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Defying the poachers

WHY KOLMÅRDEN WILDLIFE PARK IS THE PERFECT TEST ARENA FOR ANTI-POACHING RESEARCH

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The east African countries are engaged in what seems to be a hopeless struggle against the well-organised poaching of rhinos and illegal trade in rhino horn, driven by a price per kilo higher than that of gold and cocaine and reaching an almost equal economic turnover on the black market.

Once, thousands of black rhinos (*Diceros bicornis*) roamed the 'Rhino Valley' in Tsavo West National Park. Today, fewer than 100 rhinos remain in the area, which is now called the Ngulia Rhino Sanctuary. To be able to protect the rhinos against poachers, the rangers in Ngulia Rhino sanctuary in Kenya need all the help they can get.

Kolmården Wildlife Park, together with Linköping University in Sweden, is now making an important contribution to saving these magnificent animals by developing a surveillance and communications system that will give the Ngulia rangers the upper hand in the war against the poachers.

The project was initiated in 2013 by the Stimson Center, a US-based international security think tank, which agreed with the Kenya Wildlife Service to start a pilot project on wildlife security. Linköping University was engaged as a technology partner, and since then more partners have joined the project, one of which is Kolmården Wildlife Park in Sweden. Kolmården's role is to offer a test arena for new surveillance and communications systems. The project's ultimate goal is not only to save the rhinos in Ngulia, but also to develop methods and technologies that can be applied to conservation efforts worldwide.

Professor Fredrik Gustafsson and his colleagues at Linköping University are experts on sensor informatics. Together with their partners they are exploring several different innovative ideas involving surveillance and communications technology. These include remote sensor systems, such as Doppler radar, TV and thermo cameras, microphone arrays and smartphone detectors, all aimed at detecting poachers and alerting the rangers.

BUILDING THE PLATFORM

The initial approach to the problem by Fredrik and his team was to go to Ngulia and talk to the rangers to find out how they worked and what tools they needed to deal with the threat from poachers. The conclusion that Fredrik's team drew was that the solution lay in communications; how could the rangers' observations be connected to the new sensor systems into one common communications platform and how could this information be made available in a clear and effective way? Fredrik and his team decided to build this platform on a smartphone application. They took the rangers' wishes into account and put a great deal of effort into training them to use the app effectively, and it is this bottom-up approach that distinguishes this project from other initiatives. Recently the rangers have been provided with a second version of the app, which allows them to report intrusions in real-time to headquarters, so that the information is immediately available for counter-actions.

The app uses GPS to trace the rangers' foot patrols, ensuring that the area is fully surveyed. This function also improves the rangers' safety, as headquarters can keep track of exactly where they are at any given moment and provide targeted support in an emergency. The rangers also use the app to report animal observations, including newborns and the health status of individual rhinos, which makes the monitoring of the populations easier and more efficient.

REMOTE SURVEILLANCE

In parallel with the development of the smartphone app, new remote sensor systems that will be integrated into the platform are being developed and tested.

The anti-poaching surveillance in Ngulia today is entirely based on the foot patrols by the rangers. People on the ground will always be crucial, but the eyes and ears of the rangers can be supplemented by high-tech sensor systems. The project is therefore developing a remote watchtower system with a number of sensors, such as a microphone array, radar and a pan, tilt and zoom camera. However, no sensor system will provide a sustainable anti-poaching solution without a powerful user interface. The data from all the sensors are integrated into one composite situational picture which can be easily accessed via the smartphones in the field or from the Dashboard at headquarters. This function was part of the original design objectives. Deep-learning algorithms enable automatic classification of animals for monitoring purposes and for detecting anomalies in the scene, which would result in an alert being sent to the officer in charge. Security measures are in place to make sure that unauthorised access to this highly sensitive information is absolutely impossible.

A prototype of the remote watchtower will be mounted on the roof of the savannah lodge at Kolmården. It will survey the rhinos and the other animals in this exhibit and provide important data for the systems evaluation. The processed data will be presented live to the visitors, providing a powerful outreach tool for conservation. Kolmården has a well-developed infrastructure and a long history of conservation research and was ideally placed to act as a test-site for this project, which agrees perfectly with Kolmården's vision of a world that balances the needs of man and nature.

