings to culmination all the earlier descriptions of the area. In his 60-page seminal essay, published in 1875, Hunter portrayed the Sundarbans as an area 'intersected by a thousand river channels and maritime backwaters, but gradually dotted, as the traveller recedes from the seaboard, with clearings and







patches of rice land'. The area, he noted, was a vast alluvial plain, where the process of land-formation was still ongoing. He described the forest as very dense and commented that the swampy nature of the terrain impeded progress through the jungle. Colonial constructions of the Sundarbans were hybrids that were partly British and partly indigenous, and often neither of the two. The Raj was neither wholly British nor entirely native. Like the British, the indigenous people of the Sundarbans perceived the area as harsh and dangerous, a place full of banda (bushes) and kada (mud), and infested with tigers and crocodiles. Thus, indigenous and foreign perceptions were sometimes in tune. The combination often resulted in new ecological or environmental ideas relating to the management and exploitation of this then little known natural world.

Most descriptions of the Sundarbans, including WW Hunter's classic account, portray the Sundarbans tigers as dangerous man-eaters. As British power in India expanded, information about the deaths caused by tigers began to pour in. By the second half of the nineteenth century it was estimated that tigers killed 1,600 people every year. It was also estimated that on average each tiger killed between 300 and 600 pounds' worth of cattle in a single year. Travellers' accounts and memoirs are packed with tales of the deaths of Europeans seized by tigers while travelling, going out for a picnic, or hunting, as many graves in European cemeteries can testify. The most famous such incident was the death of Sir Hector Munro's son in the Sundarbans in 1792. We shall see how the British and the Badamiyan seemed in some ways to be locked in a conflict for the control of the Sundarbans.

## Taming The Beast

The intrusion of the colonial state, the implementation of Project Tiger in the post-colonial era, and the introduction of the biosphere reserve programme inflicted a new sort of misery on the inhabitants of the Sundarbans. Conservation of nature has often involved the relocation of residents; for example, during the early history of the US and in the former colonial world in Africa. The Sundarbans was declared a Protected Forest in the nineteenth century, not to make it a tourist destination like Yellowstone, but as part of a general

policy that led to the reserving of a fifth of the land area of British India as government forest between 1878 and 1900, to the purpose of increasing revenue and upgrading a growing stock of various kinds of timber.

The colonial government was quick to grasp that the Sundarbans, if reclaimed, could be transformed into a revenue yielding area. As early as 1867, the forest administrators had realized the revenue value of the Sundarbans. In the Forest Department's report for that year, we read: 'these woodlands should be a permanent source of revenue of several lakhs to the state, and an unfailing supply of wood at a fair price to the public'. Besides placing the forest under protection, the government gradually introduced user fees, licences and tolls under the pretext of preserving the diminishing natural resources. The customary users of the Sundarbans forests saw these as detested intrusions of the state.

The designation of the Sundarbans as a Protected Forest was especially significant. The cultivable lands and villages in and around the Protected Forest were alluvial lands that had formed after 1793 and were outside the jurisdiction of the Permanent Settlement (1793). Recent research suggests that in the nineteenth century the Sundarbans and the more active part of the deltaic region had high economic potential and social mobility. We shall now look at how their efforts to maximize revenue brought the colonial rulers into an indirect conflict with the tigers of the Sundarbans. References to Sundarban tiger are too many to list here. It is known from the Pala inscriptions that there was a place called Byaghratati-mandal in southern Bengal, facing the sea. The literary meaning of the term, as Niharranjan Roy has pointed out, is 'a forested seashore infested with tigers'; a characterization that is highly evocative of the Sundarbans as we know them. Ralph Fitch, who visited the area in the 1580s, described southeastern Bengal as a dense forest infested by ferocious wild animals such as tigers and buffaloes. The earliest concrete reference to the notoriety of the tigers of the Sundarbans can be found in the writing of Francois Bernier, who visited the area in 1665.

