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AMONG THE VULTURES OF NORTHERN KENYA



Darcy Ogada discusses her research on this vitally important, and highly endangered, scavenger.

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WHERE IS THE CAT? MONITORING LION MOVEMENTS USING GPS TECHNOLOGY



Mark Napao introduces the Laikipia Predator Project and discusses how equipping lions with GPS collars helps researchers study them.

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INFECTIOUS PERSONALITIES



What is it about some rodents that makes them such efficient disease transmitters? Collin McCabe investigates this question for his PhD research.

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BUNCHED GRAZING: THE WAY TO GO?



Lalampaa Priscilla explains her study on the benefits of planned grazing management techniques on group ranches.

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Did you know the most commonly seen vultures in Laikipia are all endangered species? These include the highly social, carcass-mobbing Rüppell's and White-backed vultures, the chicken-like Hooded vulture, and the regal and proud Lappet-faced vulture. In fact, seven of the eight species of vulture found in East Africa are listed on the IUCN Red List of Threatened Species. Vultures are among the most threatened groups of birds worldwide and this is largely due to deliberate and unintentional poisoning. East Africa's vultures are mainly unintentional victims of poisoning targeted at predators (e.g. hyenas and lions) that have killed livestock.

The Peregrine Fund's Africa Program began a project in northern Kenya in 2012 to better understand what are arguably nature's most important scavengers. As part of the initial phase of the project, three Rüppell's Vultures were captured at Ol Pejeta Conservancy and fitted with tracking units. Each unit recorded data on the bird's location, flight speed, and elevation approximately every 15 minutes. Over the ensuing year the birds showed us their true colours as they traversed vast areas of northern Kenya and southern Ethiopia in search of livestock and wildlife carcasses (Fig. 1).

One youngster (1.5 years-old) ranged the farthest (175,000 km², about the size of Oklahoma), spending one-third of its time in extreme northern Kenya near Moyale, probably feeding predominantly on livestock carcasses. An adult bird nested on a cliff northeast of Maralal, due north of Mpala, and spent the majority of its time in conservancies and private ranches in Laikipia, Samburu and Isiolo counties. The third bird, also