The remote watchtower will have a multi-microphone array system that can determine the precise location of sounds detected in the surroundings, e.g. a gun shot or a car engine. This can be used to automatically aim a camera and zoom in towards the sound source, allowing the officer at headquarters to evaluate whether or not it constitutes a threat to the rhinos.

NGULIA RANGERS FAMILIARISING THEMSELVES WITH THE NEW SMARTPHONES AND APP FUNDED BY THE KOLMARDEN FUNDRAISING FOUNDATION. INSET: STRONGER ANKLE BRACELETS ARE BEING DEVELOPED AFTER THE INITIAL DEVICES WERE DESTROYED

TAGGING THE RHINO

One way to improve the protection of the rhinos might be to provide the animals with GPS tracking units. Knowing where the rhinos are relative to an intruder would enable more efficient counter-actions. However, it is important to make absolutely sure that the GPS data cannot be hacked by the poachers. Modern GPS systems are protected against such misuse, but the potential risk must always be kept in mind.

Normally GPS units are attached to a collar, but this does not work with rhinos' thick necks. A better option for them is an ankle bracelet. However, this is a more exposed placement, requiring a more robust casing for the GPS electronics and batteries. This is now being tested on the Kolmården rhinos, one of which, the female Namakula, has been trained to allow the keepers to put the bracelet on without sedation or immobilisation.

The possible wear on the skin is frequently checked and the information is used to make improvements. The durability of the bracelet most likely differs in a zoo setting compared to the wild, but durability testing in Kolmården was still deemed useful. Indeed, the first GPS casing lasted for only a couple of months before it broke. Now a new, stronger casing has been developed, which will be tested during 2017.

If this were tested in the wild, removing the faulty collar would have required a large-scale, expensive and potentially risky operation to immobilise the rhino, and another immobilisation later on to put on a new bracelet with a stronger GPS casing. But this has been achieved much more easily and cheaply at Kolmården's test site.

The cameras in the remote watchtower can also be controlled by the GPS positions transmitted by the ankle bracelet, allowing the camera to automatically follow a tagged rhino. This has also been tested on Namakula and as well as testing the function, it makes a nice demonstration of the technology to the zoo's visitors via a TV screen in the savannah lodge.

