



CUBANGO-OKAVANGO RIVER BASIN (CORB) FUND

VALUE PROPOSITION: JUNE 2021





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This Value Proposition is informed by the time, resources and information made available by the Member States of Angola, Botswana and Namibia, various government agencies, the development partners within the Cubango-Okavango River Basin (CORB), and internationally accepted datasets. The views, findings, interpretations, and conclusions expressed in this work do not necessarily represent those of the Member States, agencies, individuals, or organisations mentioned herein.



FOREWORD



DR JACQUELINE KING, AQUATIC ECOLOGIST, 2019 LAUREATE OF THE STOCKHOLM WATER PRIZE

The Cubango-Okavango River system is one of the world's great free-flowing rivers, with no major dams or abstractions. Its globally iconic peatlands, floodplains and delta are a vital part of the southern African mosaic of wetlands, and the basin is renowned for its abundance of plant and animal life. As other watery destinations gradually disappear or degrade, the Okavango becomes ever more important to the region, its wildlife and its people.

There is poverty in the basin and development is inevitable, but can it occur without destroying the river system; without losing more than is gained? As the Member States address this, they have scientific support that can help them and their stakeholders weigh up the full range of costs as well as benefits of different possible futures. Their commitment to work together on this at the basin level is a hugely important step. It paves the way for the Cubango-Okavango basin to perhaps become a world leader in demonstrating truly sustainable development.

The CORB Fund Value Proposition is an important contribution to this discourse, exploring both a Business-as-Usual future for the basin and an alternative one that addresses ecological and social resilience. The next decade is crucial, because it will define the kind of future that awaits the basin and its people. I applaud the nature of the information becoming available to the Member States and wish them well in their deliberations.



PHERA RAMOELI, OKACOM EXECUTIVE SECRETARY

Angola, Botswana and Namibia are privileged to own one of the world's great natural treasures, the Cubango-Okavango River system. Rising in Angola as the Cubango, it flows to the confluence with its main tributary, the Cuito River, flowing south and then east between Namibia and Angola. It then flows on into Botswana as the Okavango River. Its waters never reach the sea, and instead spread onto the flat Kalahari sands to form a wetland of global importance – the Okavango Delta.

Our three countries wish to develop some of the water resources of the Cubango-Okavango system for the benefit of our people, but to do this in a way that is sustainable and does not threaten the health of this magnificent river system. The CORB Fund offers us a mechanism to ensure that any plans for the development of the Basin can be balanced with measures to ensure the maintenance of its ecosystems' integrity, as well as the prosperity of its residents.

OKACOM upholds the vision of its Member States and the type of future that the CORB Fund Value Proposition outlines for the Basin – one where the natural wealth of this remarkable river system is protected and enhanced for the benefit of all who reside in and depend upon the Cubango-Okavango River Basin.

PROLOGUE



CAROLINO MENDES, DIRECTOR GENERAL OF GABHC AND OKACOM COMMISSIONER FOR ANGOLA

The Value Proposition for the Cubango-Okavango Fund (CORB Fund) is an important milestone towards realising the intended outcomes of a momentous decision that was taken by The Permanent Okavango River Basin Water Commission (OKACOM) in November 2012 in Windhoek – to establish a long-term financial sustainability model for the Cubango-Okavango River Basin. Subsequently, the CORB Fund establishment was further approved at Ministerial level demonstrating the buy-in from the OKACOM Member States. A truly pioneering innovation within a transboundary water resources management context across the world.

OKACOM member states have been at the forefront when it comes to innovation around promoting effective and impactful management of shared water resources. They jointly developed the Transboundary Diagnostic Analysis (TDA) in 2011 – a shared knowledge of the basin. The TDA found out that this globally unique and important freshwater resource is facing numerous threats and competing demands. There is a common recognition among the Member States that Basin's freshwater resources are the natural resource component most at risk since there is no substitute for the basin's watercourses and associated aquifers. This is the resource that over 1 million inhabitants in the basin directly rely upon to sustain their livelihoods.

The Value Proposition demonstrates that following the current business-as-usual model, the system will be driven to surpass unacceptable thresholds for the maintenance of its ecological integrity. The Value Proposition will support the establishment of the CORB Fund's Impact Investment Vehicle, which is an innovative finance mechanism aimed at leveraging additional resources to support socially- and environmentally-focused activities in the CORB. The Value Proposition presents the findings of a rigorous scientific analysis that demonstrates the value of investing in climate resilient livelihoods and conservation actions at scale.

The CORB Fund is expected to attract global financial support and investment into the basin that can contribute towards OKACOM's strategy to directly tackle the main threats facing the CORB ecosystem in a coordinated way, and thereby enabling the Member States to mutually share in the benefits. Through the support and monitoring of improved land use practices and the rehabilitation of degraded ecosystems in the upper catchment, the quantity and quality of water in the whole system and the ecological resilience of the Okavango Basin can be positively impacted. The CORB Fund will therefore help galvanize local and regional government as well as international support for improved management of this enormous and unique watershed. The Fund is the combination of a clear and holistic sustainable development message and tri-national collaborative management tool for the basin. As the Commissioners of OKACOM, we pledge our support.

EXECUTIVE SUMMARY

The Cubango-Okavango River Basin (CORB) Fund is a novel and ambitious multi-country initiative. It aims to enhance livelihoods, improve ecosystem resilience, and provide equitable benefits to the riparian states of Angola, Botswana and Namibia, in their shared river basin. This Value Proposition presents the economic value of undertaking interventions through the CORB Fund. These are assessed in the context of two distinct development scenarios. A Business-as-Usual Development Scenario would lead to environmental degradation and persistent poverty, while the Resilient Development Scenario would address ecological threats, protect natural resources and biodiversity, and provide socio-economic benefits to over a million people who depend on this unique ecosystem.

THE BASIN

The CORB is a transboundary basin with a network of river systems traversing through Angola, Botswana, and Namibia. It is comprised of a network of rivers whose headwaters are in the Angolan highlands where the Cuito and Cubango Rivers originate. The CORB covers approximately 700,000 square kilometres (an area larger than Texas or France), yet its rivers, watercourses, swamps, and aquifers derive their principal flow from 120,000 square kilometres of sub-humid and semi-arid rangeland in the Cuando Cubango Province of Angola. The Cubango-Okavango stretches for approximately 1,100 kilometres and is drained by the Cubango (referred to as Kavango in Namibia and Okavango in Botswana). The Cubango-Okavango River forms the boundary of Namibia and Angola, and on this stretch is joined by the main tributary, the Cuito, before flowing through the panhandle as it enters Botswana and spills into the Okavango Delta.

The CORB's low human population density, numerous habitat types, and intact ecosystems support thousands of species of plants and animals, making it one of the most important areas for biodiversity conservation in the world. Critically, the Basin also supports the livelihoods of over a million people, who directly rely on its natural resources and ecosystem services. The Okavango Delta is the

best-known feature of the CORB. It is one of the largest and most pristine wetlands anywhere. The rich biodiversity, land and water resources of the Basin, in particular its wetlands, channels, riparian woodlands and adjacent dryland woodlands, form the basis of critical ecosystem services that underpin the socio-economic development and livelihoods of rural and urban communities within the Basin, as well as for millions of people living downstream.

THREATS AND FUTURE DEVELOPMENT

The CORB is still relatively underdeveloped. The 30-year civil war in Angola significantly hindered economic development in the upper catchment, yet now, with a more stable political landscape in Angola, significant economic development is expected. Several large-scale projects, including extensive irrigation schemes and hydroelectric power dams, have been proposed. These could significantly affect hydrological flows and water quality within the Basin, and lead to further population growth, infrastructure development and land use changes.

Impacts from poorly planned or executed agricultural and energy development projects would exacerbate worrisome trends related to an array of existing, interrelated threats to the fragile CORB ecosystem. Over the past 20 years, more than 200,000 hectares of forest have been lost, and some 830,000 hectares of forest have been degraded, due to commercial logging, land clearing by small-scale farmers, and charcoal production. This is equivalent to almost 67,000 football fields worth of forest each year, and over 1.3 million football fields in total. Given the current trends, an additional 105,000 hectares could disappear in the upper Okavango Basin over the next 30 years. Forest loss of this magnitude would seriously undermine the CORB's ability to continue providing key ecosystem services to its inhabitants, the riparian states, and the globe.

