A SMART Case Study
Successfully and Sustainably Implementing SMART in a Community Conservancy where Rangers are semi-illiterate

The SMART approach for adaptively managing conservation areas is employed at more than 140 sites worldwide, most of them formal government protected areas. However, the approach can also be applied to community conservation areas, although there are few successful examples. This case study details how SMART can be successfully and sustainably implemented:

I. in a large Community Conservancy
II. with rangers who are predominantly illiterate, and who operate remotely for long periods of time.

This case study is highly replicable and offers a proof of concept for similar projects worldwide to improve conservation effectiveness, drive significant organisational efficiencies and provide reliable, valid evidence that can be used to demonstrate impact, and secure further funding.

This case study demonstrates how a Maasai community in Kenya was able to effectively implement SMART at Kuku Group Ranch where lions, elephants, timber and rangelands are under threat. Individuals recruited as community rangers benefited from practical law enforcement training that emphasised drill, discipline and other core skills. In the first year, distance walked per patrol tripled, detections of illegal activity tripled, and arrest rates doubled. In 3 years, the project progressed from having undocumented patrols, driven in an ad hoc, uncontrolled and reactive manner to a state where management uses information from patrols on a quarterly basis to identify gaps and other deficiencies in patrolling, and ranger teams are competing to meet performance targets and reach threat hotspots. Serious threats such as poaching and forest encroachment began trending downwards.

Having a motivated leader, and rangers incentivised to perform, are among the lessons learnt for successful implementation of law enforcement monitoring in community areas.

Introduction
Community-based conservation aims to sustainably manage communal resources including forests, wildlife, water and land for local benefit, with the ultimate goal to improve the livelihoods of local communities. There are diverse formats for community conservation around the world, with varying legal status,
formalities, management styles and levels of involvement of government and communities. Community-based conservation areas usually have some form of management plan and regulations, with the area requiring a level of policing to ensure these are adhered to. The policing can occur in different forms, but like protected areas, rely on patrols to survey the area.

Background
The community-managed Kuku Group Ranch (KGR) (1200km²) lies between Amboseli and Tsavo West / Chyulu Hills National Parks in south east Kenya (Fig. 1). Dominated by an Acacia mosaic of bush and open grasslands, the KGR houses resident and migrant populations of many species including lion, elephant, cheetah, leopard and buffalo; provides a buffer for a section of both Tsavo West and Chyulu Hills National Parks’ boundaries and forms part of the wildlife corridor between these three National Parks.

Group Ranches in Kenya are officially gazetted lands given to local communities to provide land tenure security for collective pastoral management and resource use. KGR is used by over 17,000 Maasai for essential livelihood activities including grazing land for 50,000 head of livestock and provision of firewood and traditionally used plants (e.g. medicine, construction material). As community land, the group ranch committee, several grazing committees and chiefs, together with the Maasai Wilderness Conservation Trust (MWCT) manage KGR. The management objectives of the KGR are to increase livestock productivity, improve revenue generation through eco-tourism and other alternative livelihoods and protect natural resources. To accomplish this, KGR works closely with MWCT to implement a holistic grazing management plan to prevent overgrazing and land degradation. MWCT employs a community ranger unit from the KGR to combat poaching, unmanaged resource collection and charcoal production. Additionally, MWCT have a program to compensate livestock owners for loss of livestock by predation to reduce retaliatory killings.

The KGR is protected and monitored by 101 employed Community Rangers, the majority of whom are illiterate. As such, it is not a typical site for SMART implementation. The rangers are managed by an Operational Commander (also from the local community), and the operations are run from MWCT headquarters on Kuku Group Ranch. The Operational Commander and two other honorary KWS wardens have powers of arrest. The MWCT Community Rangers work closely with the Police and Kenya Wildlife Service (KWS) for any illegal incursions, investigations and arrests. Non-illegal activities that are not in the spirit of the KGR are managed by the group ranch officials and area chiefs.
The management seeks to find answers to important questions about the core values under protection and monitoring – wildlife, land-use practices, and threats, especially human-wildlife conflict:

- Are the key carnivore and elephant populations stable, increasing or decreasing?
- How is the status over time of the ungulate population as a prey base for key carnivores?
- How does livestock predation and crop raiding vary spatially?
- Where are the areas of highest threat from illegal activities and disturbances?
- Where do we need to have greater patrol effort?
- What is the trend in illegal activities (bushmeat or ivory poaching etc) and disturbances?

