Tricks for tracking
transmitters, transponders & traps

A hopeful view on the current role of rhino conservationists is that we simply have to keep rhinos alive in viable numbers for long enough that new technology will become available to make our work ten times easier.

Raoul du Toit | Director, Lowveld Rhino Trust

The new technology that is most likely to benefit the battle against poachers within Africa will be advanced tools for monitoring rhinos and detecting poachers. The 'new toys' for poacher detection will probably be a combination of surveillance devices such as unmanned aerial vehicles (UAVs) with thermal-imaging capacity, and boundary sensors installed around conservation areas to detect incursions.

Some of the poacher surveillance options will also be useful for monitoring rhinos, for example, UAV-mounted infrared sensors should be able to generate a flow of data that can be automatically analysed by customised software to distinguish rhinos from other animals. However, the research-and-development costs of these tools will be high. The costs are not only financial but also require time from over-stretched conservationists to streamline practical solutions amidst the growing clamour of technical suggestions (especially from the many enthusiasts who drone on about drones).

Meanwhile, we have to keep playing with the tools we already have for tracking rhinos, making them more cost-effective and appropriate to the varying circumstances that arise in African project sites.

Radio transmitters are tried-and-tested technology with ongoing high value in rhino conservation. They are small matchbox-size devices, containing lithium batteries that generally last about three years and with a thin cable aerial, 10–15 cm long. Various ways of attaching them have been attempted, including neck collars. However, African rhinos have sometimes developed lesions from collars. It seems surprising that a pachyderm should be more susceptible to collar-rubbing than, for instance, a lion is. The problem is the very thin skin that a white or black rhino has behind its ears, and the bulging neck shape that pushes a collar against those soft areas. Although neck lesions are especially likely in humid and muddy areas of Africa, Greater one-horned rhinos are regularly fitted with collars without reported problems, despite living in swamps, presumably because they have a different neck configuration.

Far left: Rhinos regularly visit dung middens, where they are snapped by camera traps for identification purposes

Left: A rhino horn fitted with radio transmitter and RFID system in its posterior horn

The option that is now routinely implemented in Zimbabwe is to embed the transmitters in a hole that is drilled and gouged into the nerveless base of the rhino's horn, just above the sensitive germinal layer. The aerial is threaded through another hole that is drilled to the apex of the horn, and a quick-setting embedding substance is poured around the transmitter and aerial.

The 'beep' transmitted every second or so on a specific frequency (for example, 150 mHz) is detected by a receiver, over a range of 5–15 km depending upon factors such as whether the transmitter is mounted in an aircraft or carried

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on the ground. With an aircraft that has antennae on both wing struts (so the pilot can determine the strongest signal direction), it takes on average nine minutes to locate the rhino once the first 'beep' is heard. Frequency 'drift' is a common problem with most transmitters, but can be dealt with through experience and use of digital receivers that can be scrolled through a frequency range to find the signal.

Conventional radio telemetry therefore remains a major tool, limited primarily by affordability given that most transmitters work only for two to three years before the battery fails or the growth of the horn brings the transmitter up to the horn apex where it gets damaged. Therefore, in Zimbabwe transmitters are generally implanted only in rhinos that have been translocated and go through an unsettled phase before developing regular home ranges, or 'problem' rhinos such as those that habitually range into insecure areas or have injuries that require frequent monitoring.

Radio Frequency Identification (RFID) systems are a somewhat different concept, since these signals rely less on the battery strength of the tag and more on the reader to activate the signal. Each tag transmits a unique identity code but all tags transmit on the same frequency. Because the reduced battery requirements mean these tags can be much smaller than transmitters, the primary limitation to their working life is the time until they are exposed at the tip of the horn, which should be up to four years (especially if embedded in the slower-growing rear horn).

Active RFID tags (as opposed to very short-range RFID microchips that have no batteries) are a tenth of the price of transmitters, but 'off the shelf' products have limited ranges (around 80–100 m). In areas such as the Lowveld conservancies, these cheap tags have major potential despite their short signal ranges because readers installed at water-points frequented by the rhinos can automatically record the identity codes when rhinos come to drink, thus facilitating ongoing population 'auditing'. Current constraints of reader battery life and data-logging requirements are being addressed to make this system fully practical. It is feasible for RFID readers to be carried on UAVs that fly in a search pattern to record tags within an extensive area.

Another tool becoming standard in Zimbabwe is camera trapping. Automatically triggered trail cameras have become highly cost-effective as a consequence of research-and-development and mass production of these devices for the safari-hunting industry. The tendency of rhinos to regularly use the same dung middens exposes them to identity confirmation from cameras set there, meaning their most private moments are recorded by 'pooperazzi'!

Grants

We are very grateful to Dublin Zoo for its grant of €5,000 and to Knowsley Safari Park for its grant of £6,000 for the work of the Lowveld Rhino Trust.

It's not all about rhinos... these cheeky mongooses were caught on a camera trap looking for attention!

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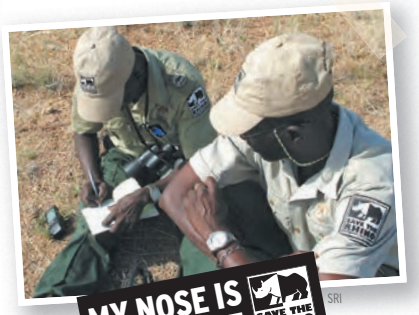

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