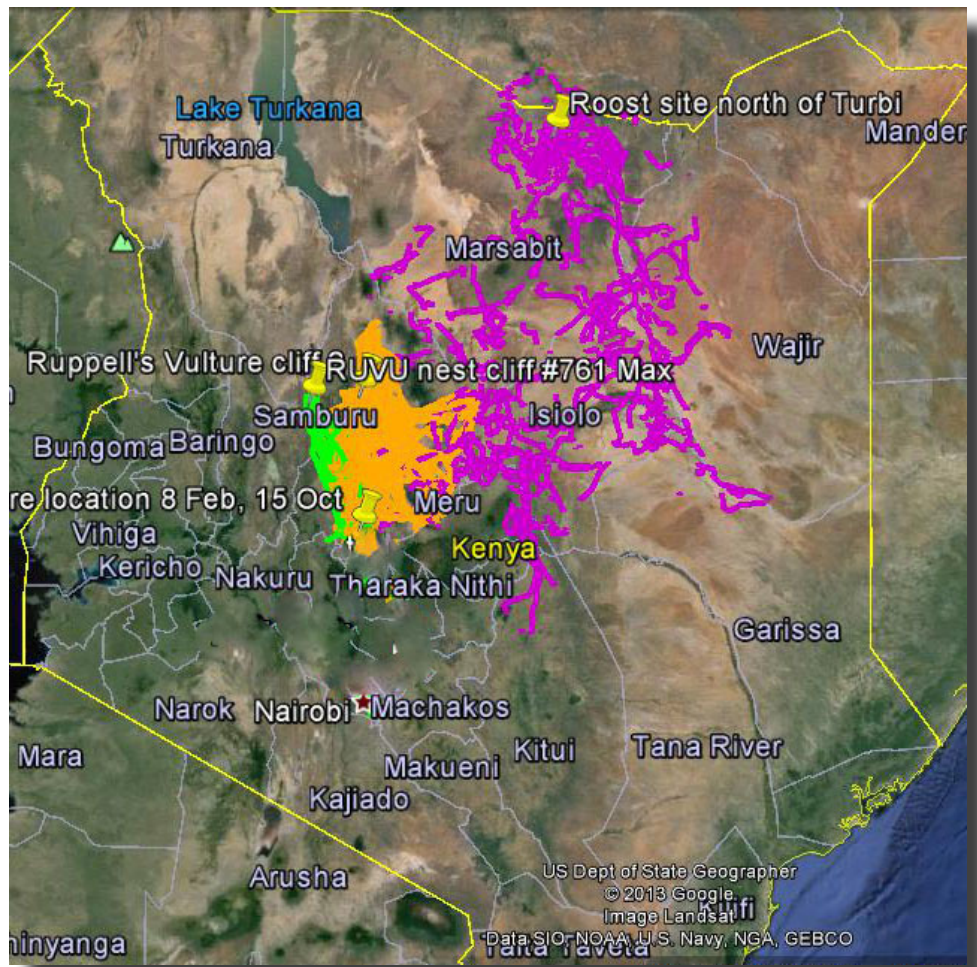


Figure 1: Map of Kenya showing movements of three Rüppell's vultures. Each colour represents a different individual.

an adult, showed us a new breeding cliff in southern Turkana County.

For the first time we've been able to positively identify a number of important nesting and roosting cliffs, most of which are located outside of protected areas and therefore vulnerable to large-scale development projects or other human interference. With the fine-scale data gathered via the tracking units it was even possible to identify specific locations where the birds

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AMONG THE VULTURES OF NORTHERN KENYA

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were dining, which of course is key towards addressing the threat of poisoning. While most of southern Kenya's vultures frequent the Masai Mara to feast on the casualties of the migration of a million plus herbivores, the vultures of northern Kenya prefer a home-grown smorgasbord of Laikipia's bushmeat mixed with Moyale's best 'nyama choma' (aka sun-dried livestock).

Power lines that will bisect Laikipia, Samburu and Marsabit counties pose a significant new threat to these already depleted populations, while the threat of poisoning lurks at every meal. For Kenya's vultures, the future remains perilous. But we remain committed to ensuring a future for these vitally important scavengers. Awareness-raising activities such as the celebration of International Vulture Awareness Day at Ol Pejeta in 2011, continued efforts to identify and protect important breeding areas, and policy-level engagement to restrict access to highly toxic agricultural pesticides that are often used as poison, will all have an impact. Charles Darwin described vultures as 'disgusting', but these denizens of the sky are nature's most efficient clean-up crew, performing an unglamorous job in the most spectacular way. •



S. THOMSETT

Darcy Ogada about to release an adult Ruppell's vulture equipped with a transmitter.

WONDERING ABOUT WONDERBAGS SALLY GOODMAN

Many residents of Mpala's staff village have enthusiastically agreed to participate in a small study on a cooking device, known as the **Wonderbag**, manufactured by the **Zeitz Foundation** in collaboration with social enterprise organization Natural Balance. So far, 27 Mpala employees have received Wonderbags, which are colorful insulated bags that cook using heat retention, keeping food that has been brought to a boil above cooking temperature for hours. The bags decrease the need for kuni (firewood), saving time and carbon emissions, and lessen the harmful inhalation of smoke, typical of traditional cooking over an open fire. The extent of the fuel savings and health benefits is the goal of this study. Surveys administered prior to distribution of the Wonderbags have found that families burn up to 25 kg of kuni per day for food preparation and spend hours each week collecting it. Follow up surveys two months after receipt of the bags will help determine their effectiveness.



