

# MPALA MEMOS

NEWS FROM MPALA

TOP STORY

## LAIKIPIA WILDLIFE: BUCKING THE NATIONAL TRENDS

*Margaret Kinnaird, Tim O'Brien, and Gordon O. Ojwang'*

The crews rose every morning at dawn, fueling up and checking over their two, twin-engine Partenavia airplanes before taking off. Once in the air the real work began – counting and photographing 15 wildlife and five livestock species across the landscape. After three hours of continuous flying, the crew would land, take a mid-day break, and start the routine again in the late afternoon.

For two weeks, this was the daily schedule for twelve pilots and observers from the Department of Resource Survey and Remote Sensing (DRSRS). Tasked with taking inventory of wildlife and livestock numbers, the team spent half of February methodically flying over the Greater Ewaso Ecosystem, an



*Members of the DRSRS team.  
Photo by Margaret Kinnaird.*

enormous area of Kenya made up of Laikipia District, a substantial chunk of Samburu

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COMMUNITY

## BOMA MONITORING: A SIMPLE STEP TOWARD HEALTHIER LAND



*The Mpala boma monitoring team at work.  
Photo by Corinna Riginos.*

*Jennifer Balachowski*

Take a drive on Mpala Ranch, and you might see elephants, giraffes, impalas, Grevy's zebras – perhaps even an aardwolf or armadillo. But believe it or not, amidst all of the unique wildlife, the most interesting animals here may just be the cattle.

On Mpala, like most of East Africa, cattle spend their nights protected from predators in fenced enclosures called bomas. But bomas are more than just livestock corrals—they can also improve the health of the land.

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## MEASURING THE BREATH OF LIFE

*Lixin Wang and Kelly Caylor*

Sitting at the bottom of a small valley in the northern section of Mpala Ranch, the green tower can hardly be seen from a distance. Some who have spotted it thought perhaps it was a new cell tower built to serve one of the nearby luxury tourist lodges. But the truth is much more interesting: this structure is the center of a new suite of research activities focused on how water and energy move through Mpala's landscapes.

After a year and a half of planning, the 24-meter tall tower was erected in mid-January, 2010 with the help of the local cell tower company, Digitel. A climb up the central ladder to the narrow catwalk surrounding the upper level yields a spectacular bird's-eye view of the surrounding savanna and a close encounter with a host of sensors and equipment designed to provide new insight into the landscape below.

For the past eight months, these sensors – which initially took weeks of extensive programming and exhaustive debugging to get up and running – have been taking very rapid measurements (10 times a second) of air movement along with measurements of carbon dioxide, atmospheric humidity, and temperature. These simultaneous measurements are then used to measure the exchange of carbon, water, and energy between the savanna and the atmosphere. A host of other meteorological and hydrological data are also collected at the site to better understand how rainfall, soil moisture, and atmospheric properties affect the growth and water use of the savanna vegetation.

One special aspect of this tower is the inclusion of a revolutionary laser-based isotope analyzer. This allows the Mpala



*The tower and a close-up of several sensors mounted on top it. Photos by Kelly Caylor and Callistus Narengelui.*

tower to take continuous measurements of the oxygen and hydrogen isotope concentrations in water vapor leaving the ecosystem – something almost no other tower in the world can do. With this information we can calculate how much water plants are using, which is crucial for understanding the health of the ecosystem.

This stationary tower will soon be joined by a smaller, portable tower equipped with similar sensors that will help us to take the “pulse” of the landscape in many more places. The portable tower will tell us how well plants are able to use rainfall and grow productively in different areas – including areas that have different grazing histories. Together with the continuous and more detailed data from the stationary tower, this will help us to understand and diagnose

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# ALICK ROBERTS

*Theresa Laverty*

Mpala welcomes Alick Roberts as the newest addition to our staff. Many Mpala regulars may know Alick as a neighbor, but starting September 1, Alick officially joined us as Mpala's Workshop Manager. In his new capacity he oversees the garage where vehicles are serviced and handles general maintenance work across the ranch. Alick's prior experiences in construction, mechanics, and management have prepared him well for his new position at Mpala.

