



SASSCAL

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

PASSPORT



**Republic of
Botswana**



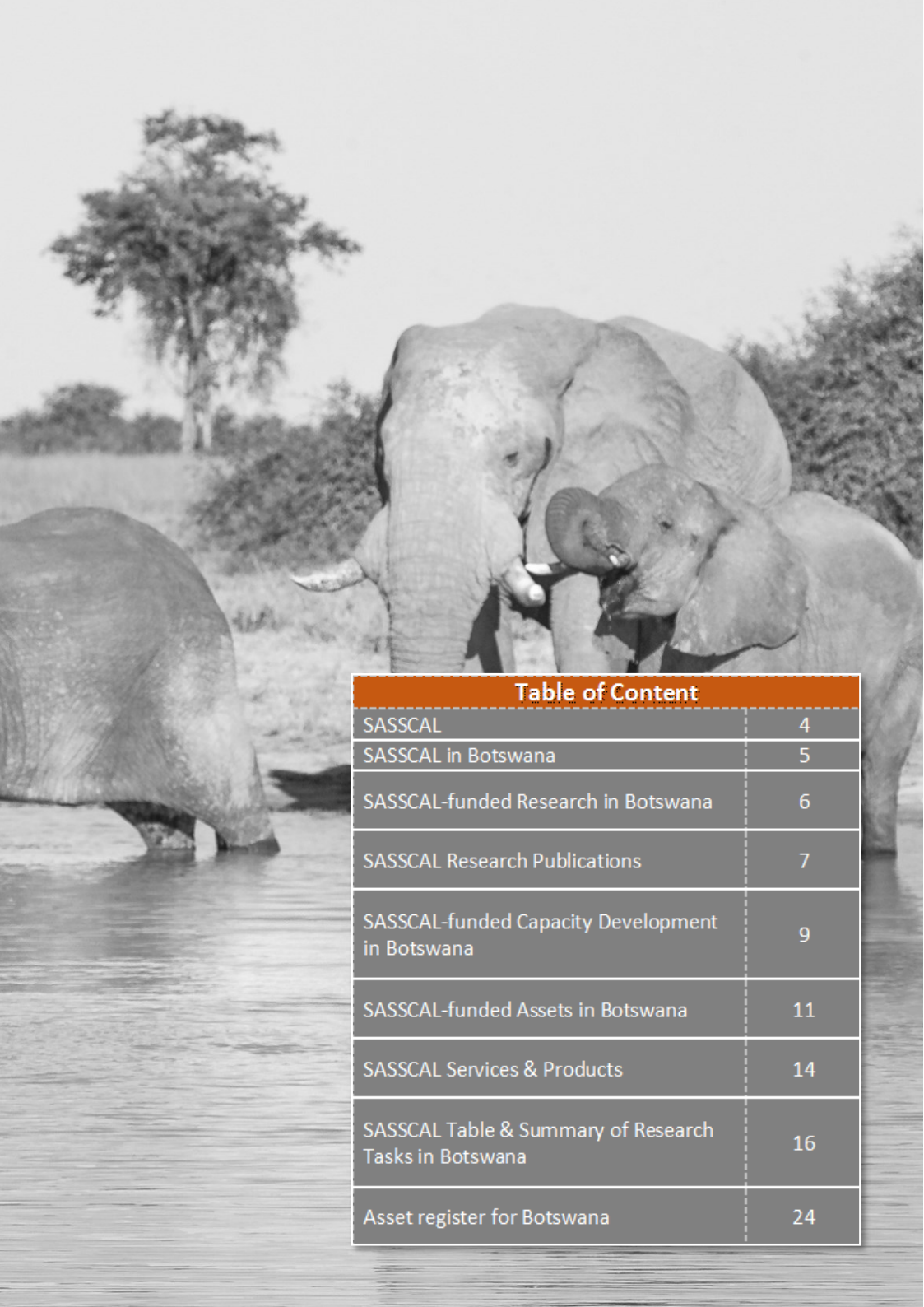


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SASSCAL is a joint initiative of Angola, Botswana, Namibia, South Africa, Zambia and Germany in response to the challenges of global change

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 Botswana

SASSCAL was initially established as the Regional Science Service Centre (RSSC) in Windhoek in 2010. The National Executing Agency of SASSCAL in Botswana is the Department of Meteorological Services (DMS) with guidance and support from the Ministry of Environment, Natural Resources Conservation and Tourism.

In Botswana, 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 achieved through SASSCAL's Research Portfolio 1.0, from 2012 to 2018, and facilitated by the SASSCAL Node in Botswana.



