



# **SASSCAL**

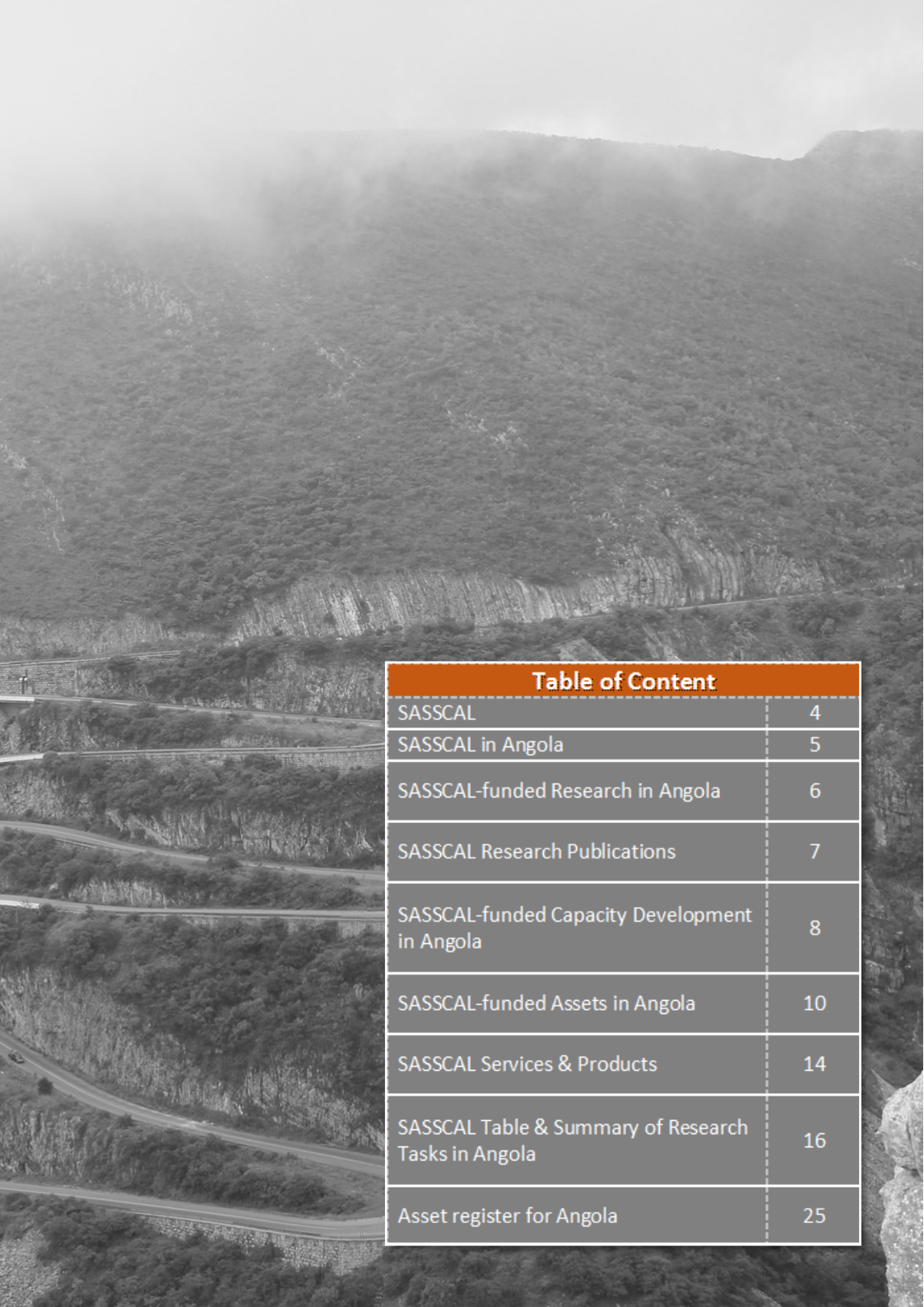
Southern African  
Science Service Centre for  
Climate Change and  
Adaptive Land Management

# **PASSPORT**



# **Republic of Angola**



An aerial photograph of a mountainous region. A winding road is visible on the left side of the image. In the center, there is a large quarry or open-pit mine with visible rock layers. The background shows dense forest covering the hills under a hazy sky.

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SASSCAL is a joint initiative of Angola, Botswana, Namibia, South Africa, Zambia and Germany in response to the challenges of global change

### **Vision**

To be a leading regional centre in integrated climate change and adaptive land management science services for improved quality of life in southern Africa

### **Mission**

To strengthen the regional capacity to generate and use scientific knowledge products and services for decision making on climate change and adaptive land management through research management, human capital development and services brokerage

### **Objectives**

- to conduct research in adaptation to climate change and for sustainable land management
- to provide products, services and information for decision-making
- to contribute to the creation of a knowledge-based society through academic and non-academic capacity development programmes



**RESEARCH**



**SERVICES & PRODUCTS**



**CAPACITY DEVELOPMENT**

## SASSCAL in Angola

The National Executing Agency of SASSCAL in Angola is the José Eduardo dos Santos University in Huambo province.