Land reclamation in the Sundarbans in the 19th century proved extremely difficult. One of the major challenges came from the local tigers, branded as 'man-eaters' in the official papers. The tiger often attacked the defenceless forest clearers and wrought such fearful havoc that the authorities had to temporarily postponed the work. The coolies (workers) thus had to be accompanied by shikaris (hunters) who would fire their guns at intervals to frighten away the tigers, which abounded in the forest. On many occasions the work would have to be given up entirely and the reclaimed land would eventually revert to jungle.

The tigers seemed reluctant to distinguish between white and coloured bodies. White people appeared to be equally helpless in the face of the beast. In 1782 the Henckelganj market was

established. Mr. Henckell's native agent named the place after Mr. Henckell in the hope that the local tigers would no longer molest people in the area out of respect and fear of the name of the first English Magistrate of Jessore. However, reports of tiger attacks continued to reach the district headquarters with the usual regularity. Stories about man-eaters developed into myths and legends of startling proportions. Superstitions were rife among Indians and Europeans alike, and the man-eating tiger often approached the status of the werewolf of European lore.



The government was convinced that all or most of the tigers of the Sundarbans were 'man-eaters' and the destruction of as many tigers as possible appeared to be the only way of reducing casualties. The encounter with the beast on the ground, however, was mostly left to the indigenous shikaris, who were usually looked down upon as incompetent, unskilled and effeminate. The government adopted a policy of rewards to induce the indigenous shikaris to destroy tigers. A government notification dated 16 November 1883 and published in the Calcutta Gazette authorized the rangers and foresters in charge of the eight chief revenue stations in the Sundarbans reserved forest to pay rewards for the killing of tigers. In 1883 the amount of the reward was Rs. 50 for each full-grown tiger and Rs. 10 for each cub. To receive their reward, the shikaris were required to produce the skin and skull of the animal for the forest official. The reward was gradually raised over time, each increase following fresh depredations of tigers in the jungle. In 1906 the reward was

raised to Rs. 100 per full-grown tiger and Rs. 20 per cub. In 1909 the amount for a full-grown animal was further raised to Rs. 200. This last raise was prompted by the loss of 500 lives to tigers between 1906 and 1909.

Thus, a large-scale slaughter of this magnificent animal was undertaken in the Sundarbans under official patronage. Between 1881 and 1912 more than 2,400 full grown tigers were killed in the area. (The Annual Reports of the Forest Department, however, from which I derived this figure, do not take tally of those killings that took place outside the forest area or were not reported to the Department.) The authorities left no stone unturned to suppress the tigers. Efforts were made, for example, to destroy them by setting plain traps or traps with spring-loaded bows and poisoned arrows. Such traps could be successful only in the winter, as tidal waters flooded them at other times of the year.

## The Current Scenario

The Sundarbans was one of the nine initial tiger reserves. From the early 1970s it was also included in UNESCO's global chain of biosphere reserves. The Sundarbans thus became a local theatre for a larger universal campaign informed by the science and politics of international capitalism. The chain of reactions generated in the Sundarbans propagated in multiple directions, often far beyond the aspirations of the original project. Following the recommendations of Project Tiger, some inner core zones of the Sundarbans were reserved for undisturbed reproduction and buffer zones were established around them, where villagers would be allowed limited access for the collection of forest products. As dictated by ecosystem approaches, the core zones were to be carefully bounded and all roads closed, stock grazing and commercial timbering were to be suspended in them, and silted watercourses and the habitats of depleted tiger prey species (mostly deer) were to be restored. The existing forest landscapes were to be reengineered. The implementation of Project Tiger involved the relocation of many villages from the buffer zone. Thus, the price for setting up the tiger reserve was human displacement. Hundreds of people were relocated for each tiger being protected. Only in a few buffer areas were people allowed to remain. The ideal size of the reserves as suggested by international wildlife biologists would have been 3,000 sq km, but India with its ever-increasing population had no other choice but to opt for less than 15,000 sq km on average. In the case of the Sundarbans the size was even smaller. The task force predicted that as they increased in number the tigers would eventually start roaming outside the core and buffer zones. The prediction has come true, in the Sundarbans as well as in other reserves. Clashes between Forest Department staff and local villagers are very common in the Sundarbans today, the main issues being poaching, fishing and human deaths caused by tigers.