Alick is a long-time resident of Laikipia, born and raised on a cattle ranch just eight miles south of Mpala. For more than forty years, he served as a hunting- and photographic-safari guide in Kenya, Tanzania, and Sudan. During long safaris, his bush and mechanical skills often came in handy. When he was days away from the nearest town and his vehicles had problems, he would have to figure out what to do on the spot with only the materials on hand.

In 2008, Alick retired from his position as a guide, but continued to work outside Kenya. Last year he oversaw the construction of a public road in Sudan – supervising 210 workers and about 60 road works vehicles. Over his career, Alick has also constructed numerous dams and become a competent arc and gas welder. In his personal time, he oversaw the design and construction of his own home, including the electrical system and sanitation and water storage tanks.

Alick is happy to be back working in Laikipia. His favorite part about his new job at Mpala



*Alick Roberts, Workshop Manager.  
Photo by Theresa Laverty.*

is the people he works with, who, he finds, have good attitudes and work ethics. After years of working far from home, he also enjoys the short, twenty-minute commute from his house, where he lives with his wife, Dee. Alick and Dee have two sons, one who works for John Deere in Tanzania and one who works in the security sector in Kenya.

Alick invites everybody to stop by the workshop and say hello, if you have not done so already. ■



*Alick and Daniel Ndoria, Mechanic, working together at the workshop.  
Photo by Theresa Laverty.*

## SAFETY 101: JULIUS NAKALONYO

*Allison Williams*

Mpala is a beautiful place. It is easy to forget, while enjoying the prismatic sunsets or observing a family of Grevy's zebra drinking from High Dam, that you are surrounded by multiple dangers. Luckily for all of us, Julius Nakalonyo is around to prevent the unfortunate from occurring.

As Head of the Mpala Research Centre security, Julius is a steadfast line of defense. Having worked at Mpala since 1993, he knows every nook and cranny on the ranch. People, locations, wildlife behavior, and current events all fall under Julius' knowledge and guarding responsibilities. As Julius said with a smile, "I'm on duty twenty-four hours a day, seven days a week."

With his distinct swagger, Julius fully looks the part of Head of Security. He is in charge of eleven guards or askari at the Centre and six askari at the River Camp. Beginning with the Centre's gate entrance, Julius and his team keep track of visitors and residents.



*Julius Nakalonyo, Head of MRC Security.  
Photo by Allison Williams.*



*Julius (center) amongst other askari at the security training camp in October.*

*Photo by Mburu Tuni.*

Inside the Centre, Julius is watchful of ambling wildlife that could pose a threat to those going about their daily routine. If you wish to go on a run around the Ring Road, look no further – Julius is the go-to guy to verify the absence of elephant, buffalo or carnivores. If he finds any possible danger, your run will have to be rescheduled.

Theft, damage to property and a variety of other issues fall under Julius's umbrella of security, but luckily these incidents are rare on Mpala. Julius also liaises with neighboring ranches and communities around Mpala and works to keep harmony. As one of the village elders, Julius holds a powerful position when it comes to mediating issues.

When Julius is not officially on duty, he enjoys being at home and spending time with his family. He is also an avid fan of playing and watching football. With his infectious smile, it is always a pleasure to see Julius and it is a comfort knowing he is around. ■



## ELEPHANT PASSING

*Field musings by photographer  
Tui De Roy, Laikipia Wildlife  
Forum book project*

The old elephant is walking slowly now, lagging behind the herd, standing for prolonged periods without eating, eyes half closed. After a life of immutable strength, of lengthy traverses through the familiar Laikipia landscape, of lessons learned and knowledge passed on, she is fading. Her trunk hangs limp even as her proud symmetrical tusks still gleam in the equatorial sunshine. Finally she lies down heavily on the warm, red dirt in a private glen amongst dense acacia scrub. She closes her eyes to the world and sighs one last time. Unseen internal injuries, or perhaps a lingering infection, have drained her formidable vigor. Life departs.

This scene was not witnessed by anyone, but it is fair to imagine that is how she ended. Her final breath faded with the sounds of the wind and distant thunder and the chorus of afternoon birdsong.