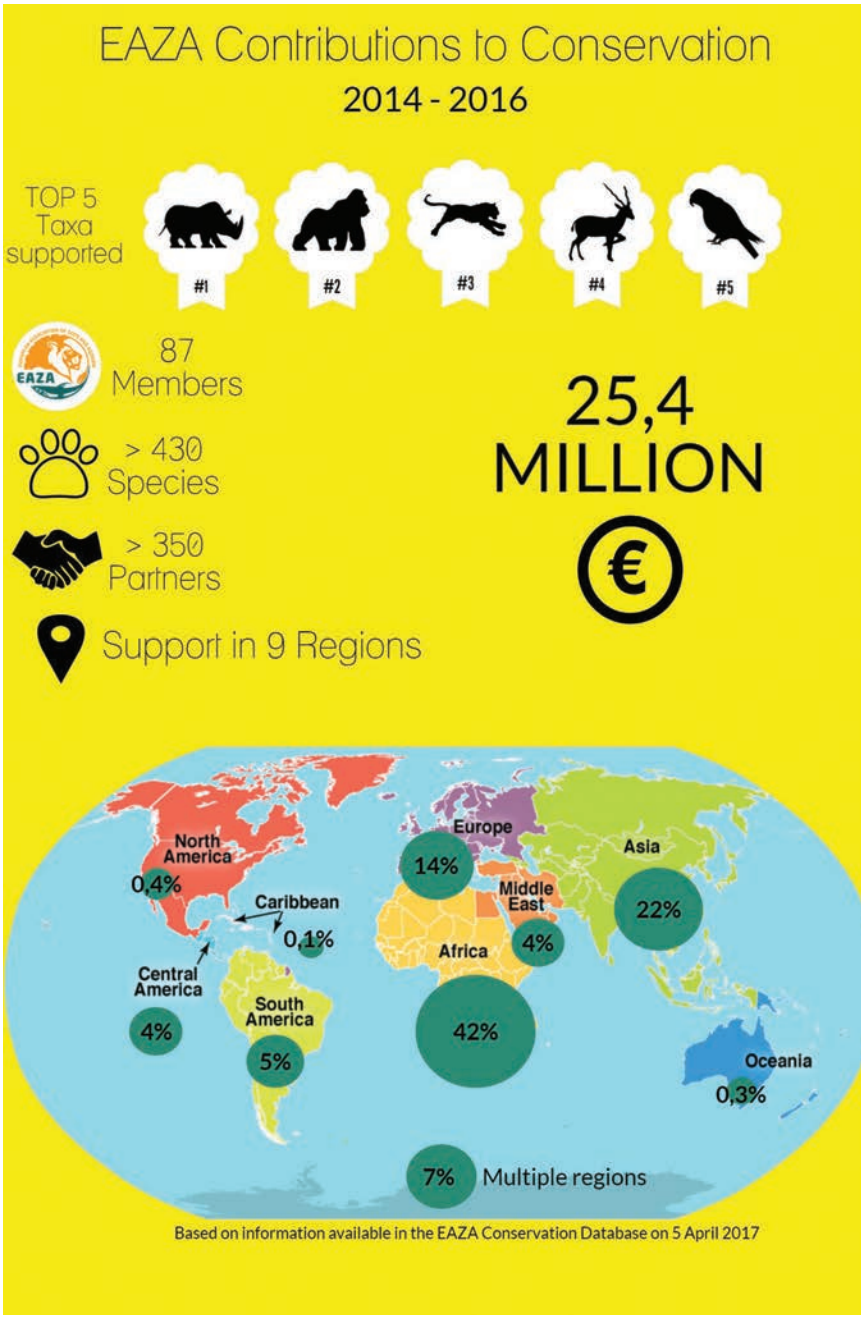
As a result of this research, Kolmården's rhinos and staff contribute substantially to the protection of rhinos and, maybe more importantly, to conservation through public awareness. When the project is completed, we hope that the Ngulia anti-poaching system will be adopted and used to save rhinos in other parts of the world.

CONSERVATION NOTICEBOARD

GLOBAL SUPPORT

Between 2014 and 2016, the contribution made by EAZA Members to conservation projects totalled an impressive €25.4 million. As the illustration (right) shows, this expenditure was spread across the globe, supporting 430 species in nine different regions, and reflects the exceptional effort that EAZA is making to protect and conserve a wide variety of threatened species.

Evidently, reporting on our conservation activities is a powerful tool for communications. This infographic generated nearly 30,000 views when posted on the EAZA Facebook page, and has been much discussed by the zoo community in Europe and beyond. Statistics such as these also help greatly when EAZA approaches stakeholders such as the European Union, IUCN and others, establishing our Association's credibility in the sphere of conservation both in the wild and in our institutions. It is worth noting that these statistics are based on data inputted by only 87 Members of EAZA; so these figures, while impressive, are not the whole story. We would therefore encourage every Member to put their conservation contributions into the database as soon as possible to ensure that we reflect accurately the fantastic work being done in conservation by all the Membership. If you have questions about entering your data, please contact Merel Zimmermann (email details at the bottom of the page).



EAZA CONSERVATION FORUM 2018

From 22–25 May 2018, Tallinn Zoo in Estonia will be hosting the next EAZA Conservation Forum. This platform offers the zoo and aquarium community, as well as the field conservation community, the opportunity to exchange experiences and build bridges. During this event we are looking to provide an interesting and diverse programme showcasing *ex situ* and *in situ* conservation stories and partnering opportunities. Some of the topics we intend to highlight are: innovative fundraising mechanisms, how to determine where to invest resources, reintroductions, wildlife trade, freshwater conservation and ways of connecting people to conservation. We also intend to pay special attention to conservation efforts in the Baltic region. More details about the programme, including how to register and how to contribute, will be made available through the EAZA website later this year. If you have questions or suggestions for the programme, please contact merel.zimmermann@eaza.net .