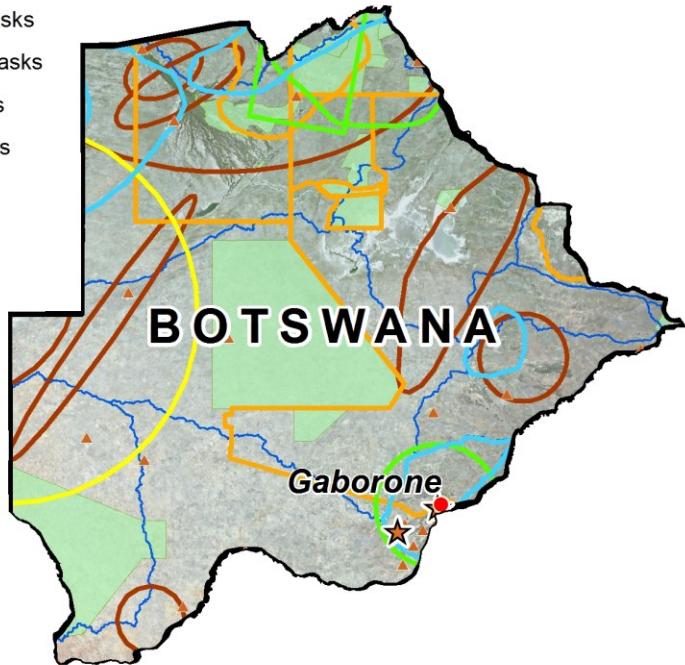
SASSCAL-funded Research in Botswana

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

- ★ **SASSCAL Funded Institutions**
- ▲ SASSCAL WeatherNet Automatic Station
- Hydrobasins
- Protected area

SASSCAL Research Portfolio 1.0

- 2 Agriculture tasks
- 3 Biodiversity tasks
- 3 Climate tasks
- 2 Forestry tasks
- 2 Water tasks



The SASSCAL-funded Research Portfolio in Botswana, from 2012 to 2018, constituted 14 projects, referred to as tasks. The total budget for these tasks was € 2 861 686.00.

Tasks are performed under the leadership of three national partners:

- Botswana University of Agriculture and Natural Resources (BUAN) (Task 308, 311, 316, 321, 335)
- University of Botswana (UB) (Task 304, 314, 337, 338, 341, 344, 349)
- Department of Meteorological Services (DMS) (Task 323, 332)

Other partners in Botswana task consortiums were:

Ministry of Environment Natural Resources Conservation and Tourism

Ministry of Education and Skills development

Ministry of Agriculture

Department of Forestry and Range Resources

Department of Environmental Affairs

Department of Water Affairs

Botswana Institute of Development AND Policy Analysis

National Food Technology Research Centre, Botswana

Veld Products Research and Development, Botswana

Kelosika Foods, Botswana

University of Trier, Environmental Remote Sensing and Geoinformatics, Germany

Department of Wildlife and National Parks

University of Pretoria, South Africa

University of Hamburg, Germany

Kalahari Conservation Society

University of Kwazulu-Natal

Water Utilities Corporation

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.

The Book is freely available for download:

WWW.BIODIVERSITY-PLANTS.DE/BIODIVERS_ECOL/VOL6.PHP

Botswanan SASSCAL partners contributed to 11 of the publications featured in the SASSCAL Book and further contributed to every thematic chapter in the book.

SASSCAL IN BOTSWANA

*14 SASSCAL-funded
projects*

€ 2 861 686.00

16 Institutions

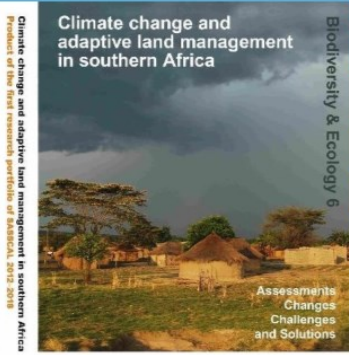
80 Individuals

(excluding students)

BUAN
BOTSWANA UNIVERSITY OF
AGRICULTURE AND NATURAL RESOURCES



**UNIVERSITY
of
BOTSWANA**



Colour guiding system to the chapters

Climate	page 13
Water resources	page 63
Risk management	page 131
Rangelands	page 165
Food security	page 225
Forest resources	page 295
Land cover dynamics	page 343
Biodiversity	page 381
Task overview	page 480
Further reading	page 488

Climate change poses a serious threat to natural ecosystems. This book features the current research of SASSCAL and aims to draw the attention of a wider scientific community. The studies presented cover assessments of the status of resources, analyse how their management will change, identify risks and challenges involved and offer solutions and policy recommendations. The book also addresses education and sustainability management in southern Africa.

