THUTO KE THEBE

UNIVERSITY of BOTSWANA

Okavango Research Institute (ORI)

Brochure

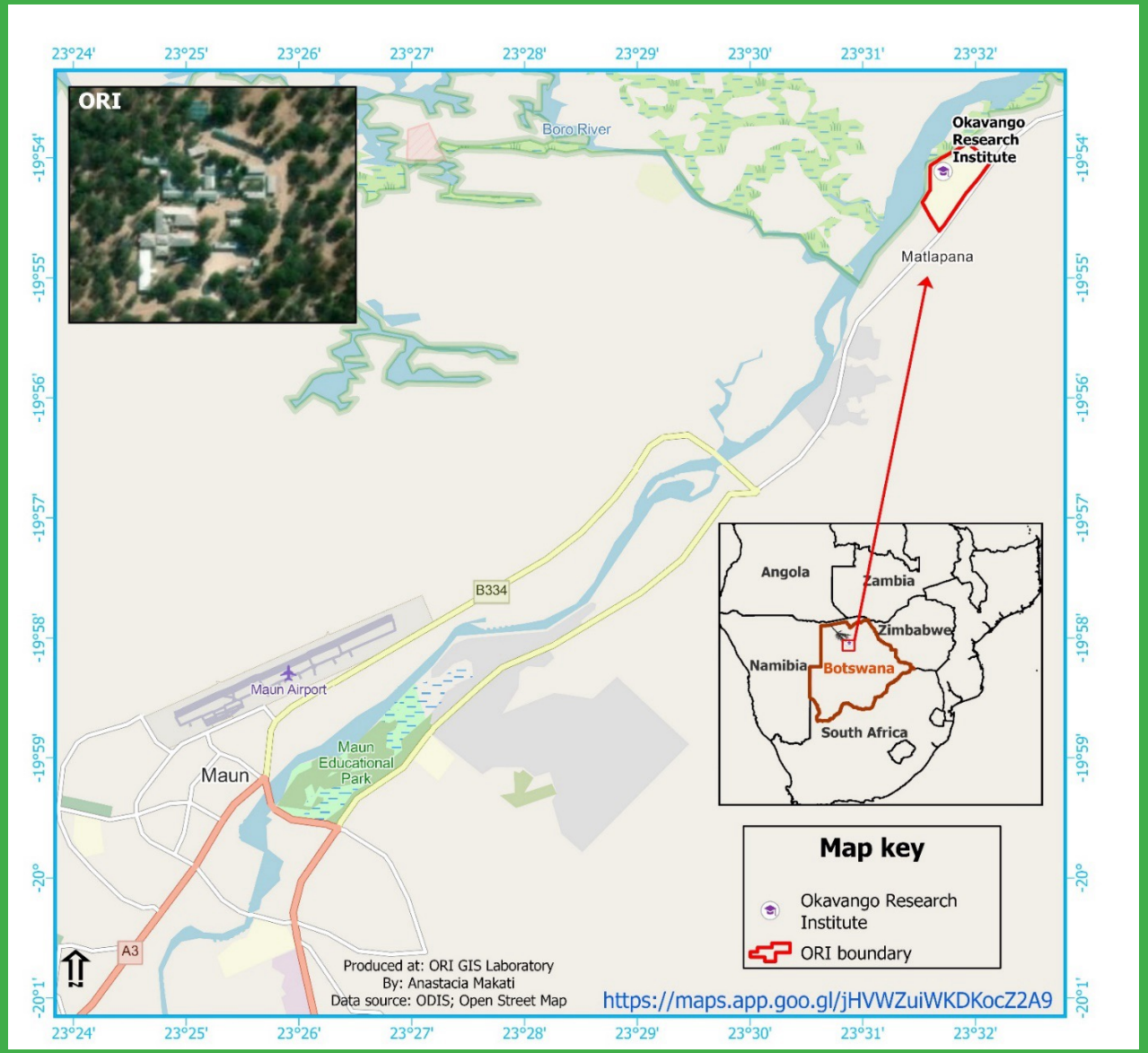
Contents

VISION

To be a leading wetlands and adjacent drylands research institute in Africa and the world by 2029 and beyond.