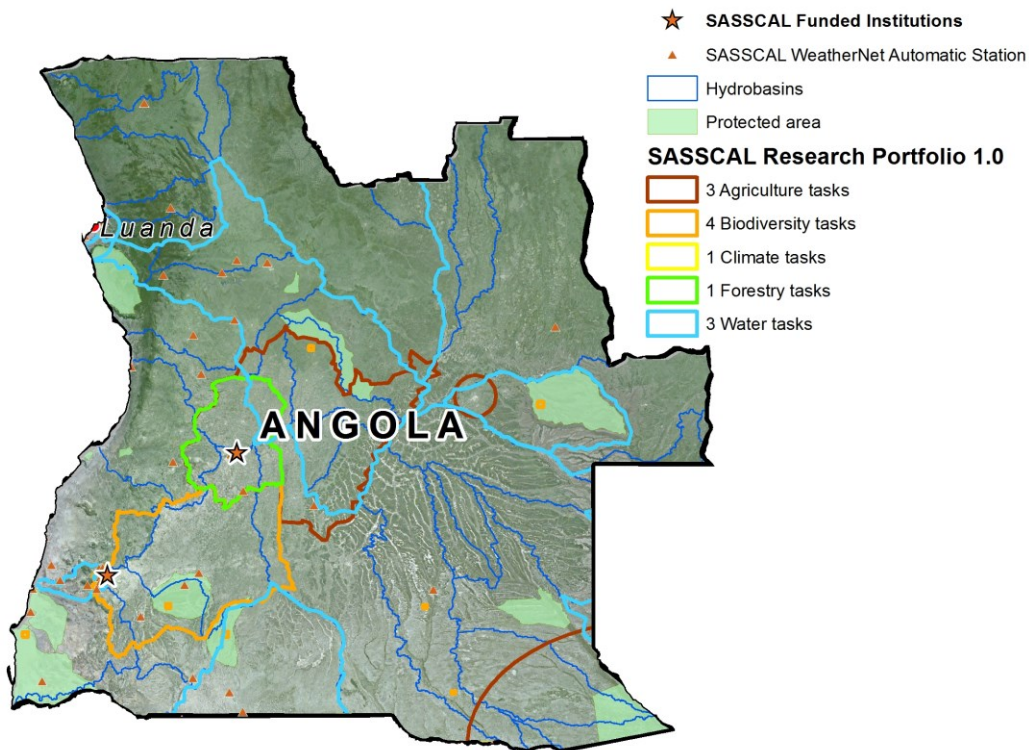
The line Ministry of SASSCAL in Angola is the Ministry of High Education, Science, Technology and Innovation (MHSTI), formerly the Ministry of Science and Technology.

In Angola, SASSCAL's Mission, to strengthen the regional capacity and to generate and use scientific knowledge products and services for decision making on climate change and adaptive land management, was promoted through SASSCAL's Research Portfolio 1.0, from 2012 to 2018, and facilitated by the SASSCAL Node in Angola.



## SASSCAL-funded Research in Angola

The map gives an overview of SASSCAL-funded research activities in Angola:



The SASSCAL-funded Research Portfolio in Angola, from 2012 to 2018, constituted 13 projects, referred to as tasks. The total budget for these tasks was € 2 623 041.03.

Tasks are performed under the leadership of five national partners:

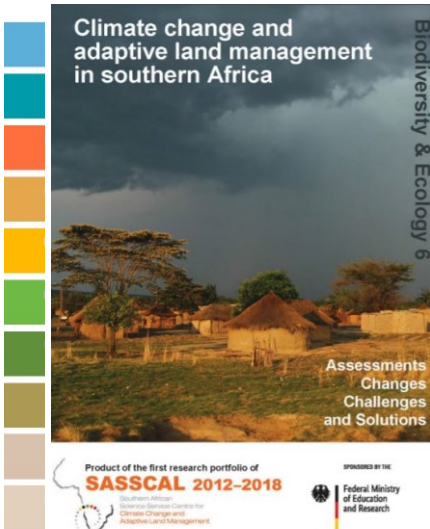
- National Centre for Scientific Research (CNIC) (Task 173)
- Faculty of Agricultural Science: University Jose Eduardo dos Santos (FCA-UJES) (Task 137, 144, 147)
- Faculty of Science: Antonio Agostinho Neto University (FC-UAN) (Task 171, 196, 208)
- Instituto Superior de Ciencias de Educacao (ISCED-Huíla) (Task 154, 209, 210, 301)
- Instituto Superior Politecnico da Tundavala (ISPT) (Task 139, 141)

Other partners in Angola task consortiums were:

- Provincial Government of Huambo, Bie, Moxico, Lundas (Sul & Norte)
- INAMET-Instituto Nacional de Meteorologia
- IDF-Instituto de Desenvolvimento Florestal
- IIA-Instituto de Investigacao Agronomica
- IDA-Instituto de Desenvolvimento Agrario
- FAO-Food and Agriculture Organization
- Ministry of Environment
- University of Cordoba
- University of Hamburg
- University of Coimbra

## SASSCAL Research Publications

The SASSCAL Book, a culmination of six years of SASSCAL funded research, was launched at the SASSCAL Symposium in Lusaka in April 2018. The book is entitled “Climate change and adaptive land management in southern Africa – assessments, changes, challenges, and solutions”, edited by Revermann, R., Krewenka, K.M., Schmiedel, U., Olwoch, J.M., Helmschrot, J. & Jürgens, N. and published in the book series Biodiversity & Ecology, Vol. 6, Klaus Hess Publishers, Göttingen & Windhoek.



Colour guiding system to the chapters

|                     |          |
|---------------------|----------|
| Climate             | page 13  |
| Water resources     | page 53  |
| Risk management     | page 131 |
| Rangelands          | page 168 |
| Food security       | page 235 |
| Forest resources    | page 295 |
| Land cover dynamics | page 343 |
| Biodiversity        | page 381 |
| Task overview       | page 480 |
| Further reading     | page 488 |

## SASSCAL IN ANGOLA

13 SASSCAL-funded projects  
 € 2 623 041.03  
 5 Institutions  
 83 Individuals  
 (excluding students)



The Book is freely available for download:

[WWW.BIODIVERSITY-PLANTS.DE/BIODIVERS\\_ECOL/VOL6.PHP](http://WWW.BIODIVERSITY-PLANTS.DE/BIODIVERS_ECOL/VOL6.PHP)

Angola's SASSCAL partners contributed to nine of the publications featured in the SASSCAL Book and further contributed to three thematic chapters in the book.

In addition to the SASSCAL Book, SASSCAL-funded researchers in Angola authored 10 peer-reviewed publications and co-authored seven peer-reviewed publications. SASSCAL-funded research contributed to nine non-peer-reviewed publications. Non-peer reviewed publications include various contributions to the SASSCAL Newsletter ([WWW.SASSCAL.ORG/NEWSLETTERS/](http://WWW.SASSCAL.ORG/NEWSLETTERS/)).



