

GORONGOSA: RESTORING MOZAMBIQUE'S NATIONAL TREASURE

A partnership between a nonprofit organization and the Mozambican government is aiming to restore a national park to its former glory as an iconic African floodplain teeming with elephants, lions, zebras, wildebeests, and a myriad of smaller critters. The success of the project will depend not only on the ability to restore and protect the animal species in the park but also on meeting the challenges of overpopulation and poverty in the area. The lessons learned from this sustainable development endeavor could help reshape and restore wild places everywhere.

War Destroys an African Eden

Today, Gorongosa National Park comprises 1,570 square miles of wilderness at the southern tip of the African Great Rift Valley in Mozambique, a country on the southeastern coast of Africa. It began life in the early 20th century, when Mozambique was a Portuguese colony, as a reserve for wealthy hunters to come and shoot “big game,” such as elephants and lions. In the 1960s, while still under Portuguese control, Gorongosa became a protected park where tourists, mainly from Portugal, could come and stay at Chitengo camp and see the wild herds.

But two years after Mozambique gained independence from Portugal in 1975, the country was engulfed by a civil war. By the time the war ended in 1992, a million people were dead and several million more were maimed, traumatized, and displaced. The web of life within Gorongosa’s park was likewise left in tatters. Soldiers killed and ate most of the large animals, and elephants were shot

for their ivory, a major source of funding for weapons and ammunition.

In the decade after the war, civilian hunters continued killing most of the remaining large animals for food. In just 20 years, the decline in the number of herbivores in Gorongosa was staggering and, as the prey disappeared, so did the predators. Before the war, Gorongosa had over 200 lions, 2,500 elephants, 14,000 African buffaloes, 6,500 wildebeests, and 3,500 zebras. By 1994, you could count the number of lions on one hand, there were no buffaloes and wildebeests, and elephants and zebras each numbered under 110.

The scale of Gorongosa’s tragedy is not unique to Mozambique. Other places that once boasted an incredible natural bounty share a similar history of loss. But what sets Gorongosa’s story apart is its rebirth. Today, Gorongosa still lacks the incredible density of elephants, buffaloes, zebras, and wildebeests it once had, but many species are once again thriving. The park has experienced

Species	1972 Estimates	2000 Estimates	Loss 1972–2000	2014 Estimates
African buffalo	14,000	<100	>99%	>500
Elephant	2,500	<200	>92%	<400
Hippo	3,500	<100	>97%	>200
Waterbuck	3,500	<300	>91%	>6,000
Zebra	3,500	<20	>99%	<40
Blue wildebeest	6,500	<20	>99%	>400
Sable antelope	700	<100	>86%	>500
Lichtenstein hartebeest	800	<100	>88%	>300
Lion	200	N/A	N/A	>30

Table 1. Estimated Wildlife Populations over Time. The 1972 estimates represent the number of animals before the civil war. The war ended in 1992. By 1994, the number of animals were at an all-time low but started to increase by 2000, as animals were reintroduced to the park. By 2014, populations have grown but not to the same numbers as before the war. *Source:* Gorongosa Restoration Project. *Note:* “N/A” means “no data available.”

a remarkable, and remarkably fast, recovery. The fragile success at Gorongosa is due largely to a partnership between a nonprofit organization and the government, which has implemented a new form of conservation in the park. Their approach, which mixes traditional conservation biology with solutions for practical challenges in the community, serves as a model of sustainable conservation. If the project prevails, it will have preserved not only a beautiful and unique wild space—but also our human relationship to it.

The Aftermath of the War

Since the civil war ended, the wildlife of Gorongosa has faced other ongoing threats. The park sits in the center of Mozambique at the intersection of two main roads that crisscross the country. As development and trade have increased in the region, once-tiny farming villages have grown. Better accessibility to markets puts farmland at a premium, and so the villages surrounding Gorongosa have expanded right up to the border of the park. Some farmers even advance across the park's invisible borders to gain more farmland.

This encroachment is evident on Mount Gorongosa, the 6,000-foot, rain-forested peak that rises 40 miles northwest of the park's floodplain and gives the park its name. Here, the rain forest is being cleared for corn and potato fields. Besides destroying habitat for the animals living on Mount Gorongosa, cutting down the forest affects the amount of water that is available to animals and plants throughout the park. Forest soils absorb precipitation and allow the water to be slowly released throughout the year, keeping the rivers and lakes in the valley flowing. Without those trees, the water would just flow off the mountain in a few weeks and there would be little or no water available during the dry season.

