

# Can tech save the rhino?

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Poachers are slaughtering rhinos to the edge of extinction. Scientists, conservationists and tech companies are working to stop the killings. This article was published in the winter 2016 issue of CNET Magazine.

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November 27, 2016 5:30 AM PST

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Skulls of poached rhino including a calf (center) at the Great Fish River Nature Preserve (S. Africa) in 2008.

Photo from International Rhinoceros Foundation

The future looks grim for the rhinoceros.

Just 29,000 rhinos now exist in the wild, down from half a million at the beginning of the 20th century.

Look closer and the numbers become even more disheartening. The western black rhino was officially declared extinct in 2011. Three of the five remaining species aren't far behind: Just 58 to 61 Javan rhinos and fewer than 100 Sumatran rhinos now live in the wild. Armed guards in Kenya constantly protect the last three northern white rhinos on the planet.

The animals' most lethal predators are human, attracted to the big business of rhino horn. And it is big business. By most estimates, rhino horn can fetch as much as \$60,000 per kilo, or about \$27,000 a pound. That makes it more valuable by weight than gold or cocaine.

The chief markets are in Asia, where traditional medicine has used the horn for centuries to treat everything from fevers and convulsions to rheumatism and food poisoning. But demand for the horn has skyrocketed in just the past 10 years, primarily in Vietnam. Now the world's biggest consumer of rhino horn, the country's swelling well-to-do class prizes it as a status symbol of wealth and power, and a miracle cure for cancer.

As a result, poaching has surged to "unprecedented levels," [\*\*Save the Rhino International\*\*](#) (SRI) says on its website.

In South Africa alone, poachers slaughtered almost 3,400 rhinos over three years -- a rate of one animal every eight hours -- according to SRI. If the pace continues, rhinos could be wiped from the wild within the next decade. That could have far-reaching consequences because the rhinoceros is what scientists call an [\*\*umbrella species\*\*](#). Protect it, and you protect the other species sharing its habitat.



Rhinoceros survival matters -- and conservationists are turning to science and technology to save it.

## Out of the lab

Several companies, including [Ceratotech](#), [Rhinoceros Horn LLC](#) and [Pembient](#), believe they have the solution for stopping illegal rhino horn traffic: Give consumers lab-grown alternatives at a fraction of the price, crowding the real thing out of the market.

Pembient is the most prominent company in this space. Its approach relies on 3D bioprinting -- basically adding rhino DNA to synthetic keratin, then creating a sort of keratin ink that can run through a 3D printer. The company says its bioprinted material is genetically identical to real horn.

Co-founder and CEO Matthew Markus thinks Pembient can do more good by flooding the market with lab-grown horn than traditional conservation efforts can.

"When you show up in a country and say you can't use tiger bone, rhinoceros horn, pangolin scales and so on, that's a tough sell," says Markus. "We like to say Pembient is founded on the belief that animals are precious and traditions are important. I see value in both, while it seems most conservationists don't."

Conservationists don't just see things differently. Over the past two years, more than a dozen organizations have written articles, published position papers or filed petitions against the sale of synthetic horn. This past February, WildAid and the Center for Biological Diversity [\*\*petitioned the US Department of the Interior\*\*](#) to ban the import, export and sale of bioengineered horn. Nearly all say fakes will just make things worse -- stimulating demand for real horn and reinforcing the myth that it can cure cancer.

"What Pembient does is validate the untruth that there's any medical value to rhino horn," says CeCe Sieffert, deputy director of the [\*\*International Rhino Foundation\*\*](#) (IRF). "Having something created as a supplement or replacement says there is value."

[\*\*Thomas Snitch\*\*](#), previously executive officer of the UN Wildlife Enforcement Monitoring System and professor at the University of Maryland's Institute for Advanced Computer Studies, believes black marketers would just sell synthetic horn as the real thing.

"The criminal syndicates would like to kill every rhino on the planet and control every rhino horn left in existence," he says. "Then a horn will have an infinite value. They will buy up the Pembient horn and sell it for tens of millions."

## Shoot for the moon

This year, researchers with [\*\*San Diego Zoo Global\*\*](#) and the [\*\*Leibniz Institute for Zoo and Wildlife Research\*\*](#), in Berlin, revealed they're working on an absolute last-ditch effort -- building rhinoceroses from scratch [\*\*using stem cell technology\*\*](#).