When I first laid eyes upon her, she had been dead perhaps three days. She was not a particularly old animal as her jaw still bore unerupted teeth in store for further years of chewing rough forage, years that never came. Now it was time for this animal to be reborn in the form of protein recyclers, turning her death into a new bonanza of life. Their work would be fast and furious — three tons of elephant vanishing in a matter of days.

Already vultures had gathered in a great spiraling vortex from every corner of the sky. They descended in a melee of heavy feet and hissing, clacking beaks, expertly burrowing into the maggot-ridden well



*A hyena tears apart elephant flesh.*

*Photo by Tui De Roy.*

of burst entrails, where flies were in their own time race for reproduction and survival before being inadvertently consumed by bigger maws.

But as day faded into night, it was the hyenas who stole the show, and the lion's share — so to speak — of the bounty. As twilight began to blur all outlines, mottled shapes could be seen slinking hither and thither, and little demonic heads with square ears and slathering grins seemed to pop up from behind every bush. Soon the shadows came alive with yelps and growls, hoots and hollers, screams, cackles and that most hyena-like trademark, insane peals of squealing laughter.

I had set my tripod and camera with a fisheye lens just feet from the great carcass, using a remote trigger from the car some distance away. While jaws as powerful as bolt-cutters tore into hide and bone, I managed to get some interesting shots of what looked to me like a Pleistocene banquet. Under the glow of the full moon I wended my way slowly out of the bush and back to MRC, feeling alive and energized by

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## ELEPHANT PASSING

...continued from previous page  
my solitary experience in the African night.

I returned the following afternoon to find the great hulk had just about vanished – incredibly some two tons of tissue had already been recycled into other beings. Another day later all that remained were shreds of hide, shining bones, and the massive feet, like discarded boots. Undeterred, the hyena mob was still milling around, still snarling and warring over the scattered leftovers. The bone-chilling concert continued, except that now the sound of crunching cartilage and cracking bones also rose out of the thickets, while underlings who had lost access to such choice pieces as ribs and scapulae tackled



*Hyenas feasting. Photo by Tui De Roy.*

toenails and two-inch soles of feet that had once trodden softly over hundreds, if not thousands, of ancestral pathways across the African landscape. The elephant was gone, but its life force would travel on forever. ■



*A fisheye lens provides a different view. Photo by Tui De Roy.*

## MPALA MEMORIES, PART VI: EARLY MRC RESEARCH AND SCIENTISTS (1995-1999)

*Truman Young*

The Mpala Research Centre grew steadily through the late 1990s. September 1995 marked a watershed for my own KLEE project, as the exclosures became operational. Starting in 1992, I had been surveying possible sites. I first thought to put the exclosures near the Centre (the areas to the north were not yet available for research). However, I decided that the vegetation was too heterogeneous near the Centre, and I opted instead for the more homogenous black cotton area. Little did I know what a popular research ecosystem this would become in the years ahead.

Before deciding on sites for the KLEE exclosures, I began a comprehensive botanical survey and spent countless hours with my nose in a book keying out species. I had no aerial or satellite images nor a GPS unit (they were backpack-sized back then!). I walked the black-cotton section of MRC (about 800 ha) back and forth at 100-200m intervals on a compass bearing, mapping all key features based on pace counts. The result was a handmade map that was sufficiently precise to plan the KLEE layout. Sanyati began construction of the exclosures, and the electricity was turned on in September of 1995.

In 1994, I had suggested to Felicia Keesing of UC Berkeley that she come up to Laikipia and monitor rodents in my plots. At the time, she was working on a project in the Serengeti. Felicia and Steve Takata came to Mpala just after the Centre officially opened, in February 1995. They quickly



*One of the bandas under construction.  
Photo by Dan Rubenstein.*

collared a bunch of mongooses for Steve. Meanwhile, Felicia became the first major collaborator on the KLEE project and a major presence at Mpala for the next ten years.

