CyberTracker revolution

CyberTracker, the brainchild of 1998 Laureate Louis Liebenberg, is a handheld device originally developed to modernise the ancient skill of tracking. While it has proven highly successful for its original purpose, Liebenberg has discovered that its software has revolutionary potential to reduce some of the negative impacts of climate change; CyberTracker technology can monitor, predict and help prevent irreversible damage to our ecosystems.
Louis Liebenberg, a South African scientist and tracking expert, believes that the only way to understand and deal with the impact of global warming is to establish an ecosystem’s status quo. “At present we have no idea how many species are really threatened, as we do not have enough observations,” he says. “Many species could be going extinct without us even knowing it. For example, it is now believed that the Golden Toad [Bufo periglenes] was driven to extinction by climate change. The only reason that this is known is that a research team happened to be studying this particular species. What we need to do now is to generate raw observations about nature, particularly small mammals, reptiles and flora not monitored by conservation agencies, so that we can detect any declines in populations.”

Liebenberg is convinced that CyberTracker can make a difference. He says that while CyberTracker basically is a tool to gather data in a very efficient way, it more importantly offers a new way of looking at nature – a new methodology that will make it possible to monitor the environment on a worldwide basis at a level of detail not possible before. “While we can never hope to ‘manage’ the environment – the global ecosystem is simply too complex – we can manage the impact of humans on nature by changing human behaviour. If we observe a sudden decline in a population of animals or plants, data gathered will give us an indication of what the cause was, and establish whether human activity is having a negative impact. If a species disappears from a river, we need to determine if there are any signs of pollution. The objective of
environmental monitoring is therefore to alert us if and when human actions are having a negative impact on nature.”

CyberTracker’s innovative and flexible software combines the indigenous knowledge of Africa’s traditional trackers with state-of-the-art computer and satellite technology to give highly detailed observations of natural systems. The CyberTracker software runs on smart phones and handheld computers. It has an icon-based interface which, Liebenberg says, allows for significantly faster collection of complex data by trackers, scientists and conservationists alike. “The beauty of the programme is in its ease of use – it was originally designed to meet the needs of illiterate Kalahari Bushmen,” explains Liebenberg. “To record a sighting – whether it be an animal, tracks, or a plant – the user chooses from a menu of pictograms which can be easily customised depending on requirements. They then simply tap the screen the appropriate number of times – for example, five taps means five elephants. The GPS component adds the location and time of sighting automatically.” The data on the handheld is easily downloaded onto a PC. Analysis is then instantly available, either through detailed reports or via colour-coded maps which offer an immediate and compelling view of where, for example, animals are congregating.

The CyberTracker software is available online as “greenware” – free software that benefits conservation – and to date there have been more than 30,000 downloads. At least 700 independent projects, in 75 countries, use CyberTracker. The system is being used to monitor such critically endangered wildlife as the Sumatran rhino in Borneo, dolphins in the Gulf of Mexico, snow leopards in the Himalayas and wolves in Alaska.

In Liebenberg’s home country, South Africa, CyberTracker has proved highly successful. For South African National Parks (SANParks), for example, CyberTracker is an indispensable tool for field data collection, particularly in the 2-million-hectare Kruger National Park (KNP). Geographic information systems expert Sandra MacFadyen says CyberTracker is a quick and dynamic tool which facilitates scientific research, benefiting both rangers and management. “The CyberTracker interface was customised to allow KNP rangers to collect data on poaching activities, fence line breakages, the location of diseased and injured animals, tracks and sightings of rare animals and illegal human activity, all of which are used to formulate KNP’s adaptive management practices and policies,” says MacFadyen. “Our park’s rangers are also empowered as they can now see a tangible visual record of their efforts. Previously we used paper-based patrol data which were of limited value as only incidental observations were written down. These often did not see
the light of day, which was frustrating and disheartening for our rangers. Now they know their efforts on the ground will translate to improvements in our conservation management practices.”

In another part of Africa, CyberTracker has proved pivotal in pinpointing gorilla mortalities from Ebola hemorrhagic fever in Odzala National Park. The Republic of Congo, and Odzala National Park in particular, is one of the world’s most important strongholds for lowland gorillas and chimpanzees. In 2001, its primate population was devastated by an unexpected and lethal Ebola outbreak. In some areas, the drop in numbers was as much as 80 to 90 per cent. It was only because of data collected by CyberTracker patrols that the outbreak was detected. “Initially, it was assumed that Ebola affected only primates and humans,” says Liebenberg. “On analysing CyberTracker data, it was discovered that chimpanzees, duikers and bush pigs are also killed by the deadly virus. The true extent of Ebola would never have been known had it not been for the CyberTracker programme.”

While CyberTracker is starting to prove indispensable for conservationists around the world, the software has also been adapted to accommodate a variety of other innovative applications, from supporting search-and-rescue operations in California, to conducting socio-economic surveys in southern and central Africa.

In South Africa, CyberTracker is being used by organic farmers to record observations of pests and predator species. Unlike conventional farming, organic farming is more exposed to natural variables, including pest infestations. As organic farmers aim to minimise any negative impacts on the environment, keeping track of both pest and predator populations allows them to make informed decisions about the need to apply pesticides.