Additionally, if major upper-basin development projects, including hydroelectric dams, irrigation schemes and water supply diversions, do not implement necessary safeguards, they would

negatively impact long-term social or economic gains and threaten the continued viability of the CORB ecosystem. The health of the Okavango Delta depends on the duration and depth of seasonal flooding, as well as on the frequency of flooding events over time (years and decades). The transition areas between biological communities, where two communities meet and integrate, evolves year to year, and from decade to decade. This evolution is an essential, defining characteristic of the Delta. It determines the health of the entire ecosystem because it affects primary productivity and core ecosystem functions, such as carbon cycling. The CORB's large populations of herbivorous ungulates, including the Basin's iconic giraffes, hippopotamuses and rhinoceroses, as well as numerous water-dependent bird species, owe their existence to the ever-evolving mixture of wetland and dryland habitats made possible by regular flooding and constantly changing water levels.

Under the Business-as-Usual Scenario, floodplain areas in the Angolan catchment below the Mucundi Hydro-Electric Power (HEP) Dam on the Cubango-Okavango River would likely deteriorate due to hydrological alteration of flows downstream of the dam. The projected 26% loss of floodplain area would undermine riverbank and floodplain recession farming (one of the dominant livelihood activities in the area), as well as rural livelihoods from reed harvesting and subsistence fishing. The data also shows that seasonally flooded grassland and sedgeland, which provide crucial dry-season forage for livestock and wildlife, serve as breeding habitat for fish populations, and replenish groundwater, could decrease by as much as 18%. Other major threats include uncontrolled fires, over-harvesting, over-fishing, and climate change. Inadequate natural resource management and widespread poverty among the Basin's growing population compound these threats, placing tremendous pressures on the natural resources and negatively impacting biodiversity. Collectively, these threats impact heavily on the inhabitants of the CORB, who also must contend with the growing unpredictability of the impact of climate change, including potential drying and increased rainfall variability.

THE RESILIENT DEVELOPMENT ALTERNATIVE

Fortunately, OKACOM's Member States recognise that poverty and environmental degradation are inextricably linked, and that well planned development and sustainable land use practices will protect critical natural resources and enhance the livelihoods and wellbeing of the over a million people who directly depend on the CORB's natural resources and the ecological services they supply. Under the Resilient Development Scenario, the CORB Fund would make crucial investments in social and environmental interventions that protect globally important biodiversity, build more resilient communities in the face of climate change, and promote the kinds of livelihoods and socio-economic development that are articulated in the CORB Strategic Action Program (SAP).

The Value Proposition demonstrates a clear economic basis for Resilient Development investments that blend lower-impact, ecological infrastructure investments, tourism development, and livelihood development interventions with traditional, well-sited, conventional infrastructure in a way that, through calculated trade-offs, could optimise delivery of the desired development outcomes while safeguarding vital ecological assets. Over the 30-year analysis period, the Fund's socially and environmentally-focused interventions would have a combined Return on Investment (ROI) of 7-to-1 – meaning that for every dollar spent on Resilient Development, communities in the Basin accrue USD 7 worth of benefits.

Now, transforming the shared vision for the CORB Fund into a reality requires the continued dedication of the Member States and the government agencies mandated with sustainably developing the Basin. It also depends on expanding public and private support from all the stakeholders who rely on the CORB and the essential ecosystem services it supplies. Importantly, it depends on securing purposeful investments by development partners and private capital providers who share the CORB Fund's vision of enhanced livelihoods, improved ecosystem resilience and equitable benefits for Angola, Botswana, and Namibia.

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ACRONYMS AND ABBREVIATIONS

ANR	Assisted Natural Revegetation
BaU	Business as Usual
BCR	Benefit Cost Ratio
BDS	Basin Development Scenario
CORB	Cubango-Okavango River Basin
CRIDF	Climate Resilient Infrastructure Development Facility
DFID	Department for International Development (UK)
GEF	Global Environment Facility
GIS	Geographic Information Systems
IRR	Internal Rate of Return
KAZA	Kavango-Zambezi Transfrontier Conservation Area
MSIOA	Multi-Sector Investment Opportunity Analysis
O&M	Operations and Maintenance
OBSC	Okavango Basin Steering Committee
OKACOM	The Permanent Okavango River Basin Water Commission
PES	Payment for Ecosystem Services
ROI	Return on Investment
SAP	Strategic Action Plan of OKACOM
SWAT	Soil and Water Assessment Tool
TDA	Transboundary Diagnostic Analysis for the CORB
TNC	The Nature Conservancy
USAID	United States Agency for International Development
USD	United States Dollar

GLOSSARY

Board means the Company's board of Directors.

Budget means funds to cover the costs of the Fund's operations and funding for projects, including the contracting of external service providers.

Catchment is the area of land that drains water from a divide or ridge to an outlet location such as a stream channel, which may also lead into waterbodies such as bays or dams/lakes. The word "catchment" is used interchangeably with the terms "watershed" and "drainage basin".

Constitution means the CORB Fund constitution and any appendices thereto, as amended from time to time.

Contribution means, with respect to each Contribution Agreement, the total amount of funds expressed as the respective Donor's Contribution to the Fund in such Contribution Agreement, as such amount of funds may be supplemented through amendments to such Contribution Agreement from time to time.

Dam is an artificial body of water used for water storage before it is supplied for later use. This report follows the terminology used in Southern Africa. Therefore, the term "dam" is used to describe what might be termed a "reservoir" in the USA and many other countries.

Director means a director of the Company, and where the context so provides, an alternate director appointed in respect of such director.

Discount Rate refers to the interest rate used in discounted cash flow analysis to determine the present value of future cash flows.

Ecosystem Services are flows from, or components of nature that directly benefit human well-being. The Millennium Ecosystem Assessment 2 categorised ecosystem services as provisioning, regulating, cultural, and supporting services.

E-flows Site means a site where environmental flows – which describe the quantity, timing, and quality of water flows required to sustain freshwater ecosystems and the human livelihoods and well being that depend on these ecosystems – are modeled and seen as of critical importance in the analysis.

Endowment Vehicle means the endowment account(s), and all associated policies and procedures, that holds the endowment assets of the Fund.

Fund means all the components and organs of the institution that has been established to enhance livelihoods and conservation in the CORB, including the financial and investment mechanisms.

Member States means each of Angola, Botswana, and Namibia, and "Member State" means any one of them, as the case may be.

Members means the members of the Company reflected in the Register from time to time.

Millions of cubic meters (Mm3) the default volumetric unit of water in this document is the cubic meter, typically expressed in millions given the large volumes of water discussed in this document. One cubic meter is equivalent to 1000 litres, making the conversion quite simple.

Natural Infrastructure is the nature-based equivalent of grey or engineered infrastructure. It forms and supports a network of interconnected structural elements, such as catchments, rivers, riparian areas, and natural corridors supporting habitats and movement of animals and plants. The term "ecological infrastructure" is also used to convey the same meaning.

OKACOM means the Commission for the Cubango-Okavango River Basin established on 15 September 1994 by the Member States.

Project means the undertaking and/or implementation of an intervention or suite of interventions within the geographic scope.

Purpose means the Company's sole purpose, as set out in a clause in the Constitution.

Sinking Account means the bank account(s) and custody account(s) of the Sinking Vehicle.

Sinking Vehicle means the sinking account(s), and all associated policies and procedures, that holds the seed funding of the Fund.

Source Watersheds are watersheds which are vital natural infrastructure for rural communities because they collect, store and filter water and provide benefits for biodiversity conservation, climate change adaptation and mitigation, food security, and human health and well-being.

Wetland means a defined portion of land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water.