The Centre in these early years was inhabited largely with other people associated with the KLEE project. David Kinyua and Bell Okello joined in 1996. David later dropped his doctoral research to become the Centre's first Resident Scientist and is now with USAID. Bell got his Ph.D. from Natal University. Other early KLEE researchers included Michelle Gadd (elephants) and Mikaela Huntzinger (grasshoppers). My wife Lynne Isbel's primate project, later based on Segera, flourished from 1992-2001, supporting several American and Kenyan graduate students. Philip Muruthi finished his baboon research at Mpala in 1996. Early visitors also included Dan Rubenstein and Jeanne Altmann. The first Smithsonian scientists (Allen Herre, Elizabeth Kalko, and Dave Rubik) visited in 1998. Scott Miller later established a more permanent presence.

Additional projects began to arrive. The Centre hosted a field course of Lynne's out of Rutgers in 1995, and Princeton field courses at MRC starting in 1996, which complemented the zebra studies that Dan Rubenstein and his students were doing in Samburu. Mau Stanton, Todd Palmer and I began the acacia ant study in 1998. The KLEE project hosted six University of California Research Expedition Program (UREP) groups between 1998 and 2002. Sue Talbot came

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## WHY DO OLD BOMA SITES STAY TREELESS FOR SO LONG?

*Lauren Porensky*

Spend a little time in Laikipia and you'll quickly notice that its rolling savannas are often interrupted by grassy, treeless "glades". These glades mark the sites of abandoned bomas (temporary cattle corrals; see Boma Monitoring, page 1). Glades are well known as nutrient-rich sites that harbor a distinct set of plant species and provide high-quality forage for both livestock and wildlife. One amazing thing about them is their longevity. On Mpala and surrounding properties, glades remain conspicuously treeless for many decades. But why?



*From the air, abandoned bomas stand out as treeless glades scattered across the landscape.*

*Photo by Corinna Riginos.*

To begin answering this question, my colleagues and I planted nearly 600 tree seedlings on Mpala and neighboring Jessel Ranch. We found that browsing by large herbivores and competition from grasses both hinder the survival and growth of seedlings inside glades.

Trees must overcome several hurdles to establish in a glade. First, a tree seed must reach the glade and avoid getting eaten until it manages to germinate. After germination, young seedlings must survive and grow in the face of potentially adverse soil conditions, browsing by large herbivores, and competition from the thick, productive grasses that grow inside glades. We focused

on how these last two hurdles—herbivore browsing and grass competition—affect the survival and growth of young seedlings.

We found glades that were located on black cotton soils and at least 50 years old. Inside each glade, we planted seedlings of a common tree species, *Acacia drepanolobium* (whistling thorn acacia). For comparison, we also planted seedlings more than 300m away from each glade. In each location, we put up wire cages to protect some of the seedlings from herbivores and cleared away grass from some of the seedlings to protect them from grass competition.

After 11 months, only 25% of the uncaged seedlings inside of glades are still alive. Far from glades, about 80% of uncaged seedlings have survived. With both caging and grass clearing, 90% of seedlings planted inside glades survived. Thus, both browsing and grass competition seem to contribute to the death of seedlings – and ultimately the lack of trees – inside of glades.

We also made another discovery: when seedlings were protected from grass competition, those planted inside glades grew more than twice as much as those planted far from glades. These results indicate that, in the absence of grass

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# MPALA-AT-A-GLANCE

## Congratulations

Congratulations to Collins Ouma, an Associate Professor at Maseno University in Kisumu, for winning the 2010 Royal Society Pfizer Award for best African scientist. Collins conducted his Masters research from 2001-2003 on hartebeest genetics with Nick Georgiadis, the former Director of the Mpala Research Centre. At age 36, he became the youngest person in Kenya to become an Associate Professor at a Kenyan university. The prize was awarded for Collins' outstanding research on the effects of genetic variation in children with severe malarial anemia.

## Courses & Student Groups

In August, the University of Michigan held its inaugural undergraduate field course at Mpala entitled "Sustainability Challenges and Opportunities in East Africa." Twenty students attended the three-week course co-taught by Professors Johannes Foufopoulos and Rebecca Hardin. Additionally, four engineering Masters students from the Graham Environmental Sustainability Institute at University of Michigan conducted research on Mpala's energy efficiency during the course.