Product of this first research portfolio of SASSCAL 2012-2018

Ministry of Education and Research

In addition to the SASSCAL Book, SASSCAL-funded researchers authored 16 journal articles, 18 book chapters, 24 peer reviewed abstracts, and have made over 30 conference and poster presentations at various scientific fora. Non-peer reviewed publications include various contributions to the SASSCAL Newsletter (WWW.SASSCAL.ORG/NEWSLETTERS/).



Drought resistance under field conditions in Hukunsi show that Mahutohuto landrace is out-performing other genotypes in dryland environment (SASSCAL Newsletter September 2017)

SASSCAL-funded Capacity Development in Botswana

Graduate Programmes

In June 2018, the *Collaborative Master Degree in Earth Observation, GIS and Remote Sensing* (Task 303) was launched in Botswana. The programme development was coordinated by the Namibia University of Science and Technology (NUST), in cooperation with Cape Peninsula University of Technology (CPUT), the University of Botswana (UB) and the University of Zambia (UNZA). The programme aims to address the capacity limitations in the fields of earth observation, geographic information systems and remote sensing. The nine of the first 21 students have received SASSCAL scholarships. SASSCAL has also contributed to the IT infrastructure to enable the programme.



(top) Launch of Masters Programme in Earth Observation, Geographical Information Science and Remote Sensing and (right) participants of the research methods training that was held in Johannesburg, South Africa



Through Task 349, *Research capacity development for SASSCAL Countries*, which aimed at developing a critical mass of researchers with skills on proposal development, scientific writing and publication skills as well as mentoring skills, trained a total of 113 students and lecturers in research methods and manuscript writing.

SASSCAL-funded Graduate Degrees through Botswana Research Portfolio

SASSCAL funding supported 59 students to obtain degrees (some students are busy with their studies):

- 4 PhD students (1 already graduated)
- 17 Master students (15 already graduated)
- 30 Bachelor students graduated
- 8 Students were qualified at certificate level
- 25 Technicians through short courses

One of the success stories is that of Kefentse Mogwera, who won Best Student Award at the April 2018 SASSCAL Science Symposium for his talk “Ecological predictors of risk areas for carnivore predation on livestock in agricultural landscapes around Makgadikgadi/Nxai National Parks, Botswana”. Below, Kefentse is receiving his award from SASSCAL board chair Mrs Jane Chinkusu .

Kefentse graduated with a Master of Philosophy in natural resource management, from the Okavango Research Institute at the University of Botswana, through SASSCAL funded Task 314 (Exploring Human-Wildlife Interactions in Agro-Ecosystems in northern Botswana).



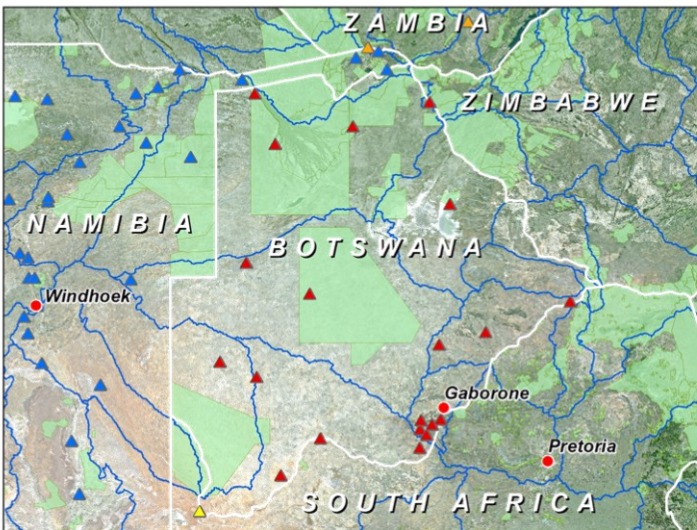
SASSCAL –funded Assets

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 20 automatic weather stations (AWS) of the total 154 AWS of the SASSCAL WeatherNet, are strategically distributed in Botswana. A total of 15 AWS were installed under Task 323 based at the Department of Meteorological Services. The Task aimed at improving the weather observational network across Botswana. The other five AWS were installed under Task 337 which focussed on improved spatial data for hydrological modelling and implications for water resources management. The data of 15 AWS are made available through the online SASSCAL WeatherNet.

All data transmitted by these stations are made available in near real-time on the SASSCAL WeatherNet (WWW.SASSCALWEATHERNET.ORG) and are freely accessible. The stations transmit hourly rainfall, air and soil temperature, humidity, wind speed and direction, barometric pressure, solar radiation, leaf wetness and other sensor data.



The AWS in Ngwatle and (left) SASSCAL WeatherNet AWS in Botswana

Laboratory and Field equipment

The BUAN research infrastructure was strengthened through Task 308, *Water Use Efficiency and Grain Quality of Crops Under Water Deficit Conditions*. The task procured an Ultra-Low Freezer which is designed to meet the highest international level of requirements for scientific and laboratory research. The freezer has the capacity to reach very low temperature suitable for storing samples for longer periods of time.

