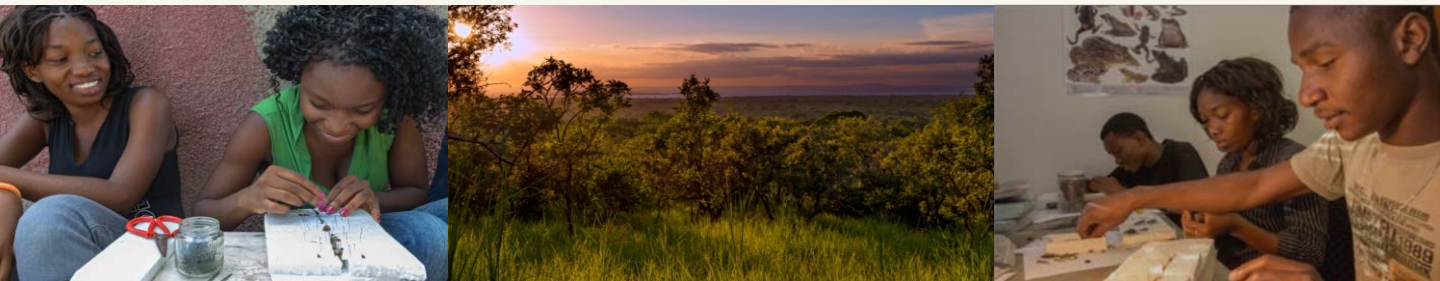


# Science in the Gorongosa National Park, Mozambique

Research opportunities and supporting facilities  
at the EO Wilson Laboratory

January 2017

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GORONGOSA RESTORATION PROJECT





**“Anyone witnessing the rebirth of Gorongosa cannot escape appreciating the magnitude of the accomplishment. It is one thing to draw a line around a beautiful natural area, declare it to be a national park, and add the amenities necessary to serve the public. It is entirely another thing, at a higher order of magnitude, to restore a damaged park back to its original health and vibrancy.”**

**Edward O. Wilson, “Gorongosa: A Window on Eternity”**

### **Why choose Gorongosa ?**

- **An incredibly rich and diverse open-air laboratory**
- **A 25-year co-management agreement between the Government of Mozambique and the Gorongosa Restoration Project = a stable institutional environment**
- **Core funding assured for the protection of the Park for the next 25 years**
- **Research permits issued by the Park**
- **A modern research center to serve as a logistical basis**
- **Core Park staff and data to assist visiting researchers**
- **A network of universities and other institutions involved in research and monitoring in the Park**
- **Opportunities to give back through capacity building of young Mozambican scientists.**

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## Summary

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Gorongosa National Park and its Buffer Zone cover 10,000 km<sup>2</sup> (1,000,000 hectares) within the Great African Rift in central Mozambique. Gorongosa was proclaimed in 1960 and is the flagship National Park of the country. Following independence in 1974, the Park suffered through a long civil war and in its aftermath until restoration efforts started in the early 2000's.

In 2008, the Government of Mozambique signed a 20-year Public-Private partnership with the US-based 501c3 corporation "Gorongosa Restoration Project" ("GRP"). The GRP was formed by the US-based Carr Foundation to implement this contract. The Government of Mozambique provided a dual mandate to the GRP: protection of biodiversity in the Park itself and advancement of human development in the region around the Park known as the "Buffer Zone". The agreement was renewed and extended in 2016.

The role of science in the protection, management and development of the greater Gorongosa Ecosystem is defined in this Public-Private partnership. It includes:

- Coordinating the creation of the Park Management Plan.
- Monitoring Park ecosystems with a multi-disciplinary team of ecologists, hydrologists, zoologists, botanists and other specialists.
- Creating tourism zoning policy and assess the environmental impact of tourism establishments.
- Building the capacity of Mozambican researchers, managers, and technicians in ecological research and monitoring, conservation biology, sustainable development, adaptive management, etc.
- Constructing, staffing, managing and maintaining a Science Research Center with a view to ensuring the optimum health of the Park's ecosystem and providing science management advice pertaining to it and providing science management advice to all Departments and to regional conservation bodies.

The juxtaposition of geomorphology, geology and climatic conditions leads to an incredible diversity of landscapes and plant communities. Biodiversity is very high. Other than the Park's megafauna, this biodiversity has been little studied prior to the restoration project.

In 2014, the Edward O. Wilson Biodiversity Laboratory (EOW lab) was inaugurated. It is a modern facility devoted to research and education in fields related to biodiversity conservation. It has been created to explore, document, and protect biodiversity of Gorongosa National Park. It offers research and training opportunities in biodiversity-related fields to students and scientists from Mozambique and from around the world.

## Summary - continued

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Facilities at the EOW lab include a collection room, offices and workspace, accommodation and supporting services such as permanent internet connection, database, 24-hour electricity, drying oven, lab grade freezer etc. These facilities have been expanded in 2016 . A second collection room has been built as well as a lecture hall, additional accommodation and an analytical lab that will allow for DNA extraction.