## Farewells and Welcomes

Mpala bids farewell to Frankline Otiende, the 2009 Levinson-Smithsonian Tropical Research Institute (STRI) Fellow, who will be completing his Masters coursework at the University of Nairobi. Over the past two years, Frankline has been studying the effects of British Army training activities on Mpala's wildlife.

As we wish Frankline good luck in his future endeavors, we also welcome the 2010 Levinson-STRI Fellow, Stephen Nyaga, who is working with Jake Goheen to study small-mammal populations in the UHURU (Ungulate Herbivory Under Rainfall Uncertainty) plots for a Masters degree from Moi University.

Mpala welcomes Keir Soderberg, a Princeton postdoctoral researcher in the Civil and Environmental Engineering department. Keir is working on the atmospheric flux tower in the north of Mpala (see Measuring the Breath of Life, page 2). He will be at Mpala for a year with his wife, Natasha, and their daughter, Emma. ■

## COMMUNITY

### A ROYAL VISIT

Mpala was honored to host Prince Edward, Earl of Wessex, and 12 members of 2RIFLES Battalion and BATUK on the 10th of September. His Royal Highness, who serves as the Royal Colonel for the 2RIFLES Battalion, was visiting Laikipia and Isiolo Districts to inspect his troops while they were undergoing training. Everyone enjoyed sundowners at Baculi Dam with a herd of elephants and one lone klipspringer at attention on a nearby rock. A delicious

dinner followed with animated conversations ranging from the history of 2RIFLES in Kenya to the conservation of Grevy's Zebra. His Royal Highness expressed appreciation for the excellent work Mpala is doing for Laikipia and the Arid-and Semi-arid regions of Kenya. The company was picked up the following morning on the front lawn of the ranch house by a Puma helicopter and headed to Archer's Post for inspection of the troops. ■

# LAIKIPIA WILDLIFE: BUCKING THE NATIONAL TRENDS

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District, and small slices of Isiolo and Meru Districts.

The results of these aerial surveys form a vivid reminder of Laikipia’s importance in the conservation of Kenya’s wildlife. Compared to the rest of the Ewaso Ecosystem and the country as a whole, Laikipia stands out as an area where wildlife populations are not declining.

The surveys conducted this year continue a biannual tradition that extends back to 1981. Since the mid-1990s, Mpala Research Centre has been the custodian of these important data. This year was exceptional in that the aerial survey covered the entire ecosystem – something that has not been done since 2001 – and was especially important given questions about wildlife and livestock survival in the wake of the 2009 drought.

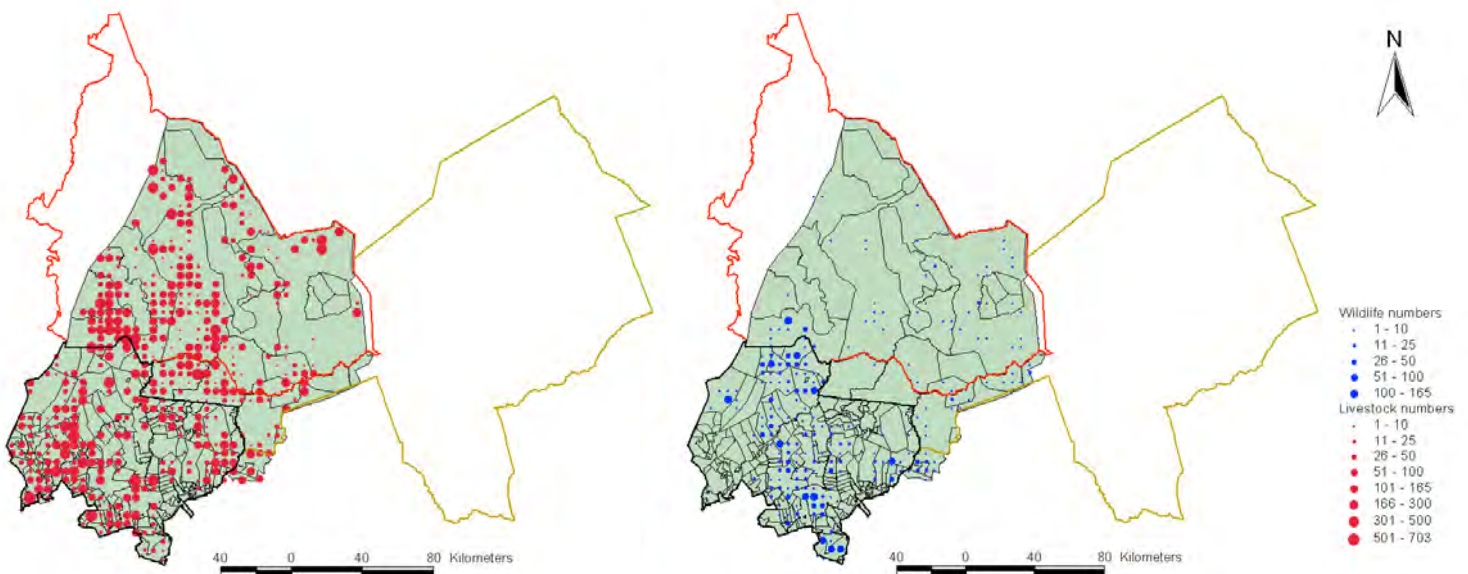
The most notable change across the Greater Ewaso Ecosystem between 2001 and 2010 is in cattle numbers. Estimates of cattle across the region are 50% less in 2010 than in 2001, likely due to the devastating effects of the