As Mozambique's population (currently 24 million people) continues to grow, the number of people living in extreme poverty increases, making it challenging for surrounding communities to



Figure 1. A partnership between a private philanthropy and Mozambique's government has set out to restore and conserve the wildlife of Gorongosa National Park. After a civil war that lasted almost 16 years, the populations of large animals were decimated. (Photo credit: Michael Paredes.)

prioritize saving the park's natural space and biodiversity. Mozambique is one of the poorest countries in the world, and the Gorongosa District is one of the poorest areas within Mozambique. The average person in Mozambique lives on the equivalent of \$0.38 per day, and 1 in every 4 children dies before age five.

Many citizens who live near the park's borders are often desperate to feed their families, and so illegal hunting of bush meat and illegal logging are major problems for park rangers. Active gold mining upstream of the park's rivers and lakes poisons the waterways with mercury and clogs them with silt. On occasion, crocodiles and elephants kill people in surrounding communities, stirring outrage and fraying local relations with the park.

A New Partnership for Conservation

In March 2004, American philanthropist Greg Carr visited Gorongosa for the first time. When asked to sign the park's guest book, he wrote, "This is a spectacular park and it could become one of the best in Africa with some assistance."

It turned out that Carr would largely supply that assistance himself in the form of a unique public-private partnership. Formally signed into action in 2008, the \$40 million, 20-year deal between Mozambique's government and the Gorongosa Restoration Project, a US nonprofit led by Carr, set out to restore and conserve the park, and at the same time, to engage in sustainable development for the 200,000 people living in the surrounding communities. The agreement was designed to last 20 years to adequately address the community challenges, give time for policies to take hold, and give the ecosystem time to recover and stabilize.

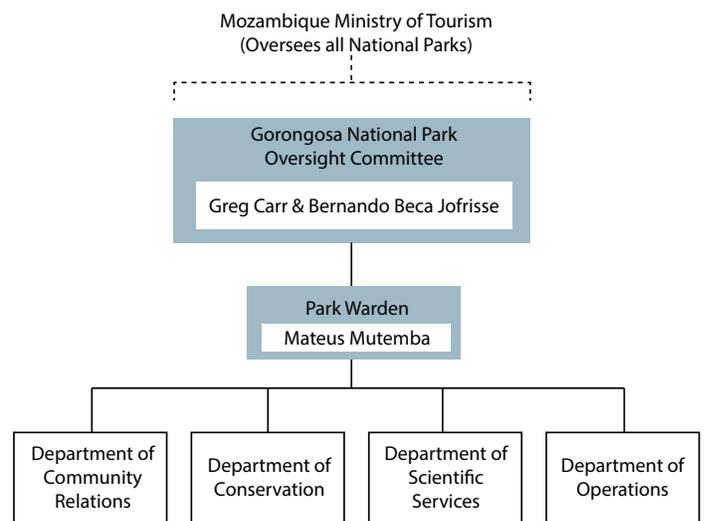


Figure 2. Gorongosa National Park is part of the Mozambican national park system within Mozambique's Ministry of Tourism. Park operations are overseen by US philanthropist Greg Carr and his Mozambican counterpart, Bernardo Beca Jofrisse, and implemented by the park warden, Mateus Mutemba. Mutemba supervises four departments—Community Relations, Conservation, Scientific Services, and Operations.

A Science-Based Approach to Restoration

Scientists at Gorongosa National Park have studied the impact of dwindling large herbivore populations in the park's ecosystem and are determining how best to restore a healthy balance of species in the park. Without the large herbivores, or "big grazers," the grasses grow tall. Tall grass has fewer nutrients per bite than short grass, so only large grazers like buffalo and zebra, which go for quantity over quality, can eat enough of this nutrient-poor grass to support their needs. When there aren't enough large grazers to mow down the tall grass, then the short, nutrient-rich grass species get overshadowed. As medium and short grass species get squeezed out, plant diversity declines and smaller herbivores, like oribi antelope, have a hard time finding the nutritious grass they thrive on.

Too much tall grass brings another problem in the dry season, by fueling massive wildfires. Wildfires have always been a natural phenomenon, but since Gorongosa lost its big grazers, the fires burn larger and happen more often. Finally, the hooves of thousands of large herbivores break up the soil, and their dung adds vital nutrients—factors that promote plant growth and diversity when these populations are large.

To return the grazer populations to numbers close to what they were before the war, the park's Department of Scientific Services brought in animals from other parks. Bringing in animals is expensive, complicated, and stressful to the animals. But it is a necessary step to kick-start the repopulation of some of Gorongosa's key animal species. In 1994, some populations, such as zebra, had dwindled to such a small number that they couldn't rebound successfully on their own; others, such as elephant and hippo, needed a few new individuals to increase the genetic diversity of the current population; while others yet, such as buffalo and wildebeest, had been wiped out completely. Park staff trucked in 196 buffaloes, 180 wildebeests, 6 elephants, 5 hippos, 35 elands, and 14 zebras from other parks in Mozambique, South Africa, and Zimbabwe. Fourteen zebras may seem like a small number, but these are members of a rare subspecies of zebra (*Equus quagga crawshayi*), endemic to just a few places in East Africa. Gorongosa was once their prime habitat, and bringing them back will hopefully provide a stronghold for the population and return large herds to the park.