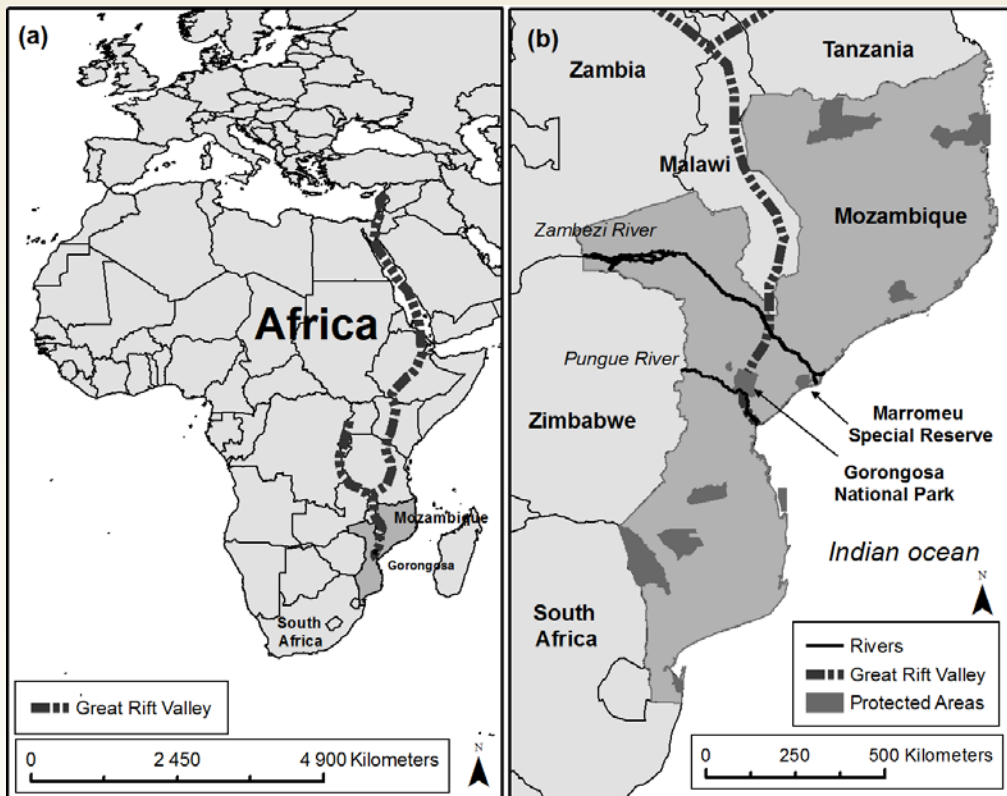
The EOW lab has attracted students and researchers from multiple Mozambican and international institutions. The main foreign institutions whose scientists work closely with the Laboratory include Harvard University, USA (biodiversity documentation), Princeton University, USA (savanna ecology), University of Coimbra, Portugal (multi-trophic interactions), University of California – Berkeley, USA (ecology), Boise State University, USA (bird monitoring), Idaho State University, USA (ungulate and elephant studies), University of Oxford, UK (palaeontology), and Yale University, USA (ecology). Additionally, the Laboratory regularly hosts students and visiting researchers from other universities and research institutions.

Research permits are issued by the Park itself based on a short and easy application process. All fields of research and lines of enquiry are encouraged within the Park and its Buffer Zone, including biodiversity, ecology, ethology, hydrology, agriculture, land use change and human development.



## 1. Background to Gorongosa National Park

Gorongosa National Park covers 408,600 hectares in central Mozambique to the south of the Zambezi River. The Buffer Zone around the Park covers an additional 533,300 hectares. Gorongosa lies at the southern end of the Great Rift Valley system that extends from Ethiopia in East Africa down into Mozambique.



Gorongosa was known for having some of the highest densities of large wildlife in all of Africa. Fertile soils, a high rainfall, regular flooding and warm growing conditions create an extraordinarily productive environment with high carrying capacity for wildlife. The fine-scale juxtaposition of different woodland types, sand forests and flood plain grasslands result in a high biodiversity. Outside of the Rift Valley, Gorongosa Mountain rises to 1,863 m above sea level. It is cloaked in rainforests and Afromontane grasslands with unique flora and fauna. The Mountain is a critical source of water for the surrounding human population as well as for the functioning of the Parks's ecosystems.

## 1. Background to Gorongosa National Park - continued

The area was first declared a hunting reserve in 1935. In 1960 it became a National Park. After the country gained its independence in 1974, wildlife numbers were greatly reduced during the civil war and its aftermath.

Restoration efforts started in the early 2000's and greatly accelerated after 2004 with the involvement of the Gregory C. Carr Foundation and the signing of a Public-Private Partnership between the Gorongosa Restoration Project (created by the Carr Foundation) and the Government of Mozambique in 2008. In 2010, the previously unprotected Gorongosa Mountain was proclaimed as part of the National Park.

