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COMMON GROUND

Why elephants thriving in Karnataka's coffee estates isn't good news

Changes in landscape and climate are fuelling human-animal conflict in the region. There are no easy solutions in sight.

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On a warm April morning, a Mahindra Bolero sped through roads lined with coffee plantations in Kodagu's Virajpet block.

Inside the vehicle were three forest watchers, staffers of the Karnataka Forest Department whose job it is to patrol and monitor the forest. The three formed a "rapid response team", or RRT, of the department, responsible for tracking and monitoring elephant movement and, if needed, chasing the animals away from fields and inhabited areas, so that they don't present a danger to humans.

Also in the vehicle were two researchers from the Wildlife Institute of India, or WII, a government institution headquartered in Dehradun.

One of the forest watchers was armed with an airgun. A researcher seated in the passenger's seat, meanwhile, held an antenna out with his right hand, while with his left he held close to his ear a monitor that was beeping faintly.

The team was tracking an elephant herd that had entered a coffee estate. As they drew closer, the beeping grew louder. Once they found the animals, they would keep a close watch on them until they left the estate – if the animals grew aggressive, the team would frighten them away by exploding crackers or firing the gun into the air.

The regular presence of elephants in the region's coffee plantations suggests that the animals have increasingly moved away from the surrounding forests, their natural habitat. Residents of the area say this has occurred over the last fifteen years.

Research backs this conclusion. The WII team, for instance, has found that some of the animals they track in this region have barely ventured into forested areas in the past three years, largely remaining inside coffee estates.

In Karnataka, elephants are often spotted outside protected areas – increasingly, in coffee estates. Photo: Dibyangshu Sarkar / AFP

Sanath Muliya, a project scientist with the WII team till June, noted that this shows conclusively that coffee plantations are now being used increasingly as permanent refuge sites, rather that just as temporary migration routes, by certain elephants outside protected areas.

Instances of elephants raiding paddy fields have also gone up over the last two decades, but Muliya explained that although the animals see the fields as a source of food, they see a coffee estate as a suitable habitat to live in.

"Coffee estates have abundant water sources for irrigation, edible tree species and have green cover throughout the year, even in dry season," he said. "Water bodies found in such estates are perennial as compared to seasonal water bodies in adjacent protected areas. And neighbouring agricultural landscapes also provide dense, highly palatable and accessible resources such as paddy, grass, edible trees."

Astonishingly, the rise in the number of elephants straying into coffee estates has been accompanied by a change in the animals' behaviour.

In the late 1970s, elephant ecologist and conservation biologist Raman Sukumar conducted the first statistical study done in Karnataka to understand elephant ecology, which was also the first such study in the world to look at conflict between humans and animals.

Sukumar discovered that it was only the male elephants that raided crops. Further, they only did so when they were in musth – a state of sexual arousal that male elephants go through periodically, during which they seek mates. Sukumar deduced an evolutionary principle at play in this behaviour. To sustain the state of musth and increase the possibility of mating, the elephants required higher nutritional intake. In the 1970s, the elephants of south Karnataka, where Sukumar did his study, could obtain this nutrition by raiding crops. It was these nutrition-hungry males that were at the centre of human-elephant conflict, he discovered.

But four decades later, this pattern has shifted, at least in Kodagu. Males, females and sub-adults are all known to raid crops.

"Elephants are intelligent, social animals," said Muliya. "This crop raiding behaviour must have started with a few individuals and then got passed on. And it makes sense too – the amount of energy an elephant has to spend inside the forest to consume the same amount of calories that it can get inside a coffee estate is huge."

This presents a problem, since the animals can pose a threat to humans in these coffee plantations. The rapid response team is one kind of a solution, which tackles situations when elephants are found in human inhabited areas. But devising a longer term solution requires a more intricate understanding of the problem, one that begins with tracing the formation of the district's landscape itself.

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Kodagu district is bordered by the Western Ghats on one side and the Mysore plateau on the other – on the side of the plateau is the Nagarhole Tiger Reserve, the protected area with the highest density of elephants in the country.

