ARBiT
it happens here...

Husband Appreciation Day

Every day they are out there, taking care of and helping out their families in a million different ways, both large and small. Things have changed over the years and a husband's role has changed right along with it. Men take more responsibility for the household and children than in any previous generation! What hasn't changed is the appreciation that these amazing husbands deserve for all their tireless efforts. Husbands work hard and they deserve to be appreciated. *Husband Appreciation Day* reminds everyone to take a little extra time each year, to celebrate these wonderful men and everything they do as 'husbands.'

राष्ट्रदूत
SATURDAY
20 April 2024
A-B

#FITNESS

What exercise burns the most calories?

Experts recommend these exercises as good alternatives to running for an effective calorie burn

Ask anyone what exercise burns the most calories and chances are they'll say 'running.' They're not wrong. Per se, there are plenty of benefits to running, and one of the biggest is its ability to burn calories and fat, fast, but there are so many other high *calorie-burning exercise options* out there. So if running's not for you, that's A OK!

But a reminder. There's little value in aesthetic goals, if that's what you have in mind, on your hunt for calorie burning exercises. You'll get so much more from mastering a new skill or, for example, lifting heavier through progressive overload and a well-structured workout split (either lower and upper-body, or a push pull workout routine) when strength training.

Experts recommend these exercises as good alternatives to running for an effective calorie burn. The exact amount of calories you'll burn varies wildly according to several factors including your age, height, weight, gender, fitness level and more. So, we haven't specified exact numbers to expect (though, we have given a ballpark figure for a few), but these exercises are ranked according to average calorie burn.

Rowing

Rowing uses the whole body, just like running, and works both your respiratory and cardiovascular systems. But rowing does much more for the arms and back than running does, and it's particularly good for anyone with joint issues in their lower body.

Skipping

Skipping is great for cardio burn, and also helps to strengthen your arms and legs. It requires hand-eye coordination and balance, too, and can be more fun than running since it offers a new skill to learn. For those with bad knees, know that skipping is also far less impactful on the knee joints than running.

Boxing

Boxing workouts work your strength and balance, while getting your heart pumping at the same time. Boxing is similar to running in that you need to focus on breathing techniques, but it requires more thought and attention than running as you need a strategy. It burns approximately twice as many calories as running, and if you have a history of lower body injuries, it's great for letting those heal since it focuses on the upper body.

Cycling

Cycling offers very similar cardio benefits but with the added benefit of leg strength. That said, it doesn't put as much stress on your leg joints since it's low-impact. This could mean that you're able to cycle for faster or longer, resulting in a higher calorie burn than if you were to run for a shorter time. It's also handy for anyone short on time, since it can double up as a form of transport.

Swimming

Swimming burns calories at a very similar rate as running, but it's entirely low-impact. So, if you have any pre-existing injuries, it's a great way to get a full-body workout and strengthen all of your muscles. Switch up your strokes to work your body in different ways. To boot, this is also a great prenatal exercise option, for pregnant women, since it spreads out the additional weight of a baby bump, but always consult a professional before exercising when pregnant, especially if you're new to swimming.

How exactly does India count its tigers?

In India, the use of camera traps to estimate populations was pioneered in the 1990s by Ullas Karanth, who relied on the classical *Capture-Recapture model* to calculate the number of tigers in a given area. Qureshi continued, "With the establishment of the National Tiger Conservation Authority in the mid-2000s, that model has been replaced by *Spatially Explicit Capture-Recapture* based on maximum likelihood. It is the most robust method used worldwide." He takes a step back to offer an overview of camera trap technology's evolution through the census cycles. "When we started, we focused on identifying individual tigers through their stripes, then their ranging patterns, and now we can use camera traps to study non-patterned animals too." While acknowledging that the most precise method of tracking animals is *satellite telemetry*, Qureshi feels that a 2 square kilometre camera trap density does allow for significant success. "We want inference about a given area to be drawn across time scales/periods and this method allows us to do a 1:1 comparison across time periods."

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■ **Kamayani Sharma**

> "...AT LONG LAST THE GREAT MOMENT OF DEVELOPMENT ARRIVES AND THE PLATE DROPS INTO THE SOLUTION, AS WE SIT IN THE DIM RED LIGHT OF THE DARK-ROOM... YES: A BEAUTIFUL NEGATIVE OF BAMBOOS ARCHING OVER WHERE THE TIGER SHOULD BE, BUT ALAS, NO TIGER!...BUT WAIT A MOMENT. SURELY THAT'S A TIGER'S FACE ON THE VERY EDGE OF THE NEGATIVE?...HE HAS SEIZED THE HIND-QUARTERS FROM BEHIND AND THERE IS HIS GREAT FACE, PARTLY OUT OF FOCUS, AND JUST ON THE EDGE OF THE PICTURE."