Approximately 200,000 people live in the Buffer Zone of the Park. The largest town is Vila Gorongosa in the west. In the east, Muanza district has a low population density of less than three people per 100 hectares. The most important land use is subsistence farming. Commercial farming is limited to some vegetables (under irrigation), potatoes, bananas and pineapples. Livestock consists primarily of goats. A limited number of cattle are found in the Dingue Dingue area and on the south-western slope of Gorongosa Mountain. Communities inside the Park and along the southern border experience high levels of human-animal conflict, especially with crocodiles and elephants.

### *Decline and recovery of wildlife in Gorongosa*

Wildlife species	1972 estimate	2000 estimate	Loss 1972 - 2000	2016 estimate	2016 estimate as % of historical levels
Buffalo	14 000	<100	>99%	>700	>5%
Elephant	2 500	<200	>92%	>500	>20%
Hippo	3 500	<100	>97%	>400	>15%
Waterbuck	3 500	<300	>91%	>45,000	>100%
Zebra	3 500	<20	>99%	<20	<1%
Blue wildebeest	6 500	<20	>99%	>350	>5%
Sable antelope	700	<100	>86%	>800	>100%
Lichtenstein hartebeest	800	<100	>88%	>500	>60%
Lion	200	?	?	> 60	> 30%



## 2. Conservation values of Gorongosa National Park

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The outstanding conservation values of Gorongosa comprise the following:

- Habitats
  - Large, virtually intact natural habitats including a functional floodplain;
  - Highly diverse montane rain forests (largest expanse in Mozambique) and grasslands with endemic species (including Green-headed oriole and Gorongosa Pygmy Chameleon);
  - Limestone gorges with evergreen forest;
  - An extensive system of karst caves providing habitat to rich troglobitic fauna, including several threatened species of bats;
  - Aquatic habitats ranging from fast-flowing, clear and nutrient-poor mountain streams to slow-moving, turbid and nutrient-rich lowland rivers;
  - High internal diversity and rapid change from one habitat to another, thus enhancing opportunities for many organisms.
- Large wildlife
  - Part of the larger Gorongosa-Marromeu Lion Conservation Unit;
  - Rapidly recovering elephant population with habitat potential for a larger population in future
  - High number of sable antelope;
  - Very high number of oribi antelope.
- Birds
  - High bird diversity (possibly the highest of any Protected Area in southern Africa) (recognised Important Bird Area according to BirdLife International);
  - Large breeding colony of southern African importance for Yellow-billed Stork, African Openbill and other species;
  - Strong populations of Ground hornbills , Crowned cranes and vultures.
- Other wildlife
  - The richest bat fauna in southern Africa, with over 40 recorded species
  - Very high diversity of ants (species list larger than previously known the whole of Mozambique);
  - Highest known diversity of praying mantises.
- Archaeological and paleontological heritage – the 2016 field season yielded the first significant collections of fossil bones and teeth ever reported from this part of the East African Rift System;
- Cultural traditions and oral history;
- Linkages downstream along the Pungue with the Ocean and eastwards across the Cheringoma Plateau to the Marromeu National Reserve and the Ocean;
- Intangibles: sense-of-place, wilderness.

### 3. The Role of Science in the Public-Private Partnership

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The Gorongosa Restoration Project (GRP)--created and supported by the Carr Foundation, a U.S. not-for-profit organization, entered into a Public-Private Partnership with the Government of Mozambique in 2008 for a period of twenty years. The Government of Mozambique provided a dual mandate to the GRP: protection of biodiversity in the Park itself and advancement of human development in the region around the Park known as the "Buffer Zone". The Long Term Agreement was renewed in 2016 for a period of 25 years.

The ambitious goal of the GRP is to use modern biodiversity conservation science to restore Gorongosa to its former glory, to develop an ecotourism industry to create employment for local communities, and to enhance human development in the buffer zone of the Park. Although most of the large mammal populations of the Park had been depleted as consequence of the civil war, its underlying biological structure and its landscapes were largely intact.

Since 2006, the GRP has led a successful, large-scale ecological restoration of Gorongosa National Park. From the outset this project placed emphasis on both science and educational outreach activities. Gorongosa is on its way to once again becoming a great eco-tourism destination and a source of ecosystem services to the large human population of central Mozambique. Due to our interventions, virtually all large wildlife species exhibit positive population growth. We employ more than 150 trained park rangers who patrol the Park and have reduced the incidence of illegal hunting and logging. The Park itself has been expanded to include the biologically unique Mt. Gorongosa, a place bursting with unstudied and endemic species. Mt. Gorongosa is the source of the major rivers that sustain the Park and surrounding communities. At the same time, Gorongosa National Park has become one of the most important elements in the local economy, both directly--by creating many employment opportunities--and indirectly, by its inputs into various sectors such as health, education and agriculture.

