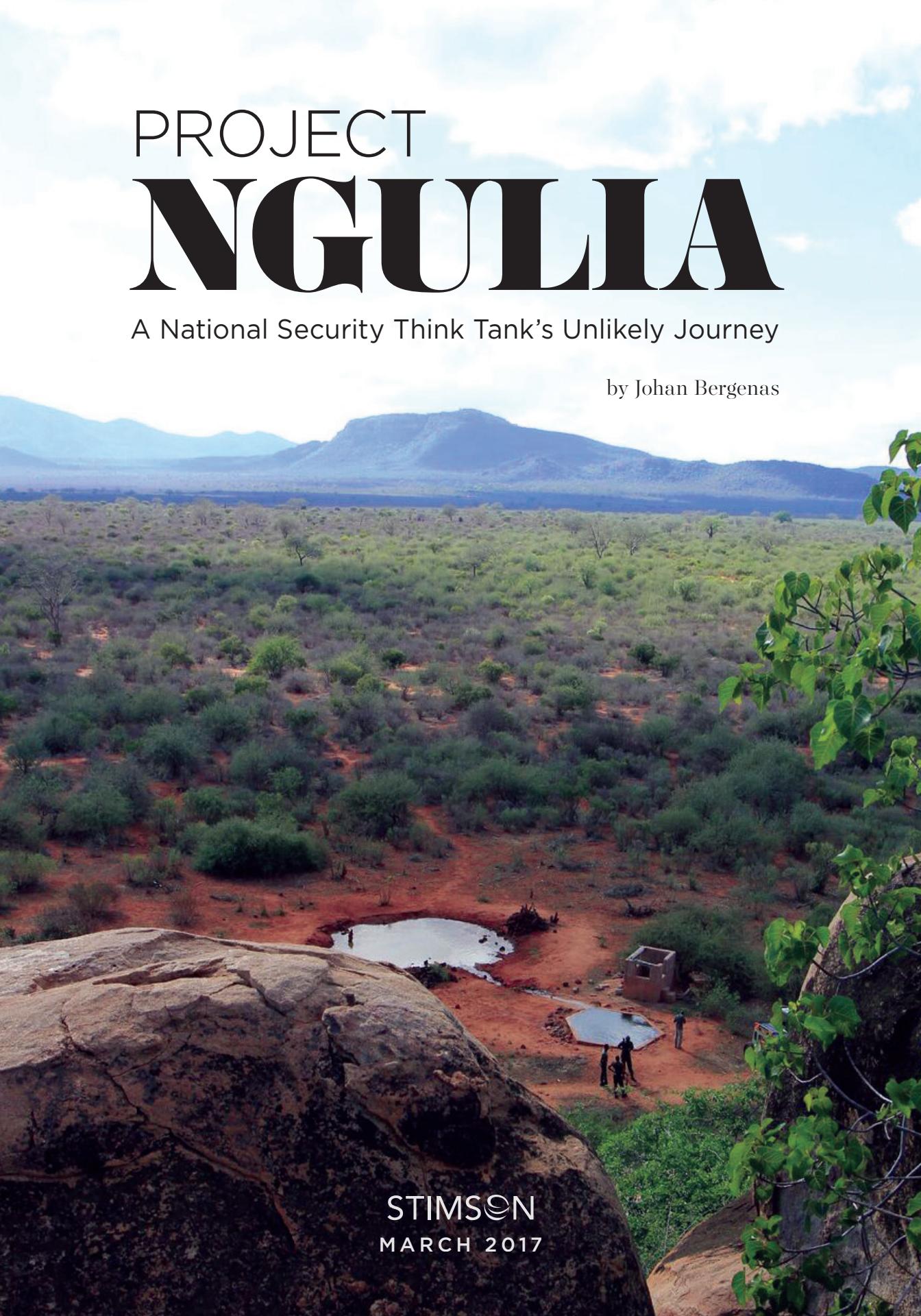


# PROJECT **NGULIA**

A wide-angle photograph of a dry, arid landscape in Kenya. In the foreground, large, light-colored rocks are visible on the left. To the right, there's a cluster of green trees and bushes. In the middle ground, a small, shallow, circular water source or mud puddle sits on reddish-brown dirt. A group of about five people are gathered around a small, simple concrete or mud-brick structure nearby. The background is dominated by rolling hills and mountains under a bright, slightly cloudy sky.