2009 drought. Three wildlife species declined substantially between the two time periods: Beisa oryx, Grevy’s zebra and gerenuk. Unfortunately, these are endangered species and declines in their populations are reason for concern.

**“...LAIKIPIA STANDS OUT AS AN AREA WHERE WILDLIFE POPULATIONS ARE NOT DECLINING.”**

Within the Ewaso Ecosystem, Laikipia continues to be a haven for wildlife. Laikipia has far less livestock than the rest of the ecosystem, whereas the reverse is generally true for wildlife. Outstanding examples include impala, with population estimates 20 times higher, Burchell’s zebra more than six times higher, and gazelles (Grant’s and Thompson’s) more than five times higher in Laikipia than the rest of the ecosystem. Additionally, the only sightings of hartebeest and Cape buffalo in 2010 were in Laikipia District. There are, however, a few exceptions to the general trend: ostrich are only half as abundant in Laikipia compared to the entire ecosystem, while Grevy’s zebra

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*Distributions of livestock and wildlife across the Greater Ewaso Ecosystem, February 2010. District boundaries: Samburu (red), Laikipia (black), and Isiolo (yellow).*



## LAIKIPIA WILDLIFE: BUCKING THE NATIONAL TRENDS

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and gerenuk populations are four and ten times lower, respectively.

To look more carefully at long-term trends in wildlife populations, we used an index much like a stock-exchange index to measure the percent change in wildlife and livestock since 1981, when aerial surveys began. This approach shows that, although livestock numbers have doubled since the early 1980s, wildlife populations across Laikipia are, on average, 15% larger than they were in the 1980s. National averages, on the other hand, have declined by 60 to 70%.

Laikipia deserves to be commended for its exceptional stewardship of the land and wildlife, but there is no room for complacency. Overall, wildlife numbers reached a peak in Laikipia in the early 1990s and have been slowly declining ever since. Iconic wildlife species such as the reticulated giraffe have declined by 21% and ostrich by 50% over the past two decades. In addition,

### RESEARCH

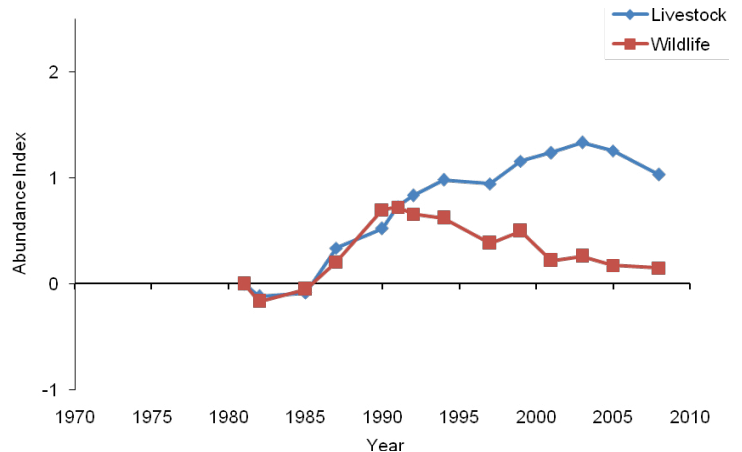
## MEASURING THE BREATH OF LIFE

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land degradation in this and other dryland regions of the world.