The role of science has been formalised through Articles 5.3, 5.4 and 5.5 in the Long Term Agreement:

- Coordinate the creation of the Park Management Plan.
- Monitor Park ecosystems with a multi-disciplinary team of ecologists, hydrologists, zoologists, botanists and other specialists.
- Create tourism zoning policy and assess the environmental impact of tourism establishments.
- Building the capacity of Mozambican researchers, managers, and technicians in ecological research and monitoring, conservation biology, sustainable development, adaptive management, etc.
- Construct, staff, manage and maintain a Science Research Center with a view to ensuring the optimum health of the Park's ecosystem and providing science management advice pertaining to it and providing science management advice to all Departments and to regional conservation bodies.

## 4. The goals of Science in the restoration of Gorongosa National Park

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The goals of Science in the restoration of the Park and the development of its Buffer Zone are as follows:

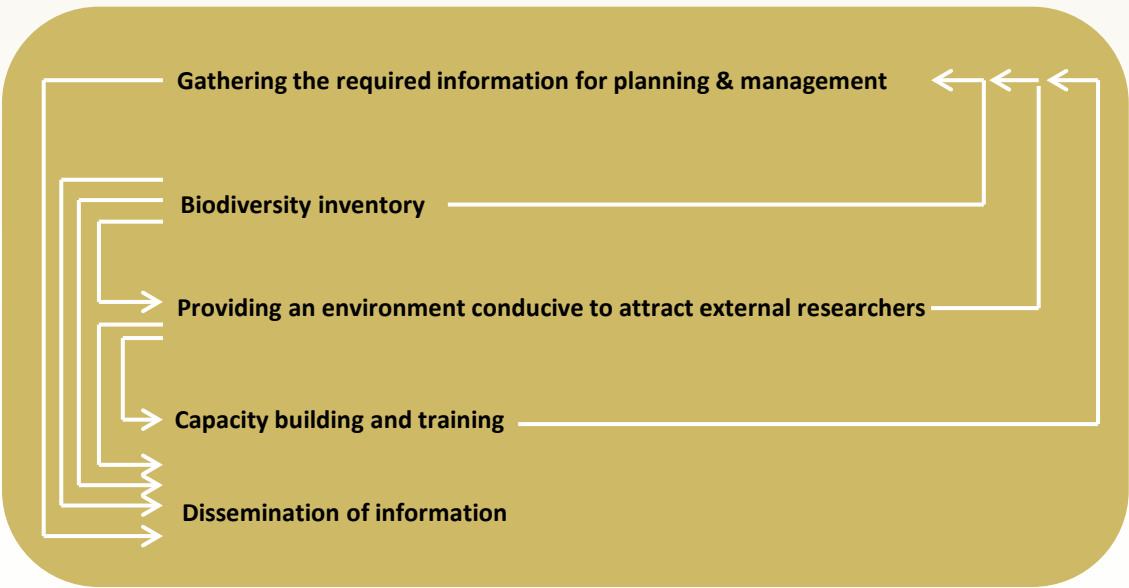
- Surveying and naming of every macroscopic species in Gorongosa (to be accompanied by diagnostic DNA sequence information and digital images of all specimens, freely available on the web);
- Understanding the ecology of Gorongosa National Park well enough so as to determine the need for any intervention and to predict the consequences of any such management action;
- Quantifying land use changes and understanding backward and forward linkages with human activities and well-being;
- Creating a model of the water balance to understand and predict how climate- and anthropogenic-driven factors will affect water input/output in the future;
- Reconstructing the ecological and evolutionary history of the Gorongosa National Park region from the deep past to the present;
- Consolidating and curating all relevant inventory, research and monitoring data in a GIS and database format;
- Informing and shaping management policy through science rather than through rhetoric;
- Being the place where the Mozambican scientists of tomorrow are trained through emergence of home-grown post-graduate science programs in Mozambique;
- Generating information and visual material that can be used to strengthen the Gorongosa constituency at the local, national and global level.



# 5. Approach to research and monitoring

Gorongosa National Park offers a conducive environment for external students and researchers. Creating such a conducive environment requires people, facilities and systems:

- People
  - A small core group of staff focuses on maintaining the facilities and systems, gathering long-term monitoring data, and curating collected specimens and data. They support the work of the external scientists. They assist with the training of students and young scientists. The emphasis is on quality rather than on quantity.
  - External students and researchers are encouraged to pursue projects in the Park. We target the best people in their fields to come to Gorongosa to share their knowledge and help train the next generation of Mozambican conservation and education leaders.. We aim to become the premier and the most sought after destination for research and science education in Africa.
- Facilities
  - The EO Wilson Biodiversity Laboratory provides the logistical base for research and monitoring in the Park and its Buffer Zone.
- Systems
  - The Park issues research and collecting permits;
  - Data and specimens are made accessible through the synoptic collection and database;
  - A programme of formal training courses provides for world class training opportunities.