A National Security Think Tank's Unlikely Journey

by Johan Bergenas

STIMSON  
MARCH 2017



## **Foreword**

I am pleased to present this report, *Project Ngulia: A National Security Think Tank’s Unlikely Journey*, authored by Johan Bergenas. This study, and the initiative that it details, is the manifestation of three and a half years of work across continents, involving actors in the public, private, and non-governmental sectors. The effort embodies Stimson’s strategy to disrupt and redefine the role that a nonpartisan public policy think tank can play in addressing complex issues of global concern—in this case, the international security and development ramifications of wildlife crime.

Project Ngulia is unique in that it brings Stimson beyond the traditional role of studying, analyzing, and providing unbiased public policy recommendations to politicians and policymakers, and instead takes our research one step further toward practical implementation. Perhaps even more importantly, Project Ngulia reframes the traditional environmental issue of wildlife trafficking as a threat that not only impacts biodiversity but also local economic growth and development as well as global security. Mr. Bergenas has carefully identified the vast array of intersecting interests between the embedded constituencies representing these interests, identified common ground, and helped inspire a new level of collaboration that better leverages resources and coordinates activities on the ground. His efforts in this regard have yielded a new model whereby security, development, and business interests can find new pathways for mutually beneficial assistance. It is our hope that this model for collaboration can be scaled and replicated in other areas of global policy significance.

Stimson is deeply grateful to all partner organizations that are participating in this initiative, and for the Government of the United Kingdom—particularly the Department for Environment, Food and Rural Affairs—for assisting in resourcing this work over the last few years.

Brian Finlay,  
President and CEO



TO

KAR  
KWS TSA  
HOT LINE  
**TICKET**



## The Beginning

In early January 2014, a few weeks ahead of a major international conference on the illegal wildlife trade hosted by the United Kingdom, the Stimson Center held an event featuring the British Ambassador to the United States, Sir Peter Westmacott, and the former Commander of the U.S. African Command, retired General Carter Ham.<sup>1</sup> Neither were lifelong environmentalists. Their careers had only tangentially touched the world of wildlife protection. Nevertheless, they both spoke of the illegal trafficking of ivory and rhino horn as U.S. and international security threats.

Their testimonials from the world of politics and military affairs furthered a nascent narrative of the growing links between poaching, transnational criminal networks, and even terrorist organizations. During Stimson's work on border security in Kenya, we had begun to make the same connections. There, we encountered firsthand highly organized and increasingly militarized poachers, whom closely resembled the sophisticated networks that smuggle arms, drugs, and other illicit commodities across national boundaries.

In September 2013, a Stimson team visited Tsavo West National Park, home to the Ngulia Rhino Sanctuary, which held around 60 of Kenya's 650 black rhinos on its approximately 100-square-kilometer domain. Just a few decades ago, some 6,000 to 8,000 black rhinos lived in Tsavo West, which was nicknamed rhino valley. The Kenya Wildlife Service (KWS) commander of the park's security had invited us there and was eager to illuminate to us the uneven fight he and his rangers were waging against poachers. He described it as a war, and one that they were currently losing.

Just a few nights before our arrival to Tsavo, a band of rangers had set a trap for poachers based on information gathered from nearby villages. Based on this information, the rangers intercepted a group of poachers in the middle of the night. Three of the intruders died, while a fourth escaped and was never found. After examination, the rangers realized that the poachers were well-armed with automatic weapons and night vision goggles. Furthermore, one of those who died was a member of the Kenyan armed forces, revealing the pervasiveness of this illicit industry even within arms of the Kenyan government.