The conflict between humans and tigers in the Sundarbans is rooted in the socio-economic condition of the local people and the tigers' man-eating habits. The per capita income in the Sundarbans is estimated at less than half the state average. In their struggle for survival thousands of people enter the forest braving the crocodiles, sharks and tigers in order to gather honey, cut wood and catch fish. This brings them face to face with the tigers. Sometimes the tigers enter villages near the buffer zones and carry off men, women or cattle. This is an area where tigers kill hundreds of people a year, but since they are a protected species, killing a tiger that has been preying on a village will bring in the government authorities to mete out punishment; a terrifying prospect for the deceased's near and dear. Thus, the new widow and the victim's children are forbidden to cry and taught to say their father has died of diarrhoea, because if the actual cause of death is found out the family members will be forced to pay for the dead trespasser and will be treated like criminals.

In his remarkable novel *Hungry Tide*, Amitav Ghosh gives a vivid interpretation of this conflict between the indigenous people of the Sundarbans and the tigers. In the novel, a tiger is accidentally trapped in a livestock pen while trying to carry away a calf. An angry mob quickly gathers and attacks the incapacitated animal with sharpened staves. A boy thrusts a sharpened bamboo pole through a window and blinds it. Piya, an American cetologist and the central character in the novel, tries her best to save the animal but is helpless in the face of the hostile crowd. Even her associates Horen and Fokir side with the mob and participate in the killing. Such occurrences are very common in the Sundarbans. The incident portrayed in the novel is illustrative of a fundamental and yet delicate issue that continues to feature prominently in global debates on the management of nature. The setting up of the tiger reserve has given rise to a host of new unknowns, including the human-tiger conflict. The later conversation between Kanai and Piya about the killing of the tiger brings out the essence of the several flashpoints in this complex matter. The issue of the tiger-human conflict in the Sundarbans, depicted in the above story, has its roots in the policy pursued both by the colonial and the post-colonial state in India. The colonial forest policy, fuelled by global capitalism, led to the dislocation and degradation of the local people. The post-colonial project of tiger conservation has further contributed to their misery. The forest policy of the post-colonial state has excluded the indigenous people from the Sundarbans tiger reserve. It has deprived them of the right to use the forest, which it has preserved only for the animals. To quell the local people's hostility towards the state conservation policy, global agencies have recommended the involvement of residents in the management of local resources. The biosphere reserve and Sundarbans tiger conservation programmes are based on a highly participative approach of local communities. But the



on-ground implementation of tiger conservation has neglected the enormous knowledge of the people of Sundarbans about their ecosystem and the local wildlife. The short-sightedness of official conservation policy in independent India is reflected in its neglect for local communities' immense knowledge of ecosystem and wildlife management. This indigenous knowledge is tapped by the officials when convenient and then discarded. The relevance of traditional knowledge of biological resources needs to be understood in the full context of the local social and cultural milieu, including the surrounding habitats. But unfortunately the local communities have never been asked to become a part of the decision-making process. The universal rhetoric of conservation and its implementation have given rise to new complexities that have alienated the local communities, and this has made the new unknowns even more unmanageable. The forces of industrialization of the globalised world have been continuously threatening the reserve in recent times. Ever-expanding human settlements have encroached on large areas in the buffer zone. Intense water transport using up an enormous amount of fossil fuel is disturbing water life through continuous navigation and oil slippage. The decrease of fresh water flow has increased the salinity of the water and seriously perturbed the region's ecosystem. A large number of water bodies on the outskirts of nearby Kolkata, which had previously acted as natural filters, have been drained and replaced by housing estates to meet growing demand. As a result the city's effluents now flow directly into the Sundarbans biosphere reserve. All this is causing great harm to the mangrove forest and the natural food chains and multiplying the possibilities of human-wildlife conflict in various forms.