This thrilling glimpse of an elusive tiger, viewed not in the *jungle* but in a photograph, is from *'With a Camera in Tiger-Land,'* the 1927 memoir of the British forester, F.W. Champion, about his expeditions in the *Shivalik range*. Based on a tripwire system devised in the late 19th and early 20th century, Champion's 'flashlight apparatus' involved placing bait to attract the animal and setting up a wire that released the shutter of his reflex camera, when the beast tripped it. By creating the ideal conditions for a feline selfie of sorts, the arrangement eventually enabled Champion to produce *the first-ever full-fledged photograph* of the nocturnal *panthera tigris*.

Nearly a century on, camera traps are a lot more reliable and sophisticated than Champion's, generating not just a single blurry image in one night by chance, but potentially tens of sharp and clear pictures per day. This transformation has made these imaging technologies a sound and robust tool of ecological study, whose findings contribute towards conservation policies aimed at protecting biodiversity. At the same time, their advantages for research purposes exist alongside troubling ways in which camera technologies in forested areas are used and misused by governments and affect human communities.

In India, the most high-profile application of camera traps is probably in the context of *national tiger estimation exercises*, undertaken under the aegis of the Ministry of Environment, Forests and Climate Change. These surveys are carried out with the aim of monitoring a keystone species endangered due to a number of factors like habitat loss to urbanisation and industrialization, prey depletion and a concerningly high rate of poaching, for example. Since the initiation of *Project Tiger* in 1973, the conservation of Indian tigers has received state support. But it was their local extinction at *Rajasthan's Sariska Tiger Reserve* in 2004 that sent shockwaves across the country and the world, prompting the Indian government to set up the *National Tiger Conservation Authority*, a statutory body under the Environment Ministry. Since 2006, this agency has partnered with the Wildlife Institute of India and State Forest Departments to count India's tigers every four years, combining data from camera-trap-based surveys and sign surveys. The *fourth All India Tiger Estimation survey* in 2018 was cited in the Guinness Book of World Records as the 'largest camera trap wildlife survey ever.' The fifth one in 2022 was even more ambitious. The full report titled *'Status of Tigers: Co-predators and Prey in India,'* released in late July claims that more than 32,803 cameras were placed at 175 sites for the exercise (compared to around 26,800 in 2018) across 19 states, generating 97,399 tiger photos and identifying 3,080 unique tiger individuals in the process.

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Image building

The latest iteration of, what is colloquially termed the *'tiger census,'* used a camera-trap-based *Capture-Mark-Recapture approach* to calculate the abundance and density of India's national animal through sampling. The report provides an account of the methodology implemented over three phases. In the first two phases, trained frontline forest workers collected data using a mobile app called *M-STrIPES* (regarding signs of carnivores and large herbivores, population of hooved animals, presence of humans, facts about vegetation and dung counts) and remotely sensed data provided information about habitat and human impact. In the third phase, the camera traps 'were systematically distributed within the sampling area in 2 sq. kms cells, deploying at least one pair of cameras within each cell,' spaced at least a kilometre apart. These cameras were installed after the cells had been reconnoitred for the best locations to sight big cats from and sampling was then done concurrently across multiple cells, in blocks of at least 200 square kilometre. With this nested grid division in place, cameras usually operated at each location for 25 to 45 days, to obtain images of tigers.

While the survey report is a useful resource for learning about the general methodology of camera-trapping, what does the actual process of setting these traps entail? The Wildlife Institute of India trains local forest watchers, guards and rangers to implement the logistics of the sampling exercise. A Range Forest Officer, involved in the 2022 Tiger census, agreed to describe his work on the condition of anonymity. Explaining the division of the landscape into cells, he said, "We distribute the area into small grids, depending on the equipment, terrain and duration of the survey. After identifying sensitive areas and trails, where tigers and carnivores are present, with the help of forest watchers and guards, we then deploy the camera for 30-45 days." Given the necessity of a scientifically useful image, are there any specific ways in which the image is composed? "For tigers, knee-height installation is a thumb rule, to get a good, clear shot." Installation could depend on the site, "For instance, at a watering hole, each of the two cameras should cover half the span."