The rangers explained how commonplace this instance was—that many poachers enter the park under the cover of darkness and use the blinking radio towers in the distance to navigate to and from Ngulia. Once a rhino has been identified, the poachers kill and remove the horns with little to no notice to the rangers. Typically, the first indication of an intruder occurs when the rangers hear gunshots. By then, it is too late. When the rangers arrive at the scene of the crime, the poachers are never there, having left the park to deliver the rhino horn to transit points, such as the Port of Mombasa. After arriving at the port, the same transnational criminals who smuggle drugs and arms in and out of East Africa facilitate the transfer of wildlife products. As such, the poachers who target Tsavo typically collaborate with some of the world's most sophisticated transnational criminals, who provide them with entrance into a global illicit market.

Just a few dozen rangers with basic military training were charged with defending Ngulia's wildlife from this increasingly sophisticated threat. These rangers were technologically under-equipped and in need of more advanced training. For example, during their daily patrols around the sanctuary, they logged critical information—rhino sightings, footprints, fence breaches, and suspicious people—using pen and paper. They would then transmit the information via radio to the Ngulia headquarters. Despite being on the frontlines, the rangers had very little access to real-time information that could alert them to the presence of any unauthorized individuals in or near the reserve. The five-volt electrical fence surrounding the preserve was keeping the rhinos in, but it

did nothing to keep the poachers out. In fact, to detect footprints, the rangers and officers would drag a tire behind a vehicle to smooth the earth and later look for fresh prints. KWS and Ngulia were missing the minimum qualifications for a standard critical infrastructure security construct—such as digitized communications, sensors, and early warning systems.

Just around the time of our visit to Tsavo, the U.S. National Intelligence Council released a report that drew direct and indirect links between wildlife trafficking and a range of transnational organized criminal groups and terrorist actors.<sup>2</sup> Other governments similarly recognized the illegal wildlife trade, an industry which rakes in \$19 billion per year, as a serious threat to peace and security.<sup>3</sup>

Ngulia represented a microcosm of a worldwide problem. In recent years, nearly 6,000 rhinos have been killed by poachers.<sup>4</sup> This loss of wildlife has significant economic consequences. In Kenya, approximately four percent of the country's gross domestic product (GDP) comes from the travel and tourism sector, where wildlife is the star attraction, making poaching an undeniable economic threat.<sup>5</sup> In addition to the security and economic threats of poaching, fighting an increasingly militarized poaching threat has put rangers in harm's way. In the last 10 years, nearly 1,000 rangers worldwide have been killed in the line of duty.<sup>6</sup>

Along with our experience at Tsavo West, Stimson's research on border security led us to believe that wildlife trafficking was a good fit for our expertise.<sup>7</sup> There was and remains a clear need for more robust research, coupled with effective policies and strategic communication, to address this issue. Many of the solutions to wildlife trafficking pull on the lessons we learned in the course of our work combatting transnational organized crime.

In anticipation of the event with General Ham and Sir Westmacott in early 2014, Stimson drafted a paper that included early reflections on where we believed the wildlife counter-trafficking field needed to go to stand a chance against transnational organized crime.<sup>8</sup> Part of our message was the need to bring a broader range of organizations and resources to the table, most notably tapping into the security community, which had not yet been leveraged to empower the conservation community. The challenges of fighting the transnational organized criminal elements of wildlife trafficking were beyond what the conservation community alone could manage. Through collaboration with stakeholders outside of the traditional environmental arena, including security stakeholders, we could tap into the resources needed to effectively tackle wildlife trafficking.

As part of the paper, we announced our intention to launch a capacity building project in Tsavo in partnership with the Kenya Wildlife Service. This was an unconventional move for a think tank with little experience with on-the-ground capacity building. We wanted to be part of implementing the recommendations we had made, believing that our participation in the implementation process could further provide a unique perspective to future problems and applications.