MISSION

To undertake engaged research and provide training and service on wetland and adjacent dryland eco-systems.



BACKGROUND OF THE OKAVANGO RESEARCH INSTITUTE (ORI)

The Okavango Research Institute (ORI) of the University of Botswana (UB) is dedicated to the study of wetlands and adjacent drylands. ORI was established in 1994 in response to the need for scientific information on the Okavango Delta ecosystem. ORI, formerly the Okavango Research Centre (1994-2001) and Harry Oppenheimer Okavango Research Centre (HOORC) (2001-2010) is under the auspices of the University of Botswana. ORI's mandate of generating scientific information and knowledge on the Okavango Delta enshrined in Vision 2036 of the Government of Botswana. ORI was thus established to promote multidisciplinary research and to contribute towards making the university a research-intensive institution■

Brief description of the Okavango Delta

The Okavango Delta is the terminal alluvial fan of the Cubango-Okavango River Basin (CORB), which extends from Angola through Namibia into Botswana. This Delta, located in northern Botswana, is a large wetland ecosystem listed in 2014 as the 1000th World Heritage Site due to its relatively undisturbed ecological functioning, aesthetic quality and abundant wildlife. Given its ecological quality and global significance, the Okavango Delta acts as a hub for collaborative research and partnerships that promote sustainable natural resources conservation.

ORI STRATEGIC GOALS

i. To increase research competencies in the ORI areas of focus;

ii. To create an enabling environment for high quality research and training;

iii. To conduct engaged transdisciplinary research that responds to problems facing conservation of the Delta and its surroundings, as well as the needs of local communities, and

iv. To ensure financial sustainability for the institute.

1.0 RESEARCH PROGRAMMES AND THEMATIC AREAS

Research at the Okavango Research Institute (ORI) is guided by five (5) thematic areas which also constitute five research programmes. The research themes and programmes address all aspects of wetland ecosystems, from biophysical to socio-cultural, economic and political dimensions of wetlands. Research programmes and their thematic areas are outlined below.

1.1 Ecosystem Dynamics

The Okavango Delta, Linyanti-Chobe system and Makgadikgadi Pans are key wetland systems in northern Botswana that are critical for maintaining the ecological processes and biodiversity of the region upon which human livelihoods, wildlife and the flourishing ecotourism industry depend. While many species (e.g., fish, various bird species, lechwe, hippos, etc.) depend entirely on the wetlands and their associated floodplains, many other birds and wildlife species depend

upon the wetlands only in certain seasons but utilise the vast outlying woodland regions in other seasons, and, therefore, so does the tourism industry. Fluxes of nutrients and energy link the wetlands and their dry hinterlands and result in a larger ecosystem with its own emergent properties, such as the support of unusually high densities of mammalian wildlife. Thus, it is critical to understand not only the wetlands of the region but also the interactions between these and the vast dryland system of northern Botswana. The Ecosystem Dynamics programme operates under the following themes: (i) eco-hydrology, (ii) flora, (iii) fauna, (iv) ecosystem ecology, and (v) human ecology.