INTRODUCTION

The free-flowing nature of the near-pristine Cubango-Okavango River Basin (CORB) ecosystem is a global rarity among large river basins. Its predictable and variable flood pulse sustains life in the CORB. Originating in the semi-humid highlands of Angola, two main tributaries – the Cubango to the west and Cuito to the east – feed the Okavango River system. These are in turn fed by numerous smaller rivers, before entering the Okavango Delta. Each year, the flood pulse moves over 1,600 kilometres from its headwaters to the Delta over the course of four to six months. The Delta's unique and distinctive hydrology creates a globally

renowned but vulnerable ecosystem that is sensitive to hydrological, climatic, and biological changes. In 1996, the International Convention Wetlands designated the Okavango Delta a Wetland of International Importance (Ramsar site) and, in 2014, UNESCO named it the 1000th World Heritage Site. The Delta is also the centrepiece of Botswana's vibrant tourism economy, the country's second largest economic sector. The Basin above the Delta covers an area of approximately 165,000 square kilometres, the majority of which lies in Angola.



TRANSBOUNDARY BACKGROUND AND OKACOM

Unlike many of the world's large transboundary basins, the CORB has a functioning governing body, the Permanent Okavango River Basin Water Commission (OKACOM), established in 1994 by the countries that share the River Basin: Angola, Botswana, and Namibia. The Commission's mandate emerges from a shared vision around anticipating and reducing unintended, unacceptable, and often unnecessary impacts to the resources of the Basin that occur as a result of uncoordinated resource development. To do so, it has developed a coherent approach to managing the River Basin that is based on **equitable allocation, sustainable utilisation, sound environmental management and the sharing of benefits**. OKACOM's vision is to support "economically prosperous, socially just and environmentally healthy development of the Cubango-Okavango River Basin."

ECOSYSTEMS AND LIVELIHOODS

The Okavango Basin ecosystem, with its low human population density and minimal consumptive water use, supports an astounding variety and abundance of terrestrial and freshwater animal and plant life, and it is essential to the livelihoods of more than a million people. Rural communities predominate in the

Basin, and most are located either adjacent to rivers or along roads. Relative to populations in capital cities and main centres of economic activity, people living in Basin have fewer economic opportunities, suffer more health problems, and lack access to key infrastructure and many basic services. This is particularly the case in Angola where for decades, war curtailed social and economic development.

The CORB is a hydrologically complex system. Floodplains sustain the river in the dry season and store floodwaters that would otherwise increase flooding downstream. From the headwaters of the Cubango River, where there are numerous incised valleys, come high peak flows at the beginning of the rainy season that are critical to maintaining floodplains and fisheries along the Angola-Namibia border, and later in the year, further downstream, in the Delta. These seasonally inundated floodplains are critical for providing bridging forage for wildlife and livestock because as the flood pulse recedes towards the end of the dry season, grasses and sedges become accessible. The more expansive wide valley bottoms of the Cuito tributary also play an important role in the functioning of the whole lower river system, because of its reliable year-round flow, its wet-season storage of floodwaters

on vast floodplains and year-around abundant groundwater that allows for a gradual release of water back into the river in the dry season. The annual flow regime of the Cubango when combined with the Cuito's sustained flows, largely sustains riverine ecosystems and communities of people living along the lower Cubango-Okavango River, the Okavango Delta and the outflowing Thamalakane and Boteti Rivers (Figure 1).

Water-mediated ecosystem services provided by the upper Cubango-Okavango River system are critical to livelihoods throughout the Basin. Community livelihoods, ranging from artisanal fisheries to small-scale agriculture, in all three riparian states depend on the CORB's floodplains, rivers, wetlands and other natural resources. These resources are also vital for larger industry, including major tourism in the Okavango Delta in Botswana

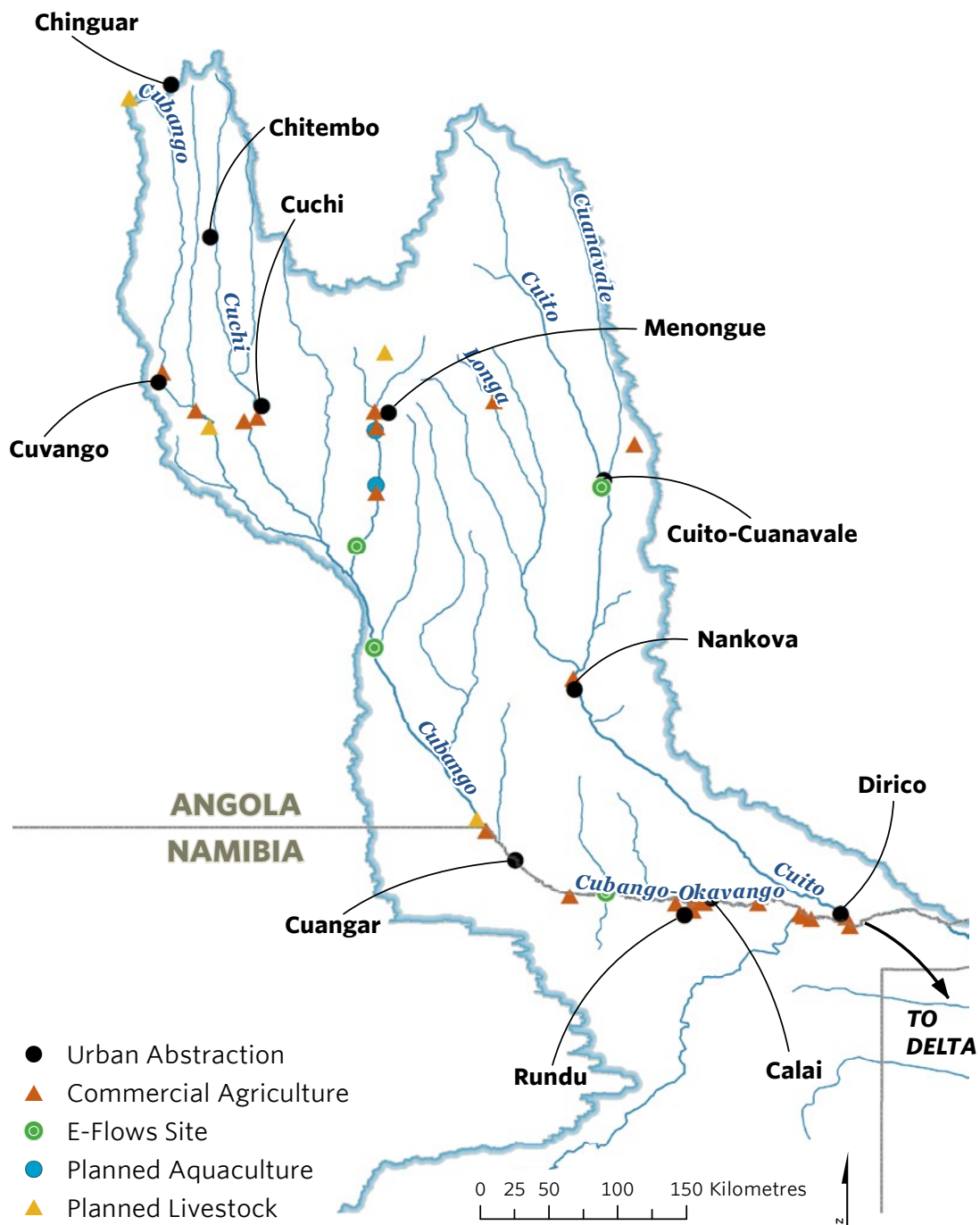


Figure 1: Major beneficiaries of the CORB's water resources.