In truth, a national security think tank in Washington, D.C. is not—nor should it be—naturally equipped to conduct programmatic activities in the field. What we had at our disposal, however, was a network of experts on subjects ranging from governance to technology. So, we decided to step outside of our conventional workspace to experience what it meant to be a *do* tank, in addition to a *think* tank.

## The Team

While we could bring security expertise to the table, we could not marshal engineers, technology system integrators, designers, developers, user experience (UX) professionals, product managers, telecommunications experts or electricians. From its inception, our team was built upon the idea of creating partnerships. Our first stop was to find people with the credentials to build an independent technological plan to address the information deficit faced by rangers and officers in Ngulia. We connected with technology experts at Linkoping University during a societal security conference in Sweden per the invitation of Professor Fredrik Gustafsson. In preparation for the conference, Stimson officials met with Gustafsson to discuss our wide-ranging portfolio. As an aside to our conversation, our recent excursion to Ngulia came up. That experience was Professor Gustafsson urged us to share with the audience—and so we obliged.

The scholars at Linkoping University have been a major driver of technological projects across Sweden, from a fighter plane project to major innovations in critical infrastructure protection. Specifically, Professor Gustafsson recently led a national initiative for societal security technologies with applications for critical infrastructure such as border crossings, including airports and seaports. As Stimson and Linkoping learned more about our respective strengths, it became apparent that there was common ground for fruitful collaboration focused on wildlife protection. While Stimson found a problem in need of a public policy and technology solution, Linkoping University had the technological expertise to put our plan into action. The KWS, Stimson, and Linkoping represented very different yet mutually reinforcing organizations who together formed the center of the Project Ngulia team.



## The Plan

In early January 2014, Linkoping and Stimson, with guidance from our colleagues in the KWS, conducted a feasibility study at Ngulia. We were eager to understand what the rangers needed to enhance their ability to protect the park and its wildlife. The best route to grasp this understanding was to dive deeper into the rangers' world—to know how patrols operated and how information was exchanged and catalogued.

There were several principles guiding our work in that early stage. First, we were committed to not changing the way that the rangers currently worked. Instead, we wanted to focus on making their processes more effective and efficient. Second, whatever system we designed, it needed to be scalable and replicable to other parks. And third, we decided not to base the technology platform on the most sophisticated technology available but rather model it on the needs and current capabilities of the users. In short, the plan had to be bottom-up and focused on the needs of the rangers and their officers.

After a week in the field—during the five-hour ride from Ngulia back to Nairobi—Professor Gustafsson sketched up a plan of action based on what the KWS rangers and officers had told us about their work, as well as what we had observed about the conditions on the ground.

In a first phase, Professor Gustafsson insisted that the rangers' workflow should be digitized. Pen, paper, and radio communications needed to be upgraded to a command, control and communications (C3) system that could secure correspondence between rangers and officers. In a second phase, sensor systems, like a radar, would provide an overview of a larger area and be able to detect large objects—poachers and animals alike. Eventually, and if appropriate, in a third phase, unmanned aerial systems (UAVs) could hover over the park's perimeter to gather around-the-clock, real-time information on intruders and wildlife.



## **Growing the Team: Tapping the Implementers**

After we developed our model, we needed to partner with technology firms to make it a reality. Stimson and Linkoping could leverage our policy and technological competencies, but we needed to support the development of the C3 system, improve connectivity in the park, conduct tests around the park, and train the rangers. Essentially, we needed to put together a consortium of implementers with the right competencies who were willing to work together.

About a dozen partners have, in one way or another, contributed to the project since its inception—from major defense organizations to small ICT companies. Here are some of the great stories to come out of those collaborations.