Evolution of monitoring solutions

Ranger-based law enforcement monitoring (LEM) is critical for understanding trends in human impact. Monitoring patrol effort, changes in human impact levels and areas of high threat can inform effective deployment of patrols and mitigation of threats over time. After the MWCT rangers received training at Manyani Law Enforcement Academy in 2011, they returned with knowledge on MIST, which MWCT briefly experimented with. In 2012, SMART was initiated with training from ZSL at site, alongside the development of a monitoring protocol. The (then) conservation managers, Dirk van der Goes and Lana Muller, attended follow-up SMART training in London. Inspired to make it work, Dirk and Lana returned to KGR to set up the data model, design data collection forms, and systems for ensuring data flows.

They trained Operational Commander, Muterian Ntanin, who had been with MWCT since 2000, on SMART. The three of them ran the initial rollout, training the leaders of each ranger sector during multiple training workshops. Muterian was instrumental in explaining and translating the concepts to the community rangers and wildlife scouts (Fig. 2). In turn Muterian, inspired by the functionality of SMART and its ability to monitor patrol effectiveness, became the site’s SMART champion.

How is patrolling organised at site?

Large conservation areas are a challenge to patrol and monitor effectively. The KGR is divided into eight patrol sectors (average size of 150km²), each with a ranger station from which teams conduct foot patrols. Patrol sectors are defined by geographical features, threat risks and wildlife distributions, with boundaries following rivers, ridges or other landscape features. Across the ranger sectors, livestock herding is permitted, but with restrictions on other activities. Daily patrol targets are planned each morning through radio communication with HQ and the patrol team leader. Two conservancies within the boundary of KGR are restricted-use zones, and were established as areas of special importance for wildlife. Inside the conservancies, herding and all other human activities are prohibited except under drought conditions, and special protection and monitoring activities are implemented.

![Fig. 2 Operational Commander Muterian Ntanin mentors his community rangers at Kuku Group Ranch](image)
Three types of ranger teams are involved in LEM data collection:

1) A law enforcement team, the Community Wildlife Rangers, who collect all data on human activities, especially illegal activities and human wildlife conflict, and direct observations of key wildlife species;

2) A wildlife monitoring team, the Simba Scouts, who monitor key wildlife species, with a special focus on lions, and use various methods including general wildlife patrols, transect data collection and radio-telemetry for collared lions. Direct and indirect sightings of key wildlife species are also recorded;

3) A human-wildlife conflict team that collects livestock predation data by wildlife, monitoring the compensation scheme (Wildlife Pays).

With 66 community rangers responsible for law enforcement across the KGR, teams need to have clear guidelines on how to operate effectively (Fig. 4). A Standard Operating Procedure (SOP) guides patrolling at KGR. Patrolling is scheduled six days a week. On patrol, rangers must record details of all sightings of key wildlife species: number of adults/young and sex. For human activity and disturbance, rangers record: type (illegal activity); action taken; information source; additional remarks. If wildlife carcasses are encountered, the cause of death is noted if known. Each sector has a set of target patrol points that lie around the boundaries of their block. Each target point must be reached at least once a quarter or as designated by the Operational Commander. Aside from target patrol points, rangers react to specific threats through targeted ambushes and patrols, fire-fighting, human-wildlife conflict and water use management, and to specific intelligence from partner organisations, principally KWS, and Biglife Foundation.
How SMART works?
The SMART approach is a feedback loop in which data collected by rangers is turned into information that is used by managers to adaptively manage a conservation area, providing regular feedback to rangers to react to information, plan patrols and motivate ranger performance (Fig. 5).

The starting solution for patrol data recording was GPS devices and paper forms. Data collection was later automated using Cybertracker, an application for mobile data capture and visualisation. The configured data model was customised for use at KGR with icons to represent animals and threats. This allowed for faster data entry as semi-illiterate and illiterate rangers could recognise icons and images rather than text (see Challenges and solutions below). Cybertracker was further adapted for the site by adding a field map, and locations of patrol target points for navigation, and by altering species lists for different types of observations. Cheap ($120) Android smartphones with protective cases were used for data collection. The Cybertracker plug-in has improved the quality and accuracy of data collected by rangers. Electricity is not readily available at the ranger posts, so smartphones are charged using power packs and solar panels.

Patrol data is assembled by a data sergeant whose task every month is to visit each ranger sector and upload data from the smartphones to a laptop. An extra step is then required at headquarters to transfer the data from the laptop to the SMART database on the project server, with this data quality checked weekly. For regular patrols, the data system works well, but for patrols with arrests, checks are required to ensure the observations are entered into both SMART and a separate incident log spreadsheet.