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*\*Artwork by Kalyani Ganapathy.*

# Circumventing the Elephant

Farmers of the rainforests of Nigeria, Africa constructed an extensive network of earthen walls and moats. Astonishingly, in some places, the walls are 20 m high and the moats 20 m deep. What makes this even more remarkable is that Sungbo's Eredo (meaning "Sungbo's Ditch") is thought to have been built around 1150 AD on the orders of a childless matriarch, Bilikisu Sungbo (although the dates don't add up, locals believe that she is none other than the Queen of Sheba). The fortifications span 160 km encompassing an area of 1,400 sq km, the size of Delhi. Nearby Benin City has even more spectacular walls and trenches, extending 16,000 km and covering an area of 6,500 sq km. This is thought to be the single largest archaeological phenomenon on the planet, an enterprise larger than the Egyptian pyramids. The zooarchaeologist, Juliet Clutton-Brock, believes they may be evidence of man's earliest elaborate defense of crops against elephants. However, conflict with these pachyderms is thought to have started much earlier, when man first began to till the soil.

A millennium later, the range of devices that farmers use to keep elephants at bay is a tribute to the ingenuity of both, animals and humans. The simplest and most widespread (perhaps the oldest) practice is guarding crops through the night from tree top machans (or ground level tunsis, rickety

shacks sometimes protected by a trench, used in north Bengal and Assam). When elephants are spotted, the vigilant farmers set up a cacophonous racket by lighting fire crackers, banging plates or rattling other noisy implements to scare the animals away. When extended families lived together, men took turns at guard duty. Now that nuclear families are the norm, the burden of chasing elephants falls on the man of the household night after night; hiring guards is not an option for poor farmers. The price of inadvertently falling asleep after a long day's labour is catastrophic: the loss of the family's sustenance for the next few months.

If an animal is repeatedly chased away from food, it gets irritable and elephants are no exception. Humans who haven't slept well for days become crotchety. When bad-tempered members of two species confront each other, the stage is set for tragic accidents. The elephants' dark coloration renders them almost invisible at night and drowsy farmers on patrol have been maimed or killed. Bursting fire crackers can goad elephants to take out their aggression on buildings or machans. Feeble torch lights, the barking of dogs and even a solitary human voice can cause a frustrated elephant to charge, sometimes with fatal consequences. Guarding crops is probably one of the most dangerous occupations in elephant country and several villagers tilling marginal lands have abandoned farming altogether.

In parts of elephant country, farmers complain that none of the commonly used methods such as torch lights and bursting fire crackers work anymore. In north Bengal and Assam, farmers have resorted to chasing elephants using mashal (a spear tip surrounded by a flaming ball of rags), birio (indigenous sling shots), poison arrows, flaming arrow heads, jute (fire balls on sticks), cycle tyres set afire, and more. Some of these cause grievous injuries to elephants and the pain can ramp up their aggression. In areas where damage caused by elephants is particularly high and farming has become unsustainable, men emigrate to cities for work leaving their wives to guard the crops. One agitated woman in Upper Kolabari village (north Bengal) shrieked, "We used to think that elephants were god, but not anymore. If they are killed, then finally there will be peace." Eventually when she calmed down, she complained that she hadn't slept



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for weeks and the stress of managing the farm and family while her husband was away was sapping her energy. The despondent woman was only voicing her threats, others more intolerant carry them out—they kill elephants with home-made guns, electric wires hooked up to high tension cables, and poison or explosive filled pumpkins.

In an effort to aid the beleaguered farmers, almost every division of the Forest Department in north Bengal and Assam forms a squad to chase elephants away during the harvest season. Depending on the obstinacy of the herd, it may take a few hours to a full night's work to complete the job and the squad can only rush to one or two sites per night. On jeeps, tractors or trained elephants called kumki, they fire blanks to drive wild elephants away. One beat officer claimed proudly, "The elephants won't budge if your vehicle goes, but as soon as our jeep arrives, they start moving." During the harvest season, the field staff of the Forest Department is stretched to the limit, performing their regular duties through the day and chasing elephants every night without overtime or other benefits. On the other hand, farmers complain that these squads are inadequate and that the elephants return to the crops once the squads leave.