SALLY GOODMAN

Escari Ileri Reipon shows off his new Wonderbag

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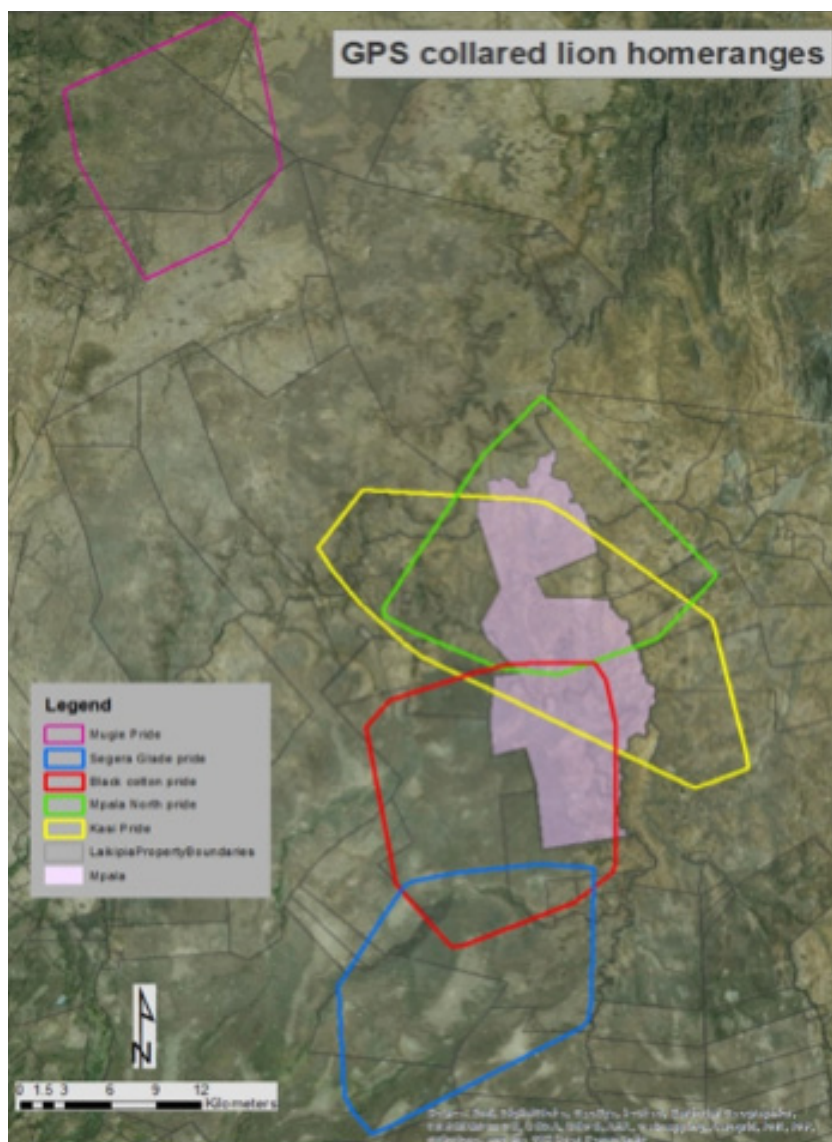
WHERE IS THE CAT? MONITORING LIONS USING GPS TECHNOLOGY

MARK NAPAQ

Laikipia's thick scrubland and the elusive nature of lions makes it extremely difficult to study these magnificent creatures. Historical persecution of lions in Laikipia as a result of livestock depredation is also a contributing factor as to why these cats would rather hide from humans. Those of us who work on Mpala probably have driven past lions numerous times oblivious that they are sleeping behind a bush or purposefully hiding to avoid humans. Lions love to sleep. They can spend as many as twenty hours just chilling, especially during the day, as they get ready for the busy night ahead. The Laikipia predator project is overcoming these challenges with high tech GPS collars that transmit an individual's location in real time. Gone are the days of old-fashioned radio collars and frantic ground and air searches holding antennas and listening for beeps. No longer do we have to disrupt the lion's activity in an effort to establish its behavior! Today, we can know the individual's location from the comfort of our offices-thanks to the GPS collar tracking technology.

Data from these satellite collars has helped us immensely in understanding how many prides use Mpala and neighboring ranches, their movement patterns, homerange size and other important ecological data such as what they are eating. Owing to the social nature of lions, these data enable us to monitor not only the collared individual, but its respective pride members as they move across the landscape. With these data we also are able to match reported incidents of depredation with the most recent location of our known pride members and tell whether or not our collared prides were involved.

So far we have learned that Mpala is home to four prides with an estimate of about 15-20 individuals. The Mpala North pride (n=3), Kasi pride (n=6), Nanjo pride (n=4)



Home ranges of five prides with collared lions around Mpala

and the Mlandama (n=4) pride. Few of these prides spend all of their time on Mpala. Cindy, the collared female in the Mpala North pride, also spends time on Male and Mukogodo Ranches. The notorious Kasi pride was christened Kasi (Swahili for speed) because they crisscross as many as four ranches, probably because they were a pride of sub adults and evictees from their natal pride. Mlandama ranges across Mpala and Segera. It is so interesting to see how the prides have distinct