While hardly the occasion for aesthetic considerations, the tiger's framing by the camera trap is also relevant. "We need pictures of each flank, and adopt a *'steps-and-stripes'* method, wherein we frame the animal according to the distance between hind and forelegs (step) and right and left legs (stripe)," the forest officer said. There are guidelines regarding the equipment itself. "There are two modes, photo and video. We also have to consider the camera's orientation. To avoid reflection via flash or blurring of the image, cameras should not be facing each other and should instead be tilted at an angle. The time period between photos is a very important aspect, whether 15, 20 or 30 seconds. We aim to get at least one or two clear photographs during a tiger's crossing (between the cameras)."

Once the images have been snapped and stored in the camera's memory card, the frequency of collection varies, depending on the accessibility of the site, the purpose of the data and the capacity of the card. In case, the location has vehicular access, collection could take place within a day or two, but pedestrian access takes longer. The forest officer added, "In some cases, such as an animal conflict or an injury requiring medical intervention, we might need continuous photos which deliver daily captures but the regular cycle is 15-30 days." The frontline staff then dispatches the collected images through a chain that goes from the Range Office to the Division Office, then the State-level Coordination Committee, before finally arriving at the Wildlife Institute of India for analysis by its scientists, and storage in a National Repository of camera trap photographs of Tigers and Leopards under the direct control of National Tiger Conservation Authority.

Scientists from the Tiger Cell at the Wildlife Institute of India are repositories of insights into the technical aspects of the camera traps' operation, the processing of the images and implications of the camera-trapping method for research. Y.V. Jhala, the former Dean of the Wildlife Institute of India, who led the Tiger census in 2022, points out that an important goal in camera trap manufacturing 'is to improve the camera image and make the technology simple, because currently it's very expensive and requires a lot of effort.' Historicising the photographic hardware used in the National Tiger Estimation Exercises, he said, "They used to be based on infra-red light, but now come with in-built heat and motion sensors, which was the major breakthrough in technology." How do scientists decide which equipment to use? "There are many brands which vary in performance and pricing," noted Jhala. "We go for the middle-range ones. They provide the appropriate resolution (5 megapixels or more). More than resolution, the most important factor is how fast the camera is. It is the synchrony between flash and shutter that matters for the purpose of our work." "As far as the camera arrangement itself," said Jhala, "We first look for tracks (to place the cameras). Lots of groundwork is required. Rake marks and scat marks are used to identify the trails. We have standardised the height at which cameras are installed, the objective being perpendicular shots from a distance, with full frame pictures of the flanks from both sides." Ayan Sadhu, a contributor to the 2022 Tiger census report, elaborated further on the apparatus, "These are simple cameras, paired with digital sensors, that sense both temperature and movement simultaneously. Whenever a warm-blooded animal, that is, one whose temperature the heat sensor can detect to be greater than ambient temperature, crosses between cameras, the motion sensor is activated."

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#WILDLIFE CONSERVATION

Photo finish

Heat and motion sensors are relatively new additions to camera traps. Jhala's colleague at the Wildlife Institute of India, Qamar Qureshi, who has been a part of the Tiger census since its inception, talks through the various methods of tiger counting in independent India. "In the 1970s," said Qureshi, "Saroj Raj Chaudhary (then Forest Conservator for Orissa) devised the method of counting tigers on the basis of *pugmarks*. The pugmarks would be traced on a glass plate and then transferred onto butter paper or cast into plaster. This was a method ripe for human error and not scientifically sound."

In India, the use of *camera traps* to estimate populations was pioneered in the 1990s by Ullas Karanth, who relied on the classical *Capture-Recapture model* to calculate the number of tigers in a given area. Qureshi continued, "With the establishment of the National Tiger Conservation Authority in the mid-2000s, that model has been replaced by *Spatially Explicit Capture-Recapture* based on maximum likelihood. It is the most robust method used worldwide." He takes a step back to offer an overview of camera trap technology's evolution through the census cycles. "When we started, we focused on identifying individual tigers through their stripes, then their ranging patterns, and now we can use camera traps to study non-patterned animals too." While acknowledging that the most precise method of tracking animals is *satellite telemetry*, Qureshi feels that a 2 square kilometre camera trap density does allow for significant success. "We want inference about a given area to be drawn across time scales/periods and this method allows us to do a 1:1 comparison across time periods."

Ullas Karanth, the Tiger Ecologist, who introduced camera traps to India, has been sceptical of the tiger estimation surveys and is among a group of scientists who has engaged in debate over their statistical methodology and extrapolation. He was equally critical of them in my interview with him. "Lots of people use traps in a random, non-optimal way. Thousands of camera traps have been bought by the government but most people do not understand the problem with Tiger surveys."