The Mpala tower is one of only a handful of its kind on the African continent and the only tower located in an equatorial dryland. As such, the research conducted at Mpala will fill a big data gap for the continent. Because the tower is solely powered by solar panels, we like to think of green energy feeding a green tower that will help to provide a path towards a green future for African savanna ecosystems. ■

*A view from the top of the tower showing trenches where ground sensors were later buried. Photo by Kelly Caylor and Callistus Narengelui.*



*Wildlife and livestock abundance index from DRSRS counts dating back to 1981.*

sheep and goats – livestock species that are far less friendly on the landscape – now outnumber cattle by more than two-to-one.

As a result of these surveys, we have a much better idea of the species and areas on which to focus attention as we continue our conservation efforts. ■



## BOMA MONITORING: A SIMPLE STEP TOWARD HEALTHIER LAND

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When a boma is abandoned or relocated, its legacy lives on for years to come in the form of lush, nutritious, grassy “glades.” Glades can attract wildlife, prevent erosion, and altogether help restore degraded land. Thanks to newer metal fencing, bomas can now be moved as often as we please, and land managers have begun to incorporate them into plans for improving the land.

But how often should a boma be moved, and to where? How close to an older glade should a new boma be? How do bomas on black cotton compare to red soils? To answer these questions and more, Mpala is starting up a boma monitoring program.

With Mpala Conservancy Manager Mike Littlewood, we began by considering Mpala’s land-management goals – such as getting grasses to grow in the barren northern areas of the ranch – and how bomas can play a role in meeting these goals. To monitor bomas, data are collected at three basic times: before a boma is installed, while it is in use, and repeatedly after the boma is gone. We can then compare the different ways bomas are used and learn how effective they have been in achieving our goals.

The methods we use for gathering data are simple and require no special equipment.

With only a meter stick, camera, and datasheets, Mpala’s boma monitors, Charles Chanana (normally an askari) and Yairo Manyas (at other times a driver), can finish evaluating sites quickly and be on with the rest of their day.

Soon, we hope that others in Laikipia will begin monitoring their bomas, too. Managers across the district can then learn from each other’s results. To help, we are developing an easy-to-use database for anyone interested in analyzing and sharing their boma monitoring data.

If you are interested in launching a similar program, you can download the free Guide to Boma Monitoring at: [www.mpala.org/Monitoring\\_Guide.php](http://www.mpala.org/Monitoring_Guide.php). This guide outlines methods and techniques

for data collection and includes data sheets for gathering monitoring data.

For more information about monitoring in general (goal-setting, planning, detailed monitoring methods), download the free guide Monitoring Rangeland Health from the same website.

We are always seeking ways to make our monitoring guides easier for you to use. If you have suggestions or questions, please contact monitoring project leader Corinna Riginos at [criginos@gmail.com](mailto:criginos@gmail.com). ■



*Paired photos from the same boma, taken six weeks apart (top photo is earlier).  
Photo by Corinna Riginos.*



## MPALA MEMORIES, PART VI: EARLY MRC RESEARCH AND SCIENTISTS (1995-1999)

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on two of these and later returned to marry Nick Georgiadis. Majid Ezzati (from Princeton) did a project on indoor air quality and cookstoves. David Augustine arrived in 1999 to study the red soil glades and erect his own set of exclosures (including the one by the MRC staff village). Also in 1999, Vanessa Ezenwa started her wildlife disease research.