1.2 Ecosystem Services

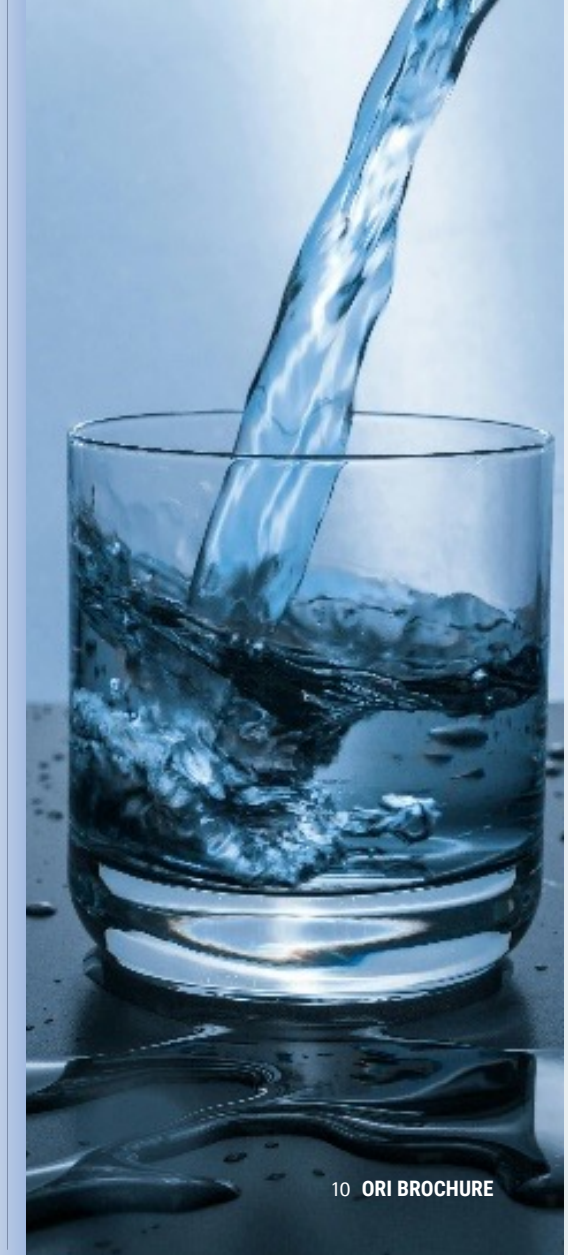
The overarching goal of the Ecosystem Services (ES) programme is to contribute to scientific knowledge and policies on the management of ES in the Okavango Delta in Botswana and other wetlands to avoid negative impacts of their degradation on human well-being. Ecosystem Services or “goods and services” have been categorised into four main types: provisioning, cultural, regulating, and supporting services. This thematic area thus aims at studying and understanding the dynamics of change in ecosystems and how they affect ES and human well-being.

There is a need to search for innovative approaches for the governance of ES. Objectives of the programme are to (i) understand the dynamics of change in ES in order to develop sustainable management tools; (ii) improve the understanding of the economic value of ES in order to contribute to their sustainable management; (iii) contribute to the understanding of the interlinkages between ES and human well-being in order to formulate appropriate policies and strategies for poverty alleviation and (iv) contribute to the understanding of ES governance by developing appropriate institutions. The programme has the following four thematic areas: (i) dynamics of ES, (ii) economic valuation of ES, (iii) ES and human well-being, (iv) institutions and governance of ES.

1.3 Water Resources Management

The Water Resources Management programme aims to contribute to the sustainability of water resources in northern Botswana and beyond (i.e. locally, nationally, and internationally). As a result, the objectives of the programme are to (i) understand hydrological and ecological systems, and processes in Botswana and beyond, (ii) assess water resources governance and cultural systems; (iii) assess economic systems for water resources management. The programme brings together multi-disciplinary teams of experts, builds capacity

and contributes to the vision of the Okavango Research Institute through the following five main themes: (i) wetland hydrological systems and quality, (ii) water and land resources governance, (iii) water security, risk and vulnerability, (iv) ecological health and sustainability of water resources and (v) water conservation.



1.4 Sustainable Tourism

The goal of the sustainable tourism programme is to conduct tourism research that is informed by sustainable tourism development principles. Sustainable tourism principles suggest that tourism research should address issues of economic impacts, environmental matters, social and cultural heritage matters, tourism planning and governance. In addition, the programme conducts research on the cultural, archaeological and historical aspects of tourism that play a remarkable role in tourism development. As a result, the sustainable tourism programme addresses the following thematic areas: (i) economic impacts of tourism, (ii) socio-cultural aspects of tourism, (iii) archaeological and heritage aspects of tourism, (iv) environmental impacts of tourism, (v) tourism business and marketing, (vi) hospitality and Interpretation, (vii) recreation, leisure, and sports tourism.