Beginning with Bill Goodson's Trailmaster cameras as a graduate student in Florida in the 1980s, Karanth pursued his interest in wildlife sampling by working with the Capture-Recapture model. "Since then," he says, "paradigm shifts have occurred on both the technological and conceptual levels, from the transition from film rolls to digital memory cards, to the optimisation of camera trap placement to the refinement of statistical modelling underlying the analysis of images." However, he cautioned, "None of the developments get rid of the need for knowledge of natural history and animal ecology." His chief complaint is that the government has not shared relevant data in the public domain for independent scientists to analyse and verify. "Unfortunately, in India, the official management of forests is not run by scientists. We get treated like technicians."

The 120 scientists at the Wildlife Institute of India's Tiger Cell have a laboratory, equipped with workstations having the computational capacity to process the amount of data received. Sadhu shares that, similar to the collection, there are multiple phases of sorting and analysing it. First of all, GPS locations are checked and photographs geotagged or paired with accurate locations, 'a practice that is hugely important for tracking poaching by matching recovered skins with those of individual tigers in our database.' Next follows the artificial intelligence-based segregation of images into various categories and identification of individual tigers. Finally, researchers manually check the data for errors and verify it.

Another scientist contributor to the 2022 Tiger estimation survey, Shikha Bisht speaks about the way in which the vast corpus of camera trap images are collated into scientifically useful sets. Over WhatsApp, she said, "All the nearly four crore animal images are compiled. We use a geotagging software called the *Camera Trap Data Repository and Analysis tool* (CaTRAT). CaTRAT stamps camera trap images with GPS locations and prepares the data for further processing. After this, an AI-based auto-species segregation tool is used to segregate these camera trap images into species. Tiger and Leopard images are then processed through the Extract Compare program to get an individual tiger's number." However, despite the efficiency of artificial intelligence tools, with sensitive data like tiger and leopard images, the manual intervention of trained biologists is imperative. Unless the AI tools can process images with 100% accuracy, manual intervention will still be required.

From these images, a number of conclusions can be drawn. "We observe behaviour, interactions between animals, foraging behaviour (waking, resting etc.), tiger-human conflict, and so on," said Sadhu. Over the past 17 years, *tiger population dynamics* have been extensively studied using camera traps. Abundance, density, richness, activity, dispersal, life history and interactions with other predators are some of the parameters on which studies have been conducted. The other prominent utility of camera trap images, that ecologists reiterated, was their use in helping curb illegal wildlife trade, by identifying poachers, aiding their prosecution or by facilitating the matching of photos of tiger skins to those of the individual tigers in the central database, marked by their unique stripes.

As scientific instruments, camera traps provide crucial data and information about animal populations, behaviour and forest habitats. At the same time, the form's ancestral links to colonial regimes of hunting and policing and contemporary links to what has been termed the 'militarization of conservation' cannot be dismissed. Karanth did acknowledge the camera traps' affinity with other technologies of surveillance such as CCTVs and drones (now flying in forests), arguing that "this is not a problem of camera traps alone." It is, however, a problem. Conservation geographer/sociologist Trishant Simlai delivered a talk in 2021, based on his dissertation, *'Negotiating the Panoptic Gaze: People, Power and Conservation Surveillance in the Corbett Tiger Reserve, India'* in which he critiqued conservation surveillance technologies including camera traps. His ethnography-based research at Corbett revealed how camera traps extended patriarchy into women's spaces in the forest, entrenched caste power through scopic violence and criminalised scheduled tribes, and indigenous communities by weaponising the categories encompassing illegal wildlife activities against them. The ensemble of drones, camera traps and electronic eyes constituting *'(c)onservation surveillance*, when used without ethical safeguards and with complete impunity by the state, can lead to control in the most repressive ways.'

Given, as Simlai found, that images of humans engaged in perfectly legal activities can be captured and circulated, what are camera traps' implications for privacy? Bisht said that the Wildlife Institute of India receives images of tourists, guards, researchers and villagers, used 'to assess relative abundance index of tourists and (the) presence of humans.' "This data is stored separately in hard drives in the central repository, sans time limits and privacy policies," she claimed. "It is," she said, "the property of the National Tiger Conservation Authority and State Forest Departments. They decide whom to share it with." The National Tiger Conservation Authority did not respond to a request for comment.

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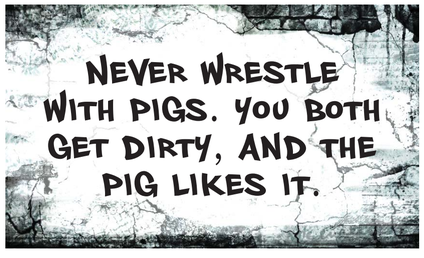
THE WALL



BABY BLUES

By Rick Kirkman & Jerry Scott

ZITS

By Jerry Scott & Jim Borgman