It was during this time that the Trust began looking for a senior scientist to be the Director of the Centre. Nick Georgiadis was hired in 1997. Nick was in many ways an ideal candidate. He was a Kenyan citizen and an active international researcher who continued his work at Mpala. His research spanned the range from plant physiology and community ecology to large mammal genetics and evolution. In his first years at MRC, Nick supported Kenyan M.Sc. students

Oscar Wambuguh and Gordon Ojwang in their broader Laikipia studies. Under Nick, the entire ranch property became more available for research, and he oversaw the expansion of the Centre as it began to make its mark in the scientific world. ■



*An early group of Princeton graduate students at River Camp. Photo by Dan Rubenstein.*

### RESEARCH

## WHY DO OLD BOMA SITES STAY TREELESS FOR SO LONG?



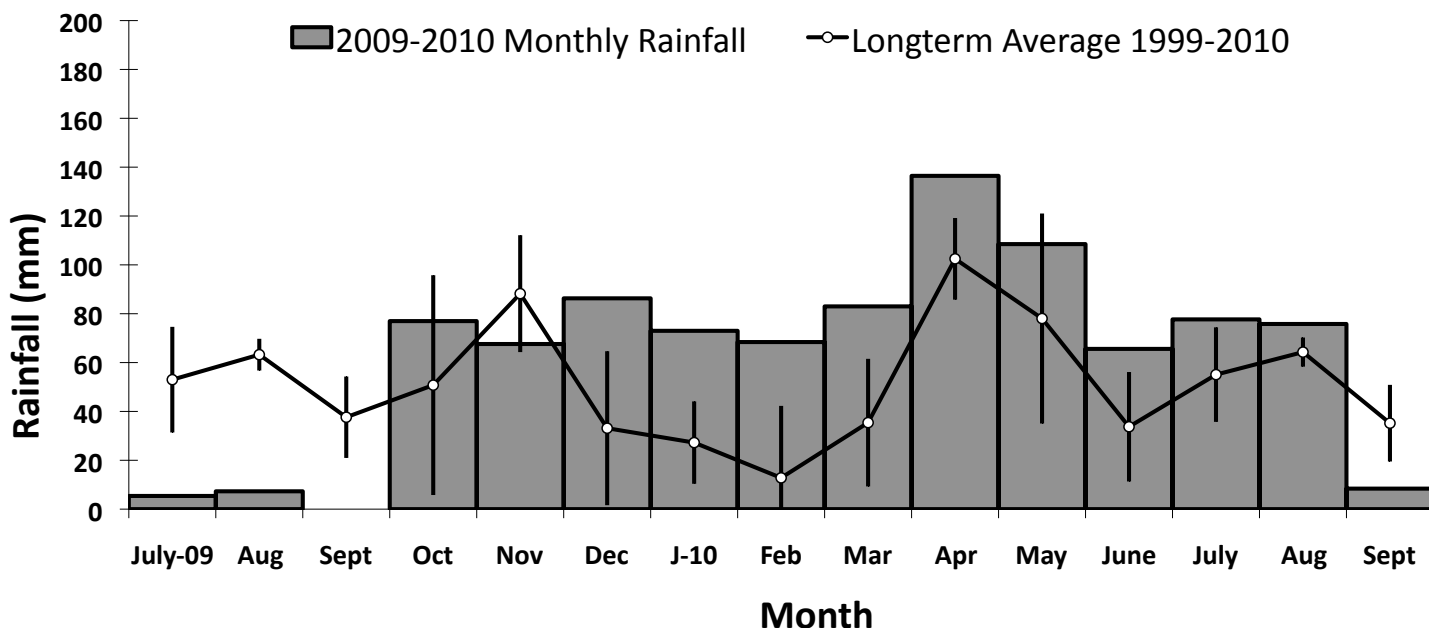
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competition, seedlings inside glades thrive even more than seedlings far from glades.

Although our work doesn't provide any final answers, these results emphasize that both large herbivores and grass competition dramatically affect the density and distribution of savanna trees. Moreover, simply by keeping cattle in a boma, humans can initiate a complex set of ecological processes that maintain treeless, nutrient-rich glades for decades or even centuries. ■

*A tagged seedling. Photo by Lauren Porensky.*

## MRC RAINFALL 2009 - 2010



## NEW TO THE MPALA WEBSITE

A new [checklist](#) on the reptiles and amphibians of Mpala can now be found on the Mpala website with the [other flora and fauna lists](#). Enjoy! ■

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