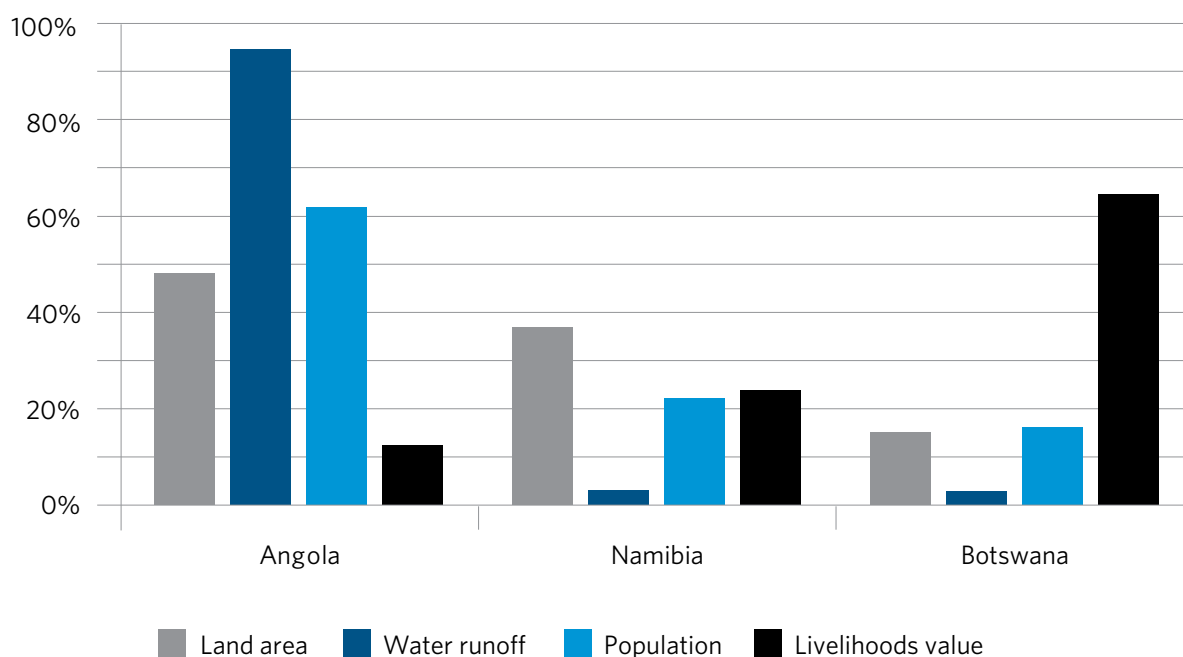


Figure 2: Proportional share of the CORB resource endowment by country (adapted from the TDA, 2011).

and the planned commercial irrigation, hydroelectric power, and urban infrastructure in Angola.

While Angola, Botswana and Namibia all use the CORB's natural resources for economic development, the benefit, in terms of the economic value of resource-based livelihoods, derived by the Member States is neither equitable, nor proportional to their share of the Basin's resource endowment (Figure 2). As such, the status quo in the CORB is characterised by inequitable benefits among the Member States, requiring a response to rectify this imbalance, while navigating the various threats and challenges to the sustainability of the water resource.

THE CORB VALUE PROPOSITION

Myriad possible responses exist to the ecological and socio-economic challenges facing the CORB. The Cubango-Okavango River Basin Fund (referred to herein as 'the CORB Fund' or 'the Fund') represents an asset-based and collaborative path forward. The Fund aims to catalyse significant long-term investments across sectors that promote a Resilient Development trajectory.

This Value Proposition focuses on how long-term, equitable benefits can be derived by the riparian states of Angola, Botswana and Namibia

through CORB Fund investments in socially and environmentally-focused interventions designed to promote sustainable livelihoods and socio-economic development, and to protect and restore the natural capital and environmental resources upon which the region's inhabitants depend. This document describes the context in which the CORB Fund will operate by contrasting a Business-as-Usual Development Scenario with a Resilient Development Scenario that matches the Fund's aspirations to support sustainable development, conservation, and climate resilience. Identified and quantified potential benefits from the CORB Fund include economic benefits directly produced by interventions, as well as benefits produced through changes in ecosystem service flows as a result of interventions.

This Value Proposition outlines the benefits that could be accrued over time, with a projected combined benefit-cost ratio of the livelihood and environmentally-focused interventions themselves of nearly 7-to-1. Even accounting for the potential full value of the reduction in the Business-as-Usual development of irrigated commercial crop area assumed under the Resilient Development Scenario, the benefit-cost ratio of the Resilient Development Scenario analysed in this Value Proposition still exceeds 2-to-1.

PART OF THE GLOBAL SOLUTION

The CORB Fund would contribute to the practical realisation of the United Nation's 2030 Agenda for Sustainable Development and the realisation of numerous Sustainable Development Goals (SDGs). The Fund's interventions would create impacts that directly address food security and hunger (SDG 2), improve infrastructure backlogs (SDG 11), improve water and sanitation service delivery (SDG 6), enhance ecosystem health and functioning (SDG 15), and develop better human settlements (SDG 11). In turn, advancement toward these SDGs would bolster progress against the broader

SDGs pertaining to poverty eradication (SDG 1), health and wellbeing (SDG 3), inclusive economic opportunity (SDG 8), inequality reduction (SDG 10), and addressing climate change (SDG 13). This relationship is demonstrated in Figure 3. Support for interventions that contribute to addressing the compounding socio-economic, environmental, political, and climatic challenges in the CORB would also allow the Fund and the Member States to uphold and make meaningful contributions to numerous other international commitments, including the [Convention of Biological Diversity](#), the [UN Convention on Climate Change](#), and the [Convention on Wetlands](#).

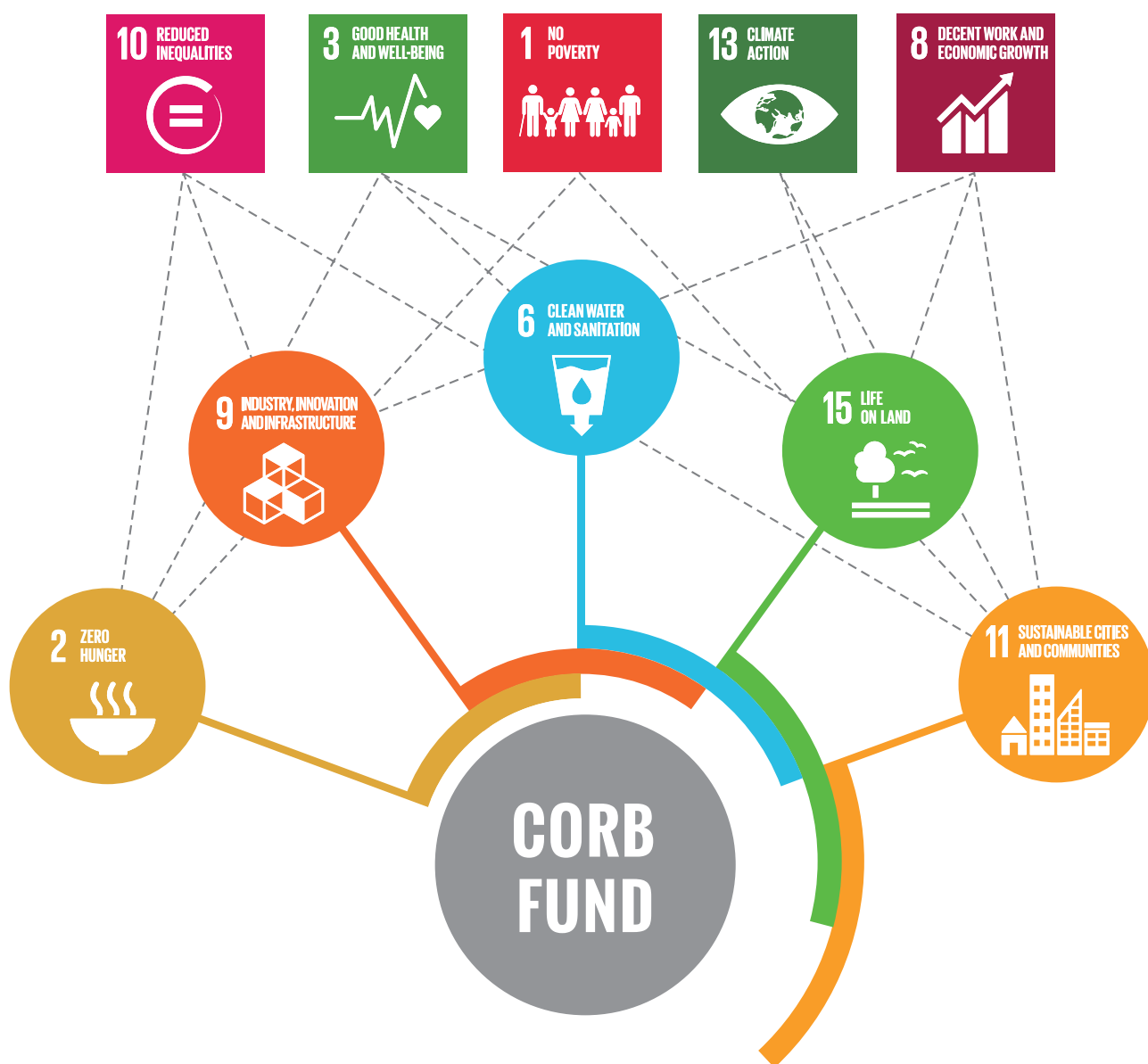


Figure 3: Supporting the SDGs through the CORB Fund.