Because of these reintroductions, the numbers of some of the large grazer populations had increased slightly by 2000 and are continuing to increase (Table 1). The reintroductions of large grazer species, combined with protecting the park from illegal hunting, has given small grazer species a chance to rebound on their own. Between 2000 and 2014, impala, oribi, bushbuck, reedbuck, and kudu increased naturally without any reintroductions (Not shown in Table 1).

Another challenge Gorongosa's scientists must conquer as they work to restore the park to its former glory is a geographical one. Decades ago, Gorongosa's wildlife was connected to areas outside the park's official borders that were still wild and full of animals. The flow of animals between the park and these other areas increased the genetic diversity of the species in Gorongosa, keeping animal populations healthy. Genetic diversity is important because the flow of new genes into a population increases the odds that the population can adapt to a changing environment. Without that in-

flux of new genes, a population is more susceptible to local extinction if a change, such as climate or human disturbance, threatens the population.

Today, Gorongosa is an island surrounded by a sea of humanity. Most of the corridors that provided ways for wildlife to mix are gone due to the presence of farms, villages, and roads. Working with the government of Mozambique, local stakeholders plan to create two corridors along major rivers connecting the northwest portion of the park with Mount Gorongosa. They would also like to establish a large corridor through a network of protected areas from the eastern side of the park to the Marrromeu Reserve, a 3,860-square mile protected area on Mozambique's east coast, connecting two of the country's major wildlife populations.

Beyond the Big Animals

The relative peace and stability in Gorongosa provides an unprecedented opportunity for scientists to measure the park's biodiversity as it undergoes restoration—research that will inform future conservation decisions in the park and other damaged places around the world. But the study of biodiversity is not only about the study of large animals and plants. The biodiversity at smaller scales is largely unknown territory, and the park gives scientists a chance to discover new species of small animals, such as insects, and investigate the behavior and biology of known ones. Many insects survived the war years, some even thrived, because they had ample food and less competition.

After exploration trips in 2011 and 2012, one of the world's greatest champions of biodiversity conservation, Dr. Edward O. Wilson, declared Gorongosa to be "the most diverse park in the world" ecologically speaking. In 2014, the park opened a new field lab named after Wilson, to explore, document, and protect the biodiversity of Gorongosa National Park and to offer research and training in biodiversity-related fields for students and conservation leaders in Mozambique.



Figure 3. Gorongosa National Park includes a new lab named after Dr. Edward O. Wilson of Harvard University. Among his many accomplishments, Dr. Wilson has transformed his field of research—the behavior of ants—and has spearheaded efforts to preserve and protect the biodiversity of this planet. (Photo credit: Gorongosa Restoration Project.)



Figure 4. Gorongosa National Park is surrounded by many towns and villages. Park staff has engaged in sustainable development to ensure that the needs of local people are met while also preserving the environment. (Photo credit: Tish Grant.)

Working with Local Communities

Sustainable development—the principle of meeting human needs while also ensuring the sustainability of the environment for future generations—sits at the heart of Gorongosa National Park’s mission. The Department of Community Relations is in daily contact with people living around Gorongosa to coordinate a number of health and education programs for the surrounding communities: disease-prevention including HIV/AIDS and malaria; reproductive health services, including family planning; prevention of gender-based violence; and pre- and postnatal care and early childhood nutrition. In addition, it teaches conservation education classes that show schoolchildren how a healthy park provides communities with clean air and water.

To create large-scale, long-term social change, the park is exploring the idea of creating “community conservancies” in the neighboring villages, empowering local people to protect the land and enjoy the benefits of good stewardship. These conservancies would be areas managed by a governing body made up of community members. Citizens would work with park representatives to come up with sustainable ways to generate revenue for their communities while also protecting the environment. This might take the form of ecotourism, sustainable fishing, or sustainable farming.

A new Department of Agriculture in the park will work with farmers to increase their yields fivefold using improved seeds, farming methods, equipment, and irrigation techniques. As Carr has pointed out in presentations about the project: “When farm families get more out of the land they have, they don’t need to expand their farms into the park.”

Gorongosa mirrors the struggles that conservationists and scientists face all over the world as they try to hold the line against human encroachment. It’s no longer a simple matter of restoring Gorongosa to what it once was. The world has changed: human populations have doubled and doubled again. People need food, shelter, a way to make a living for themselves. That’s why Gorongosa must become a 21st-century national park, operating equally effectively inside and outside the park’s borders. If Gorongosa succeeds, it will be a model and inspirational example for areas of high biodiversity in other developing countries.

This article was written by Gorongosa Restoration Project staff.

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