*Dried-up open water reservoir in Cunene province, Angola (Integrated Tool for Drought Hazard Assessment), SASSCAL Newsletter September 2017*

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## ***SASSCAL-funded Capacity Development in Angola***

### **Graduate Programmes**

SASSCAL made a significant funding contribution to capacity development through the Angola SASSCAL research portfolio with the following SASSCAL tasks:

- Task 137: Deforestation monitoring in Huambo province from 2002 - 2012 using detection technologies and geographic information systems (GIS)
- Task 141: Development of Meteorological Observation Conditions in Angolan Southwest Province of Namibe and slopes of Serra da Chela
- Task 147: System management of soil fertility, integrating the rational use of fertilizers in agriculture and Bio fertilizers on the basis of *rhizobia*



- Task 154: Plant and vegetation assessments in the region and elaboration of regional vegetation databases and vegetation maps
- Task 173: Mitigation of the effect of soil erosion
- Task 208: Inventory of inshore and freshwater invertebrates and small vertebrates

These tasks were aimed at addressing the inadequate capacity in various fields of science and assisted 41 students to pursue their degrees at PhD, MSc and BSc levels in Angola, Germany, Spain and Portugal.

In the context of the regional Master programme in *Earth Observation, Geographical Information Science and Remote Sensing* (Task 303) , three students from Angola are pursuing their degrees at University of Botswana (UB) and University of Zambia (UNZA).

## SASSCAL-funded Graduate Degrees through Angola Research Portfolio

The 41 students that received SASSCAL support for their studies graduated with the following degree (some students are still busy with their studies):

- 2 PhD students are expected to graduate in 2019
- 9 Master students have graduated and 6 are still busy with their degree work
- 24 Bachelor students have graduated

Capacity building is considered a key component in implementing SASSCAL’s research portfolio in Angola and has been identified as a priority for most of the implementing institutions. In this context, ISCED proposed a training program focused on methods of study, analysis and management of biodiversity. The program consists of certificated training courses, such as methods of sampling of flora and fauna, data analysis and statistics, remote sensing applied to conservation biology, management tools, conservation strategies, and others.

The impact of SASSCAL sponsored students is already being observed, as some of these young professionals are engaged in research activities at their respective institutions.

*One of the success stories is that of José João Tchamba, who won the Best Symposium Talk award at the April 2018 SASSCAL Science Symposium for his presentation “Characterization and cartography of vegetation in the Chipindo region of Huíla province - Angola”*

*José obtained his Master in Conservation Biology from the Universidade de Evora, within the context of SASSCAL funded Task 154 “Plant and vegetation assessments in the region and elaboration of regional vegetation databases and vegetation map”.*

## SASSCAL-funded Assets

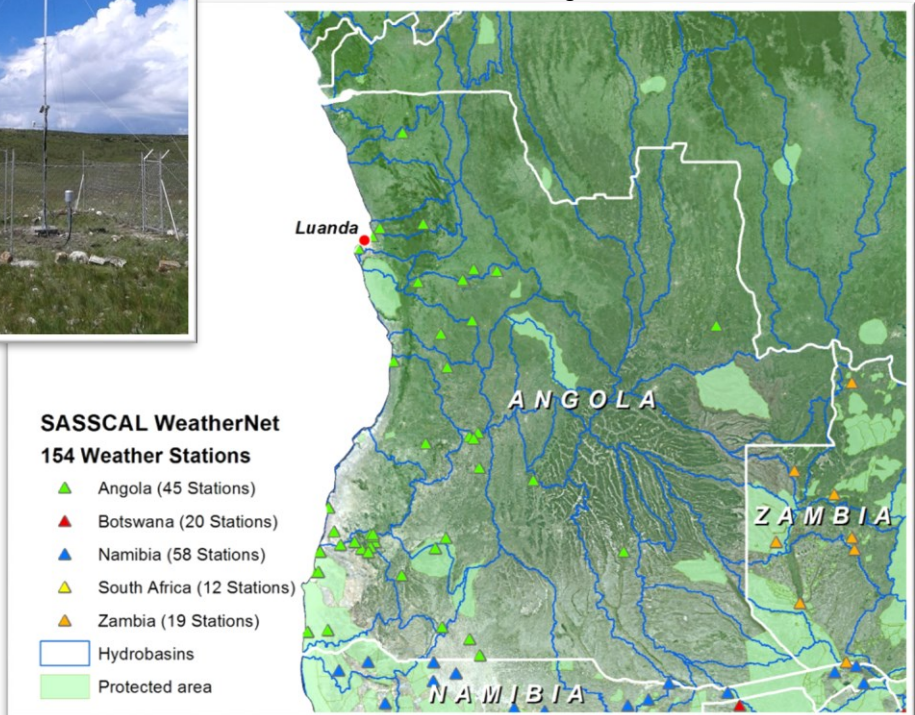
SASSCAL's contribution to the southern African region, through the SASSCAL-funded Research Portfolio, also impacted the available research infrastructure.

### The SASSCAL WeatherNet

A total of 45 automatic weather stations (AWS) of the total 154 AWS of the SASSCAL WeatherNet, are strategically distributed in Angola. Out of 45 AWS, 28 have been installed since 2014, with SASSCAL funding, while the remaining 17 AWS were rehabilitated and installed with funding from the Ministry of Agriculture and Forestry and INAMET, and later taken over by SASSCAL-funded Task 141 (Development of Meteorological Observation Conditions in Angolan Southwest—Province of Namibe and slopes of Serra da Chela).



(left) The AWS at Tundavala Observatory and (bottom) SASSCAL WeatherNet AWS in Angola





munities of Northern Huila to climate change and is involved in a project financed by the UNDP to build an early warning system of floods and droughts for the the Cuvelai Basin.