Perhaps the one method that has gained mythical powers of stopping elephants in their tracks is the electric fence. The non-lethal pulses of high voltage power carried along steel wires, unpleasantly jolts a barging elephant, warning it to stay away from the farm. As ingenious as it sounds, electric fences are no panacea. Desperate elephants have learnt a variety of tricks to get through fences—toppling trees onto them, using their tusks to rip or the soles of their feet to step on the wires and even running into them bringing posts and wires down! In Kenya, removing the tusks of eight fence-breaking bull elephants did not stop them from breaking 20 electric fences in the following five days. Once an elephant loses its fear of electricity, no fence, however sophisticated, appears to stop it.

Several NGOs in different parts of India are testing and implementing different methods of protecting crops from elephants. Perhaps the simplest innovation is the creation of voluntary youth groups to watch for elephants from machans. Young men spend their evenings playing card games while keeping an eye out for the pachyderms. Some of the other experiments range from using thorny plants to create a 'biofence', alternate inedible cash crops, bee hives along the perimeter of farms, trip wire alarms that alert sleeping farmers to the presence of elephants, and delivering chilli's pungency through a variety of means (smoke, spray, paste smeared on a rope surrounding the crops). Some of them have shown initial promise but that is mainly because elephants stay away from anything new and unusual; if they put their minds to it, they seem to eventually overcome

these obstacles. This talent inspired the ancients to create the elephant-headed god, Ganesa or Vinayaka, the super-human clearer of obstructions.

The crucial factor that determines the success or failure of any conflict resolution measure seems to depend on the elephants' desperation for crops. In areas where there is abundant natural forage such as the Nilgiri Biosphere Reserve, elephants that are tempted by agricultural goodies, can be deterred by any of the methods. But in places such as Kodagu (Karnataka), Assam, north Bengal, Orissa and the Northeast where the assault on

## **When bad-tempered members of two species confront each other, the stage is set for tragic accidents.**

forests is intense and unrelenting, hungry elephants rely on human agricultural enterprise for their survival and they will overcome any challenge that man erects between them and the food they crave. Confining these giants with gargantuan appetites to fragmented insubstantial forests using fences, trenches, or walls is bound to fail (and unethical); but should these measures work, the elephants will in all likelihood eat through the forests and worsen the situation. Enriching the habitat by planting fodder, trees, and bamboo in elephant country has been suggested, but little is known of its efficacy.

We cannot hope to be successful by gnawing away at the habitat with one hand and with the other, curbing, altering and manipulating elephant behaviour and movement according to our convenience with the expectation that they will obey. That's like trying to staunch a hemorrhage with several little band-aids. Wildlife managers are constantly on the lookout for measures that work decisively against elephants under any conditions, but unfortunately, there are none. At best, using the various measures in combination, changing them frequently and constantly improvising will buy us some time while a long-term habitat protection strategy is developed.

Conflict is caused mainly as a result of human actions, and this has to be at the heart of any attempt at resolution. Elephants are only compensating for what they have lost. In other words, it is not the elephants that are badly behaved, it is us. According to Project Elephant, 3% of India's land surface is elephant country and of this, only 10% is affected by conflict. It is still possible to achieve a more amiable relationship with elephants if we put our minds to it and this is the time to do it before we irrevocably lose more elephant habitat.

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# Can we Solve Human-Wildlife Conflict?

Based on our studies in Norway and India, and the rapidly expanding scientific literature in this field, it is safe to say that human-wildlife conflicts are a universal state of affairs. This is a serious issue because it represents a long term threat to the persistence of wildlife as well as negatively affecting the lives of millions of people. Our conflict research is motivated by a desire to identify paths towards conflict reduction and mitigation, for the benefits of both people and wildlife. After many years of research we must ask ourselves the question—can we actually turn landscapes of conflict into landscapes of coexistence?