Surface and Groundwater Research Equipment

Task 344 which aimed at “Improved database on water quality and quantity”, procured, amongst others, equipment used to measure electrical conductivity which is important for estimating salts amounts in water bodies. The task also measured the amount of dissolved oxygen which is needed by aquatic organisms and should the levels drop to below 5mg/L, aquatic organisms usually experience stress and death if the level goes below 1mg/L.

Task 341 procured water dippers which were used to measure and monitor the status (including water levels, conductivity and temperature) of water resources in the various

study areas. They also purchased soil gas flux equipment, which was used to establish that percentage organic carbon and CO₂ fluxes are significantly high closer to livestock concentration areas than at dis-



(left) Student running tests at the BUAN Science Laboratory (top) student showing samples stored in the Ultra freezer

tances more than 100m from livestock concentration areas to WMAs. The overall results show that, besides natural geochemical conditions, land use, especially livestock overgrazing and sedentarization significantly impact soil quality and its productivity.

IT Equipment

SASSCAL funding supported the procurement of equipment for the DMS, through Task 323, which enabled the Department to digitise and store historical data. The data will be used nationally, regionally and internationally to facilitate global and regional climate monitoring and research. SASSCAL contributed to an improved database, automatic Ingestion of meteorological data from different sources into the database, upgrading of Climsoft from v3 to v4.0 and upgrading of the MySQL database to MariaDB (Improved MYSQL). Data processing and management procedures training was provided. The Department further more procured an AWS server, backup server, 3 desktop computers, 3 laptops, network printer, wireless network with 5 access points and a backup software, which have enhanced data storage facilities and manipulation tools, improved data accessibility and availed better database management tools.

Overall SASSCAL Tasks procured 25 lap tops, 3 desktops, 2 servers, 29 different types of GPS, 6 cameras and software, camping equipment and many more assets, see Annex 3 for a detailed table of SASSCAL procured assets.



(top) The DMS climate data archive before digitisation and archiving, and (bottom) after digitisation and archiving

SASSCAL Services & Products

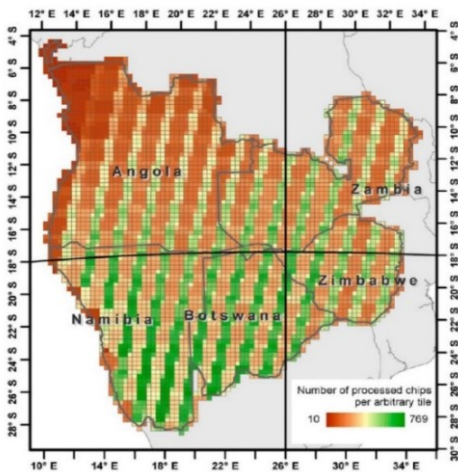
SASSCAL ensures that the research deliverables resulting through the SASSCAL-funded Research Portfolio, are made available openly and free of charge.

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

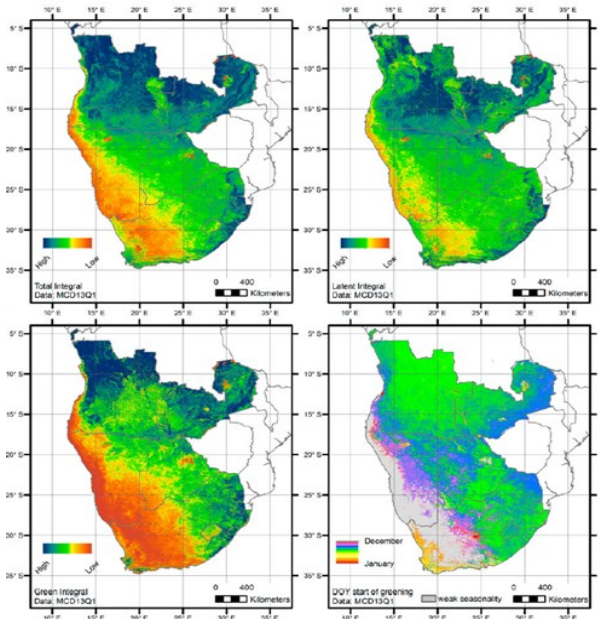
WWW.SASSCAL.ORG/SASSCAL-DATA-AND-INFORMATION-PORTAL/

It is noteworthy to highlight that besides the invaluable research results stemming from the Botswana portfolio, deliverables from other SASSCAL research of interest to Botswana 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 km² (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)