Widely recognized as East Africa's most prominent information and communications technology (ICT) provider, iHub partnered with Linkoping to work on the design and deployment of the C3 system. After some back-and-forth with a local contact, we were introduced to a team at iHub who were eager to help implement the idea. The iHub team quickly made the project their own and began accompanying us to Ngulia to evaluate the user group, to develop code for the mobile application, and to train the rangers and officers on how to use the application. During the most intense periods of the project, Linkoping University's staff had near daily contact with the iHub team's developers, designers, and trainers. The iHub team transferred technical knowledge to the staff at Ngulia, helping to achieve the project's deliverables.

Stimson was critical to actualizing the project. Acting as a convener between actors in disparate sectors helped improve implementation and mitigate challenges. Today, iHub and Linkoping are equipped to wield this experience to implement innovative technology in varying environments because of their shared management of Project Ngulia. Both organizations have offered significant amounts of time and effort on a pro-bono basis.

In our initial visits to Ngulia, it became quickly apparent that we needed support from a Kenyan-based telecommunications team to boost the connectivity in the park by providing data bundles for the C3 system. Airtel—one of the largest telecommunications companies in the world—stepped up to support the project with in-kind contributions, including data bundles and support and service for SIM cards.<sup>9</sup> Airtel also facilitated a dialogue with Nokia, which in turn boosted the connectivity in and around Ngulia.

As the partnership pieces were falling into place for the C3 system, our team began thinking ahead to the deployment of Linkoping's radar solution—the second phase of Professor Gustafsson's three-part plan. Over the course of 2015 and 2016, we built a consortium of about 20 government, conservation, and technology organizations and experts to provide guidance for the project. Among this group, one organization, Kolmården Wildlife Park, stepped forward and offered to not only test but also pilot Linkoping's technology. The Linkoping team ran tests of radar and other technologies at the Swedish park, which had offered its animals as test subjects. This pilot deployment affirmed that the Linkoping system was an appropriate solution to the problems facing Ngulia. While Linkoping was running tests in Kolmården, the team on the ground in Ngulia secured a location for the radar in the sanctuary, working closely with the KWS in the field.<sup>10</sup> While our partnership with Kolmården opened opportunities to test a range of innovative solutions, from C3 software to drones, it also benefited the park. Kolmården showcased our work during its tourism seasons, which draw some 700,000 visitors annually.

Our partnerships with Kolmården and others have had cross-cutting benefits. The project has enabled the Kenyan government to implement programs with technologies it might not have used otherwise. Linkoping both offered and received research value, developed new technologies and products, integrated technological systems, and identified new value for off-the-shelf security technologies in emerging parts of the world. The project also gave the technology and telecommunications sector an opportunity to showcase their products

in a real-world environment, demonstrating the products' effectiveness in new markets and building market opportunities across a wider, less conventional customer base.

As we briefed members of various multilateral organizations, ranging from the United Nations to the Clinton Global Initiative, on the project, we told the story of a replicable, scalable cross-sectorial, capacity building initiative in a developing country. The initiative stretched beyond its impact on conservation, we insisted. It also furthered the conversation on a wide range of development and security priorities.



## The Outcome (so far)

The main aim of the C3 system was to digitize the work flow of the rangers. A beta version of the system was deployed in the field among a pilot group of rangers, commanders, and researchers in May 2015. The beta application was based heavily upon a sensor fusion app developed at Linkoping in spring of 2013. After we piloted it, we realized the potential of finding new uses and value for existing technology—a lesson learned that became a central theme of our work.

The platform for the beta application was the Nexus 5, an Android smartphone manufactured by LG Electronics. The app produced trail logs of the rangers' patrols, as well as logged radio measurements from the wireless network. It was during the May 2015 pilot that we discovered that the park had uneven connectivity and that we would need to enhance its network coverage.