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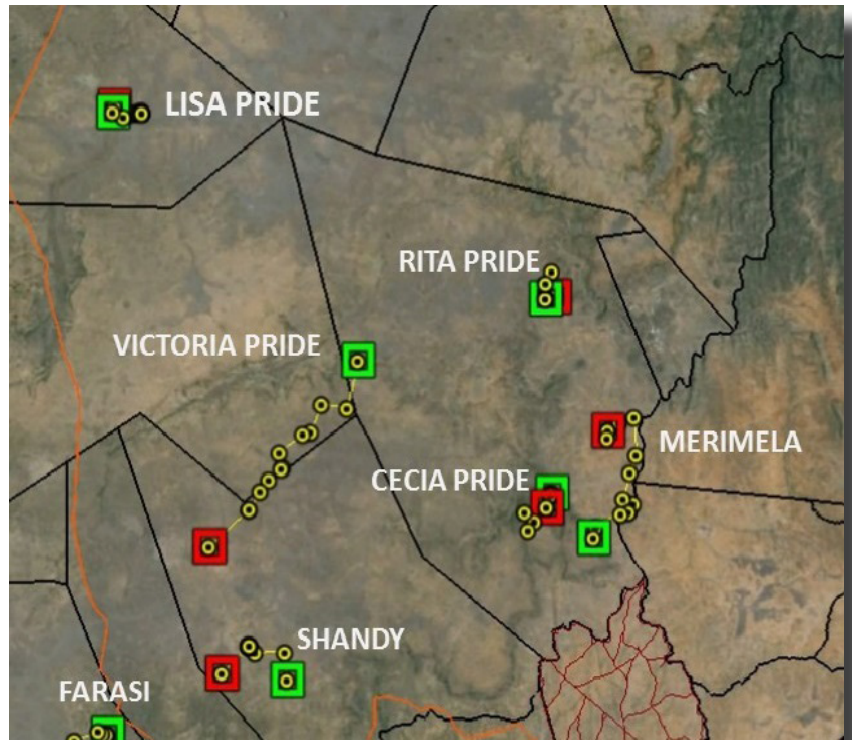
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WHERE IS THE CAT? MONITORING LIONS USING GPS TECHNOLOGY

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territories and sometimes have some degree of overlap, but each of the females is known to use a specific homerange area. For instance, when on Mpala, Cindy sticks to the area just below the Mukenya escarpment and northwards whereas the Mlandama group only uses the black cotton area below the Mukenya escarpment to the southern end of Mpala.

Besides collecting data on daily movements of lions, our Living With Lions (LWL) team is also undertaking a lion prey preference study in Laikipia in collaboration with Margaret Kinnaird and Tim O'Brien (MRC and Wildlife Conservation Society) and more recently Chris Wilmers (UC Santa Cruz). Following concerns that the lion may be responsible for the decline of other endangered wild animals such as Grevy Zebra, Hartebeest and Eland, our study aims to establish what the lions are eating. This involves mapping the daily locations of each collared individual in 8 prides in north and central Laikipia and searching sites where individuals stopped for 3 or more hours for prey. We also email our maps to all participating ranches. This information can then be used to tell



The home ranges of some of Mpala's female lions

herders to avoid specific areas where the lions are ranging all in a bid to avoid conflict between the lions and the livestock using these areas. •

A female lion basks in the afternoon sun



MARC NAPAQ

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Zoonoses are what we call the diseases that are transmitted between humans and other animals, and they account for more than half of all infectious diseases in humans. Rodents are one of the oldest and richest sources of these zoonoses – they have been living with or around humans for at least 10,000 years, and many devastating human pandemics throughout history have been traced directly to rodents. However, solid explanations are scant for why rodents have had such an enormous impact on human health, and even less is known about why some species are great at transmitting these diseases while others aren't such good hosts for these pathogens. These are the main questions that I hope to answer with my research at Mpala Research Centre.

The work that I'm conducting focuses on rural populations in central Kenya, where over twenty endemic rodent species overlap with humans in a single habitat and show varying degrees of infection with zoonotic pathogens. This diversity in rodent species and pathogens makes the area an ideal natural setting in which to identify the effects of commensalism on disease transmission. A relative newcomer, I arrived at Mpala in September of last year to begin at determining whether rodents that live with people, in and around their homes