## 6. EO Wilson Biodiversity Laboratory

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The Edward O. Wilson Biodiversity Laboratory is a modern facility devoted to research and education in fields related to biodiversity conservation. It has been created to explore, document, and protect biodiversity of Gorongosa National Park as well as to offer research and training opportunities in biodiversity-related fields to students and conservation leaders in Mozambique. The areas of particular expertise of the Laboratory include documentation and identification of species, floristic and faunistic surveys, tracking and monitoring of mammals, and training Mozambican students in the theory and practice of biodiversity conservation. It provides the logistical support and facilities for ecological research and monitoring.

The inauguration in 2014 of the first phase of the E.O. Wilson Laboratory represented the formal delivery by the Gorongosa Restoration Project on its obligation expressed in clause 1.3.23. of the Long Term Agreement with the Government of Mozambique, namely: “the research center to be constructed, staffed, managed and maintained by the Scientific Services Department and with the support of the Park Management Team, with a view to ensuring the optimum health of the Park’s ecosystem and providing science management advice pertaining to it and providing science management advice to all Departments and to regional conservation bodies”.

This facility was named in honour of Edward O. Wilson who is considered being one of the foremost biologists of our time and who is credited with coining the term “biodiversity”. Prof. Wilson has visited Gorongosa a number of times to do biodiversity inventory work. He wrote a book about the Park titled “A window on eternity – a biologist’s walk through Gorongosa National Park”.





## 6. EO Wilson Biodiversity Laboratory - facilities

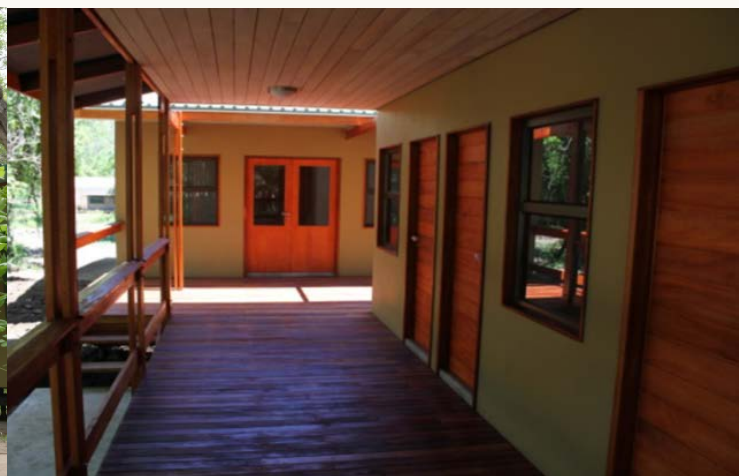
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The Science Center was established in Chitengo, adjacent to the principal tourism camp of Gorongosa National Park. This is a strategic location for the following reasons:

- Close to the ‘heart’ of the Park-- the floodplain and Urema Lake;
- All weather access via the main entrance road to the Park;
- Adjacent to the airfield which enables aerial support for surveys and monitoring;
- Close to other logistical (fuel and workshop) facilities provided by the Park;
- Next to the tourist camp with access to extra accommodation, restaurant, conference facilities etc.

The current facilities comprise:

- Offices and common workspace for technicians and visiting researchers with 24-hour electricity, air-conditioning and Wi-Fi;
- Climate-controlled herbarium room and a zoological collection room with adjacent work rooms;
- Chemical/molecular laboratory facility with work benches for 8 to 12 researchers to work simultaneously (DNA extraction facility expected to be operational by the middle of 2017);
- Lecture hall;
- Storage rooms, fridge/freezer room, drying oven;
- Accommodation consisting on individual and shared *en suite* units, dormitory rooms and safari tents.



## 6. EO Wilson Biodiversity Laboratory – synoptic collection and database

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While there exists very good and current records of the distribution and abundance of large mammalian species within the Park, little is known of such organisms as amphibian and reptiles, fish, bats and rodents, pollinating insects, and virtually all other groups of terrestrial and aquatic invertebrates. The flora of the Park is known only from a few select sites and also needs comprehensive documentation.

