wildlife camera-trapping

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As evening shadows blend into darkness in the jungle of western Thailand, a lone male Indochinese tiger (Panthera *tigris* corbetti) steps up close to a shallow forest pool for an evening drink. At the right moment, an infrared camera set on a dead tree is tripped to take a photograph of the mature cat just before it bounds into a bamboo thicket. It couldn't have understood what has just taken place, of course, but its instinct told it to flee after seeing the flash and probably hearing the mechanical click of the camera. Taking a photograph of a tiger in the wild is a very difficult task – to say the least. But as we are now blessed with all kinds of modern electronicwizardry, the difficult can be overcome.

A few days later, about two kilometers away, another tiger pads slowly through the forest in the late afternoon. Its senses are on high alert for any movement or sound that could lead it to its next meal. Cresting a 600-metre-high ridge in Sai Yok National Park in Kanchanaburi Province, the world's largest cat moves through an invisible infrared beam activating a camera attached to a tree several meters away. The time and date are recorded on the frame and the wildlife photographer has just snapped one of Thailand's rarest mammals without even being there. A candid wildlife photograph taken automatically by the subject.

In another forest, a mother leopard walks next to her young offspring to a sambar kill in early-morning darkness. The carcass is ripe after three days but it's just right for a heavy meal. I had set up an active infrared SLR camera and flash after finding the dead deer close to a ranger station deep in Huai Kha Khaeng Wildlife Sanctuary. After two nights on standby, the camera tripped several times and when the film was finally processed I saw that not one but two leopards had been feeding. One photograph shows that mother leopard is spotted but the young one is black. A remarkable scene probably never before photographed. The camera-trap worked perfectly showing nature as it really is in the wild.

Camera-traps have been successfully used for almost a hundred years to record passing wildlife. Pioneer wildlife photographer George Shiras III used a flashlight camera with trip wires in 1906 to photograph wild animals. Two other men experimented with pressure-plate-activated camera-traps: F.M. Chapman in 1927 and F.W. Champion in 1928. These traps were, of course,

very primitive in those days but still adequate for the job at hand. Their magnificent black-and-white photographs adorned the pages of National Geographic magazine many times. Other photographers and researchers have experimented with camera traps since then but these have primarily been mechanical in operation.

In the last 15 years, non-invasive camera-traps (wild animals are not captured or handled) have been used by researchers and biologists to estimate wildlife numbers and investigate secretive, rare, nocturnal and endangered species like the tiger and leopard. Prey species like cattle, deer and wild pig are also recorded to ascertain relative abundance and activity patterns. These self-contained camera-traps are usually attached to a tree trunk about half a meter from the ground and three to four meters from water holes, mineral licks, wildlife trails, forest roads or stream beds. The time and date each photo was taken is imprinted on the frame. This allows the researcher to develop a data base about certain species in the forest that we normally never see.

One of the first infrared cameras available was originally designed by a hunter to allow other hunters to scout and survey possible locations for big game like deer and bear. These were active infrared camera-traps manufactured by TrailMaster of Goodson Associates in the US state of Kansas. A short time later, a researcher in Texas asked a friend to come up with a passive infrared camera and Cam Trakker of Camtrak South Inc, Georgia, was born. Both companies have improved their equipment over the years and are still in business. Several other firms were subsequently set up and competition has brought the price down to about $200 (8,800 bath) for a low-end unit and up to $500 (22,000 bath) for a top-of-the-line model. These cameras are all enclosed in some form of plastic box and attached to a tree using a strap or steel cable with a padlock for minimum security. Cam Trakker now offers a digital camera-trap but it's very expensive at $1,200 (52,800 bath) a unit.

Active infrared uses a separate transmitter and receiver connected to a small camera that is triggered when the beam between the two units is cut by any moving object. A major drawback with this system is that an insect moving across the beam will activate the camera to produce a photo of seemingly empty forest. Active infrared camera-traps are best used in dry conditions when there's little insect activity. They are also complicated to set up and can be troublesome for researchers and field technicians.

On the other hand, passive infrared camera-traps comprise a single unit with camera and infrared unit sealed in a box. They emit a beam that detects a differential in motion and body

heat. The advantage of this system is ease of installation on a single tree. When warm-blooded animals cross in front of the beam, the camera is tripped taking a fill-flash photograph. These units can last for about one month between battery and film changes. Passive infrared camera-traps have proved the most successful and durable tools for professional researchers but the relatively highcost of these units is a drawback for the amateur researcher or photographer.