## Laboratories

SASSCAL-funded research enabled the investment in the following laboratories:

- Soil laboratory at FCA -UJES - The SASSCAL funded soil laboratory was installed in the faculty of science and agriculture. The lab is fully equipped with the latest scientific innovation products. The lab facilitates and conducts soils tests for farmers thus providing accurate soil fertility results and suitable recommendations for crops cultivation. This translates into increased yields.
- Water laboratory at the FC-UAN- In the course of SASSCAL 1.0, the FC-UAN, under task 171, funded and equipped its water lab for data analysis. Results from this task generated various alerts for mining, water and urbanization sectors and in particular to the governments of Lunda Sul and Norte.



*Students busy in the soil laboratory at FCA-UJES*



*The UAN team using the seismograph in the field*



## SASSCAL Services & Products

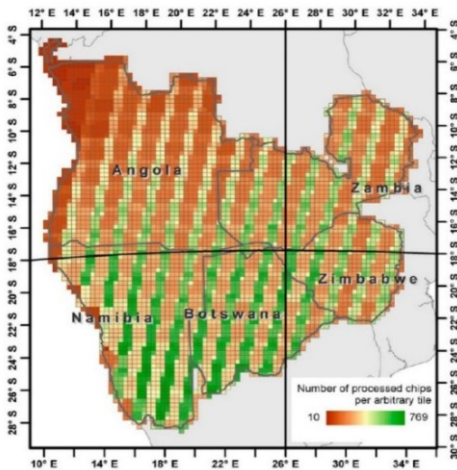
SASSCAL ensures that the research deliverables resulting through the SASSCAL-funded Research Portfolio, are made available openly and free of charge.

All research publications and deliverables, from all SASSCAL-funded research, will be accessible via the **SASSCAL Data and Information Portal**:

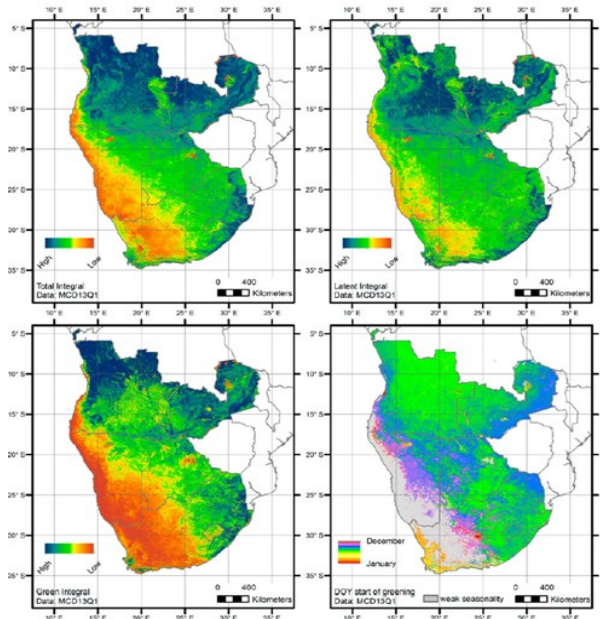
**[WWW.SASSCAL.ORG/SASSCAL-DATA-AND-INFORMATION-PORTAL/](http://WWW.SASSCAL.ORG/SASSCAL-DATA-AND-INFORMATION-PORTAL/)**

It is noteworthy to highlight that besides the invaluable research results stemming from the Angola portfolio, deliverables from other SASSCAL research of interest to Angolan partners include, but are not limited to:

- Full Landsat archive processed to surface reflectance (This data collection contains 1 912 733 images stored in 4 524 tiles of 30 x 30 km<sup>2</sup> (28 TB)) (University of Trier)
- 4 Phenological metrics for SASSCAL countries: total integral, related to overall biomass, latent integral associated with standing biomass, green integral, day of year of start of greening (University of Trier)
- Fire regime related parameters from 2000 to 2015: fire frequency, seasonality and intensity (University of Trier)
- Woody tree cover map (CSIR)



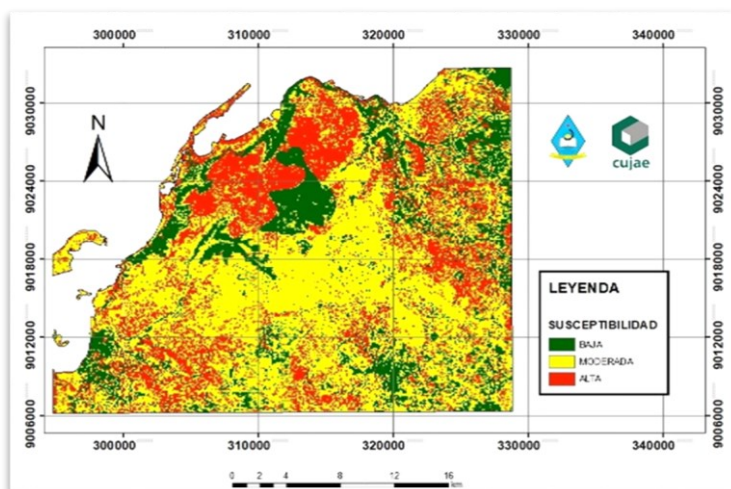
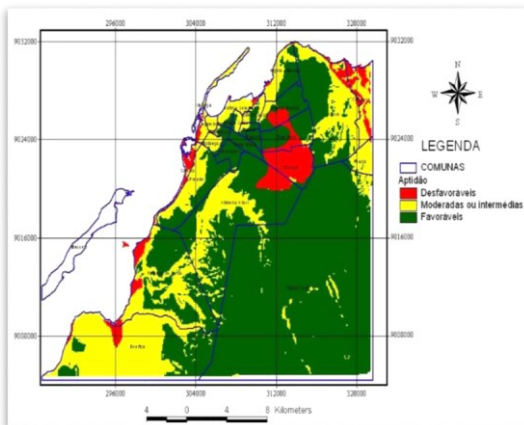
(left top) Number of processed Landsat images per tile, (right) phenological layers



- Global Urban Footprint (DLR)
- Regional Climate Change Projections for CORDEX-Africa (GERICS)
- EasyRemo climate modelling software (GERICS)