1.5 Climate Change

The Climate Change Research Programme is multi-disciplinary in approach and transcends the boundaries of other ORI programmes as outlined above. Its aim is to improve understanding of environmental, socio-economic, and political aspects that are relevant to the changing climate on environment and society in the Okavango Delta and other adjacent environments. The objectives of the programme are to (i) produce updated, state-of-the-art, locally and regionally relevant information on current climate trends and climate conditions in the future (at various temporal and spatial scales); (ii) contribute to climate change science through studies of past (palaeo-) climate variability and its drivers based on palaeo-climatic and hydroclimatic analyses; (iii) increase understanding of hydrological and ecological processes in the Okavango Delta and other wetlands that determine the magnitude and extent of climate

change impacts and developing and running quantitative impact models; (iv) contribute to the understanding of vulnerabilities of people to climate change and the nature of institutions for its governance; (v) systemise knowledge on indigenous coping strategies in order to inform adaptation and mitigation actions and policies and assist in the formulation of management strategies; (vi) educate the general public and stakeholders about climate change science and its socioeconomic and environmental implications on the local and regional economies. This programme focuses on the following broad thematic areas: (i) climate science, (ii) impacts of climate change, (iii) climate change adaptation and mitigation, (iv) climate change communication, (v) climate change education for sustainable development.

2.0 POSTGRADUATE STUDIES PROGRAMMES

Introduction

The Okavango Research Institute offers a multi-disciplinary MPhil and PhD programmes in Natural Resources Management. ORI, as a dynamic academic research institute of the University of Botswana, initiates, coordinate and conducts research that promotes effective natural resources management, environmental management and environmental monitoring. The programmes are offered on a full and part-time basis through minimal course work and research leading to a thesis/dissertation. The graduate programme offers students the opportunity to carry out natural science or social science research-based higher degree in the unique environment of the Okavango and Kalahari regions.

Since inception in 2008, the MPhil and PhD programme has attracted several students, enrolled for MPhil and PhD from the SADC region and internationally. The students come from the government, private sector, NGOs, universities and other sectors of society.

General Objective

- To produce graduate students with detailed knowledge and understanding of sustainable natural resource management, especially of wetlands.
- To enhance the capacity of Batswana graduate students to be better placed to effect natural resource management, especially in the context of river basins.
- To provide a regional facility to train graduate students from the SADC region including the Okavango River basin to better inform

partners with respect to joint natural resource management within southern Africa.

- To provide a focus for training in association with international partners in areas of both wetland and dryland science informing natural resources management throughout Botswana.

Programme Overview

The graduate programme provides candidates with enhanced research experience. Students conduct independent research, showing sound scholarship and constituting a substantial original contribution to the advancement of knowledge in a particular aspect of natural resources management science. The candidate is expected to have mastered advanced techniques in collecting, analysing and interpreting significant data sets, and should demonstrate wide knowledge and depth of understanding of literature in the field of study; develop a capacity for critical appraisal of existing facts, ideas and theories and be capable of producing an advanced treatise through the analysis and synthesis of the relevant data, concepts and theories.

Scope

The graduate programme is offered within the scope of the Okavango Research Institute's five (5) Research Programmes. These are:

- Ecosystem Dynamics
- Ecosystem Services
- Water Resources Management

- Sustainable Tourism, and
- Climate Change

Duration

Full-time

- MPhil: A minimum of 2 semesters and a maximum of 6 semesters
- PhD: A minimum of 6 semesters and a maximum of 8 semesters

Part-time

- MPhil: A minimum of 4 semesters and a maximum of 12 semesters.
- PhD: A minimum of 8 semesters and a maximum of 16 semesters

Admission Requirements

MPhil

- Relevant undergraduate qualification with a GPA: Minimum 3.5 on a 5-point scale from a recognized University/Institution

PhD

- Masters with course work and research

3.0 SELECTED PAST AND PRESENT RESEARCH

Selected past and present research projects are listed below.

- Water and Environmental Resources in Regional Development (WERRD) project (2001-2004) funded by the European Union (EU)
- BioKavango project (2006-2011) funded by UNDP/GEF.
- Ephemeral River Basins in SADC (ERB-SADC) Project (2006-2009), funded by the Norwegian Ministry of Foreign Affairs.
- The Future Okavango (TFO) Project (2010-2015) funded by BMBF, Germany
- Eco-Health Project (2010-2012) funded by IDRC, Canada.
- Regional Initiative in Science & Education (RISE) – Capacity building (2008-2018) funded by The Carnegie Corp, New York
- Southern African Science Service Centre for climate change and Adaptive Land management (SASSCAL 1) (2013-2017) funded by BMBF, Germany.
- Malaria and Bilharzia in Southern Africa (MABISA): Social, environmental and climatic change impacts of vector-borne diseases in arid areas of southern Africa Funded by the EU (2013-2017).
- Network of Energy Excellence for Development (NEED) (2015-2017) funded by the EU.
- Promoting Sustainable Livelihoods in Transfrontier Conservation Areas (ProSuli)

(2019-2023) funded by the EU.