The district is renowned for its coffee and has the highest area under coffee cultivation of all districts in the country. Every third cup of Indian coffee comes from Kodagu.

Coffee, which was brought from Iran to India by the Sufi spiritual leader Baba Budan in 1600s, came to Kodagu in the 1700s, according to the British missionary and educationist G Richter, who wrote about the subject in the Gazetteer of Coorg, published in 1870. The region's wet climate and undulating topography were ideal for the growth of the crop, and many landowners took to it enthusiastically.

In much of India, land was owned and controlled by kings in pre-colonial times. But in Kodagu, large tracts had been given over by kings to those who rendered military service to them, under a system of land ownership and inheritance known as "jamma". These lands, which were relatively lightly taxed, could not be sold, but the owners could use them as they pleased and could bequeath the land to heirs.

These landowners used the flatlands of their holdings to cultivate paddy, and largely left the hilly portions as forests, which would yield manure, in the form of fallen leaves and other plant matter, for the fields.

When coffee came to the region, many of these landholders were quick to recognise the opportunity it presented. They converted the hilly tracts in their possession to coffee plantations – the jamma system ensured that they did not have to seek permission from any authority or justify their decisions.

Later, British colonisers tweaked the jamma system to allow owners to sell land. This made it possible for more coffee planters to invest in land in Kodagu and set up coffee plantations.

Those who held these land titles continued to do so after Independence. In 1961, Karnataka passed the Karnataka Land Reform Act, under which an individual's landholdings were limited to a maximum of 40 acres under the category with the highest entitlement. But, like other land reform laws across the country, it exempted coffee plantations, allowing owners to continue to cultivate large estates and prosper.

These advantages were only further boosted in 1995. Until then, according to regulations, coffee growers had to sell their produce to the government's coffee board, which acted as a middleman and sold it on to the market; that year, the Central government changed regulations to allow growers to sell directly into the open market, which ensured that they could retain greater profits.

Coffee prices boomed. "When we used to sell to the board, we would get around Rs 2,000-Rs 3,000 per bag of 50 kg of coffee," said Rajah Madaiaah CM, a coffee estate owner who has a 30-acre coffee plantation. "After that, the prices shot up to as much as Rs 6,000 for the same amount. I turned the fallow land on my property to coffee."

The area under coffee cultivation across the country shot up. According to data from the Coffee Board of India, around 15,900 hectares of land were under coffee cultivation between 1985 and 1995, which increased to around 67,900 hectares between 1995 and 2005.

Kodagu has also seen a growth in the area under coffee cultivation in recent decades. According to the Coffee Board of India, Kodagu had 1,012 square kilometres under coffee cultivation in 2006; by 2020, the area under coffee cultivation had expanded to 1,075 square kilometres. This was the highest of any coffee growing district in the country, and almost a quarter of the geographical area of Kodagu.

Data suggests that this growth came at the cost of forests. A study in 2019 found that, between 1973 and 2018, the percentage of the district's land area that was under evergreen forest came down from 40.47% to 27.14%. "Around 66,892 ha" – approximately 668 square kilometres – "of pristine forest cover has been lost due to large scale land cover changes with coffee plantations expansions," the study noted.

But the conflict between humans and elephants in Kodagu predates this process of coffee plantations edging out forests.

G Richter wrote in the Gazetteer of Coorg about an incident in 1822, in which people complained

to the Maharaja of Kodagu about the destruction of crops and houses by elephants. The king, in Richter's words, "resolved upon a wholesale destruction of the beasts and within 38 days he killed with his own hand 233 elephants and his soldiers caught 181 alive!"

The Kodagu of the 21st century is, of course, a very different place. The human population of the district, which stood at around 60,000 in the 1840s, had increased to around 6,00,000 in 2011, vastly increasing the pressure on the land. Meanwhile, the elephant, once a beast of burden, is now listed in Schedule I of the Wildlife Protection Act of 1972, which comprises animals with the highest degree of protection.