- ★ Capital
- ⊙ Region capital
- City
- Town
- Basin boundary
- Interventions and impacts
- Rivers
- International border
- Lake
- Wetland
- Pan

0 100 200 400 km

Figure 4: Cubango-Okavango River Basin.



RISKS TO THE BASIN

The CORB faces many interrelated challenges. In recent years, the Basin has experienced increasing water abstraction for commercial agriculture, deforestation and forest degradation driven by commercial logging and charcoal production, large-scale hydropower infrastructure development, rapid growth of a population that relies on subsistence

resource-based livelihoods, over-fishing and use of unsustainable fishing methods, uncontrolled fires, and climate changes resulting in deviations from historical flood-pulse patterns. The trends are worrying.

The combined effect of the current configuration of threats and impacts jeopardizes the CORB ecosystem and its life-giving waters (Figure 5).

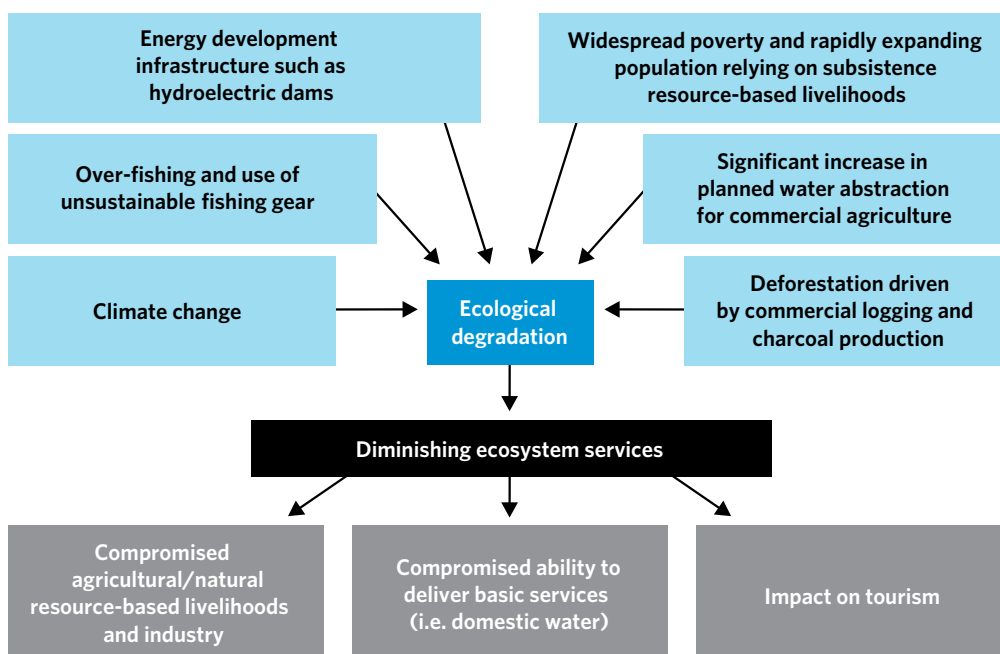


Figure 5: Systemic threats and impacts in the CORB.

There is no substitute for the Basin's freshwater resources. Their loss or substantial degradation will undermine the survival of the millions of people and thousands of plant and animal species that depend on them. Also, as the health of the Basin deteriorates, so does its ability to deliver the crucial ecosystem goods and services on which the Basin's residents and CORB Member States rely. Agricultural and natural resource-based livelihoods will become increasingly compromised, the economically important tourism industry will be threatened, and the ability of national and local authorities to deliver basic services (such as urban water supplies) will be undermined.

Major upper-basin water and infrastructure development in the form of irrigation schemes, hydroelectric dams and water supply diversions could all contribute to essential food security, energy and economic development goals in southern Angola and Namibia. However, if such development is implemented without the necessary safeguards, the developments and possible resulting ecosystem degradation will impact the River Basin in coming decades, potentially undermining any long-term social or economic gains.

LAND COVER AND LAND USE TRENDS

The vast majority, some 95%, of the water in the CORB comes from rainfall in the upper Cubango-Okavango Basin in Angola. Since 2000, this region has undergone significant land use change as populations and associated human activities in this area have increased. Between 2001 and 2018, urban areas of the basin grew by over 10% annually. Moreover, rural areas in the source watersheds of the Cubango catchment are more densely populated than anywhere else in south-eastern Angola.

Land use changes are linked strongly to population growth, yet because impacts can be slow and incremental, often they are not immediately apparent. To better understand how human

population changes may be impacting hydrology and natural resources, the Team responsible for preparing this Value Proposition produced land cover maps for the hydrologically active region of the Okavango Basin. These maps cover over 165,000 square kilometres, primarily located in southern Angola and crossing into northern Namibia, for six dates (2000, 2003, 2006, 2010, 2014, and 2017) using the Landsat archive to characterize land cover changes through time (Figure 6).

During this time of increasing population pressure in the upper Cubango-Okavango Basin, human activities converted over 200,000 hectares from forest to other land uses, primarily shrub and grass type land use classes (Figure 7). The Basin registered an average annual forest loss rate of 0.41% during this period. Additionally, some 830,000 hectares of the remaining forest have been degraded (a loss in tree canopy density of more than 10%).¹ Most of the forest loss and degradation have occurred in the heavily populated north-western areas of the Cubango Basin. Clearing for agriculture, charcoal production, and commercial logging are the three key drivers of forest loss and degradation.²

At least a third of the total forest lost since 2000 has been cleared to make way for dryland crops, often using the destructive practice of slashing and burning all the trees in a section of forest. A considerable amount of the current shrub and grass areas shown in Figure 6 are abandoned agricultural fields. Farmers in the region commonly clear a one-to-two-hectare plot, farm it for a couple of years, and then move on to a new field when the soil fertility declines and seed banks in the fields begin succession back toward dry tropical forest (called miombo) that shades crop areas. After being abandoned, these fields are seldom used again.³ This practice is known as "shifting agriculture".

Charcoal production and logging are the other major drivers of forest loss and degradation. Farmers, as well as people from urban areas, produce batches

1 NASA/terraPulse images from 2000 and 2015 (<https://www.terrapulse.com/terraView/>).

2 Chiteculo V, Lojka B, Surový P, Verner V, Panagiotidis D, Woitsch J. 2018. Value chain of charcoal production and implications for forest degradation: Case study of Bié Province, Angola. *Environments* 5(11):113; <https://doi.org/10.3390/environments5110113>. Mendelsohn J, Martins A. 2018. River catchments and development prospects in south-eastern Angola. Reports commissioned by the World Wildlife Fund), The Nature Conservancy and the National Geographic Okavango Wilderness Project. 106 pp. September 2018. Gumbo, D. 2020. Forestry and carbon sequestration assessment to support resilient development and return on investment analyses in the Cubango-Okavango River Basin (CORB). Report prepared for The Nature Conservancy. 52 pp. June 2020.