Using feedback from that first deployment, Linkoping and iHub designed and developed the C3 system to include the following components:

- A **mobile application** for rangers in the field, where they report direct and indirect rhino sightings, as well as security alerts for suspicious activities, such as footprints, fence breaches, and weapons found.
- A **backend** with a flexible database for all reports. The backend will eventually host sensor measurements and cloud computations for anomaly detections issuing alerts and analytics for offline evaluations.
- A **dashboard** where the commanders and researchers can see the reports from the field, the positions and patrols of the rangers, and other statistics of the system.

The first full version of the C3 system, including hardware, was launched in the field in late 2015. From September to December 2015, 47 smartphones for rangers and five tablets for commanders and researchers were delivered, all pre-loaded with the C3 software. During this phase, Stimson and Linkoping provided ongoing deployment assistance, including near-monthly visits to Ngulia to manage implementation. The management team provided additional assistance across Ngulia's nine blocks—the grid pattern around which rangers assign coverage responsibilities—focused on smart solutions for power preservation at the ranger stations, as well as the installation of solar panels and new batteries. Near-monthly training sessions continued through 2016.

The nature of the data collected by the rangers and officers in the field are sensitive and not appropriate to report upon publicly, but an indication that the C3 system is doing its job can be discerned from the following feedback given by one of the commanders in the field: "We are now able to see the area of coverage and make informed decisions on where rangers need to improve in their patrol."

When it comes to the deployment of the radar, the Linkoping team has tested the technology in Kolmården and plans to begin integrating the radar and C3 systems in 2017.

## The Lessons Learned

This project is far from complete and I would advise against predicting to what extent and in what direction the initiative and its technologies will develop. For Stimson, Project Ngulia was far from a simple technology project. Through our work on Project Ngulia, we sought to prove that poaching has direct and indirect links to U.S. and global security. Tackling poaching demands bringing together organizations and experts that are generally considered unlikely candidates for a conservation initiative.

While the implementers were piloting the technologies, the Stimson team was working to build a more robust case for environmental crime to be included in the security conversation in the United States and around the world. We have come a long way since the meeting at Stimson with General Ham and Sir Westmacott in early 2014. For example, in 2016, the United States Congress adopted a new wildlife crime law that highlights the nexus between wildlife crime and U.S. security interests.<sup>11</sup> AFRICOM is collaborating with the U.S. Fish and Wildlife Service and the World Bank to bring law enforcement professionals onto their counter-wildlife trafficking teams.<sup>12</sup> The trajectory of countering wildlife crime is heading in the right direction. As part of that momentum, the Stimson Center has launched a new project called the Natural Security Forum that looks comprehensively at the U.S. national and global security implications of environmental crime.<sup>13</sup>

We learned many lessons in Ngulia. These are the most important ones to our current work focused on shifting the terms of the conversation around environmental protection to emphasize the U.S. national and global security benefits.

### One: Technology Requires Hybrid Teams

At the inception of Project Ngulia and the Natural Security Forum, the Stimson team consulted environmental wonks and ecologists, Pentagon bureaucrats, and professors. We quickly realized that each stakeholder had strengths they could leverage to address the increasingly sophisticated networks perpetrating environmental crime. Our solutions demanded complex technological systems, but environmentalists were not necessarily the best suited to manage technology. Likewise, an Army general should not be put in charge of the reproductive health of rhinos and elephants. Yet, many of the tech-heavy projects we encountered were led by organizations and people with comparatively shallow knowledge of technology. Those projects relied on contracted services often under tight deadlines. By incorporating Linkoping University as an equal partner rather than a contractor for Project Ngulia, we built a more hybrid team that was better able to innovate. The Linkoping team served as an honest technology broker. Their long-term approach and buy-in to developing a sustainable plan prevented mistakes and it helped us to think creatively. Perhaps the most seismic consequence of building a hybrid team to work on Project Ngulia was this: the project was not beholden to a technology or manufacturer. It focused wholly on the end-user, the rangers. Our focus on the needs of the rangers has been the cornerstone of our success with Project Ngulia.