Today, walking around Kodagu and finding piles of elephant dung is not unusual. Neither is spotting an elephant munching away on grass in a coffee estate. As terrifying as it might sound, for people living in this area, coming face to face with a tusker is not uncommon. In fact, after a national estimate of elephant population by the government in 2017, Kodagu's then chief conservator of forests, Manoj Kumar, stated that of the 300 elephants in the district, as many as 60% were in coffee estates.

"Some 10-15 years ago, there were fewer elephants raiding the crops," said Rajah Madaiaah CM. "Even these raids had a seasonality. One or two elephants would come, mostly during the summer seasons and raid my paddy crops. Now they have become a regular feature, and at a time, anywhere between four to six elephants come. They cause a lot of damage."

Estate owners aren't the only ones who are suffering. The fringe villages of these forested areas are called "elephant villages" locally, and almost every resident I spoke to said that the elephants' presence outside the forested area had increased over the last two decades.

"When I was a child, we used to go to the forest to look at elephants," said Hari Prasad, a resident of Chennangi village, situated next to the Nagarhole Tiger Reserve. "Now I see them regularly in the village, raiding crops and destroying property! Sometimes, when there is a medical emergency, we have to wait because an elephant herd is on the road."

He added that residents of the village even struggle to find marriage partners because people are wary of living in such close proximity to elephants. He himself managed to get married because his wife also came from another elephant village. "She knew the problem and understood the situation," he said, smiling.

As elephants began to regularly raid the paddy crops on his land, Rajah Madaiaah CM converted his entire farm into a coffee estate. Photo: Ishan Kukreti

The region pays a high price as a result of this problem. In Karnataka, Kodagu district saw the highest number of human deaths resulting from conflict between humans and elephants – 22 between 2019 and 2021. It also reported the highest number of incidents of elephants raiding crops – 9,000 out of a total of 35,000 such cases across Karnataka in the same period. During the two years, the Karnataka Forest Department spent Rs 6 crore in Kodagu as compensation for elephant raids. This was around a fifth of the total Rs 28 crore paid as the statewide compensation in this period – an amount calculated per acre of a specific crop lost due to the raids.

Residents of the district have adapted in response to these challenges. Rajah, for instance, switched from paddy, which he used to grow on 18 of the 30 acres of his farm, to coffee, because while elephants typically destroy an entire crop when they raid a paddy field, in coffee estates, they usually just feed on grass, along with fallen coffee berries.

“Cultivating paddy not only gave lower income than coffee, but it also meant that elephants came regularly, destroying the crop and posing a threat to our and our workers’ lives,” Rajah said. “So, I decided to convert it all to coffee.”

In 2014, the state government began to take measures to mitigate the conflict between humans and elephants in the area, such as creating the rapid response teams. The forest department also radio-collared some elephants – a process that involves placing a collar around the neck of an animal, typically when it is tranquilised.

WII researchers came on board in 2019 to add more radio-collars and improve tracking. Apart from the animals collared earlier, the researchers placed radio collars on an additional 28 elephants. Along with helping the rapid response teams, the researchers are also tracking elephant movement patterns using this data.

In Virajpet block, while I was travelling with one of the rapid response teams, tracking the movement of a herd of elephants, the Bolero made a turn on the road and the beeping intensified.

“It must be somewhere in this patch,” said Thammaiah CK, one of the WII scientists working on the project. Born and brought up in Kodagu, Thammaiah did his PhD in human-elephant conflict management from Kuvempu University in Shimoga and joined the WII project in 2019. “We have tracked their exact location and now will monitor them from a distance,” he said. We were only around three kilometres from the nearest range – an administrative division in forest governance – of the Nagarhole Tiger Reserve.

When the beeping on the monitor carried by the other WII researcher, Chethan CM, was loud enough, the team disembarked from the vehicle and walked through the thicket of shrubs and coffee, dotted with acacia and jackfruit trees. The beeps suggested that a radio-collared elephant was nearby – but it wasn’t visible.

Thammiah and his team used a radio telemetry antenna to find the location of a radio-collared elephant. Photo: Ishan Kukreti

One of the forest watchers climbed a jackfruit tree, while the others, including me, kept a lookout from the ground.