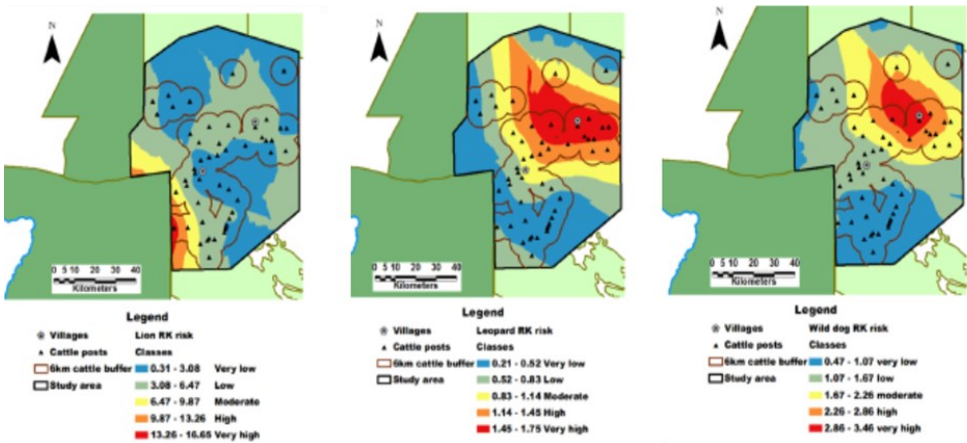
(left top) Number of processed Landsat images per tile, (right) phenological layers



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

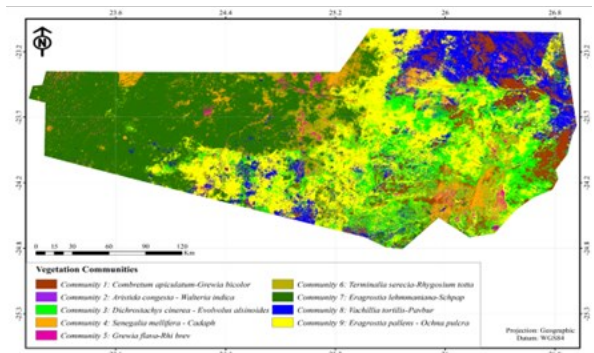
SASSCAL has further supported Botswana decision-support processes by, amongst others, the following products and services:

- Livestock predation spatial risk maps for lion, leopard and wild dog in the eastern Makgadikgadi, also incorporate the effects of the ecological factors: (amongst others) to mitigate against livestock predation, the study recommended that farmers should be encouraged to graze and water their livestock far (>40km) from park boundaries or invest in herding livestock, in building strong kraals, and promoting mitigation-development research



Livestock predation spatial risk maps for (left to right) lion, leopard and wild dog

- Vegetation maps of Kgatleng, Kweneng and Mahalapye sub-districts
- Detailed habitat map of Northern Botswana; conceptualization was based on the concept of functional habitat heterogeneity for herbivores, which determines the ability of herbivores to adapt to strong seasonal and inter-annual variation in resources and to predation risk



Vegetation map of Kgatleng, Kweneng and Mahalapye Sub-district

SASSCAL Table of Research Tasks

Task ID	Task Name	Lead	Budget (Euro)
Agriculture			
Task 308	Water Use Efficiency and Grain Quality of Crops Under Water Deficit Conditions	BUAN	€ 150 603.10
Task 316	Making use of the wild legume resource to improve arable and live-stock farming in Botswana	BUAN	€ 200 402.00
Biodiversity			
Task 314	Exploring Human-Wildlife Interactions in Agro-Ecosystems in northern Botswana	UB	€ 179 795.50
Task 304	Development of strategies for sustainable use and management of savannah ecosystem resources and services in northern Botswana through remote sensing based spatial database tools	UB	€ 294 366.50
Task 321	Vegetation survey of Botswana	BUAN	€ 156 165.00
Capacity Development			
Task 338	Community Capacity Building for Natural Resources Management and Monitoring	UB	€ 94 569.24
Task 349	Research Capacity Development for the SASSCAL Countries	UB	€ 213 130.10

Climate		
Task 323	Improving weather observational network across Botswana	€ 91 263.30
Task 332	Historical and ongoing Climate Data Management	€ 250 955.70
Task 341	Impacts of climate change on livelihoods and implications for adaptive strategies in the Kalahari ecosystem	€ 322 336.27
Forestry		
Task 335	Cultivation, value addition and marketing of climate smart emerging crops to improve food security	€ 331 034.80
Task 311	Improved forest resource assessment including socioeconomic baseline in Botswana	€ 105 320.10
Water		
Task 344	Improved database on water quality and quantity: Botswana	€ 268 835.90
Task 337	Towards improved spatial data for hydrological modeling and implications for water resources management: the case of Notwane catchment in Botswana	€ 202 908.49
		€ 2 861 686.00