3 Mendelsohn & Martins 2018

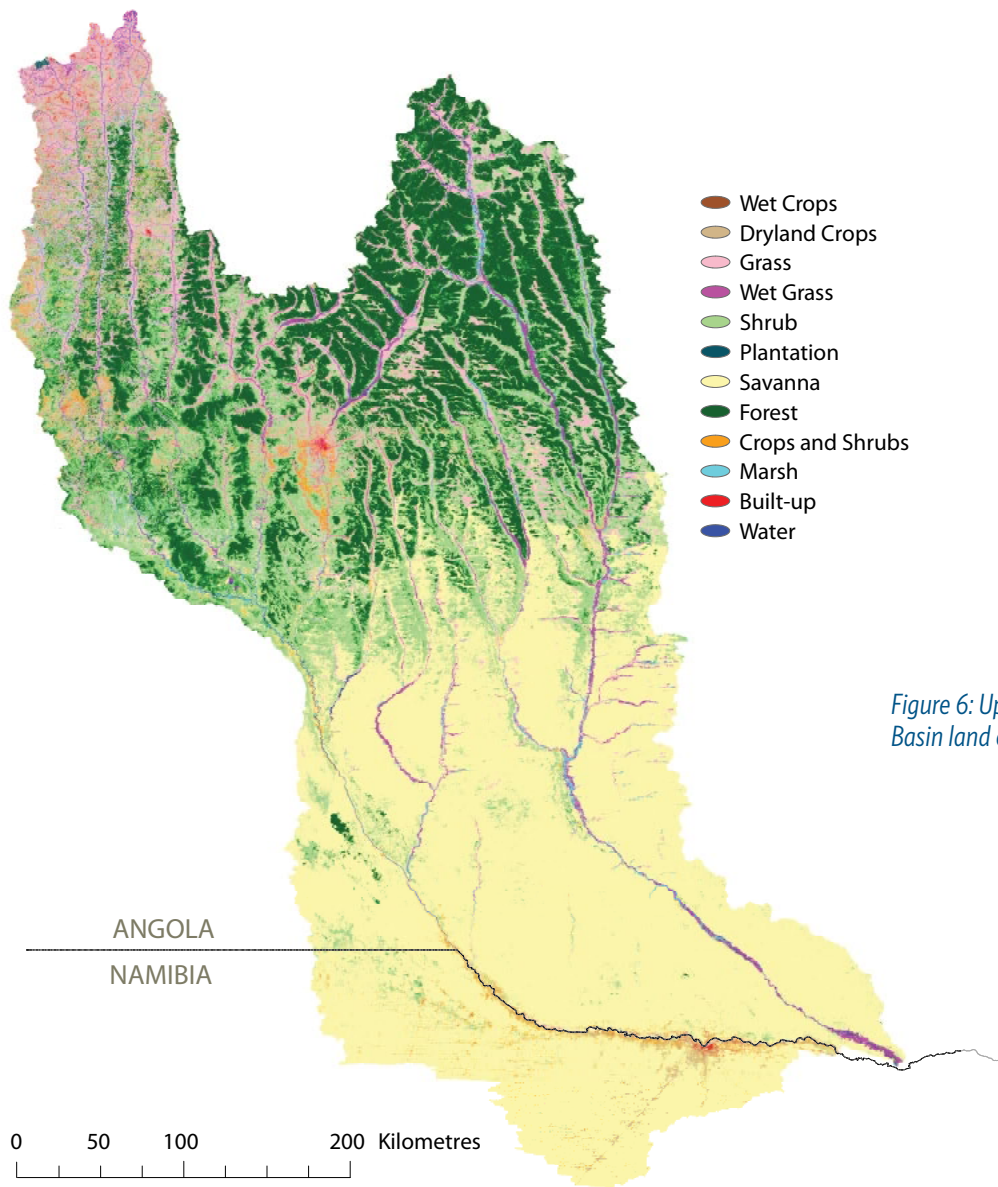


Figure 6: Upper Cubango-Okavango River Basin land cover (2017).

of charcoal from more mature members of specific species of trees, which they sell to middlemen who travel along the main roads to accumulate larger quantities for resale in the cities. These middlemen use trucks and bicycles to transport the charcoal to the urban centres where it is sold to retailers in the main markets. Commercial logging for high quality timber, primarily the Angolan rosewood *Guibourtia coleosperma* and Angolan teak *Pterocarpus angolensis*, has escalated in recent years, especially in the Basin's lower catchments.⁴ Commercial logging can damage as much as 53% of remaining smaller trees in the logged area, destroy as much as 50% of the original forest and disturb 40% of the topsoil.⁵

A destructive synergy has developed between the farmers, charcoal producers, and loggers. Some farmers produce charcoal when opening forest for crops, whereas other farmers move into areas that have been already cleared by charcoal producers and loggers.

There is limited planned land use management throughout the majority of the CORB. Currently, the only existing protection of the critical Angolan headwaters area is within the relatively remote lower Cuito (Figure 8). The Cubango River catchment is less remote with higher population pressure and lacks any protected area. Without additional protections and community-based

4 Mendelsohn & Martins 2018

5 Chamshama & Nduwayezu 2002

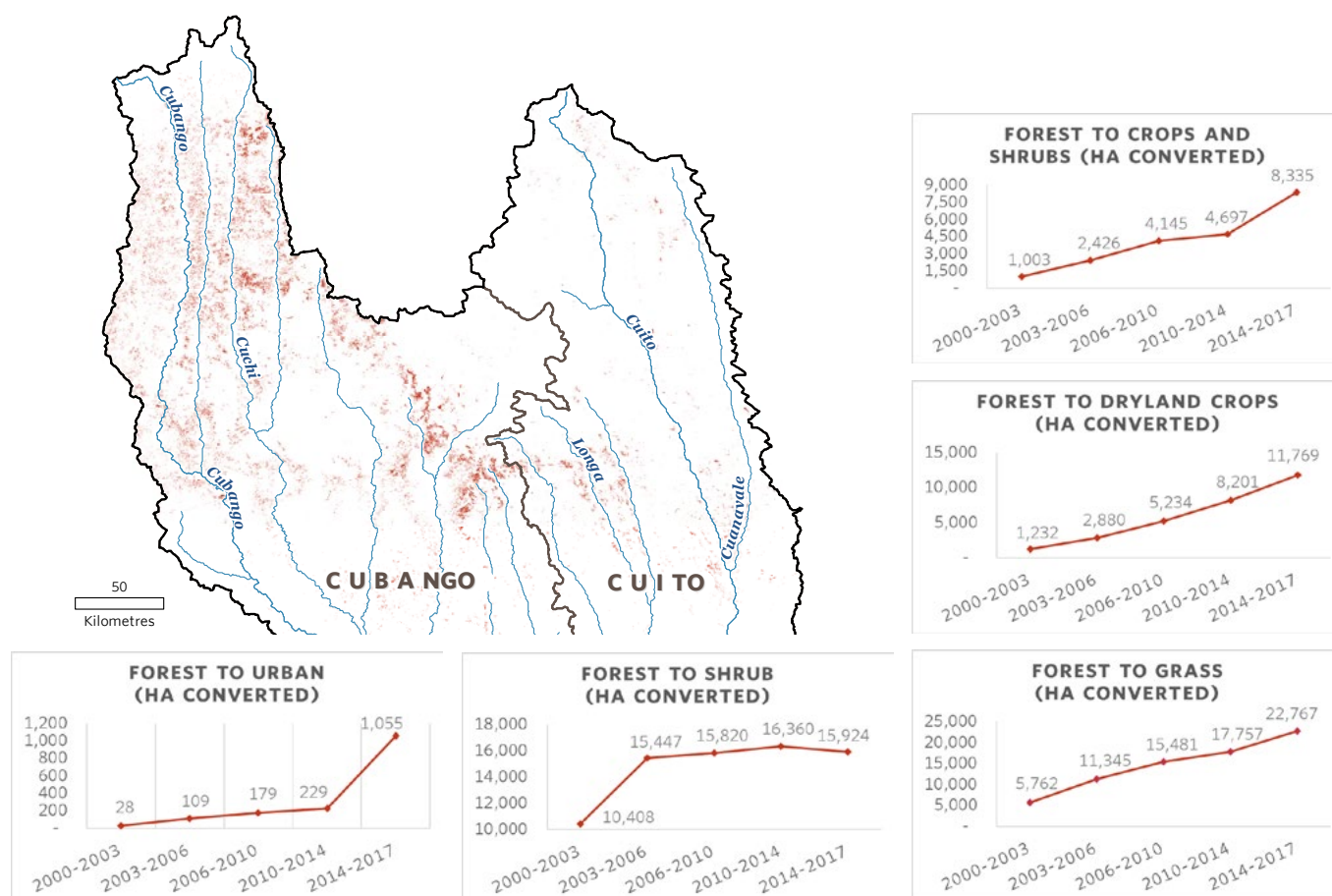


Figure 7: Land use changes in the CORB.

livelihood development programs, the current trend of degradation in the Cubango-Okavango's critical source watersheds is likely to continue and potentially accelerate. Another 105,000 hectares of forest could be lost in the upper Cubango-Okavango Basin over the next 30 years.