Some deliverables of the SASSCAL-funded research in Angola include, but are not limited to:

- Geo-Database of the city of Luanda (containing geological geotechnical maps of risks of the city of Luanda)
- A database with 40,000 specimens of birds and mammals some of which dates back to 1950s
- Database of water quality parameters (available in SASSCAL metadata)
- Maps of the distribution of mining activities in the provinces of Lunda Norte and Sul
- Map of the state of the hydro-graphic network of the provinces of Lundas
- Database with recommendation on sowing period (available to farmers and other users)
- Development of an integrated management system for soil fertility, enhancing the organic and microbiological (biofertilizer) component that ensures agricultural, social, economic and ecological development as a way of adapting to the adverse effects of climate change



## SASSCAL Table of Research Tasks

| Task ID                     | Task Name   | Lead Institution | Budget (Euro) |
|-----------------------------|---|------------------|---------------|
| <b>Agriculture</b>          |   |                  |               |
| 144                         | Effect of climate variation on the date of sowing main food crops and climate change on the development of fruit trees in the central plateau | FCA-UJES         | € 175 944.99  |
| 147                         | Soil fertility management system integrates the rational use of fertilizers and biofertilizers  | FCA-UJES         | € 197 513.00  |
| 173                         | Mitigation of the effect of soil erosion in the Lu-   | CNIC             | € 167 478.00  |
| <b>Biodiversity</b>         |   |                  |               |
| 154                         | Plant and vegetation assessments in the Huíla province and elaboration of vegetation databases  | ISCED-Huíla      | € 259 305.00  |
| 208                         | Inventory of inshore and freshwater invertebrates and small vertebrates   | FC-UAN           | € 189 688.00  |
| 209                         | Planning and implementation of biodiversity assessments including conservation inventories and monitoring                                     | ISCED-Huíla      | € 130 587.00  |
| 210                         | Establish a network of observatories in Angola following the BIOTA mega-transect South-North  | ISCED-Huíla      | € 206 025.00  |
| <b>Capacity Development</b> |   |                  |               |
| 301                         | Capacity building   | ISCED            | € 130 001.00  |



| Climate  |  |                          |
|----------|--|--------------------------|
| 141      | Development of Meteorological Observation Conditions in Angolan Southwest – Province of Namibe   | ISPT<br>€ 288 226.02     |
| Forestry |  |                          |
| 137      | Deforestation monitoring in Huambo province from 2002 using detection technologies and GIS   | FCA-UJES<br>€ 169 286.02 |
| Water    |  |                          |
| 139      | to install a collecting data network on River Giraul, Province of Namibe, to measure runoff and sediments in order to understand the necessary                             | ISPT<br>€ 308 959.00     |
| 171      | Study the impact of the land use activities such as mining, dams and other infra structure in water resources (water courses, rivers and lakes) in the Northeast of Angola | FC-UAN<br>€ 201 765.00   |
| 196      | Multiple hazard maps and geological-geophysical works for risk assessment at medium and large scale  | FC-UAN<br>€ 198 263.00   |
|          |  | <b>€ 2 623 041.03</b>    |

## Summary of Tasks

### Task 137 – FCA-UJES (€ 169 286.02)

#### Deforestation monitoring in Huambo province from 2002 using detection technologies and GIS

- A forest inventory at 4 test sites that reveals strong deforestation rates mainly due to charcoal exploitation in the municipalities of Bailundo, Cuima, Chicala Choloanga, and Chianga
- Analysed changes in forest cover, in particular, 30% Miombo forest was lost between 2002 and 2015
- Monitoring and assessment of the deforestation dynamics between 2002 and 2015, utilizing remote sensing data
- Provision of spatial information for decision makers
- Trained young researchers in innovative analysis techniques



### Task 139 - ISPT (€ 308 959.00)

#### Installation of a collecting data network on River Giraul, Province of Namibe, to measure runoff and sediments in order to understand the necessary activities to control soil erosion

- Installation of a data collection network on River Giraul, Province of Namibe, to measure runoff and sediments in order to understand the necessary activities to control soil erosion
- Installation of 3 main gauge stations in 3 sections of the river
- To obtain correlations between rainfall and runoff
- To measure sediments in several critical zones



Flow gauging station under the Muinho Bridge over the Girául river

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*Task 141 – ISPT (€ 288 226.02)*

## **Development of Meteorological Observation Conditions in Angolan Southwest – Province of Namibe and slopes of Serra da Chela**

- Completed a digitalisation and quality control of old climatic data for the period 1961 to 1974 for Angola
- Installed 10 AWS, managing and working climatic data from AWS
- Managing data integrated with task 139
- Comparing actual data with historic data in order to calculate climatic trends



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*Task 144—FCA-UJES (€ 175 944.99)*

## **The Effect of Climate Changes on Seeding data from the major Food Crops Central Plateau**

- Determine the effects caused by climate change on food crops and fruit trees of the Central Plateau in relation to sowing data
- Effects of bio-stimulants growth application in the effectiveness of the grafted avocado seedlings
- Study of dynamic growth and development of fruit plants (mango, avocado and guava) under field conditions.
- During the project, the 20 families that participated had the opportunity to learn how to select the best varieties to sow and plant; they were given the knowledge to choose the best sowing date according to climatic variations (see picture). These families are now training their communities, equipped with improved farming practices. As a consequence, it is expected that farmers will have increased crop production by applying the following techniques: knowledge of new production techniques, application of new sowing methods, correct fertilizer application rates and techniques for combating pests and diseases.



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Task 147 -UJES (€ 197 513.00)

## Soil fertility management system integrates the rational use of fertilizers and biofertilizers

- To improve the agricultural yields, specifically the yields of the main agricultural crops, by proposing sustainable technologies of land management and preservation of its fertility
- Characterization and production of bio fertilizers (Rhizobium, composting and green manure)
- Optimization of fertilizers and lime by creating software that calculates agronomic, economic and ecologically viable doses
- The team identified 14 species of legumes with potential use as green manure and for soil improvement and conservation having capacity to capture atmospheric nitrogen and transfer it to agroecosystems
- The physical and chemical properties of the plots of the farmers of the communes studied in the provinces of Huambo and Biè were analysed. They are moderate and extremely acidic, with low chemical fertility, mainly with a sandy - loam texture. and sandy clay.