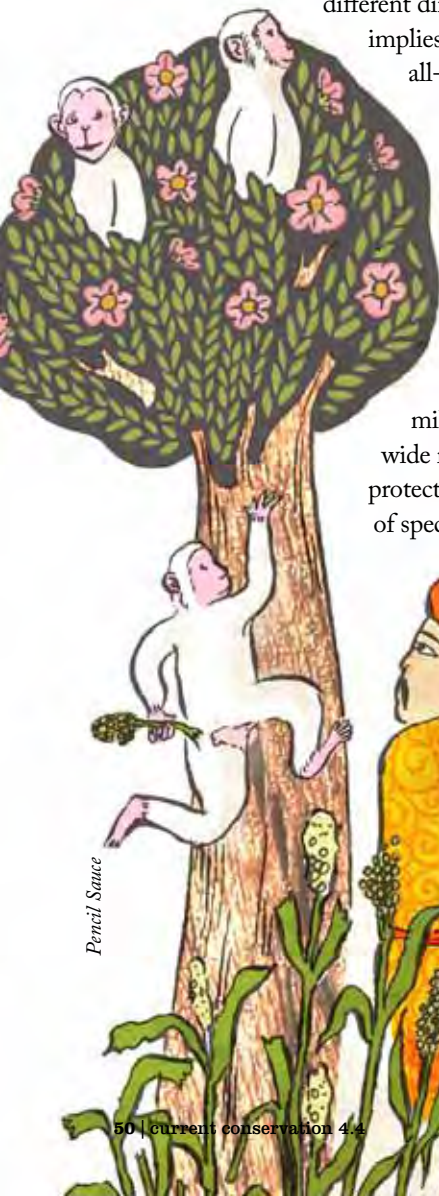
We believe that the most important result of our research is to have identified that human-wildlife conflicts exist along many different dimensions. This complexity implies that there are no simple and all-embracing solutions.

When it comes to the basic material conflicts like carnivore depredation on livestock or ungulate raiding of crops or forest plantations there are many practical measures that can be implemented. Over the millennia people have developed a wide range of methods that can protect livestock. One involves the use of special breeds of livestock

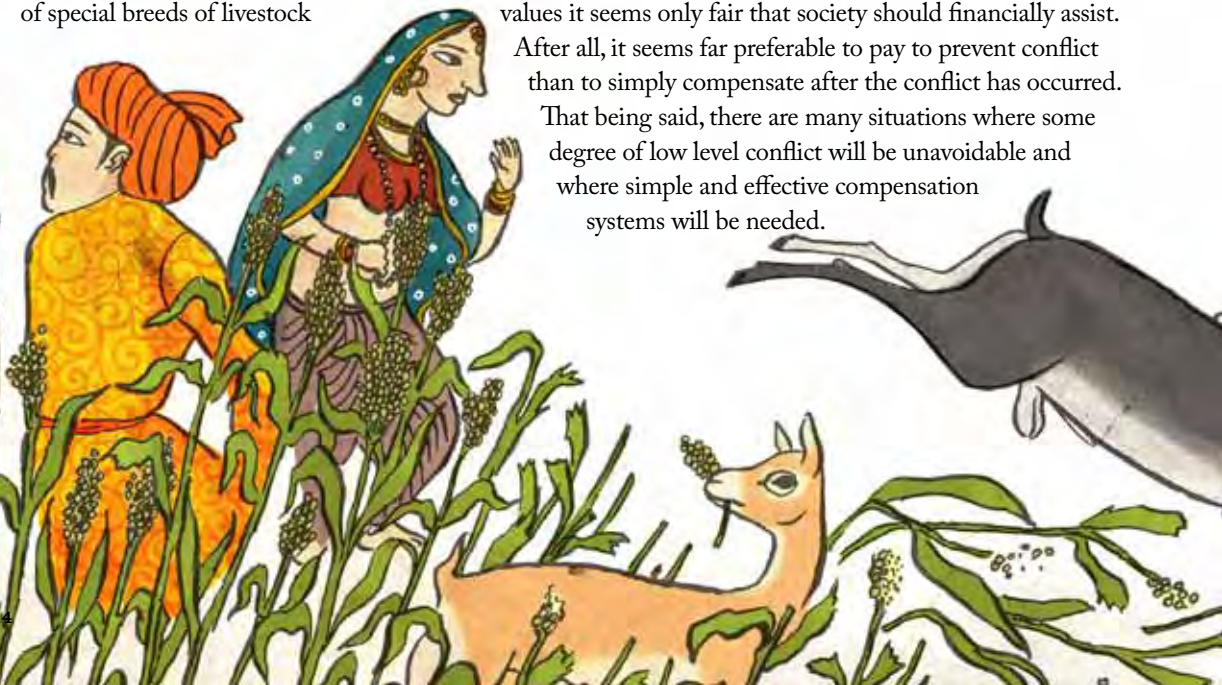
guarding dogs. Predator-proof night-time enclosures can also greatly reduce losses. Traditional materials such as stone and timber or thorn bushes are now increasingly being supplemented with portable electric fences for migratory flocks or chain-link fences and concrete barns for more settled herders. Used in combination with shepherds it is possible to keep depredation to a minimum, at least in systems where livestock are kept under supervision. Crops can also be protected by fencing either with physical fences or with “fences” of repellants. Likewise, the careful choice of which crop to plant where and when can also reduce potential losses if unpalatable crops are grown in the most exposed sites.

