Leveling the Playing Field: Employing High Technology and UAVs to Combat Poachers

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Thomas H. Snitch, PhD
Senior Professor – UMIACS
thsnitch@umiacs.umd.edu
TSAVO National Park
The Model is Failing

Herr is Edward Bear, coming downstairs now, bump, bump, bump, on the back of his head, behind Christopher Robin. It is, as far as he knows, the only way of coming downstairs, but sometimes he feels that there really is another way, if only he could stop bumping for a moment and think of it. And then he feels that perhaps there isn’t. Anyhow, here he is at the bottom, and ready to be introduced to you. Winnie-the-Pooh.

When I first heard his name, I said, just as you are going to say, “But I thought he was a boy?”

“So did I,” said Christopher Robin.

“Then you can’t call him Winnie?”

“I don’t.”

“But you said——”

“He’s Winnie-ther-Pooh. Don’t you know what ‘ther’ means?”
Basic Stats

• 30,000 + elephants killed in 2014.
• 1215 rhinos in just South Africa in 2014.
• 383 rhinos killed in SA First Quarter, 2015.
• Tusks = $3500/kg @30kgs/pair= $125,000.
• Rhino =$65,000/kg@7kg = $450,000 each.
• China is main consumer of tusks.
• Vietnam is main consumer of rhino horn.
Homemade Gun
Homemade Gun 2
KEY ISSUES

• How to employ advanced technologies to combat poaching?

• What types of **appropriate** UAV technologies should be used that is:
  – Affordable
  – Exportable – ITAR vs. CCL
  – Importable – local CAA and airspace issues
  – Easy to maintain
  – Simple to use and operate in the field.
Key Components

• High resolution satellite imagery
• Mathematical modeling
  – To create very precise UAV flight plans
  – To build strategic deployment for rangers
  – Show how animals, poachers, rangers and UAVs simultaneously move in space and time
• UAVs for night and day patrols
Olifant West, South Africa
Geospatial Predictive Analysis

• Statistically characterize the environment associated with previous incidents.
• Identify statistically similar areas at increased likelihood of future [or previously undetected] events.
• Model allows focus of resources on specific areas.
• Area reduction supports risk based deployment to use assets when and where most likely to be needed.
• PROACTIVE Resource Allocation
The Human Element

• Human behavior is not distributed either uniformly or randomly.
• Patterns can be assessed and modeled.
• Search for preferences of actions or, conversely, what deters an action.
• This applies to criminals, arsonists, terrorists and poachers.
Data Collection

• Detail and geo-tag previous poaching incidents.
• When, where, how did attack occur?
• What conditions are present PRIOR to attack?
• Animal movement patterns.
• Overlay ranger deployment patterns.
• Supplemented by ground intelligence.
2013 - 2015 UAV Flights

• Night flights in southern Africa.
• Dedicated to anti-poaching missions.
• Used both IR and EO cameras at all times.
• Day missions – fence monitor, animal counts, fire watch, waterholes, tourism assistance.
• Easy to spot animals and humans at night.
• Clear proof of concept.
Operational Use of Drones

• The Talon 120 LE UAV for use in Africa
• Chargeable batteries for silent flight
• Range of + 20 kms, speed 45 knots,
• Operates at up to 500 meters altitude
• Wing = 2.4 m Length = 1.3m
• Training 1 day plus test flights
• Hand launch with parachute or belly landing
Talon 120 LE
Drone Packages

- Combined EO/IR Gimbal Two-axis Steerable.
- Autopilot enabled.
- Rally to Home Lost Link
- Assembly = 1 min. with Launch in 5 min.
- Live video feed to control laptop in vehicle.
- Total Weight = 8 - 12 kgs.
- US Commerce Dept. License not ITAR.
Talon 120 LE Landing
Benefits of the Model

• Allows for pre-deployment of resources.
• Provides for rapid response to incidents.
• Increase likelihood of prevention or apprehension.
• Model has been battle tested in the field.
• Model is easily replicated for other areas.
LESSONS LEARNED

• Africa is too big to randomly launch UAVs.
• Night flights present greater challenge.
• Mathematical modeling is essential to narrow areas to be monitored.
• Predictive analysis and heuristic modeling can tell when and where to fly.
• Model is able to learn from each flight.
LESSONS LEARNED

• Range of UAV is NOT the critical parameter.
• Focus on how fast and how far rangers be deployed at night for intercept.
• Maximum of no more than 10-12 kms.
• Parachute landings key for night flights.
• Must be proactive with flight plans and ranger deployment from mathematical modeling.
• UAVS are only a tool.
Fear the Turtle