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Task 154 –ISCED-HUILA (€ 259 305.00)

## Plant and vegetation assessments in the region and elaboration of regional vegetation databases and vegetation maps

- Assessment of the woody vegetation of Huila Province in order to produce an updated vegetation map for the region
- Classification and description of dominant vegetation types
- Produce a *Field Guide of Flowering Plants of Huila Province* and *Field Book of Common Trees and Shrubs of Huila Province*



- Compile a concise List of Endangered Plants of Huila Province, based on IUCN red list criteria and Finally mapping the vegetation types obtained from the classification work at a scale of 1:100 000

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*Task 171 – UAN (€ 201 765.00)*

**Study of the impact of land use on water resources (water courses, rivers and lakes) in the northern region of Angola**

- An inventory and characterization of the land use activities in the northeast region

*Water sampling*



- Surveying for the determination of the main water physical chemical parameters in Lunda Norte and Lunda Sul provinces
- Mapping the land use activities and their areas of influence
- Assess and evaluate the extent to which water bodies, resources and the environment are being affected by land use activities



*Women collecting polluted water for domestic use.*

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*Task 173—CNIC (€ 167 478.00)*

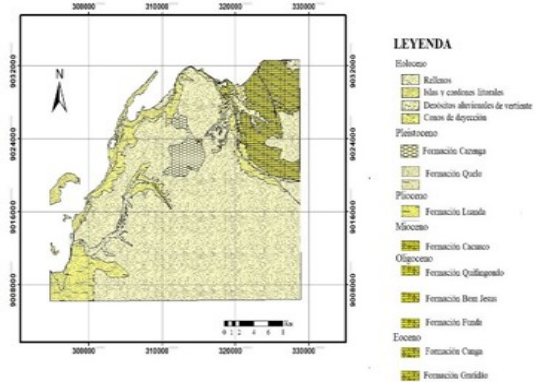
**Mitigation of the effect of soil erosion in the Luena**

- Collecting the most adapted local seeds / vegetation able to help keeping the soil get together with its rooting system, for instance the bamboo
- Transplanted more than 18.860 auto-tone and other plants in and around the contours of ravines covering more than five hectares.
- Removal of these waterless spatial refuges will result in loss of this buffering effect and degradation of the whole ecosystem.
- Master these – Application of Geographical Information Systems in Cartography Production of East of Angola Ravine Risk (example, Luena city) 2018 – at the Algarve University, Algarve city - Portugal.



## Development of strategies for sustainable use and management of savannah ecosystem resources and services in northern Botswana through remote sensing based spatial database tools

- Developed the Geological map of scale 1: 50 000 Province of Luanda
- Digital Maps (Lithological, Slope, Hydrological, and Land Use) of the Province of Luanda.
- The SIG-GEOURBE system, a computer platform that will allow managing and updating all the geological and geotechnical data of the city of Luanda and arounds
- Geological map and multiple hazards map: mass movements (erosion, landslides and falling of materials) and floods



## Inventory of inshore and freshwater invertebrates and small vertebrates

- Classification and description of the dominant invertebrate's groups like: INSECTA, aquatic invertebrates (Insecta, Mollusca e Crustacea and Fishes)
- Characterisation of ecosystems where dominant animal groups were inventoried to both teams
- Identified new records for the Fruit and Flower Chafers and Darkling beetles of Angola (*Coleoptera: Cetoniidae* and *Tenebrionidae*) and ground beetles of Angola (*Coleoptera: Carabidae*)
- New genera records: *Cetoniidae -Anthracophorides* Moser, *Chordodera* Burmeister, *Stethodesma* Bainbridge; *Tenebrionidae - Ceropria* Laporte & Brullé, *Peltoides* Laporte and *Cryphaeus* Klug. The new species records are: *Cetoniidae - A. capeneri*

Schein, *Ch. quinquelineata* (Fabricius), *Polystalactica* (s. str.) sp. and *S. strachani* Bainbridge; Tenebrionidae - *Cer. romandi* Laporte & Brullé, *Platydemia palliditarse* Laporte & Brullé, *Alphitobius lamottei* Ardoin, *P. politus* Chevrolat, *Taraxides laevigatus* (Fabricius), *Taraxides punctatus* (Fabricius) and *Cr. taurus* Fabricius.

- The new genera records are: *Arsinoe* Laporte, 1835, *Lobodontus Chaudoir*, 1842 and *Polyaulacus* Chaudoir, 1878. The new species records are: *Cylindera* (Eugrapha) *dissimilis* (Péringuey), *Catascopus beauvoisi* Laporte, *Arsinoe laevigata* Basilewsky, *Lobodontus trimaculatus* Chaudoir, *Polyaulacus* sp., *Drypta thoracica* Boheman and *Meladroma informicollis* Liebke

### Task 209—ISCED (€ 130 587.00)

## Animal Biodiversity and Conservation- Inventories, monitoring and assessments

- Installed a transect in Tundavala with 48 traps: first specimens collected in June, from the genus *Megachile*
- Gaps in information on Hymenoptera from Angola identified: most of the existing information on bee fauna backs to 1975 and limited to the northeast region
- Insect collection: creation of an entomological collection for ISCED and data divulgation on national level on the importance of pollinators (bees)

**Hymenoptera (Insecta) diversity in Angola: the challenge of a bibliographic survey heading toward pollinators conservation**  
S. Fernandes and D. Elzalde  
kias.sar@gmail.com