In areas where humans are exposed to leopard attacks it is likely that a range of measures can be adopted to reduce the chances of people and leopards meeting under the wrong circumstances. The use of simple measures like automatic timers on water pumps in distant fields that would save farmers from having to enter the crops at night would prevent many dangerous situations. Clearing up garbage to reduce the presence of free-ranging pigs, and properly enclosing livestock and dogs at night should also reduce the extent to which leopards are attracted to towns and farms.

All these measures require extra costs so there is a need to develop financial mechanisms that can assist local people in making the necessary acquisitions. When local people bear the brunt of the conflict with wildlife that national and global societies values it seems only fair that society should financially assist. After all, it seems far preferable to pay to prevent conflict than to simply compensate after the conflict has occurred. That being said, there are many situations where some degree of low level conflict will be unavoidable and where simple and effective compensation systems will be needed.



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Beyond these simple measures that can be implemented at the local scale there are a number of issues that require large scale landscape or ecosystem level planning. Examples include the need to restore connectivity in fragmented landscapes so that migratory elephants do not need to enter farmlands and the reduction of ongoing fragmentation of remaining forest patches that lead to the expansion of the human-wildlife interface. The complex example of green turtles in the Lakshadweep Islands illustrates the complexity of the pathways that can lead to conflict. There are many similar cases in a global context where the overabundance of wildlife following protection leads to some hard practical decisions about how to act and some more metaphorical questions about the role of humans in maintaining ecosystem dynamics. It often appears that we can cause as many problems because we don't have enough interaction with the ecosystem as when we have too much. It raises the question concerning the ability of conservation and legal frameworks that were designed to save species from extinction to function once the species have begun to increase and expand again.

Finally, our results have identified the importance of social and political conflicts that concern conflicts between different groups of people (e.g. local people vs the state) over how wildlife should be managed rather than directly between the people and wildlife themselves. Some of these conflicts can be addressed by developing effective channels of dialogue between local people and wildlife management authorities and creating suitable forums where issues can be discussed and solutions developed in a collaborative manner. One of the surprising things that we have experienced is that the process of doing research, especially interdisciplinary research, can actually



function as an effective catalyst for building bridges between different parts in the conflict.