Current data analysis and interpretation is limited to a shortlist of queries and summaries including patrol intensity (tracklogs), distribution and intensity maps of illegal activities, conflicts and wildlife sightings, encounter rate maps and charts of illegal activities and wildlife, and threat maps created from gridded queries of illegal activities and human impacts. Quarterly feedback meetings disseminate the results of every patrol block to all frontline staff. Discussions highlight where improvements could be made to the patrols, what difficulties occurred and considers solutions. The management highlighted the importance of these meetings in self-motivating ranger performance, as all teams can clearly see what each other has achieved. Areas at high risk for bushmeat or elephant poaching, or for forest destruction are identified as targets for patrols. Areas that have not been adequately covered are identified and set as patrol planning targets for the upcoming period. Monthly and quarterly reports are generated for dissemination to partners and donors and for use in management decisions.

Challenges and solutions
In terms of LEM, the project is focused on timely detection of illegal activities and disturbances within KGR and surrounding areas, identifying areas of high threat, for guiding deployment of patrols and to measure ranger-based law enforcement effectiveness. One of the big challenges is widespread illiteracy; only a few rangers can read or write to fill in required text entries on standard patrol forms or draft official charge
sheets for sending cases to KWS. If the literate rangers are ill, on leave or unavailable, a patrol team could not report its efforts and results using paper forms. To address this issue, an electronic patrol form was designed on Cybertracker. The Cybertracker interface uses icons to represent animals and threats in a SMART configured data model. This improves patrol reporting for all community rangers.

Ranger teams work in the field unsupervised for up to a month, often in areas remote from HQ, and thus need to be self-driven and well-led. A second challenge is creating leadership capacity within ranger sectors, and to divide tasks and responsibilities among team members. This has been addressed through mentoring rangers and identifying potential leaders. Muterian considers that rangers with leadership skills are organised and disciplined, prerequisites for conducting and reporting on quality patrols.

A third challenge is the low density of rangers across KGR and the need to maximise spatial coverage of patrols, and identification and monitoring of problem hotspots. This has been tackled by making existing teams more efficient in their patrolling. This includes setting fixed patrol points as targets for each sector, making foot patrols the only option, and creating incentives for performance. One issue faced by MWCT is that any changes to the list of patrol target points, for example to extend coverage to new areas, requires changes in administration and reconfiguration of the Cybertracker platform on handheld devices. Only a technically capable person can make such changes, resulting in this not happening as regularly as it should.

**Training and motivating rangers**

An important part of developing community ranger capacity has been formalised training, in this case at the KWS Manyani law enforcement training academy. This intensive paramilitary training includes drill, general law and the Wildlife Act, first aid, bushcraft, navigation, wildlife conservation, and counter-corruption, among other core subjects. Manyani runs specific community wildlife ranger courses once every 12-18 months. MWCT sent 44 community rangers for training, graduating from the 3-month certificate course in 2011. Muterian believes that the training conditioned his rangers to the need for focused learning, attention to detail and time. MWCT organised a leadership training course for NCOs (sergeants and corporals) leading sector teams. The training was done on-site by a former KWS director. All rangers received an additional one-week intensive training in data collection techniques. Follow-up on the job mentoring is given by the Operational Commander to motivate the community rangers.

As bad habits inevitably creep in, reminding staff of best practices reinforces the concept. Quarterly refresher training sessions done as part of the feedback meetings are hugely important. To incentivise good performance, a non-cash reward system was set in place starting in 2013. Each quarter, the best performing ranger team is rewarded with a goat for slaughter (highly prized in Maasai culture). KWS also donated three ration boxes towards prizes with two given to the second-placed team, and one given to the third-placed team. Ration packs are not part of their daily food rations but include extra treats such as biscuits, sugar and tinned fruit. Performance is based on area covered, total patrol distance, number of arrests and quality of the recorded data. Senior KWS staff are invited to present the reward to the team to ensure recognition for performance is wider than the boundaries of the conservation area.

**Trends in threats and performance**

Patrolling began at KGR in 2000 with data collected from 2012 using GPS and standard paper forms. At that time, the only way to identify trends was laborious data entry onto spreadsheets to create charts and summary tables. The managers did not have time for this task. SMART was fully operational from the start of 2013, and from that point onwards, monitoring performance was feasible. Rangers became motivated as they knew performance was being monitored. In the initial period of implementation throughout 2013, patrol coverage expanded (Fig. 6) and distance walked per patrol increased from 9.6 km in January 2013 to 37.7 km in December 2013.
Poachers evidently noticed the increasing presence of rangers during this time. The number of cases of illegal activity detected tripled, and arrests doubled compared with 2012 (Fig. 7). Due to a change in patrol targets and having more short patrols in the conservancy areas, distance walked per patrol eased off to around 12 km in 2015, while the rate of patrolling jumped from under 20 patrols/100 days in 2013 to around 80 patrols/100 days in 2015 (Fig. 8).