VULNERABILITY HOTSPOTS

While ecological threats and their consequences can be found throughout the CORB, four areas stand out for their vulnerability. Angola's Menongue region (Zone A) in the upper Okavango Basin contains two of these vulnerability hotspots. The other two (Zone B) are found in the central and lower CORB, in the Cuangar/Calai/Rundu areas of south-eastern Angola and north-eastern Namibia (Figure 9). Poverty and its accompanying socio-economic challenges are commonplace in all four hotspots, and the greatest ecological challenges tend to coincide with areas that enjoy relatively abundant natural resources. The hotspot assessment demonstrated that these two zones are

critical in ensuring the long-term sustainability of all of the Basin's resources and are therefore the short-term focus of the CORB Fund, to ensure equitable benefits across the three Member States.

Hotspot Zone A is characterised by some of the lowest population density in the CORB. Estimates from 2014 indicated a population of fewer than five people per square kilometre. Nevertheless, this area has suffered the worst land degradation in the CORB, and the data suggests that it will continue to experience the highest rate of deforestation and land use conversion over the next three decades.

Degradation in these northern reaches of the CORB (Hotspots 1 and 2) increases the vulnerability of the scattered settlements and villages of the upper Okavango Basin, and because it impacts the headwaters of the Basin's rivers, it also threatens the lives and livelihoods of downstream water users. Hotspot 2 is home to the source lakes of the Cuito River. Therefore, all of the above-mentioned stress factors – fires, deforestation, poverty and climate variability – impact the effectiveness of the upper Basin wetlands and

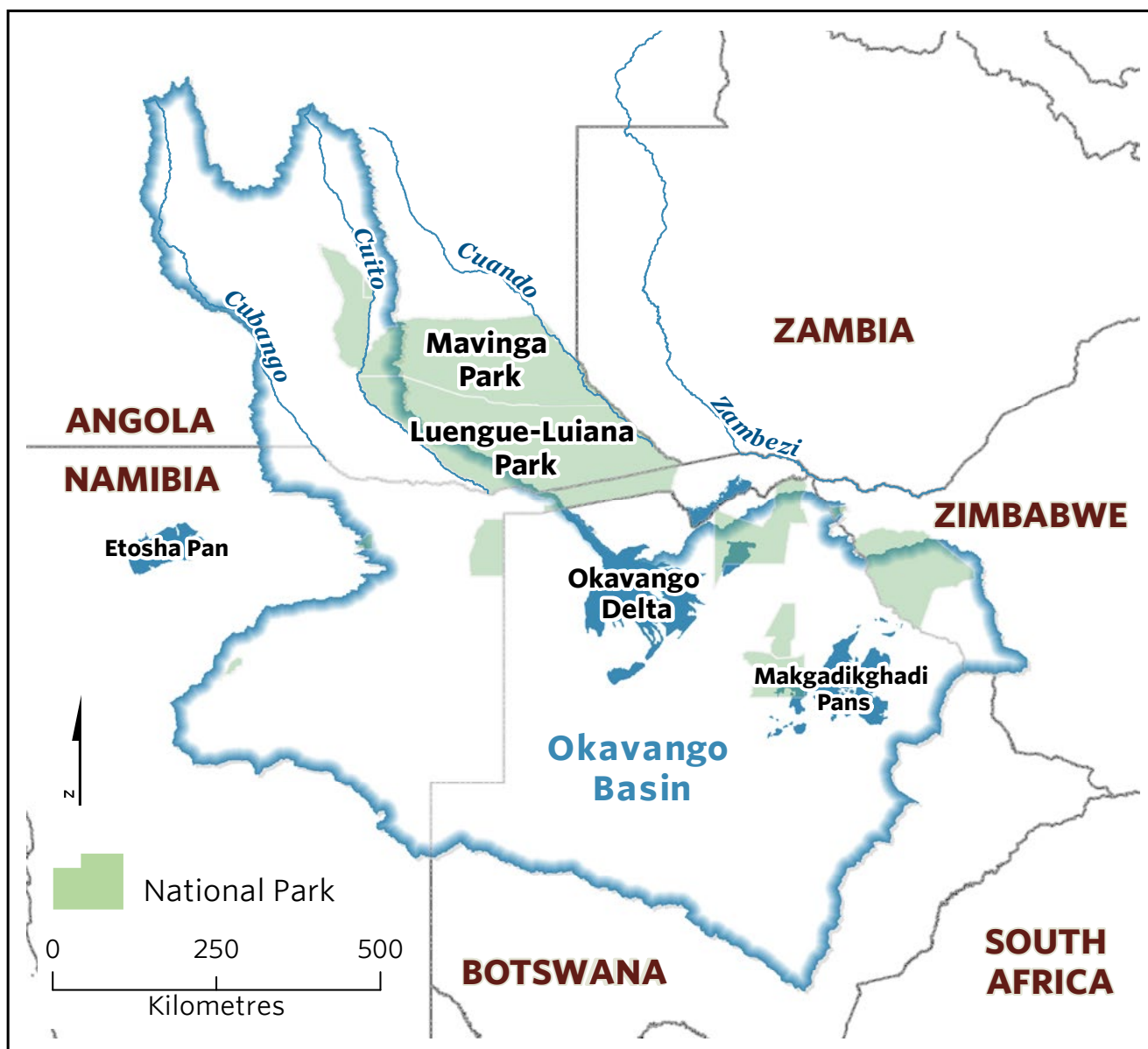


Figure 8: National parks in the CORB and surrounding area.

associated water infiltration in the zone, increasing the tendency for irregular flooding downstream in the hydrologically active part of the Basin.

Unsustainable land use practices, including slash-and-burn agriculture and uncontrolled or poorly controlled commercial logging operations, have set **Hotspot 1** on a trajectory towards a steep decline in ecosystem health. The impacts of unmanaged land use are incompatible with an equilibrium scenario that secures a sustainable future for the CORB. In this hotspot, wetland rehabilitation, reforestation and recovery of the natural habitat is critical for the survival of the local inhabitants, as well as the entire basin and Okavango delta downstream.

Hotspot 2 is characterized by less severe land degradation than Hotspot 1, yet here there is also an urgent need to manage future land cover change of relatively pristine ecosystems through support for conservation agriculture and sustainable forestry practices. Limiting future degradation is critical because the intact ecosystems in this hotspot may have to act as a 'counterbalance' to the severe degradation that has already taken place in Hotspot 1.

Scant transportation infrastructure and the presence of landmines, particularly near the few existing roads, severely limits accessibility in much of **Hotspot 3**. This reduced mobility hinders