Summary of Tasks

Task 304 – UB (Okavango Research Institute) (€ 294 366.50)

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 a detailed vegetation/habitat map of northern Botswana
- Woodland landscape occurring beyond 15km from water during the dry season, have spatial refuges for vegetation and for rare herbivores; removal of these waterless spatial refuges will result in loss of this buffering effect and degradation of the whole ecosystem
- High-densities of elephant have a negative effect on biodiversity and the resource base for other herbivores



Task 308 – BUAN (€ 150 603.10)

Water Use Efficiency of Cowpea Under Contrasting Environment and Water Deficit Conditions

- Identified drought resistant cowpea genotype that could perform well under limited moisture regime in the Kgalagadi desert where moisture availability is a problem
- Made recommendation on optimum planting dates and suitable cowpea variety for each date
- Trained farmers and extension agents on cowpea production practices



Task 311 – BUAN (€ 105 320.10)

Improved forest resource assessment including socioeconomic baseline in Botswana

- High dependency on forest resources by communities living within the vicinity of forest reserves
- Chobe Enclave communities and Makomoto woodland Management Trust trained on

Forest Resource assessment.

- Basic resource assessment (Basic Inventory) for management plans in community managed forest areas



- Soft skills such as (leadership, governance, group dynamics, conflict management & resolution)
- Propagation and domestication of the indigenous trees and management
- Sustainable harvesting and value addition on the NTFP

Task 314 – UB (Okavango Research Institute-) (€ 179 795.50)

Human-wildlife interaction and strategies for mitigating conflict in northern Botswana

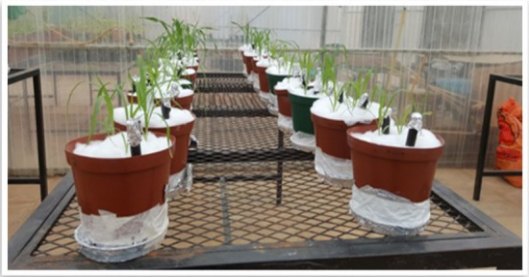
- Mapped and analysed the intensity and spatio-temporal distribution of carnivore-livestock depredation incidents (see livestock predation risk maps on page 15)
- Socio-economic and ecological outcomes of crop-raiding
- Adaptive strategies used by farmers and socio-economic options available to farmers mitigate against the negative impacts of the human-wildlife interaction

Task 316 – BUAN (€ 200 402.00)

Making use of the wild legume resource to improve arable and livestock farming in Botswana

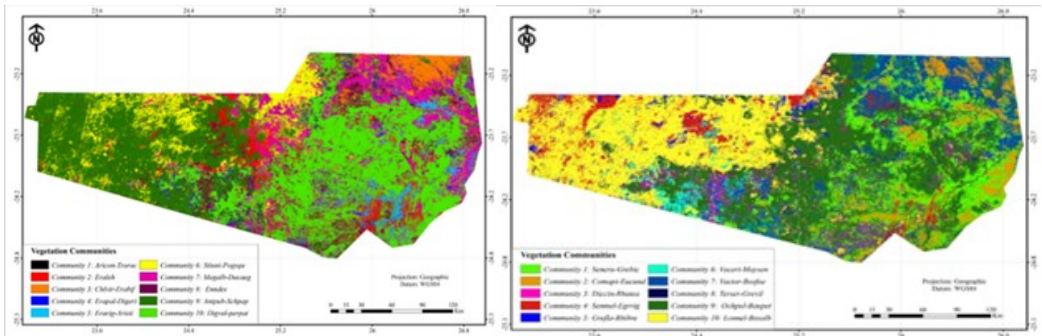
- Identified indigenous legumes that could be used for fodder production
- Some indigenous herbaceous legumes were found to fix high Nitrogen with depleted values of $\delta^{15}\text{N}$ and were also water-use efficient
- Negative effects of *Indigofera spp* and *C. sphaerocarpa* on biological fitness parameters of *A. craccivora* indicate resistance of these species against the aphid

- Significant differences in the uptake of nutrients by the various grain legumes growing in different areas.
- The diversity of nodulated legumes diminished with increasing aridity



Task 321 – BUAN (€ 156 165.00)

Vegetation Survey of Botswana



Grass vegetation (left) and woody vegetation map (right) of Kgatleng, Kweneng and Mahalapye Sub-district

- Inventory of all the tree, shrubs and grass species in Kweneng, Kgatleng and Central (Mahalapye sub-district) districts of Botswana
- Field guide of grasses of Botswana
- Distribution map of all the trees, shrubs and grasses found in Kweneng, Kgatleng and Central districts of Botswana

Task 323 – DMS (€ 91 263.30)