Fig. 6 Spatial coverage of community ranger patrols at Kuku Group Ranch during the first year of SMART implementation in 2013: A. Q1 (Jan-Mar); B. Q2 (Apr-Jun); C. Q3 (Jul-Sep); D. Q4 (Oct-Dec).

Fig. 7 Trend in number of arrests following ranger training and implementation of law enforcement monitoring using SMART.
Although the data are preliminary, threat levels in the past four years have declined with elephant poaching, bushmeat poaching and deforestation all showing downward trends (Fig. 9). Patrols are currently focused in sensitive wildlife habitats in the north and east of the KGR.

The Impact on KGR Management
The implementation of LEM through SMART has significantly improved management effectiveness at KGR. A larger proportion of the KGR is now reached by ranger patrols and some threats appear to be trending lower. The relationship with the community has improved as community rangers now have more interaction with community members and herders while out on patrol, and engage in general security,
including enforcement against petty theft, so are perceived as hard working by the community. This has resulted in more information sharing regarding illegal activities, leading to a higher number of arrests. Additionally, the quarterly feedback process of peer-review of patrol results using the SMART data motivates the rangers as they can see the impact of their work and can participate in the planning of the protection strategies for the next three months, which has created healthy competition between ranger sections. MWCT management even reported that rangers were radioing into HQ in the final few weeks of the quarter to check how their sector was ranking.

Lessons Learned
- Desire to improve management effectiveness of the area was the motivation for setting up SMART.
- Successful implementation of SMART required a motivated, trained ranger force that received positive incentives to participate in the LEM system.
- Initial 6-12 months required extensive management oversight.
- Rangers were inspired by a supervisor who understood the value of working with SMART.
- Quarterly feedback meetings proved essential in motivating rangers and securing their buy-in.
- Motivated rangers gained community respect even though the rate of arrests increased.
- Deployment of handheld devices using Cybertracker with pictoral/written options has partially overcome the problem of illiteracy for data recording. Two literate rangers (finished primary school) per six-person ranger team was sufficient to process arrest cases. The administrative sergeant responsible for data collection and analysis finished high school and has the required skills to collate and conduct initial quality checks on patrol data as it comes in.
- Peer-review of data is extremely powerful. After the one-week data collection training, half the teams were already collecting good data. Other teams only started to collect good data after the first quarterly meeting. Those rangers became motivated to improve after being presented with their own results in front of all rangers. Numbers of patrols greatly increased after this first quarter’s review meeting and continued to increase for the next few years.
- The cost of implementing law enforcement using the SMART approach including training, equipment, patrol operations, and incentives is roughly $600-700/ranger/year. This does NOT include salary and ration costs which vary greatly between areas. Table 1 gives an idea of cost breakdown for MWCT to employ 65 wildlife rangers and 18 simba scouts (monitoring team).

Key takeaways
- Customising data models with icons, rather than text, to tackle illiteracy
- Utilising the Cybertracker plug-in to improve data collection quality and accuracy
- Using supervisors from the local community, ensuring they are fully trained in and committed to SMART
- Setting fixed patrol points as targets for each sector, and making foot patrols the only option
- Implementing quarterly feedback meetings to motivate rangers
- Providing rangers with formalised training and refresher sessions
- Incentivising good performance with a non-monetary reward system

Sustainability - how to keep SMART working
Institutionalising LEM from data collection to decision-making using the SMART tool at KGR is achievable with the presence of the Operational Commander and the data sergeant. In the next phase of implementation, these key staff work to ensure all rangers are collecting high quality data and are covering their blocks. The Operational Commander begins to set targets for sectors and create plans in SMART that will be monitored on a quarterly basis. The targets will include the set of fixed patrol points, distance targets and other administrative targets.
Table 1 Operating costs for law enforcement and monitoring patrols at Kuku Group Ranch

**Law Enforcement Costs**

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<th>Item</th>
<th>Number</th>
<th>Unit Cost</th>
<th>Per</th>
<th>Total</th>
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<tr>
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<td></td>
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**Monitoring Costs**

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