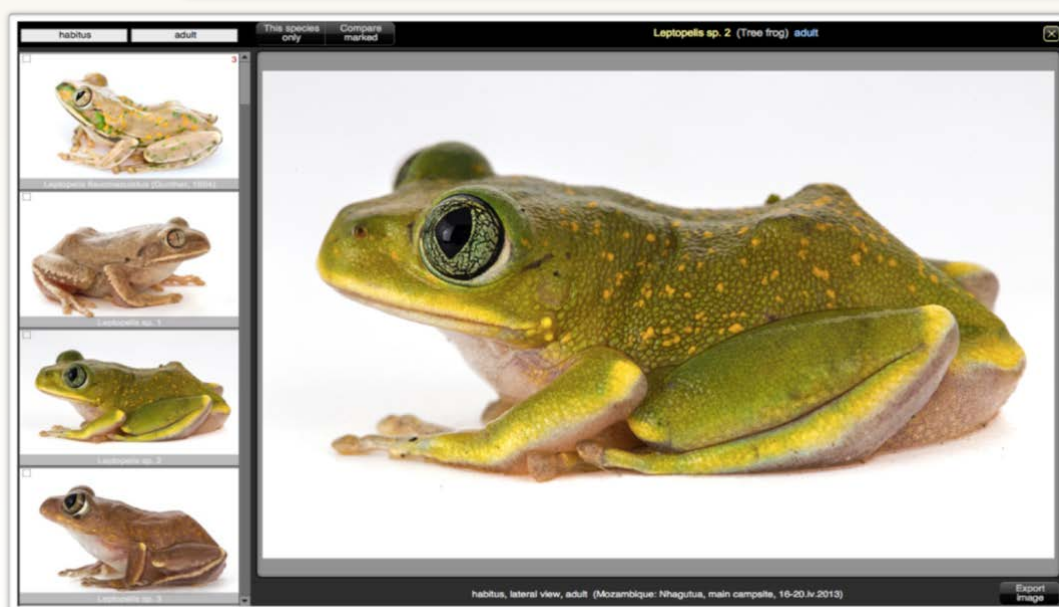
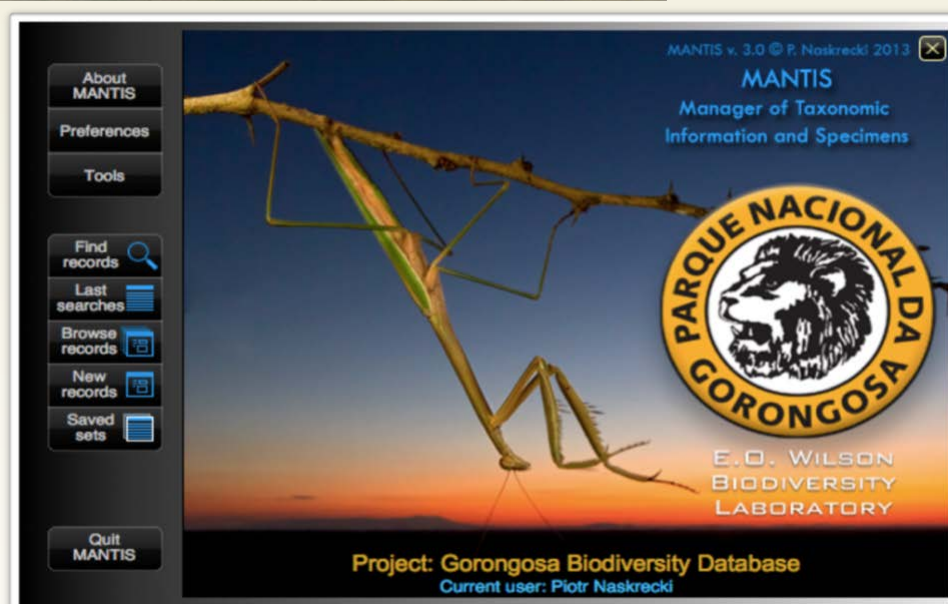
The Laboratory is home to a permanent synoptic collection of Gorongosa's flora and fauna. The collection is being built through systematic biodiversity surveys, continuous collecting by staff and targeted inventories by visiting scientists.

Systematic biodiversity surveys have been conducted annually since 2013. These surveys, involving leading experts in African biodiversity and conservation, focus on those groups of multicellular organisms that are of particular importance to the function of the greater Gorongosa ecosystem as well as those that carry the greatest promise of discovery of endemic and new to science species. Preliminary data collected during a small-scale survey of insects of Gorongosa conducted in 2012 indicate that over 90% of the Park's fauna remains unknown and that as much as 20% of its invertebrates may be new to science.

Two to three week-long field expeditions target different areas of the greater Gorongosa ecosystem, often never before explored by biologists, where a wide range of animal and plant groups is sampled. In addition to standard collecting methods, the diversity of acoustic animals (bats, cicadas, crickets etc.) is assessed using advanced technologies in sound detection and acquisition. An array of automated motion-, heat-, and sound-detection cameras are also deployed to document the occurrence and movement of elusive nocturnal mammal and bird species. Biochemical (pheromonal) traps are used to obtain data on several ecologically important insect groups.

Long-term surveys will involve continuous monitoring of selected groups of organisms (pollinators, nesting birds, carnivores etc.) over multi-year periods. Long-term surveys also incorporate advanced monitoring techniques, such as radio telemetry, infrared remote cameras, and ultraviolet light traps.

The associated data are stored in a custom-built relational database. By the end of 2016, the database held a total of 8 976 collection/observation events and 25 517 specimen/observations that represent 4 607 species. Increasingly, genetic material is being collected as well as audio recordings for certain insects and bats. Specimens are imaged and these digital images can be accessed through the database. This collection serves as an invaluable reference base to visiting scientists and as an important teaching aid to students.