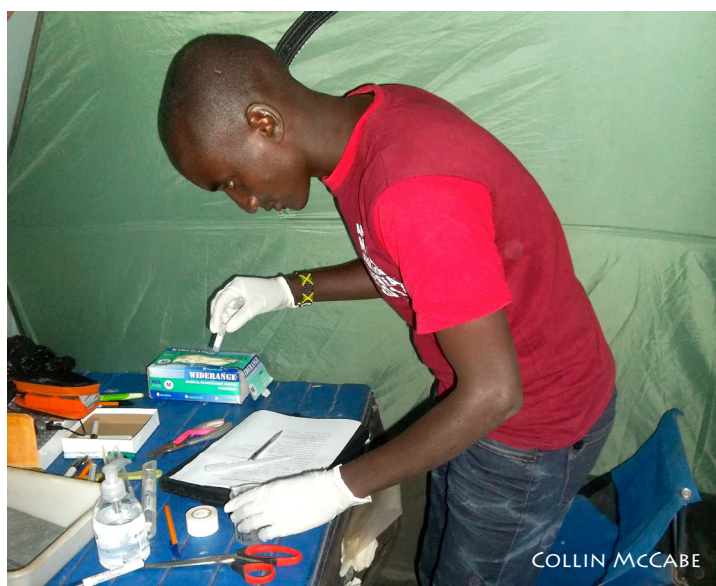


Figure 1: Research assistant John Mosiany tests for blood-borne pathogens in the rodents



Figure 2: The field lab

(an ecological relationship often referred to as “commensalism”) pose a greater threat to human health than wild rodents that are not commensal.

My team and I are in the process of live-trapping rodents (in addition to a few birds and a frog – but we let them all go free, happy and healthy) in aluminum Sherman traps from over a dozen villages and undisturbed conservation lands in the area surrounding Mpala; we'll be trapping intensively during each rainy and dry season until June 2015. After collecting the standard samples from the rodents (hair for diet composition, feces for intestinal parasite abundance, fleas and ticks for ectoparasite counts and bloodmeal genetic analysis – to name only a few, humane blood draws for bloodborne pathogens; Figure 1), we take the animals to our field lab (Figure 2) to test hypotheses for how their behavior and ecology influence patterns of coexistence with humans.

Since all of the rodents caught in our work so far have been nocturnal, or at least crepuscular (active mostly at dawn and dusk), this means a lot of late nights if we want to observe their behavior under as natural a setting as possible.

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Following a long history of research on rodent behavior in the field of experimental pharmacology, the behavioral tests that we carry out (hole-board and open field tests; Figure 3), focus on pinpointing just how curious the rodents are, with the assumptions that more curious animals are going to spend more time around humans, and that they'll also have more diseases. We also present the rodents with a buffet of sorts, in a diet preference test. The animals choose between common wild foods (acacia leaves, dried seed) as well as on a common human staple food of the region (ugali, a maize-derived meal). By determining whether the animals are living around humans to steal their food, or if they are just there because they don't mind humans and appreciate the shelter from the elements, we can suggest future control mechanism to reduce human exposure – perhaps something as basic as keeping food stored and cooked in a separate building, away from where people sleep. Additionally, our analysis of blood-borne pathogens, to be conducted back in the United States, will sug-

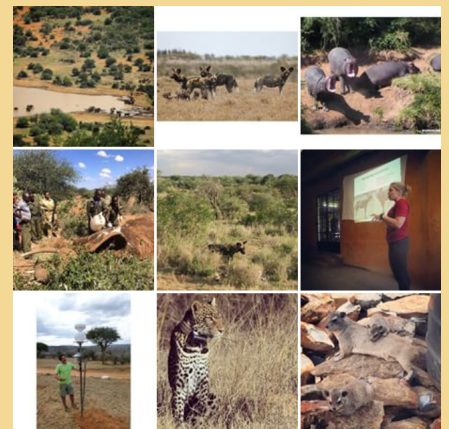
gest whether wild or commensal rodents present a bigger disease risk to humans. In today's highly connected world, the health concerns arising from new disease outbreaks are truly global, and the solutions and efforts to control and stop these outbreaks must also be global collaborations, which they are in my case, thanks to the amazing staff and facilities at Mpala Research Centre! •



Figure 3: Collin performs behavioral tests at night with the rodents

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BUNCHED GRAZING: THE WAY TO GO? LALAMPAA PRISCILLA



To pastoralists worldwide, land is highly important, as it is a primary source of their livelihoods. This applies to Laikipia pastoralists who use different techniques to manage their land and ensure its sustained productivity. The land under consideration here is communally owned and is divided into nine group ranches, which form Naibung'a conservancy.