**SASSCAL** - ISCED - Huíla

**Introduction**  
The present scenario of rapid human population growth that implicates an increase in global food demand imposes major challenges for achieving high quality and quantity of crops.  
Angola still constitutes a gap of knowledge on insect biodiversity of Southern Africa, including for key taxa as Hymenoptera.  
The aims of this study were to:  
1 - Review and compile in a digital format the data on Hymenoptera distributions for Angola.  
2 - Identify the gap of knowledge on Hymenoptera, regarding species and their spatial distribution.  
3 - Reflect on the impact that this information would have on the implementation of effective pollinators

**Results**  
Hymenoptera Records for Angola - Density Map  
Records for the Fauna of Angola - Density Map  
Records for the Fauna of Angola - Density Map  
Before 1975  
After 1975

**Discussion**  
It is difficult to develop accurate species distribution maps due to the limited information. Species density seems to reflect the distribution of researchers interests rather than species, creating a number of spatial biases that could lead to misinterpretation of biological patterns.  
Based on data available in the literature and other online datasets, we compiled a total of 1350 records from 28 families and 148 genus.  
Angola suffered a severe civil war that contributed for the lack of facilities and specialists and for this reason, almost no accurate data is available on Hymenoptera from 1975 onwards.  
In Angola, there are historical collections like the one at the Dundo Museum - Lunda Province, considered one of the richest entomological collections in Africa, that are not accessible to the public or even to the scientific community. Data from historical collections can contribute to strengthen the knowledge of distribution of species.  
Our findings suggest that there is an urgent need of an inventory on Hymenoptera of Angola, particularly on Bee fauna, known as essential pollinators of crops and wild plants, as well as on wasps that play an important role in agroecosystems by acting as biological controlling agents. From the 28 Hymenoptera families found in literature, only 5 refer to bees.  
A study has already been implemented on Native Wild Bees and their Natural Parasitoids fauna in Tundavala-Huíla-Angola.  
The data from this study will be included in the sub-project "Atlas of Hymenoptera of Angola", an Angolan open access database.  
The results of this project as well as the following studies will be a highly valuable contribute for the creation of effective conservation and land management policies, and at the same time beneficial for researchers, capacity building, education and tourism.

**Methods**  
A bibliographic survey was conducted to identify all records of Hymenoptera from Angola. The records were compiled and organized in a digital format. The data was then analyzed to identify gaps in knowledge and to determine the spatial distribution of Hymenoptera in Angola.

**Acknowledgments**  
We thank the Southern African Science Service Center for Climate Change and Adaptive Land Management - SASSCAL organization for funding these studies.

Family: Chrysididae  
Genus: Sphitrus

Family: Pteromalidae  
Genus: Nemesophora

## Establishment of a network of observatories in Angola following the BIOTA mega-transect South--North

- A total 313 different species were recorded, at least 12 of which are endemic to Angola
- A total of 13 species of amphibians, 12 species of lizards and 9 species of snakes were found in Tundavala, and some consisted of important rediscoveries for the Angolan herpetofauna, such as Anchieta's treefrog (*Leptopelis anchietae*) and Ansonge's Whip Snake *Psammodphis ansorgii*, both endemic species not found for decades
- Angola White-headed Barbet *Lybius [leucocephalus] leucogaster* was rediscovered
- In Bicuar National Park and close surroundings 14 species of amphibians, 15 species of lizards, 17 species of snakes and 2 species of testudines were recorded. The second record of the Kalahari purple-glossed snake (*Amydipsas ventrimaculata*) is among the most important findings and a preliminary checklist of the park is being prepared.



## Education and training for evaluation, monitoring and management of biodiversity

- Enhanced the knowledge, skills and attitudes of researchers, technicians and students engaged in projects for biodiversity assessment, as well as technicians of governmental and nongovernmental sectors
- Provided theoretical and practical knowledge for plan, evaluate and monitor biodiversity; promote the exchange of experiences among participants and interdisciplinary cooperation
- Improved the institutional capacity
- Implemented courses on methods for surveying, sampling and monitoring different groups of organisms; statistics, ecological data analysis and databases and geographic information systems and remote sensing



## Asset register for Angola

| Institution            | Asset specification   | # | Location         |
|------------------------|---|---|------------------|
| <b>Camera</b>          |   |   |                  |
| FCA-UJES               | Camera NIKON D3 200   | 2 | FCA-Huambo       |
| FC-UAN                 | Camera-Sony   | 1 | FC-UAN           |
| ISCED                  | Camera Canon EOS 600D   | 1 | Herbário/ISCED   |
| <b>Field equipment</b> |   |   |                  |
| ISPT                   | GARMIN GPSMAP 62 OUTDOOR  | 1 | ISPT-Lubango     |
| ISCED                  | GPSMAP 62- 01102381-GARMINI   | 1 | Herbário/ISCED   |
| FC-UAN                 | GPS-Garmin  | 1 | FC-UAN           |
| <b>Hardware</b>        |   |   |                  |
| FCA-UJES               | AP-56 Tubes Shaker, Wortex Type, With elet vel. Cont Motor of 3200 RPM, 110.Phoenix           | 1 | FCA-Huambo       |
| FCA-UJES               | computador hP Pavillion   | 2 | FCA-Huambo       |
| FCA-UJES               | ESPEC-HIN-SP-1105 - Digital spectrophotometer   | 1 | FCA-Huambo       |
| FCA-UJES               | HP computer PORT.HP15-N000SP Pavilion 15'4GB 500GB W8   | 1 | FCA-Huambo       |
| FCA-UJES               | Plataform in Aluminium and Galleries with claws in stainless steel, cap for 176 erlen of 125M | 1 | FCA-Huambo       |
| FCA-UJES               | TE-034/2 Automatic System for Spectrophotomoter   | 1 | FCA-Huambo       |
| FCA-UJES               | TE-0364 - Destiller of Nitrogen - Technical Brand Mode TE-0364                                | 1 | FCA-Huambo       |
| FCA-UJES               | TE-040/25- Digiestor block, 40Micro Samples   | 1 | FCA-Huambo       |
| FCA-UJES               | TE-145 - Orbital Stirring Table for Soil, with Cap for Until 240 tests, tecnal brand          | 1 | FCA-Huambo       |
| FC-UAN                 | Laptop  | 3 | FC-UAN           |
| FC-UAN                 | PC- Dell  | 1 | FC-UAN           |
| FC-UAN                 | PC- HP AIO 400  | 1 | FC-UAN           |
| FC-UAN                 | Printer HP Deskjet  | 1 | FC-UAN           |
| ISCED                  | 2 Laptops HP 1040 & LaptopLenovo IDEAPAD S100   | 2 | Herbário/ISCED   |
| ISCED                  | 7 Computer Lenovo think centre  | 8 | Herbário/ISCED   |
| ISCED                  | Microcomputer Lenovo580   | 1 | Herbário/ISCED   |
| ISCED                  | Plotter HP Designjet T520 24" E-Printer   | 1 | Herbário-Lubango |
| ISPT                   | ACER INTEL CORE I3  | 1 | ISPT-Lubango     |
| ISPT                   | addVantage Pro Server MU up tp 20 RTUs/3seats   | 2 | ISPT-Lubango     |
| ISPT                   | APPLE MB PRO 13R I5   | 1 | ISPT-Lubango     |
| ISPT                   | HD SRV SFF SATA 1TB 7.2K 6G MDL GEN8  | 1 | ISPT-Lubango     |
| ISPT                   | Port DELL VST 3360 i5 2.7Ghz 6GB  | 1 | ISPT-Lubango     |
| ISPT                   | Port HP 650 I5- 4210 PROBOOK 4GB  | 1 | ISPT-Lubango     |
| ISPT                   | SERVER HP DL360E G8 E52420 8GB 2X1TB  | 1 | ISPT-Lubango     |
| ISPT                   | TOSHIBA M50D-118 A4   | 1 | ISPT-Lubango     |