- Water and Environmental Resources in Regional Development (WERRD) project (2001-2004) funded by the European Union (EU)
- Building Capacity for Biodiversity Data Management & Dissemination in Okavango Delta (2016-2021) funded by RS Biodiversity Foundation
- Southern African Science Service Centre for Climate Change and Adaptive Land management (SASSCAL 2) – Enhanced Livelihoods and Natural resources management under Accelerated Climate Project (ELNAC) (2023-2026) funded by BMBF, Germany.
- Sexaxa Cultural Village Resuscitation (2017- 2020) National Environment Fund (NEF).
- Okavango Delta Management Plan (ODMP) Review (2019-2020) MENT
- Sediment Assessment of the Cubango/ Okavango River Basin (2020-2022) funded by OKACOM.
- Kavango-Zambezi Livelihood Monitoring (KALIMON) Project 2023-2028 funded by WWF
- Community-Based Natural Resource Management; capacity and partnership building (2023 to 2024), funded by the Embassy of the USA (Gaborone, Botswana).
- The Global Methane Budget Project funded by NERC-UKCEH (2017-2022).
- The CWI-Moore Foundation OKFLUX-CH4 project (in collaboration with Stanford University and UKCEH) funded by The Moore Foundation (2024-2027).
- Eastern and Southern African Regional Hub for Research and Policy on Climate Change and Health (ESARHRCCH)

(in collaboration with AMREF and African International University) funded by IDRC (2024-2028).

- Cattle Corridors-Aligning ecological processes and local livelihood (in collaboration with University of Pretoria) funded by Jennifer Ward Oppenheimer Generations Research and Conservation (OGRC) (2023 -2027).

4.0 SHORT TRAINING COURSES

The Okavango Research Institute offers credit-bearing courses namely the NES476 Introduction to Wetland Research (formerly GEC431) and ORC600 – Research Methods (3 credits) which are a part of BSc Environmental Science and MPhil/PhD Programme in Natural Resources Management, respectively. In addition, ORI also offers 15 Non-Credit Bearing Short Courses (NCBSCs) that have been recognised by the Botswana's Human Resource Development Council (HRDC). The short courses are designed for government departments, the private sector, parastatals, civic society, community-based organisations (CBOs), non-government organisations (NGOs), development partners and other interested individuals.

The 15 non-credit bearing short courses are as follows:

1. Administration and Supervision of CBNRM Programmes
2. An Introduction to African Wildlife Ecology and Conservation
3. Biodiversity Data Management for Life Sciences
4. Environmental Assessment for Sustainable Land Management
5. Hunting Guide
6. Integrated Water Resource Management
7. Introduction to Remote Sensing Concepts and Application
8. Introduction to Applied Geographic Information System (GIS)
9. Introduction to Herbarium Management
10. Introduction to Statistics Using R
11. Principle and Operation of Atomic Absorption Spectrometry and Environmental Analysis
12. Principle and Operation of Induction Coupled Plasma-Optical Emission
13. Professional Hunter: Dangerous Game
14. Professional Hunter: Wild.
15. Statistic Module for Social Sciences using SPSSS

5.0 ORI FACILITIES

5.1 Geographic Information System (GIS) laboratory

The ORI GIS laboratory teaches and provides GIS/Remote Sensing (RS) technical services to undergraduate, postgraduate students, staff as well as stakeholders in private and government institutions. The services include the following: (i) Professional services (Geospatial data acquisition, processing, analysis and map visualisation); (ii) Geospatial data hosting and management within our repositories and portals (ODIS/OBIS); (iii) GIS/RS desktop installations and support; (iv) Equipment loaning (GPS); (v) Web based GIS mapping services and application development using ArcGIS online; (vi) Customized short training courses for ORI students, staff and external clients (instructor led or virtual platforms); (vii) Drone data analysis using ArcGIS Pro 3.2; (vii) Engages in institutional consultancies in the use and application of remote sensing and GIS.■