Planned grazing management efforts, spearheaded by Northern Rangelands Trust (NRT) and The Nature Conservancy (TNC) in northern Kenya, are an important means of managing the group ranch land. These efforts aim to prevent massive degradation, biodiversity loss and declining productivity of rangelands due to unsustainable grazing management practices. "Planned grazing" includes rest rotation, bunched grazing, and strategic distribution of livestock bomas in order to restore degraded areas through enhanced carbon stocks, species functional diversity, and composition and soil productivity.

The project in which I am involved is evaluating the effectiveness of bunched grazing. Conceived by Dr. Dan



A camera trap captured a zebra grazing in one of the experimental plots

Rubenstein of Princeton University, the project began in July 2014 and lasted until December 2014. Bunched grazing is a new concept in the group ranches and involves bunching cattle and grazing them together on the land for a short period, and subsequently allowing the land to rest for a period of three to six months. This gives the land time to regain its productivity.

I had the pleasure of participating in research in two group ranches (Ilmotiok and Koiya) to assess the effect of bunched grazing on small stock (sheep and goats), wildlife, and vegetation. I used GPS trackers and camera traps to monitor movement of the small stock and wildlife in and out of the bunched area. My study also investigated the effects of bunched grazing on animal productivity and vegetation growth.

My project involved working directly with the community especially when installing GPS devices and camera traps. We made daily visits to the bomas to place GPS trackers on animals and weigh them, making the work

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Priscilla and intern Anchal Padukone completing a vegetation survey

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Intern Anchal Padukone and research assistance tag livestock at one of the group ranches

more exciting and interactive. Additionally, we worked hand in hand with group ranch officials who helped sensitize the community to the importance of the work we were doing, making it easy to get full cooperation from the families and community at large. Frequent visits and meetings with community members helped us understand how passionate they are about their livestock and land. For example, in Ilmotiok, the community has divided its land into grazing and conservation areas. The community members are disciplined when it comes to grazing their animals to ensure the conservation area is preserved. Each group ranch has its own approach to managing its land, but crosscutting issues such as water availability and movement of livestock across group ranch boundaries are discussed and managed together by officials from all ranches.

Conflicts over pasture are inevitable in these areas especially when communities from neighboring areas come looking for pasture during the dry seasons. Many outside communities do not adhere to planned grazing, thus leading to overgrazing. These conflicts are resolved by holding meetings with elders from the two conflicting communities to come up with ways in which they can coexist and assist one another, especially during dry seasons.

It is critical to determine the effectiveness of bunched grazing in restoring rangeland health and productivity to be able to adequately advise these communities on its use in their own ranches and in other parts of Kenya. However, there is insufficient scientific information on the effects of this system on pastoral rangeland health. My next step is to analyze the data collected with the anticipation that they will provide insightful and useful information for evaluating and adapting the approaches to the planned grazing system in these group ranches. •



Children herd livestock in one of the experimental plots

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MPALA AT A GLANCE

In 2014, Mpala hosted more than 300 students, researchers, professors, and guests from 57 institutions and universities and 15 different countries including Australia, Cameroon, India, Sweden, Taiwan, and Zimbabwe.

Princeton University and UIC PhD students and professors pose in the field



On November 4th, students from Kai-mathanga Polytechnic visited Mpala to learn about wildlife and conservation. Conservation club coordinator Wilson Nderitu led the group on their educational tour.

On November 19th, 55 students from Environmental Science and Natural Resource Management classes at Chuka University participated in a day trip to Mpala. The students spent the morning in the field, went on a game drive, and spoke with researchers about the current projects taking place at Mpala.

On November 22nd, 40 students studying Animal Science at Egerton University visited Mpala as part of an academic tour on camel production. They covered topics such as feeding and resource management, health and disease management, and camel breeding practices.

On January 7th, 27 PhD students from Princeton University and the University of Illinois at Chicago (UIC) arrived at Mpala for three weeks of field work as part of a tropical biology course. The UIC students (Computer Science) worked with the Princeton students (Ecology and Evolutionary Biology) on incorporating computer programming into biological research.

Teachers and local educators pose with NKCC coordinators Nancy Rubenstein and Wilson Nderitu at River Camp on the final day of the Mpala teachers' workshop



On January 10th, students from Exeter University in England stayed at Mpala for one night on their way to conduct research at Lake Naivasha.