| Sensor/logger         |   |   |                  |
|-----------------------|---|---|------------------|
| ISPT                  | A753 AddWAVE GPRS/QUAD  | 1 | ISPT-Lubango     |
| ISPT                  | A850 Telemetry Gateway 100 ( W/O A440 + CAN Cable)  | 1 | ISPT-Lubango     |
| ISPT                  | Adcon BP1 Barometric Pressure   | 2 | ISPT-Lubango     |
| ISPT                  | Adcon TR1 Combisensor TEMP-RH   | 2 | ISPT-Lubango     |
| ISPT                  | PR Pyranometer SP-LITE 2,0-2000 W/m2, 0-2.5V  | 1 | ISPT-Lubango     |
| ISPT                  | Rain Gauge YOUNG (Model:52203)  | 1 | ISPT-Lubango     |
| ISPT                  | Silizium-Pyranometer SP-LITE  | 1 | ISPT-Lubango     |
| ISPT                  | Ultrasonic Wind Sensor(WindSonic)   | 1 | ISPT-Lubango     |
| ISPT                  | UTR Adcon A753 GSM/GPRS ( Ref:100.753.010)  | 1 | ISPT-Lubango     |
| ISPT                  | Wind Direction + Velocity Mast (0-200km/h)  | 2 | ISPT-Lubango     |
| ISPT                  | Wind Direction Sensor (S/N:f.566.2s924)   | 1 | ISPT-Lubango     |
| ISPT                  | Windsensorset ADCON Pro10/2   | 2 | ISPT-Lubango     |
| Software              |   |   |                  |
| FC-UAN                | software/ArcGis   | 1 | FC-UAN           |
| FC-UAN                | software/Erdas  | 1 | FC-UAN           |
| Specialised equipment |   |   |                  |
| CNIC                  | laser measuring tape/(LEICA DISTO D510)   | 1 |                  |
| FCA-UJES              | 910-Comp - Air Compressor for Flame Photometer Model 910 and 910-H Analyser                 | 1 | FCA-Huambo       |
| FCA-UJES              | 910-M Double flame Photometer Digital, Channel. NA, K, (LI E CA opc) with Compr.,M.Analyser | 1 | FCA-Huambo       |
| FCA-UJES              | vertical Freezer BEKO 3 GAVAS FSE1072   | 1 | FCA-Huambo       |
| FC-UAN                | Colorimeter Smat3 LAMOTTE   | 1 | FC-UAN           |
| FC-UAN                | Multiparametric Probe, HI9828-HANNA   | 1 | FC-UAN           |
| FC-UAN                | SEISMOGRAPH   | 1 |                  |
| FC-UAN                | Spetrometer RS-230  | 1 | FC-UAN           |
| ISCED                 | CDC light visible with batteries  | 1 | Herbário/ISCED   |
| ISCED                 | DataShow Epson HDMI 3LCD  | 1 | Herbário/ISCED   |
| ISCED                 | Draga professional "Enthomopraxis"  | 1 | Herbário/ISCED   |
| ISCED                 | Horizontal Ark - Haier  | 1 | Herbário/ISCED   |
| ISCED                 | Refrigerator ARB 47L SICOPAL  | 1 | Herbário/ISCED   |
| ISCED                 | Shonlandr pump  | 1 | Herbário-Lubango |
| ISCED                 | Stereo Microscope STEMI 305/508 Zeiss   | 1 | Herbário/ISCED   |
| ISCED                 | Vertex Laser VL5BT complete   | 1 | Herbário-Lubango |
| ISCED                 | Water Pump+ Pipe  | 1 | Lubango/Namibe   |
| ISPT                  | A753 AddWAVE GPRS/QUAD  | 1 | ISPT-Lubango     |
| ISPT                  | A755 addSDI V2 GPRS QUAD  | 1 | ISPT-Lubango     |
| ISPT                  | Metal Detector  | 1 | ISPT-Lubango     |
| ISPT                  | MS SURFACE 3 I5   | 1 | ISPT-Lubango     |
| ISPT                  | MS SURFACE PRO 3 TYPE CO  | 1 | ISPT-Lubango     |
| ISPT                  | OTT RLS Radar Sensor  | 1 | ISPT-Lubango     |
| ISPT                  | Silizium-Pyranometer SP-LITE  | 1 | ISPT-Lubango     |



RESEARCH



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