CyberTracker was also used in Sri Lanka to facilitate humanitarian disaster relief after the tsunami in December 2004. “Disaster relief efforts have to overcome serious logistical problems created by poor communication and unreliable information,” Liebenberg says. “Using CyberTracker, we can quickly gather good-quality data on the ground, to make informed decisions. Better information on the quantities of relief supplies needed – for example medicine, food, blankets and shelter – ensures the more efficient and effective distribution of resources.”

Acutely aware of CyberTracker’s potential significance in a wide range of applications, Liebenberg continually enhances the software and devises new methodologies to improve its efficiency. In 2005, CyberTracker was completely redesigned; whereas the original CyberTracker only supported low-resolution, black-and-white Palm PDAs (personal digital assistants), the latest version (Version 3) supports two separate PDA operating systems: the PalmOS and Microsoft Windows Mobile

The CyberTracker is now used in over 700 independent projects in 75 countries, recording the movement of animals as diverse as dolphins in the Gulf of Mexico and snow leopards in the Himalayas.
for PocketPC. Version 3 has also been designed in a modular way to support new PDA and GPS units as they come onto the market. “Perhaps one of the biggest limitations with the original version was that it was very difficult to customise. Version 3 is very easy to customise – now anybody can download and run it themselves.”

Liebenberg is keen to further improve Cybertracker by enabling the software to automatically calculate critical thresholds of survival (i.e. the lowest level a particular population can drop to before it becomes critically endangered) based on an index of abundance. CyberTracker will automatically alert the user when a species crosses this threshold, signalling the need for intervention.

In an environment where global warming can lead to unexpected, widespread and rapid changes, the value of this tool is enormous. “Theoretically, it is already possible to calculate a critical threshold for a species, but it means churning through millions of data every year – a feat that is impossible if done manually,” the Rolex Laureate says.

“I would like CyberTracker to generate an indicator of abundance, based on which it can calculate the critical threshold. This would make CyberTracker an infinitely more powerful and relevant tool in conservation.”

As with most small, non-profit organisations, however, securing ongoing financial support to implement these improvements is a struggle.

iebenberg says he desperately needs more resources for research and development. His 1998 Rolex Award gave CyberTracker Conservation its first big break: the publicity generated by the Award brought CyberTracker to the attention of the European Union, which granted him a €2 million contract. The EU
funding has sustained the company for the past seven years, and facilitated the development of Version 3. However that funding has ended, and Liebenberg now faces the challenge of finding a new donor if he is to make further enhancements.

“It is difficult to get funding for CyberTracker as it is not a mainstream project, but falls in a niche category, one that most big corporates don’t tend to fund,” Liebenberg explains. “The software is not commercially viable, as most of its end-users also battle to obtain funding. Ideally, CyberTracker Conservation needs to attract a private philanthropist who recognises the true value of CyberTracker.”

In the meantime, the lack of funding does not stop Liebenberg from envisioning bigger and better versions of the software. Version 4, he says, will be web-enabled to allow users to capture and share data without owning a desktop PC. If Liebenberg gets his way – and the funding – the CyberTracker Web Version will have a smartphone component, web accessible data and global species information to promote collaborative distributed data capturing and sharing.

“CyberTracker is incredibly adaptable, and the potential applications are diverse,” he says. “I believe that we have not yet come close to reaching saturation point, but I really underestimated how long it would take to get it up and running. It has been ten years, and only now do we see good examples of how it can be used. My feeling is that it has not even reached 10 per cent of its potential. Perhaps not even 1 per cent.”

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For more information visit cybertracker.org

In the footsteps of criminals

The art of tracking is traditionally associated with animals, but Louis Liebenberg believes the same principles can be applied to tracking the movements of lawbreakers. “Tracking and plotting the movements of criminals using CyberTracker allows law-enforcement officials to position strategic observation posts, pre-empt possible attacks, and ultimately apprehend the criminal.”

Liebenberg has already successfully applied his theory at the Noordhoek wetlands and beach in South Africa. Popular with tourists and residents, this remote area was experiencing frequent occurrences of armed robbery, assaults and even rape. Liebenberg personally put in place a CyberTracker monitoring programme. By reacting immediately when an incident occurred, CyberTracker patrols were able to track the criminals by means of footprints and other clues. Comprehensive data were collected that allowed Liebenberg and the police to pre-empt attacks and set upambushes. The CyberTracker programme led to several arrests and a sharp drop in the number of attacks.

The CyberTracker patrols also observed and recorded animals and endangered plants, in the process discovering two animal species – the Cape Fox and Yellow Mongoose – previously not known to occur in the area.

In late 2007, Liebenberg was looking to implement CyberTracker in Cape Town’s famous Table Mountain National Park. The mountain has become a stalking ground for muggers who ambush tourists, joggers and walkers to steal mobile phones, watches and money, and sometimes to rape.

“The only way we will be able to catch these thieves is to track them by following their footprints, locating their hiding places and using CyberTracker to plot their movements. Unfortunately, it is not obvious to people who don’t understand the science of tracking, so the challenge for me is to convince police that it can work.”

For these rangers in South Africa’s Kruger National Park, the CyberTracker is an invaluable aid as they observe and record the park’s “big 5” species: leopards, lions, elephants, white rhinos and buffaloes.