Being a freelance wildlife photographer has allowed me the opportunity to see and photograph many of Thailand's wildlife species. Since so many rare and endangered species are elusive, the thought of camera-trapping had crossed my mind on several occasions. But how to do so on a limited budget?

Using some of the commercial units available as a model, a passive infrared camera-trap was designed using a tig-welded aluminum alloy box with a removable front cover and filtered glass lens. When installed, it is completely sealed, with silicon protecting the camera and electronics against the elements. Many years of mechanical engineering in the oil and construction fields plus a workshop with a milling machine and other equipment at home allowed me to build these units on a low budget – roughly about half the price of a commercial model. A friend modified the cameras and configured up the infrared electronics.

Ten units were constructed using various point-and-shoot cameras as prototype models. Every unit was slightly different in shape and size but the functions remained the same. Building my own traps was beneficial because if they developed problems, it would be easy to repair them. To evaluate the cameras' ability to work continuously, extensive testing of these units was carried out on domestic cats that like to walk along a wall near my house. Several different films were used but slide film at 200 ISO and 400 ISO seemed the best.

When all the units were ready, a trip to Sai Yok National Park was undertaken. The cameras were set up along known wildlife trails and near mineral licks. After a month or so, the film was collected and developed. The feeling of accomplishment was great when, lo and behold, I saw that not one but two different tigers in a nine square kilometer area had been photographed. Other species caught on film included serow, barking deer, wild pig, stumped-tailed macaque, porcupine, water monitor and jungle fowl. Wild pig sign were very evident in the area and this is probably the main prey species for tigers here. A poacher was also camera-trapped during the session.

Quite a few camera-trap surveys have been carried out in many of Thailand's forest complexes. The most notable recent survey produced a camera-trap photograph, taken last year in Kaeng Krachan National Park in Phetchaburi province, of a Siamese crocodile (Crocodylus siamensis). A team working with the Royal Forest Department (RFD) set up some 40 cameras in the park and along the Phet River and left them in place for one month. The discovery of this very rare reptile was big news and has prompted more investigation into the species' status here. Previously, it was thought that a “cold-blooded” reptile would not trip the camera, but as passive infrared also detects motion, valuable data was collected when the croc was photographed in broad daylight on a sandbar along the river.

To detect wildlife in a given area, researchers use two different techniques. The first is a trail-based survey where cameras are randomly placed along trails and roads known to have previously been used by wildlife in an area covering 100 to 300 square kilometers. The second method is plot-based and more intensive. A smaller area is chosen and camera-traps are placed systematically in one kilometer grid blocks. An area can eventually be completely surveyed -- the time taken depending on the number of cameras available -- to show the presence or absence of tigers and other animals.

Camera-trapping can also reveal very interesting or sometimes very disturbing information. Extensive surveys carried out in Khao Yai National Park, around the headquarters area, have indicated the presence of only two tigers; the same cats returning to the area again and again. Tiger-stripe patterns are like human fingerprints; no two are alike. It is therefore most important that both sides of a tiger are photographed so that individuals can be identified and their home range determined.

Researchers will sometimes set up cameras on either side of a trail or road to get images of both sides of the animal at the same time. It is likely that there are more tigers in Khao Yai but the possibility that only two animals have survived is indeed a dismal prospect.

On the downside, many poachers of wildlife and forest products have also been camera-trapped. Sometimes they walk right past the camera. But not always. The biggest problem facing researchers is theft of or damage to their cameras. Elephants have also posed a problem when they find cameras and just tear them off the tree, usually smashing the unit to bits or lobbing it into the bush. A camera-trap technician working with the RFD in Hala-Bala Wildlife Sanctuary found a damaged unit. Fortunately, the camera was still working and so it was possible to develop the film.

The last frame shows a close-up of the elephant's trunk just before it ripped the camera off the tree.

Other problems include forest fires in the dry season. No camera is available at the moment that can stand the heat created by such a conflagration. If a unit is not completely sealed (as some of the commercial models are), insects will eat the wiring and invade the interior to make nests that plays havoc with its operation. Extreme humidity during the rainy season will also create serious problems with electrical circuitry, batteries, cameras and film if the unit is not perfectly sealed.

Infrared camera-trapping has become, without a doubt, one of the most important tools available to conservation biologists. This type of camera is also a significant advantage for wildlife photographers wanting images of rare and endangered species. One day, a species, previously unknown to science, could possibly be discovered here in Thailand. Which is why I always look forward with great anticipation to developing every roll of film retrieved from an infrared camera-trap.