Improving weather observational network across Botswana

- Installed 15 Automated Weather Stations- linked to the SASSCAL online WeatherNet
- Improved observation network, both synoptic and rainfall and a reduction of critical gaps (both spatial and data), improved data quality, usefulness and reliability, improved weather forecasting



Task 332 – DMS (€ 250 955.70)

Historical and ongoing Climate Data Management

- To improve the capacity of back-end databases and the digitised historical data, as well as to improve the concept for rescuing and archiving historic data (with the support of the DWD (Deutscher Wetterdienst, through Task 123)
- Integrated data from different Meteorological data sources
- Observational archive for climate monitoring and climate research providing quality-controlled and well-documented historic and current in-situ data



Task 335 – BUAN (€ 331 034.80)

Cultivation, value addition and marketing of climate smart emerging crops to improve food security

- Abiotic and biotic factors influencing growth and development of selected indigenous plant species were established
- Assessment of abundance and distribution of indigenous plants using GIS systems was completed
- Quality evaluation of raw and value-added oilseed products in Botswana



- Analysis of nutritional and phytochemical composition of indigenous oilseeds was completed
- Health benefits of the oil seeds using an animal feeding study
- Value added products were developed from all the indigenous plants for capacity building of communities where the plants are found

Task 337 – UB (€ 202 908.49)

Towards improved spatial data for hydrological modeling and implications for water resources management: the case of Notwane catchment in Botswana

- Installed five AWS (the data for these are available via SASSCAL WeatherNet)
- Data generated from the AWS will be key in addressing climate change/variability for the catchment under study



Task 338 – UB (€ 94 569.24)

Community Capacity Building for Natural Resources Management and Monitoring

- Developed an inventory of natural resource uses and user lists
- Trained community members on Management Oriented Monitoring System (MOMS) & PGIS
- Developed MOMS monitoring books



Task 341 – UB (€ 322 336.27)

Community Capacity Building for Natural Resources Management and Monitoring

- Observed increased vulnerability of traditional livelihoods as a consequence of high aridity, high ground water salinity and poor soils
- Observed decline of rangeland resources
- Observed unsustainable dominant livelihood strategies



Task 344 – UB (€ 268 835.90)

Improved database on water quality and quantity in Botswana

- Significant increase in Electrical Conductivity (EC), spatially downstream and with time (2014-2016) in the Okavango Delta
- Sharp decrease in dissolved oxygen during high floods in the 3 years of monitoring- explaining the fish die-offs that occur during the arrival of the floods in the delta
- Flood level has significant influence on *E. coli* and *F. Streptococci* and no significant influence on total coliforms in the Lower Okavango Delta



Task 349 – UB (€ 213 130.10)

Research Capacity Development for SASSCAL Countries

- Training on how to develop a good research proposal
- Trained researchers on how to prepare and submit manuscripts for publication in accredited scientific journals



Asset register for Botswana

Institution	Asset specification	#	Location
Camera			
ORI	Camera (Sony and Canon)	4	Maun
ORI	Canon zoom lens Camera	1	Maun
BUAN	Camera Samsung WB 100	2	Gaborone
DMS	SONY CYBERSHOT DIGITAL CAMERA	1	Gaborone
Data or software			
ORI	Foder Imagery Data for vegetation	1	Maun
DMS	Symantec(Back up software)	1	Gaborone
DMS	Linc back up(Renewal)	1	Gaborone
BUAN	Gel Documentation System	1	Gaborone
Field equipment			
BUAN	Camping equipment includes 4 tents and stretchers	4	Gaborone
BUAN	Garmin GPS etrex 20	1	Gaborone
BUAN	GPS Map 78s	1	Gaborone
DMS	MAP GRADE GPS RECEIVER	1	Gaborone
ORI	Camping equipment includes 3 tents and table		Maun
ORI	Garmin GPS625	5	Maun
UB	010-00868-01 GPMAP 62s HIGH SENSITIVITY GPS. WITH 3 AXIS COMPASS & BAROMETRIC AL	3	Gaborone
UB	A520-ACQ-Bp. Acquisition Unit CEA520 with GSM/GPRS and current loop serial outpu	5	Gaborone
UB	Garmin Etrex 20 GPS	3	Gaborone
UB	GLOBAL POSITIONING SYSTEMS UNITS: GARMIN 64S HANDHELD GPS UNITS	14	Gaborone
UB	GPSMAP62 Garmin GPS MAP 62S	2	Gaborone
Hardware			
ORI	HP notebooks/laptops	14	Maun
BUAN	HP notebooks/laptops	5	Gaborone
BUAN	Projector Epson EB-518 H552B	1	Gaborone
BUAN	HP LaserJet pro 200 color printer	1	Gaborone
UB	Samsung printer; CLX-330SFW A4 color 4 in 1; print, scan, copy, fax-18ppm black,	2	Gaborone
UB	HP notebooks/laptops	4	Gaborone
UB	HP 450 Intel Core i5 4200M DC 4GB DDR3 1600. 750GB 5400RPM HDD 15.6 high. Blueto	1	Gaborone