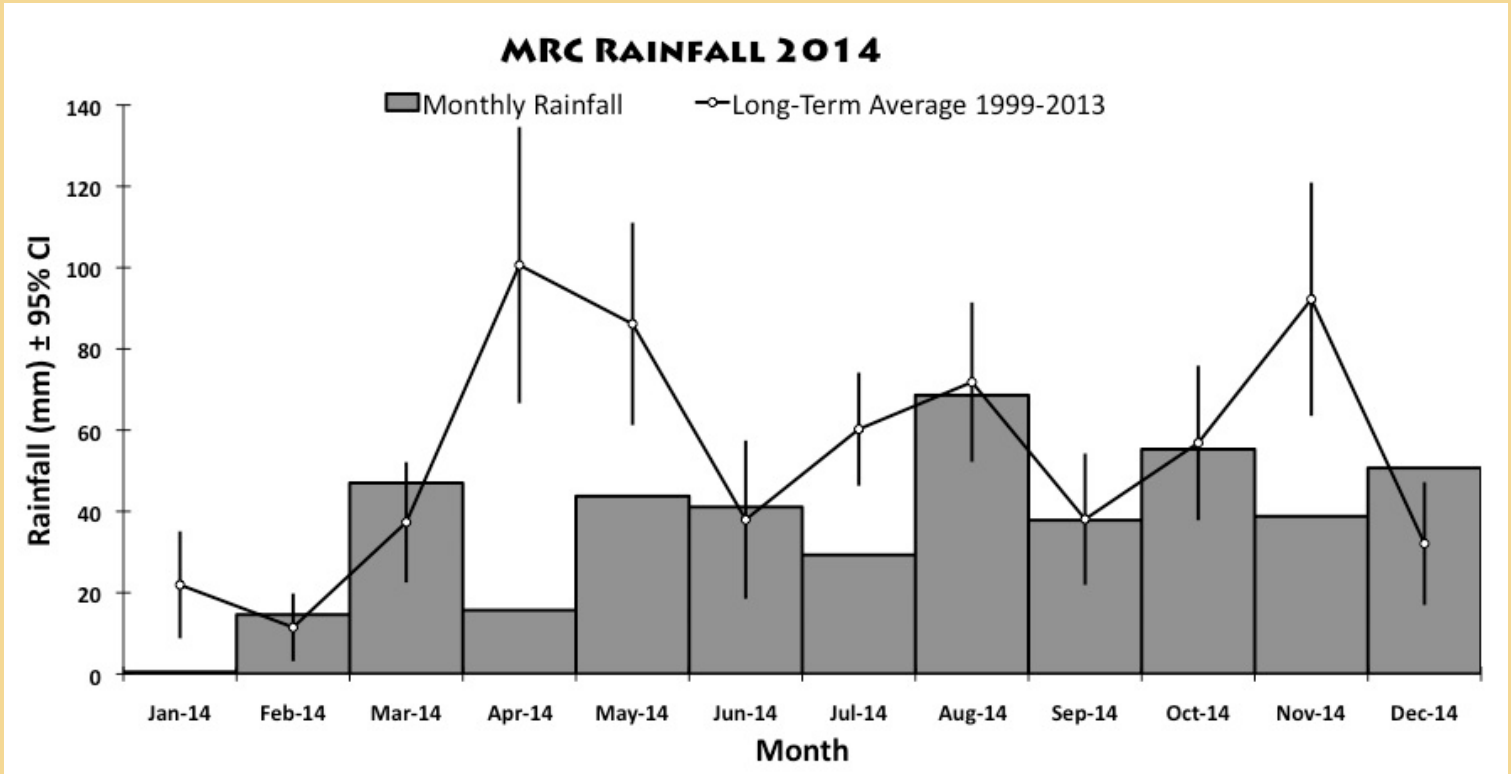
From January 9th-11th, Mpala hosted local teachers from the Northern Kenya Conservation Clubs (NKCC) for a workshop in experiential learning and environmental education. They were joined by educators from the Lewa Wildlife Conservancy and Education Beyond Borders.

The following list shows scientific articles published by Mpala-based researchers in 2014. The list is long (22 articles in 17 different journals) and impressive (average impact factor is 7.43 with articles in high impact journals such as Nature, Science, Ecological Letters, Global Change Biology, Ecology and PLOS One). Most importantly, the list demonstrates the importance of the Mpala Research Centre and the Ranch in providing opportunities to students, scientists and educators to further the field of Ecology.

-Margaret Kinnaird

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