## Two: High Tech is Not Always the Best Tech

The news abounds with stories of conservationists leveraging advanced technology to increase our awareness and subsequently protect wildlife, from satellites to drones. In some places, these initiatives have been highly successful, and they create public support for conservation efforts. However, our early meetings with the rangers at Ngulia revealed that the most advanced technology is not necessarily the most fitting solution. In the immediate, the rangers did not need nor were they equipped to use unmanned aerial vehicles. Most of the rangers used basic phones, electrical fences, and manual checks for footprints to fend off intruders. Instead, they needed to digitize their current data-collection process so that they could share findings with each other across the park in real-time. The lesson learned: building bottom-up solutions that focus fully on the current capabilities of the end-user—in our case, the rangers.

That's not to say that drones may not be part of the future of Project Ngulia. Indeed, the Linkoping Team has already designed and piloted a radar surveillance system and have brainstormed ways to integrate drones into the surveillance of the park at Kolmården. As an equal partner on Project Ngulia rather than simply a contractor, Linkoping recognized the value of meeting the rangers at their current technological capacity and only introducing new technologies and systems as needed and after the appropriate capacity on the ground had been built to leverage that technology fully.

## Three: Invest in Partnerships, Not Contracts

When partnering with technology companies (and companies in general), do not pay them for their goods and services. Partner with them. The private sector has skin in environmental protection, even when it is not immediately apparent. Think for a second about what environmentalists are safeguarding: oceans, forests, wildlife. The environment is an economic engine in the same way that ports, infrastructure, and borders are. These critical infrastructures require protection, a market that is vast and ever-growing.

Building smart technological solutions for protecting nature is not just good for our environment, it is good for business, too. It offers an unprecedented opportunity to identify new markets, reach new customers, and find new value for products and services that already exist. Find companies that get that and then invite them to work with you, not for you.

## Four: More Resources Aren't the Answer

Increased competition within the conservation community will not yield more resources. During the 2016 World Conservation Congress, CITES Secretary General John Scanlon acknowledged that the conservation community alone could not win against the transnational organized criminals who have integrated wildlife trafficking into their illicit enterprises. Government organizations, militaries and other security organizations, multilateral agencies, universities, non-governmental organizations and corporations are all critical partners in the fight to safeguard wildlife. These organizations need to stand side-by-side with the conservation community. While these unconventional partnerships present some challenges, they are a necessary union to stop the slaughter of rhinos, as well as to protect our oceans, forests, and other natural resources, and to secure states from the nefarious activities of transnational organized criminals and terrorists. The conservation community alone cannot leverage the resources nor the expertise to address this changing and escalating threat.



## The Future

The Stimson Center is fortunate that the partnerships we helped build will endure beyond our participation in the project. Some organizations that collaborated in the project have even made longer-term commitments, such as Linkoping University, Airtel and Nokia.

Poaching and the initiatives to combat it have received significant attention over the last few years as heads of state and celebrities have raised awareness about the perils facing the world's endangered species. Comparatively, little consideration is given to the rangers charged with protecting wildlife. Project Ngulia is ultimately about them.

For the Stimson Center, contributing to a hands-on project like Project Ngulia was unprecedented, and much of the project portfolio fell outside of our scope of expertise. Without our partners, the project would have not been possible.

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# About

## About Stimson

The Stimson Center is a nonpartisan policy research center working to solve the world's greatest threats to security and prosperity. Think of a modern global challenge: refugee flows, arms trafficking, terrorism. These threats cannot be resolved by a single government, individual, or business. Stimson's award-winning research serves as a roadmap to address borderless threats through collective action. Our formula is simple: we gather the brightest people to think beyond soundbites, create solutions, and make those solutions reality. We follow the credo of one of history's leading statesman, Henry L. Stimson in taking, "pragmatic steps toward ideal objectives." We are practical in our approach and independent in our analysis. Our innovative ideas change the world.



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