ARE DRONES THE ANSWER TO THE CONSERVATIONISTS' PRAYERS?

BY FELIX PATTON

Over the last five years there has been increasing interest in using UAV's for conservation tasks out of which has arisen a group called Conservation Drones who have been working with wildlife researchers particularly in Asia. Equipped with a still-photograph camera, their drone was able to document large mammals in Aras Napal, Sumatra, Indonesia. A tame elephant was also clearly photographed and a wild Sumatran orangutan was photographed on top of a palm tree. The resolution of the photographs was sufficient to identify tree species based on canopy, fruit and flower characteristics.

In video footages recorded at 80 to 100 metres above ground, individual forest trees, oil palms, orangutans and elephants could be distinguished. At 200 metres above ground, recent logging and fires including plumes of smoke rising from poaching camps were readily recorded. Such information, particularly from previously unreachable areas, would enable ranger deployment targeted at problem areas saving both time and money.

Experts estimate orangutans could be extinct in the wild in less than 25 years. Their effective conservation requires accurate and timely data on their distribution, density and land cover change traditionally obtained by ground surveys which are too expensive and time consuming to conduct on a regular basis. Appropriately equipped drones can cover a much larger amount of territory than ground-based crews. ***Line transects to count orangutan nests that would take three days can be done using a drone in 20 minutes.***

PHOTOS BY: CONSERVATIONDRONES

Elephant walking in dense forest.

Orang-utan on its nest.

Drones have also been assisting the Ugalla Primate Project to head count endangered chimpanzees in western Tanzania and get a better understanding of their habitat.

Landing the drones in thickly vegetated areas was a problem as they needed a clear touch-down zone of about 100 by 100 metres. Equipping the drone with a parachute should enable landing in confined space.

Chitwan National Park, Nepal is home to a population of over 500 Greater One-horned Rhinoceros and over 100 Bengal Tigers. The World Wide Fund for Nature (WWF) and the Nepal Army have successfully conducted trials of conservation drones to be used for

PHOTOS BY: VERMEULEN CÉDRIC

PHOTO BY: CONSERVATIONDRONES

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Top and Below Left photos: Using a UAV to census elephants at Nazinga Game Ranch, Burkina Faso; UAV images do not necessarily need to be in sharp focus just sufficient to identify the species. Photos taken at 100m and 300m respectively.
Top Right: Some drones can simply be launched by hand.
Below Right: WWF trials with a UAV in Nepal.

detecting rhino and elephant poachers and to monitor the movement of animals.

A similar system is being replicated in Kaziranga National Park in Assam, home to over 2000 Indian rhinos, as well as elephants and tigers. The drones are reported to be able to fly a pre-programmed route at a maximum elevation of 200 metres for up to 90 minutes. They are light enough to be launched by hand and will be able to take images of the ground below with a still or video camera.

With a $5 million grant from Google's Global Giving Awards, the WWF will be expanding its conservation-drone programme at sites in Africa and Asia.

In large African savannahs dominated by open vegetation and a flat landscape, aerial surveys with light aircraft have been the best option for counting large mammals. Often there is a lack of an appropriate aircraft and/or adequate fuel (aviation gasoline) and the system is very expensive so donor funding is essential and this can be unpredictable. The cost of operating a drone is relatively negligible enabling target areas to be repeatedly surveyed at high frequency to monitor potential land use changes and illegal activities.

In the south of Burkina Faso on the Nazinga Game Ranch, the use of a UAS (Unmanned Aircraft System) was tested to survey large mammals. The Gatewing x100 had a limited flying time of 40 minutes. With the camera used, only elephants were easily visible while

PHOTO BY: THERMAL B&W GENERAL ATOMICS AERONAUTICAL SYSTEMS INC.

Thermal cameras can show images of intruders at night.

medium and small sized mammals such as Buffon kob and baboon were not. However animals did not react when the UAS passed over them indicating an absence of animal disturbance as has been the case with low flying aircraft and helicopters.

Demonstration and trial flights of a 'Hornbill' UAV were successfully carried out in Waterberg National Park, Namibia in 2011 to show that a UAV carrying a radio frequency tracking antenna could detect tagged animals, such as rhinos, on the ground, for both security and post release monitoring. Trials using the UAV 'SurVoyeur' with a thermal image camera for night anti-poaching work are being undertaken.

PHOTO BY: DENEL DYNAMICS

Seeker II UAV from Denel Dynamics as deployed in Kruger Nationa Park, SA.