## 7. Science education and training

The Wilson Laboratory offers a wide range of educational opportunities to Mozambican students and conservation leaders. These include workshops and lecture series on biodiversity- and conservation-related topics, science internships for Mozambican graduates, support for independent research projects, and participation in other areas of the park’s scientific and conservation activities. A number of Mozambican research fellows are hosted at the Laboratory where they work closely together with staff and visiting researchers to develop their research skills. These programmes identify and train potential Mozambican technicians and scientists to assist or be employed by visiting researchers.

The future of African biodiversity--and thus the survival and well-being of the continent’s population--rests in the hands of a new generation of local conservationists, scientists, agriculturalists, experts, and educators. No amount of external influence will match the effectiveness of the personal engagement and dedication of Mozambican stakeholders to ensure the revival and long-term sustenance of Gorongosa National Park, other protected areas in Mozambique, and the farmlands around them.

The E.O. Wilson Biodiversity Laboratory offers a wide range of educational opportunities to Mozambican students and researchers. In partnership with the Howards Hughes Medical Institute (HHMI) a programme of short-term courses (taught by leading specialists), research fellowships and internships has been instituted. A first Masters course for the country in Conservation Biology is also being developed in conjunction with Mozambican and international universities.

The course programme for 2017 is as follows:

Statistics and Research Design	Apr-17
Plant biology	Apr-17
Geographic Information Systems	Apr-17
Integrated Methods in Conservation Biology	Jun-17
Ecology & Conservation of Birds	Jun-17
Ecology & Conservation of Mammals	Jul-17
Teaching Youth Conservation Biology	Jul-17
Palaeo ecology	Aug-17
Bioinformatics	Aug-17
Conservation Genetics	Aug-17
Ecology & Conservation of Invertebrates	Nov-17
Ecology & Conservation of Reptiles/Amphibians	Nov-17
Biodiversity Survey Methods	Dec-17







## 8. Media and Outreach

The Laboratory and its scientists play a vital role in the development and production of popular and educational media, such as TV programs and internet resources, that serve the mission of sharing biodiversity knowledge with citizens of Mozambique and the public elsewhere.

Gorongosa Park has established world-wide brand recognition through films broadcast in 500 million homes on the National Geographic Channel, and hundreds of positive stories in print magazines and newspapers.

In addition to leading the educational program to train current and future Mozambican scientists, the Lab assists in the training of the Park's rangers and natural history tourism guides. The Lab's intensive educational program is complemented by the outreach activities offered at the Gorongosa Community Education Center ("CEC"). Park staff at the CEC teach local children and community members about conservation and the preservation of the environment, and about the economic benefits of Gorongosa's natural resources. Together, the Lab and the CEC offer a rich curriculum of educational opportunities to all stakeholders of Gorongosa and Mozambique in general.



## 9. Science partners

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The Wilson Laboratory collaborates with a number of research and education institutions in Mozambique and abroad. The University of Eduardo Mondlane is involved in a number of facets including student groups that use the Park as part of their curriculum as well as faculty staff that participate in current and planned research projects. One of the other partners in Mozambique is Universidade Lúrio, with which the Laboratory is developing a M. Sc. in Conservation Biology Program, conducted entirely in Gorongosa National Park. The Synoptic Collection collaborates with the Natural History Museum in Maputo in enhancing the national biological collection. The main foreign institutions whose scientists work closely with the Laboratory include Harvard University, USA (biodiversity documentation), Princeton University, USA (savanna ecology), University of Coimbra, Portugal (multi-trophic interactions), University of California – Berkeley, USA (ecology), Boise State University, USA (bird monitoring), Idaho State University, USA (ungulate and elephant studies), University of Oxford, UK (paleontology), and Yale University, USA (ecology). Additionally, the Laboratory regularly hosts students and visiting researchers from other universities and research institutions.

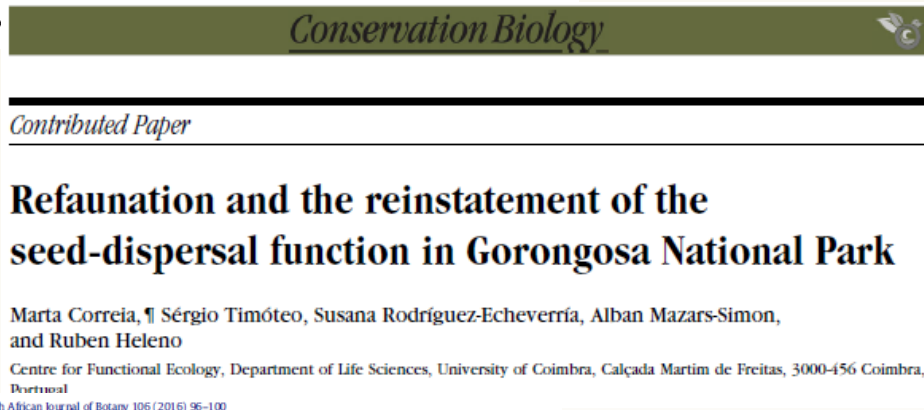




## 10. Research outputs and publications

The Gorongosa Restoration Project strongly encourages researchers to publish their results and findings. Already now, only a few years since the EOW lab was inaugurated a significant number of peer-reviewed articles have been published in the scientific literature.