“Elephants can’t see properly,” Chethan whispered. “If they see us, we’ll be just a blur, and if they get agitated, they can charge without giving a warning. You don’t want to be in a situation like that.”

Once he reached the top of the tree, the forest watcher whistled in our direction and pointed ahead of him, deeper into the estate. Three elephants came into view from behind the foliage: one radio-collared female, whose transmitter was causing the beeps in the antenna, another female, and a frolicking sub-adult, as elephants between five and 15 years of age are called. Separating us from them was just a thicket of coffee plants and trees. The elephants were feeding on the grasses in the coffee estate.

After we had observed the elephants for around 15 minutes, one of the females realised that the herd wasn’t alone. She looked directly in our direction – my black T-shirt against a backdrop of various shades of green wasn’t a particularly effective camouflage. One of the forest guards cocked his airgun. But the elephants ran in the direction of the forest. “One can never be sure which way the elephants will go when we have these encounters,” Thammaiah said. “That’s why the air gun, we fire rounds in the air to make them go the other way.”

This is a standard routine for the rapid response team and the WII researchers. They get complaints from coffee estate owners and villages about elephant herds, and set out to deal with them. “In case the elephants aren’t causing damage, we just watch them, like we did today. Otherwise we burst crackers to chase them to the forest,” Thammaiah explained as we walked back to the Bolero, parked around a kilometre away.

It isn’t only the attraction of coffee estates that is behind the elephants’ move out of forests.

In my conversations with the people in the elephant villages, another problem linked to elephants came up repeatedly: the decline of bamboo, a primary source of elephants' nutrition. This, too, they said, has led elephants to increasingly enter human inhabited areas.

Historical records show that local communities believed that bamboo could be a harbinger of bad fortune.

G Richter, writing in the Gazetteer of Coorg, noted that the Coorgs had a saying, "Once in 60 years the bamboos will decay, once in 70 years a famine may hold sway" – that is, a famine would follow after a mass decay of bamboos.

While writing, Richter had noticed that, starting in 1860, bamboo in the region had been flowering simultaneously and then dying – a process known as gregarious flowering that is seen in the plant. Richter had seen this begin in the north of Kodagu district and reach the southwestern parts of Kodagu, the Virajpet division, by the late 1860s.

This was followed by the Great Famine of the 1870s, which destroyed agriculture in much of the Deccan. This famine affected 58,500,000 people and killed 5.6 million, according to the Imperial Gazetteer of 1907.

In the late 1990s, the bamboo in the district flowered again, one region at a time, and then died. There was no famine this time – but locals were faced with a new menace in the form of elephants.

"With the bamboo gone, the elephants are searching for food outside the forest," said Hari Prasad, who works as a forest watcher in a rapid response team. "Some bamboo has regenerated near our anti-poaching camp building in Channangi. We are worried that elephants might come here to feed on it and it can be dangerous for us. So, we have installed a vertical electric fence around the camp."

Bamboo is a grass and a part of elephants' diet. Photo: Dibyangshu Sarkar / AFP

The loss of bamboo should not be a long-term problem: the plants typically regenerate between ten and fifteen years after flowering. Once they regenerate, elephants in Kodagu should technically have less of a reason to leave forested areas.

But experts believe this process might be hindered by an array of factors all linked to one broader problem: climate change.

Thammiah, for instance, suggested that the bamboo regeneration in the forest might be impeded by the spread of the invasive plant, lantana camara. Although there are no public documents recording the spread of lantana in these forest areas, a study has found that around 44% of India's forest area is infested with lantana. Studies have also found that lantana can curb the growth of grasses – such as bamboo – which are food sources for herbivores like elephants.

"Studies have shown that feeding rates of elephants decline in lantana-affected patches," Muliya said. "We don't have any data on the lantana cover in the Kodagu-Nagarahole area though."

The spread of lantana is aided by climate change, where under shifting patterns of rainfall and temperature, invasive species like lantana can outcompete other floral species.