5.2 ORI Environmental Laboratory

The ORI Environmental Laboratory is a technical support unit with three main roles: a research laboratory, a routine analytical services laboratory, and a teaching laboratory. The research laboratory provides services to researchers, undergraduate and graduate students, farmers and other stakeholders for example mining industry in analysis of samples. The laboratory has expertise in environmental analysis of water, soil, plants and sediments. Routine analysis is performed on the following: General water quality parameters; minerals in water, soils, plants, and sediments; nutrients in soil; heavy metals and microbiology. The environmental laboratory's role as a teaching

laboratory conducts short courses on theoretical background and application to environmental analysis using instruments such as GC-MS, ICP-OES, AAS to University laboratory staff, students, researchers, and other external stakeholders such as chemists and lab technicians.

5.3 Peter Smith University of Botswana (PSUB) Herbarium

The PSUB herbarium is integral to ORI, founded to study and conserve one of the world's largest and most intact inland wetland ecosystems. The herbarium is a systematically arranged collection of dried plants mounted on paper and stored in a climate-controlled environment. The PSUB Herbarium houses a comprehensive collection of plants that represent the Okavango Delta flora. The PSUB collection of more than 18000 plant specimens represents at least 159 families and about 1890 species. The herbarium has at its core the collection of the late Peter A. Smith who worked in the Okavango Delta for 30 years. In 1995 he donated his collection to the University of Botswana, to be kept in Maun for the use of researchers and the interested public. Smith's collection dates to the mid-1970s. He was collecting until he passed away in 1999. The name of PSUB herbarium honours his life, work, and legacy.

The PSUB herbarium continues to grow as specimens are deposited by students and researchers working in the Okavango delta region. The real value of the PSUB herbarium collection is as a record of the botanical diversity of the Ngamiland District of Botswana and especially the Okavango Delta. PSUB is a valuable reference resource for the community, local and global. Project staff at PSUB are digitally scanning herbarium sheets from the legacy collection of Peter A. Smith. These images are used for data entry into BRAHMS. This tailor-made database will enable information to be extracted by criteria such as location or species. Some data sets have been posted to the GBIF platform: *https://www.gbif.org/dataset/search?publishing_org=02b89818-33ab-4bf7-984d-f88a8e0b0b0f.* This Data Mobilisation Project of PSUB herbarium is financially supported by the private sector's tourism industry, Desert & Delta Safaris a part of Chobe Holdings.

PSUB offers plant identification services. The unit assists individuals, students, researchers, government departments and NGOs with many kinds of plant related queries, plant collecting training, specimen identification, demonstrations of techniques and talks about the services and function of the herbarium.

