Inventory of tiger- and ground-beetles (Coleoptera Caraboidea: Cicindelidae, Carabidae) from the Gorongosa National Park (Mozambique)

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Abstract

The Gorongosa National Park (Mozambique) is one of the most emblematic protected areas in Africa, well known for its vertebrate biodiversity and restoration ecology efforts following the Mozambican civil war in 1992. The invertebrate biodiversity of Gorongosa National Park is still poorly studied, although the scarce information available indicates the existence of a rich number of species, particularly ground-beetles. The study of Caraboidea beetles is key for designing conservation practices since they are frequently used as biodiversity and ecological indicators and provide valuable information to help decision making. Therefore, the diversity assessment of Caraboidea beetles using standardized methodologies, can be used to quantify the effects of climate change in areas identified as vulnerable to climate change, such as the Gorongosa National Park. We report the occurrence of five tiger-beetles

(Cicindelidae) and 93 ground-beetles (Carabidae) species/morphospecies in Gorongosa National Park from a field survey funded by the ECOASSESS project. Sampling was performed in the four main habitat types present in the park (miombo tropical forest, mixed dry forest, transition forest and grasslands) between October 25th and November 25th. In this sampling window, the turnover of Caraboidea species from the dry season to the wet season was recorded for the first time. Twenty-eight species of ground-beetles are new records to Mozambique, including 4 new subgenera and 2 new genera. Additional information on species phenology and habitat preferences is also provided.

Keywords: Biodiversity conservation; Carabids; Cicindelids; Diversity assessment; Habitat associations; Miombo forest; Mozambique; New records

Project details

Project title: ECOASSESS – A biodiveristy and ECOlogical ASSESSment of soil fauna of Gorongosa National Park (Mozambique)
Personnel: Artur R. M. Serrano, Martim Baptista, Rui Carvalho, Mário Boieiro, Sara Mendes, Marie Bartz, Sérgio Timóteo, Henrique Azevedo-Pereira, Carlos Aguiar, António Alves da Silva, Joana Alves, María Briones, José P. Sousa, Pedro Martins da Silva
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Study area descriptions/descriptor: This study was carried out in the Gorongosa National Park (18°58′04.84″ S, 34°21′41.64″ E), located in the centre of Mozambique, occupying around 4000 km2 of the Sofala Province. This region has a tropical climate with mean annual precipitation of 700-900 mm, along with two distinct seasons (dry and wet). GNP annual temperatures range between 15 ◦C and 30 ◦C, with warmer temperatures usually recorded in the wet season (Herrero et al., 2020). This rainy season occurs in the month of November to April and is associated with heavy rainfall, resulting in extensive floodings around Lake Urema, located in the centre of the low plateau. In this low plateau of the park ("lower Gorongosa"), the dominant habitat types range from open savannas (grasslands) to mixed savannas (transitional forests) and forested habitat types comprising mixed forests and Miombo forests. The latter is dominated by trees of the genus Brachystegia (Herrero et al., 2020). Field work was conducted in the main habitat types covering the low plateau of the GNP, namely the miombo forest, mixed dry forest, transitional forest, and grasslands (Stalmans and Beilfuss, 2008; Stalmans et al., 2019).
Design description: ECOASSESS survey focused on the four main habitat types: miombo

tropical forest, mixed dry forest, transition forest and grasslands, encompassing the low plateau of the GNP, in a total sampling area of 56130 m2. Within each habitat type, 25 sampling plots of ca. 10 m2 were randomly distributed, with a minimum distance of 1 km between each other. Caraboidea beetle sampling was done by using pitfall traps (Drift, 1951; Greenslade, 1964). At each sampling plot, three pitfall traps (sub-samples) were placed in a triangular arrangement with 5 m of separation between them. Data from pitfall sub-samples were treated separately as pseudo-replicates, which were pooled before data analysis. To include the seasonal effects on community dynamics, Caraboidea beetles were collected on three sampling periods: T1 (25 October to 5 November) and T2 (5-15 November), both during the dry season, and T3 (15-25 November) in the wet season, comprising ten days per sampling window

Data published through GBIF: http://ipt.gbif.pt/ipt/resource?r=goundbeetles_mozambique

Taxonomic coverage

General taxonomic coverage description: The following Classe and Order are covered: Insecta: Coleoptera; Caraboidea
Taxonomic ranks
Family: Carabidae, Cicindelidae
Common names: ground-beetle, tiger-beetes

Spatial coverage

General spatial coverage: This study was carried out in the Gorongosa National Park (18°58′04.84″ S, 34°21′41.64″ E), located in the centre of Mozambique, occupying around 4000 km2 of the Sofala Province
Coordinates: 19°34'12"S and 18°55'37.2"S Latitude; 34°12'10.8"E and 34°49'37.2"E Longitude

Temporal coverage: October 25, 2019 - November 25, 2019

Natural collections description

Collection name: Carabidae of Gorongosa
Collection identifier: ECOASSESS
Specimen preservation method: Dried

Methods

Method step description: Whenever possible the identification was made to the subspecies or species level, otherwise, the specimens were separated as morphospecies
Study extent description: ECOASSESS survey focused on the four main habitat types, i.e.

miombo tropical forest, mixed dry forest, transition forest and grasslands, encompassing the low plateau of the Gorongosa National Park, in a total sampling area of 56130 m2. These habitats were selected considering the ecosystem changes and complex dynamics due to seasonal flooding and human disturbance in this area of the park. Within each habitat type, 25 sampling plots were randomly distributed, with a minimum distance of 1 km between each other

Sampling description: Caraboidea beetle sampling was done by using pitfall traps (Drift, 1951; Greenslade, 1964). At each sampling plot, three pitfall traps (sub-samples) were placed according to a triangle arrangement, with 5 m of separation between them. Pitfall traps consisted of plastic vials of 10cm diameter and filled to approximately 75-80% capacity with ethyleneglycol (5%). To include the seasonal effects on community dynamics, Caraboidea beetles were collected on three sampling periods: T1 (25 October to 5 November) and T2 (5-15 November), both during the dry season, and T3 (15-25 November) in the wet season, comprising ten days per sampling window. During pitfall collection, the content of each pitfall was enclosed in a cloth bag and all bags were transported in jerricans filled with 100% ethanol to the laboratory at the Centre for Ecology, Evolution and Environmental Changes (University of Lisbon, Portugal) for sorting and taxonomic identification to the species/subspecies level, or morphospecies using several specialized keys. Data from pitfall sub-samples were then pooled before data analysis

Quality control description: All carabid and cicindelid specimens were taxonomically identified by Artur R. M. Serrano.

Datasets

Dataset description

Object name: Darwin Core Archive Inventory of tiger- and ground-beetles (Coleoptera Caraboidea: Cicindelidae, Carabidae) from the Gorongosa National Park (Mozambique)

Character encoding: UTF-8

Format name: Darwin Core Archive format

Format version: 1.0

Distribution: http://ipt.gbif.pt/ipt/archive.do?r=goundbeetles_mozambique

Publication date of data: 2022-10-31

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Hierarchy level: Dataset