Institution	Asset specification	#	Location
UB	CF146A, HP LASERJET PRO 200 COLOR M251n PRINTER (MONO & COLOR)	1	Gaborone
DMS	LAPTOP BAKPACK CARRY BAG (x2)	2	Gaborone
DMS	HP notebooks/laptops	6	Gaborone
DMS	USB MODEM 3G+ PREPAID (X2)	2	Gaborone
DMS	SD CARD with 4GB (X2)	2	Gaborone
DMS	CANON PRINTER LBP7210Cdn	1	Gaborone
DMS	CANON LIDE 210 SCANNER	1	Gaborone
DMS	HP Server Tower Proliant MI350p	1	Gaborone
DMS	Dell optiplex 3010 Desktop computer	3	Gaborone
DMS	Dell 20" LCD Computer Screen	3	Gaborone
DMS	Hp Laserjet Network Printer(all in one)	1	Gaborone
DMS	Cartridges (consumables)		Gaborone
DMS	Dell LCD 69cm	1	Gaborone
DMS	Hp DI 360 P Server	1	Gaborone
DMS	Wireless Router	1	Gaborone
Sensor / logger			
DMS	TX320 SATELLITE TRANSMITTER	1	Gaborone
DMS	RAIN GAUGE QMR 102 (X2)	2	Gaborone
DMS	RADIATION SCREEN DTR 503A (X2)	2	Gaborone
DMS	SOIL THERMOMETER (X2)	2	Gaborone
DMS	LEAF WETNESS SENSOR (X2)	2	Gaborone
DMS	SOLAR RADIATION CABLE (X2)	2	Gaborone
DMS	SOLAR REGULATOR (X2)	2	Gaborone
DMS	CINTERION WIRELESS MODULE	1	Gaborone
DMS	BAROMETER PTB110 (x2)	2	Gaborone
DMS	CMP3 PYRANOMETER (x2)	2	Gaborone
DMS	SOLAR PANEL MODEL: SD ECO PLUS 15WP (x5)	5	Gaborone
DMS	WIND CROSS ARM WAC151 (X2)	2	Gaborone
DMS	WIND ANEMOMETER WAA 151 (x2)	2	Gaborone
DMS	WIND VANE WAV151 (X2)	2	Gaborone
DMS	WIND CABLE ZZ45049 (x2)	2	Gaborone
Specialised equipment (includes, but not exhaustive list)			
BUAN	81 Ultra Freezer	3	Gaborone
BUAN	Arktik Thermal cycler 48 Well dual block and base	1	Gaborone

Institution	Asset specification	#	Location
BUAN	Centrifuge and rotor	1	Gaborone
BUAN	Chlorophyll Meter	1	Gaborone
BUAN	Defy F350 Upright Freezer	1	Gaborone
BUAN	Defy L350 Upright Fridge	1	Gaborone
BUAN	Irrigation System	2	Gaborone
BUAN	Nano-Drop Spectrometer	1	Gaborone
BUAN	Oil Pressing Machine	1	Gaborone
BUAN	Pulverizer 5E- PCM1 x100	1	Gaborone
BUAN	R-300 Rotary Evaporator unit	1	Gaborone
BUAN	Soil Moisture kit	1	Gaborone
BUAN	Soil Moisture Meter (SMMI)	1	Gaborone
BUAN	Soil Moisture Probe (MPM-160-B)	1	Gaborone
BUAN	Soil moisture system (10xMP406)	1	Gaborone
DMS	Cisco Aironet Access Point	5	Gaborone
DMS	Cisco Controller	1	Gaborone
DMS	Cisco Switch	1	Gaborone
DMS	YAGI ANTENNA	1	Gaborone
ORI	Baro Diver	1	Maun
ORI	Chlorophyll Meter and sensor: AP-Lite	1	Maun
ORI	COD digester + photometer	1	Maun
ORI	Current meter with synthetic propeller	1	Maun
ORI	Mini diver Range 20m	4	Maun
UB	010-108 Auto Navigation Kit	2	Gaborone
UB	LI-8100A-S2 SOIL GAS FLUX SYSTEM SURVEY PACKAGE WITH 20 CM CHAMBER. INCLUDES: LI	1	Gaborone



Woody and herbaceous sampling at one of the sites for the vegetation survey task (Task 321) of BUAN



RESEARCH



CAPACITY
DEVELOPMENT



SERVICES &
PRODUCTS



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