Indeed, Kodagu has seen dramatic changes in rainfall and temperature patterns over the last 40 years. A study published in 2020 looked at temperature data between 1971 and 2007, and rainfall patterns between 1971 and 2011 across the 27 districts of Karnataka. Based on this data, the study computed the magnitude of change across both these parameters. It found that of all the districts in Karnataka, Kodagu witnessed the highest decline in the amount of rainfall, calculated both for the monsoon season and annually. The study also found that there had been significant changes in both minimum and maximum temperatures during the period between 1971 and 2007. Not only had the average annual temperatures in Kodagu increased, so had winter, pre-monsoon,

monsoon and post-monsoon temperatures .

Residents have also directly observed these changes. “A peculiar feature of the monsoon here is that once it starts raining, springs emerge from various places,” Thammaiah said. “This is because the water table is quite high and the rainwater percolates and makes it breach the surface. But over the years we are seeing less and less of this phenomenon.”

The district has also seen a rise in fires, which are linked to an increase in temperature and a drop in rainfall. According to the data on forest fires available with the Forest Survey of India, there were 12 fire incidents in the Kodagu forest circle in 2003-’04, which went up to 50 in 2021-’22.

Each of these factors has slowed down the regeneration of bamboo in the forest, and so indirectly led to an increase in the number of elephants outside forests. “Climate change should have definitely added to the existing negative interactions with elephants in the landscape,” said Muliya. “Both scientific and anecdotal observations show that the water and food availability have always been among the major drivers of annual elephant migration.”

Uma Shankar, a forest officer posted in the district, noted that the department was trying a variety of methods, apart from radio collaring and monitoring, to prevent elephants from entering coffee plantations and reduce conflicts with humans.

For instance, from 2007 onwards, they had installed solar fences around some estates – these are powered by solar energy and deliver strong shocks to deter elephants from entering these areas, without causing them any long-term injury. They also dug trenches as long as 20 kilometres around some estates, which were two metres wide and deep at first, and later increased to a width and depth of three metres.

“But still conflict is increasing. What we are doing is only temporary control, a permanent solution has to be found,” he said.

The forest department has been increasing the depth and width of trenches, which act as barriers to elephant movement, keeping the animals out of coffee estates and residential areas. Photo: Ishan Kukreti

As one attempt at a longer-term solution, the Wildlife Institute of India started the Animal Birth Control project, which administers a drug to female elephants that results in a form of non-surgical sterilisation. The drug is an immunocontraceptive – that is, it uses the immune system to prevent pregnancy by generating antibodies that prevent the sperm from fertilising the egg.

The project was started under the supervision of Qamar Qureshi in 2018, but hit an unexpected hurdle in 2019. That year, the Calcutta High Court, in a different case regarding elephant birth control in West Bengal, ordered a stay on the use of the procedure on elephants across the country.

“There is a lot of human-elephant conflict in West Bengal, and in a case related to the death of elephants due to railway lines, the forest department there told the high court that they were planning to opt for birth control measures to reduce this,” Muliya said. “Maybe they were not able to properly tell the court about how this process happens.”

He noted that the strategy already had some measure of governmental approval: a 2010 report by the environment ministry’s Project Elephant, which is responsible for the conservation and management of elephant populations, mentioned reproductive control as a measure to reduce conflict. Despite this, he added, “the court ordered a stay”.

Since then the case has moved to the Supreme Court, and the environment ministry, based on inputs from the WII, has filed an affidavit in support of the Kodagu project.

“With this project, we aim to use this method in specific places, like Kodagu, where the conflict is out of control,” Muliya said, adding that birth control

will not immediately reduce the conflict, since the elephants which have been sterilised will go on to live their full life.

The project is now in its third year, after it was given a year-long extension from the environment ministry in light of the time lost through the pandemic. “We are currently conducting studies to understand the elephant demography and the level of conflict more thoroughly,” Muliya said. “I hope this project can be turned into a long-term 10-year project, because that is when we will see the results.”

Correction: *An earlier version of this article misstated the name of the head of the Wildlife Institute of India’s project team.*

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