Black rhino Mabuya is blind after being shot in the eyes by poachers. She gave birth to Squirt while being treated at the Lowveld Rhino Trust in Zimbabwe.

Photo by International Rhino Foundation

Here's how it would work. A team from the San Diego Zoo would induce stem cells from the three remaining northern white rhinos -- which are too old to breed -- into sperm and egg cells. The team will also use frozen sperm and other cells taken from 10 other northern white rhinos before they died. The scientists will then use IVF to fertilize the egg and implant the resulting embryo in a surrogate southern white rhino.

It's a real moonshot.

"Only two embryos have ever been created," says Sieffert. "One grew to two cells and one grew to three cells but weren't viable after that. A rhino's a lot more than three cells. The technology just isn't there."

## Fieldwork

In 2015, the UK nonprofit organization Protect announced it would help save rhinos by [installing cameras in their horns](#). This system, called RAPID (Real-time Anti-Poaching Intelligence Device), would comprise the camera, a GPS collar and a heart-rate monitor. A suddenly rapid heart rate would tell the system to switch on the camera, sound an alarm and dispatch an anti-poaching team.

It sounds great in theory. It also raised quite a few questions: How long would the power last? What if the rhino damaged anything? Could poachers steal or destroy the camera?



Rhinos are monitored from the air at the Lowveld Rhino Trust in Zimbabwe.

Photo by Mark Davis

Protect seems to have backed away from the idea. At the time of this writing, the organization had removed any mention of RAPID from [its website](#) and YouTube channel. And its chief architect, Paul O'Donoghue of the University of Chester, in England, didn't respond to requests for comment.

Snitch took a [more feasible approach](#). Using GPS trackers, satellite imagery and analytics software, his team created models predicting the movements of rhinos, rangers and poachers in South Africa's Olifants West Reserve.

"We now have 11 months of data on every patrol route, every animal seen, every anomaly the rangers spotted," says Snitch. "I now have an organic model of how the reserve breathes, how people and animals move, so I know when and where to target poachers."

But not everything has to be state of the art. Simple trickery can work, too.

"I put \$12 fake CCTV cameras with motion and blinking lights up in a number of trees -- along with a couple of real cameras," says Snitch, now director of federal relations at Bowling Green State University in Ohio. "The poachers think I have the fence line covered. In the area we are currently operating, we have cut poaching by 87 percent."

He's also using the nature to aid efforts to supply technology in the field, an ingenious combination that relies on a firm understanding of the way the local environment works.

"I am working on building beehives in Zambia equipped with solar panels, radio repeaters and a video camera on a telescopic mast," he says. "Honey to sell, better crop pollination, power to charge cell phones and lights at night, better ranger communications and the elephants stay away from village gardens -- reducing animal/human conflict. Elephants are deathly afraid of bees. All for \$600 a hive. No one is going to steal my beehive."

## **It's complicated**

Saving the rhinoceros involves more than stopping poachers before they kill. We also have to show local communities they can gain more from the rhino's survival than they can by killing it, says IRF's Sieffert.



Rangers and sniffer dogs watch over a group of white rhinos.

Photo by [StopRhinoPoaching.com](http://StopRhinoPoaching.com)

"That can happen with ecotourism, through hiring rangers, paying local communities," she says.

"We have one group in Indonesia that we pay to gather food for the animals in the sanctuary. In Tanzania, communities can create what's called communal conservancies and then sell concessions to tourism companies. That community-based conservation is a critical link in wildlife conservation."

Then there's the issue of combating the illegal traffic. Both Sieffert and Snitch praise sniffer dogs, like those trained by the African Wildlife Foundation (AWF), for their role in that.

Over two months, the AWF's **Conservation Canine Programme** trains dogs and handlers to be sent to key export hubs, such as Tanzania's port of Dar es Salaam. Sniffer dogs can detect even the smallest amounts of rhino horn dust with a 90 percent accuracy rate, the AWF claims. The first training class of eight dogs and 14 handlers -- rangers from Tanzania's Wildlife Division and the Kenya Wildlife Service -- graduated last year.