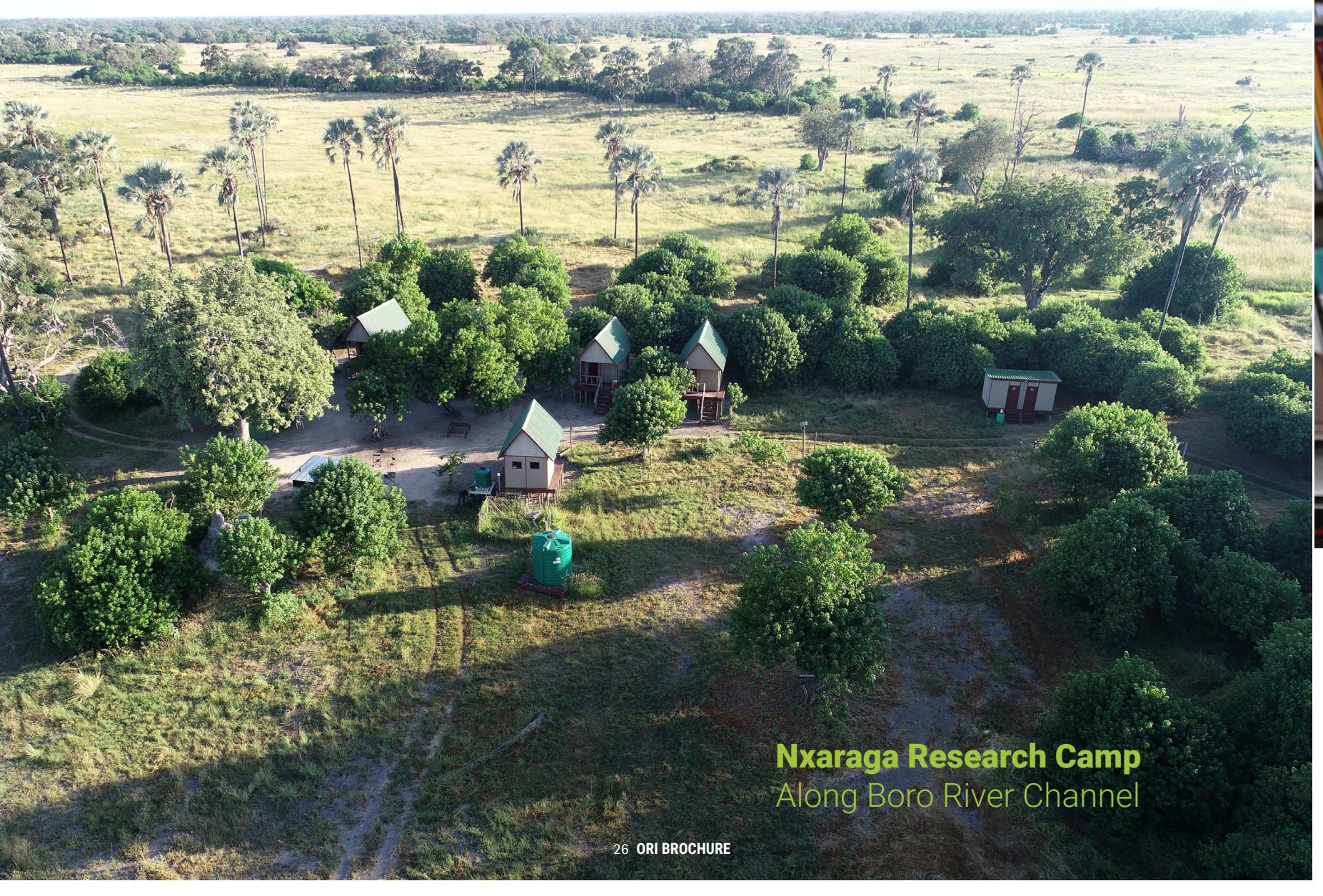
5.4 Environmental Monitoring Unit

The Monitoring Unit (MU) collects, captures, processes, analyses, and disseminates information on critical environmental parameters of the Okavango Delta and its upstream Basin. This role is designed to allow the development of evidence-based management decisions for the Delta as a Ramsar and World Heritage Site, and for the Okavango Basin as a shared resource.

The MU also provides support services to ORI and collaborating researchers through the provision of technical expertise in field research methodology, logistics and planning of field work. The MU personnel have extensive experience in the conduct of all types of field research, ranging from carrying out closed-ended socio-economic interviews to the collection of biogeochemical samples of island groundwater.

The mission of the ORI Monitoring Unit is to be the first

"port-of-call" (major reference point) for all decision-makers, regulatory and management institutions, and civic society - to provide data-based evidence on which managers and planners can base decisions. In addition, the MU has established and maintains a network of contributors and consumers of environmental data, and a dedicated website for the dissemination of processed data; *www.monitoringdata.ub.bw;www.monitoringdata.ub.bw/ipt.* The MU also offers short courses in SPSS and biodiversity data management for life scientists.



Nxaraga Research Camp
Along Boro River Channel

4.5 Library

The ORI Library exists to provide globally competitive information services and resources to facilitate teaching, learning, and research endeavours in the Okavango Delta and the adjacent drylands. It offers an integrated learning environment aimed at ensuring easy access to a wide range of print and electronic information resources.

UB/ORI publications can be accessed through the digital repository link *https://ubrisa.ub.bw/*, known as the University of Botswana Research, Innovation and Scholarship Archive (UBRISA) that showcases research outputs.

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