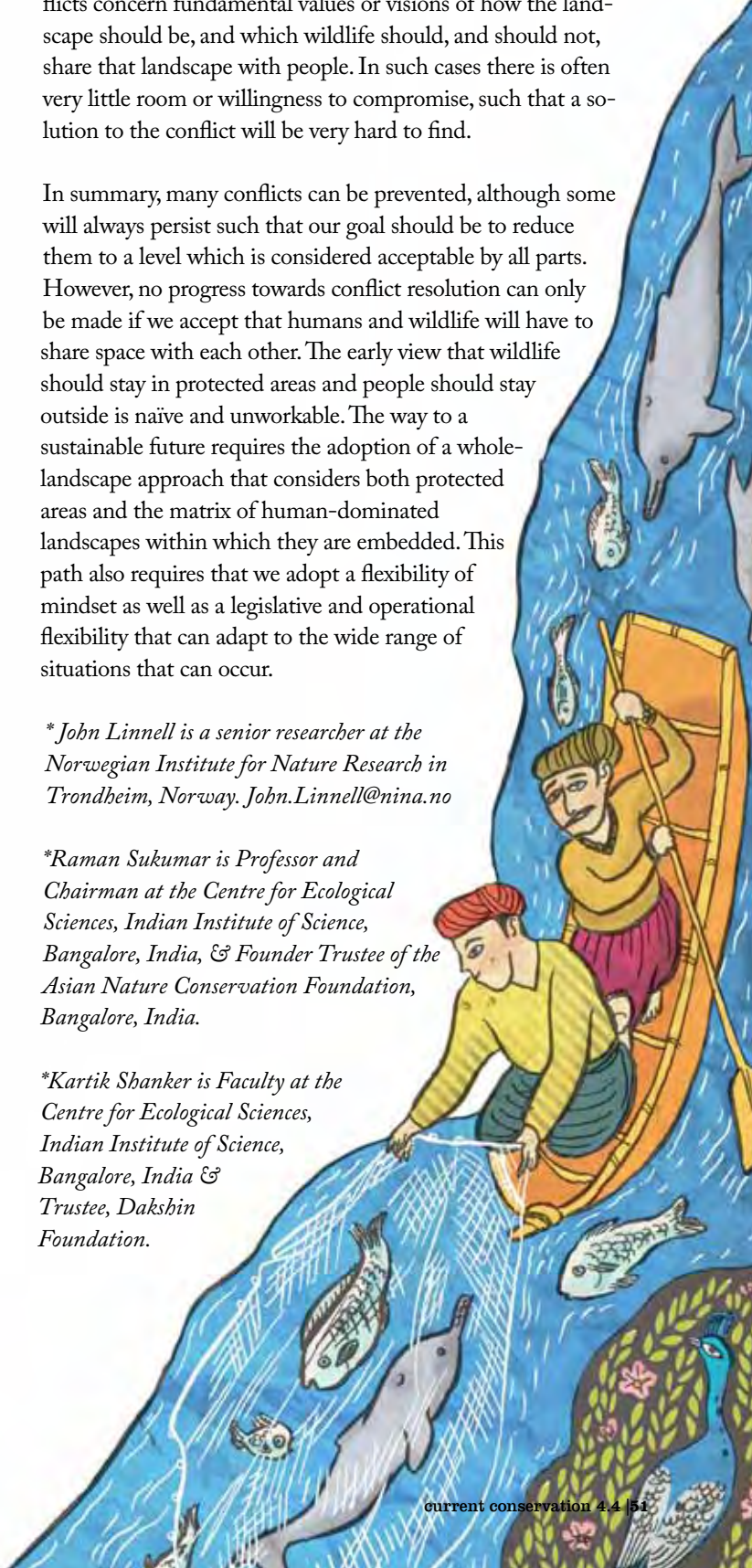
Unfortunately our research has also identified a number of areas where social conflicts are of a nature that does not permit effective solutions. These concern some of the cases where conflicts concern fundamental values or visions of how the landscape should be, and which wildlife should, and should not, share that landscape with people. In such cases there is often very little room or willingness to compromise, such that a solution to the conflict will be very hard to find.

In summary, many conflicts can be prevented, although some will always persist such that our goal should be to reduce them to a level which is considered acceptable by all parts. However, no progress towards conflict resolution can only be made if we accept that humans and wildlife will have to share space with each other. The early view that wildlife should stay in protected areas and people should stay outside is naïve and unworkable. The way to a sustainable future requires the adoption of a whole-landscape approach that considers both protected areas and the matrix of human-dominated landscapes within which they are embedded. This path also requires that we adopt a flexibility of mindset as well as a legislative and operational flexibility that can adapt to the wide range of situations that can occur.

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