South African National Parks have decided that drones should be part of their rhino security systems. Kruger National Park started using a Seeker II drone against rhino poachers in December 2012. It can carry payloads weighing 50 kg in excess of 250 km and features a video camera and a second generation FLIR. The drone was loaned to the South African National Parks authority by its manufacturer Denel Dynamics.

A South African rhino owner claims to have permission to buy the state-of-the-art Arcturus T-20 drone which has a 17ft wingspan and can fly noiselessly for 16 hours at a height of 5,000 metres without refuelling. It should be invaluable for spotting poachers at night equipped with infrared camera which, it is claimed, can tell "whether a man is carrying a shovel or firearm and whether he has his finger on the trigger or not". The drone was estimated to cost around $300,000 to keep in the air for two years. Following clearance from South African authorities, a six-month trial was planned.

At the end of 2012 Ol Pejeta Conservancy in Kenya took to the internet to raise funds to obtain a Tempest UAP (Unmanned Aircraft Platforms) from Unmanned Innovation Inc. It is only about 3.0 metres long, can carry a payload of up to 4.5kg using an electric-driven propeller, can cover 80km and fly for over one and a half hours at about 125 kilometres an hour. It will be fitted with a live streaming Sony HD Block camera with 20X optical zoom for up-close imaging, gimbal mounted for 360 degrees remote controlled viewing.

It is expected that, when an incident occurs, the drone can fly to and search the location very quickly and rangers can be guided there. The camera should be able to zoom in and record the face of a poacher for later identification. In the absence of an incident, the drone can help with the normal monitoring and security operations.

To obtain some insight into animal movements and their behaviour, rhinos and other endangered species could be chipped with radio frequency ID (RFID) tags which give an animal a unique identification number tied to a database. Sensors on the drone can recognize individual animals and use on-board GPS to store an image tagged with location coordinates.

It is reported that Ol Pejeta requires a budget of US$50,000 (Kshs4.3 million) for each drone. Mike Norton-Griffiths, a Kenya based resource economist

PHOTOS BY: HUMAN THERMAL _BLACK; HUMAN THERMAL ITO-INC

PHOTOS BY: VILLE KOTIMÄKI

Top Left and below: **Spotting intruders climbing a fence enables accurate deployment of security staff.**
Top Right: **The MAJA drone airframe and its large storage area for onboard equipment.**
Below Right: **MAJA airframe.**

who has been monitoring wildlife populations from the air for many years was seeking alternatives that could reduce costs while delivering a quality product. His research suggested that by using the MAJA airframe, a UAV for conservation monitoring could be developed. The top half of the entire length of MAJA's fuselage opens like a hatch to expose a huge storage area, allowing easy installation, access and manipulation of onboard equipment, including the autopilot, batteries and camera. The MAJA airframe weighs about 1.5 kg, and with a payload of another 1.5 kg enabling it to carry two batteries and two video/still-photo cameras! The MAJA drone can be fitted with either 1.8 metre or 2.2 metre wings depending on payload and range requirements.

Norton-Griffiths' version, costing under $2,000 is thrown into the air for take-off, has about a 60km range and is effectively silent. When successful field testing is complete, it could be scaled up to a range of around 2,000km. One unit of Conservation Drones MAJA Edition is currently being tested in Gabon. Two additional units of MAJA are being assembled for WWF-Nepal to help with their fight against wildlife poachers in Chitwan and Bardia National Parks.

UAV development is fast paced. The low cost prototype from Conservation Drones could only fly for around 25 minutes per mission, and over a total distance of some 15 km. A new upgrade will double this while the Skywalker-based conservation drone should fly for around 70 minutes covering 50 km. Near infra-red, infra-red and ultra-violet cameras are being trialled to identify warm-bodied wildlife and humans when flying at dusk or dawn.

UAVs provide a safer and more cost-effective solution to wildlife monitoring and security, allowing rangers to monitor a much greater mass of land whilst reducing their own exposure to dangerous and armed poachers. The drone can provide day or night aerial intelligence, surveillance, target acquisition and reconnaissance. It can cover in hours what a ground team covers in a week and can get to places a ground team cannot. Drones may act as a deterrent to poachers who will know they can be found, filmed and identified for later arrest.

Most importantly, the developing generation of lightweight and easy-to-operate drones is inexpensive enough for cash-strapped African governments to afford. Unmanned Aerial Systems will undoubtedly be in widespread use in wildlife conservation in the years to come.