In 2017, the first issue of the Gorongosa Bulletin will be launched. This ISBN –registered journal will be produced by the Gorongosa Restoration Project. It will be peer-reviewed and will accept any article related to Gorongosa and its environs. It will assist with young scientists to publish their early work and it will avoid the growth of grey literature. Researchers remain free to continue publishing the results of any studies from Gorongosa in longer-established or higher-rated journals.



Investigating possible effects of climate change on tree recruitment:  
Responses of abundant species to water stress in Gorongosa  
National Park

Tara Joy Massad<sup>1</sup>, Tongai Castigo

Gorongosa Restoration Project, Gorongosa National Park, Mozambique



## 11. Research opportunities

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All fields of research and lines of enquiry are encouraged within the Park and its Buffer Zone, including biodiversity, ecology, ethology, hydrology, agriculture, land use change and human development .

Due to its native biodiversity, its diverse habitat types, the dynamics of its recovering wildlife populations, and its complex human history, GNP offers unique opportunities for biological, ecological, hydrological, and social research:

- Geographically, GNP occupies the terminus of the Great Rift Valley, and early indications suggest that it was an important site in early human evolution.
- GNP encompasses a very broad range of terrestrial and aquatic environments. As a consequence, the park harbours a high level of biodiversity and contains unique species assemblages. However, much of this biodiversity is as yet undocumented.
- Many environmental features and ecological processes are driven by seasonal flood dynamics, which distinguishes GNP from other intensively studied African parks, such as Serengeti and Kruger. Gorongosa's rainfall is higher than that in many other savanna ecosystems, which makes it different and interesting for similar reasons. The high rainfall and flooding make for fast growth and accelerated dynamics compared to other Parks – this could be of value for research on woody-plant densification (which has implications for climate change studies).
- The evolving relationship between human communities and the park create many opportunities for applied socio-environmental research.
- Due to on-going restoration Gorongosa is currently one of the most biologically dynamic large conserved African ecosystems. In effect, the Gorongosa restoration effort represents a large-scale 'natural experiment' that is truly unique. This will enable researchers to study familiar questions in novel ways (e.g., How do large mammals affect vegetation communities and fire dynamics? What do recovery dynamics look like?). The sweeping scope and large spatial scale of the Gorongosa restoration effort sets it apart. Many examples of savanna restoration can be found in neighbouring South Africa. However, these were generally restricted to scales of only a few thousands to tens-of-thousands of hectares. Some of the largest and best known examples took place more than 20 years ago and were therefore studied under different scientific paradigms and with different available research tools. Some of the most famous and informative studies in the history of biology have come from natural experiments of this nature. This is likely to be the single strongest attractor of scientists to Gorongosa.

## 11. Research opportunities - continued

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- The rainforest on Gorongosa represents the largest such expanse in Mozambique. It is under threat due to deforestation for agricultural crops leading to overall forest loss and fragmentation. This area offers many forest-related research opportunities. What was the 'historical' extent of rainforest on Mount Gorongosa? Can soil patterns, rain shadow and fire shadow extent and relict forest species trees (with obvious forest architecture – buttress roots e.g.) in conjunction with habitat information be used to model past forest cover. How best can forest be re-established? What is / could be the role of riparian corridors between Mount Gorongosa and the historical Park? Should such corridors be established / reinforced, and in what manner?
- The scale of Gorongosa and its abundant supply of high-quality forage with little apparent temporal bottlenecks means that re-introduced animals and growing wildlife populations can freely 'choose' their habitats in the absence of strong competition and predation. This should shed more light on habitat preferences and optimal species requirements.
- Finally, the planned expansion of the Park that will include the conversion and restoration of a large hunting concession into National Park will offer additional research opportunities.

Researchers are in principle not limited to specific subjects and methodologies. We strive to achieve synergy and cooperation between multiple institutions and individuals. We encourage a culture of information sharing. The Park collects much information through regular long-term monitoring (e.g. aerial wildlife counts) and makes that information available to visiting researchers.

## 12. Applying for a research permit

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Research permits are issued by the Director of Scientific Services as per article 5.3.4.1. of the Long Term Agreement

Research permits are issued based on a short and easy application process.

Prospective researchers can submit a short proposal that contains the title of the project, name of the researcher(s), institutional affiliation, objectives, methodology, time frame and expected outcomes. There is no cost to the research application or to the issuing of a research permit.



### 13. Further information

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Research permits – ecology – research strategy

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Gorongosa National Park, Mozambique  
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Biodiversity inventories – species data base

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Training and education

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