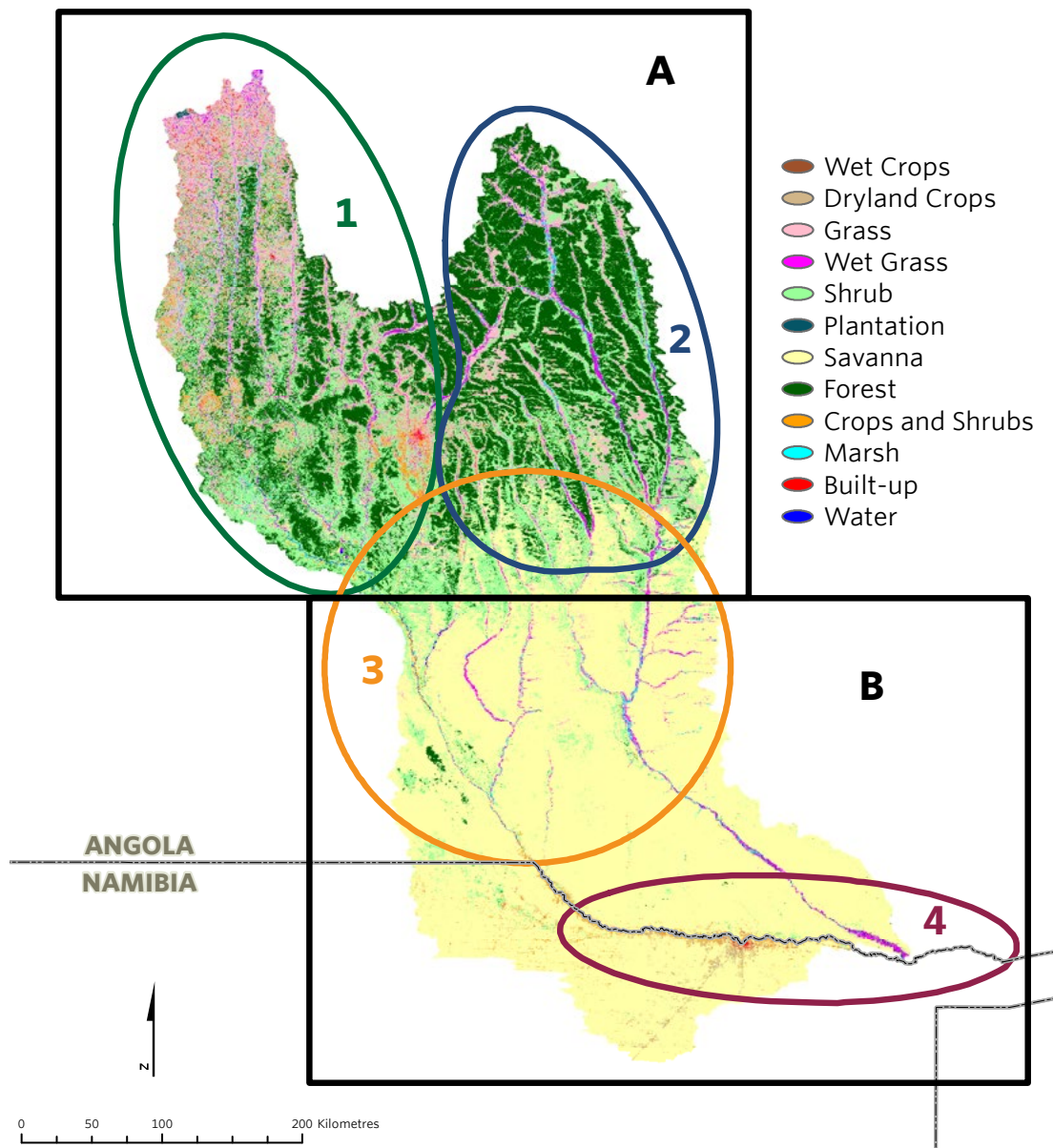


Figure 9: Vulnerability hotspots in the Upper Cubango-Okavango Basin.

communities' ability to respond to ecological challenges, including climate change, and to pursue more sustainable livelihoods. First, communities have limited ability to physically access markets that support job opportunities and reduce the need to engage in subsistence agriculture for food security. Second, few options exist for commercial agricultural expansion due to the generally poor soils and actual or perceived presence of landmines. Although it is not as prevalent as in Hotspots 1 and 2, forest loss due to slash-and-burn practices indicates a reliance on the use of wood for cooking and heating purposes at village level, which will likely lead to a reduction in woodland cover. Third, villages in Hotspot 3 have virtually no water and sanitation infrastructure.

The Cubango River, which serves as the border between Angola and Namibia, runs through **Hotspot 4**. The binational nature of this hotspot mandates truly cross-boundary interventions. Much of the population in Hotspot 4 is concentrated close to the river. These semi-formalised settlements, like those in Hotspot 3, lack adequate transportation, water and sanitation infrastructure. Populations here do not face the risks posed by landmines, yet the poor roads and difficult market accessibility hamper economic development. These communities are also more susceptible to basin impacts from changes in the water quality and quantity in upstream catchments. Households rely on subsistence agriculture year-round, and fishing is important to many during the rainy season.

WATER RESOURCES OF THE CUBANGO-OKAVANGO BASIN

Threats and challenges:

- Widespread poverty
- Biodiversity loss
- Climate change
- Population increase
- Over-harvesting of natural resources



Water resources support:

- Water supply
- Tourism
- Urban development
- Resource-based livelihoods
- Commercial agriculture



THE CUBANGO-OKAVANGO RIVER BASIN FUND

will support resilient development interventions:

ENHANCE LIVES • CREATE OWNERSHIP • PROTECT NATURE



Avoided CO₂ emissions of almost
6 BILLION TCO₂E
by 2050



500,000 HA
of additional Protected
Areas to support biodi-
versity and wildlife



\$368 MILLION
in increased
tourism revenue



SUSTAINED
water resource availability
and improved water
quality



Improved
management of
106,000 HA
of forest



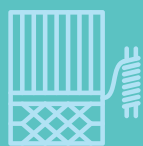
Deforestation
REDUCED BY 50%
with forest supporting
wild harvested
resources worth
\$146 MILLION



50% REDUCTION
in sediment yield,
supporting reduced
erosion and its impact
on infrastructure and
livelihoods



Agricultural diversity and
increased productivity from
60% GREATER YIELD
resulting in \$378 million in
additional revenue to
smallholder farmers



COMMUNITY HUBS
to support local skills
development and
economic
diversification



Sustainable WASH
and sanitation
services to over
370,000
BENEFICIARIES



Smallholder
aquaculture and fishery
reserves will support
increased revenue from
fish yields worth
\$8 MILLION



Clean energy access
(155mV solar PV) and
solar lanterns provided to
46,000 HOUSEHOLDS



THE CUBANGO-OKAVANGO RIVER BASIN FUND

The CORB Fund is a fully independent hybrid fund that aims to enhance livelihoods, improve ecosystem resilience and provide equitable benefits to the riparian states of Angola, Botswana and Namibia, in their shared river basin.

THE ROLE OF THE FUND

The CORB Fund would catalyse systemic improvement in basin management to achieve positive change throughout the Basin in a way that protects the natural capital and environmental resources upon which the region's inhabitants depend. It would align to OKACOM's integrated framework to ensure a harmonised response to the competing demands and threats in the Basin, bringing about shared benefits between countries that are equitable over the long-term.

The Fund's interventions would focus on the cost-effective use of on-the-ground resources, strengthened capacity, and robust monitoring and evaluation to stimulate funding and implementation of improved land and water resource management and expanded restoration efforts. In the process, it

would build momentum to protect globally important biodiversity, build more resilient communities in the face of climate change, and promote livelihoods and socio-economic development as articulated in the CORB Strategic Action Programme (SAP) by:

- Improving water and energy security, water supply and sanitation services to basin communities;
- Implementing transboundary community-based natural resource management;
- Increasing basin-wide tourism strategy developed, and tourism development;
- Establishing conservation agriculture established in the Basin and improving livelihoods from agriculture;
- Improving livestock management and productivity in the Basin;
- Ensuring the sustainability of river fisheries, and expanding sustainable aquaculture production; and,
- Identifying and securing sustainable economic investments, including those from the global climate change mitigation framework.

THE FUND'S STRUCTURE

The Fund is a fully independent Company Limited by Guarantee in Botswana, with three distinct levels of governance:

- **Five Members** – one from each of the three Member States, one non-government livelihoods anchor and one non-government ecosystems anchor – will comprise the highest decision-making body and will meet annually.
- **Seven Non-Executive Directors** – one from each of the three riparian state and four independent, non-government experts – will meet quarterly to oversee the business and affairs of the company, and ensure it delivers on its purpose.
- **One Executive Officer** – employed by the board of directors – will be responsible for managing the day-to-day activities of the Fund and for ensuring its operational efficiency.

THE FUND'S CAPITALISATION PLAN

The hybrid fund structure has two distinct investment vehicles, namely: a sinking vehicle of +USD 20 million, which is domiciled in Botswana, and an endowment vehicle of +USD 250 million, which will be domiciled offshore. Three phases are envisaged to capitalise the CORB Fund:

- **Phase 1:** The Demonstration Phase, beginning directly after fund registration for a two-year period, with the purpose of seeding and fully capitalising the sinking vehicle, with up to +USD 20 million from bilateral and multilateral development organisations.
- **Phase 2:** The Fundraising Phase, beginning once the Fund has established a track record, and running for two to three years, with the purpose of capitalising the endowment vehicle, with a target of +USD 250 million.
- **Phase 3:** The Investment Phase, beginning after the endowment target has been reached and the Fund's organisation is operating efficiently, running in perpetuity to leverage higher operational efficiencies.

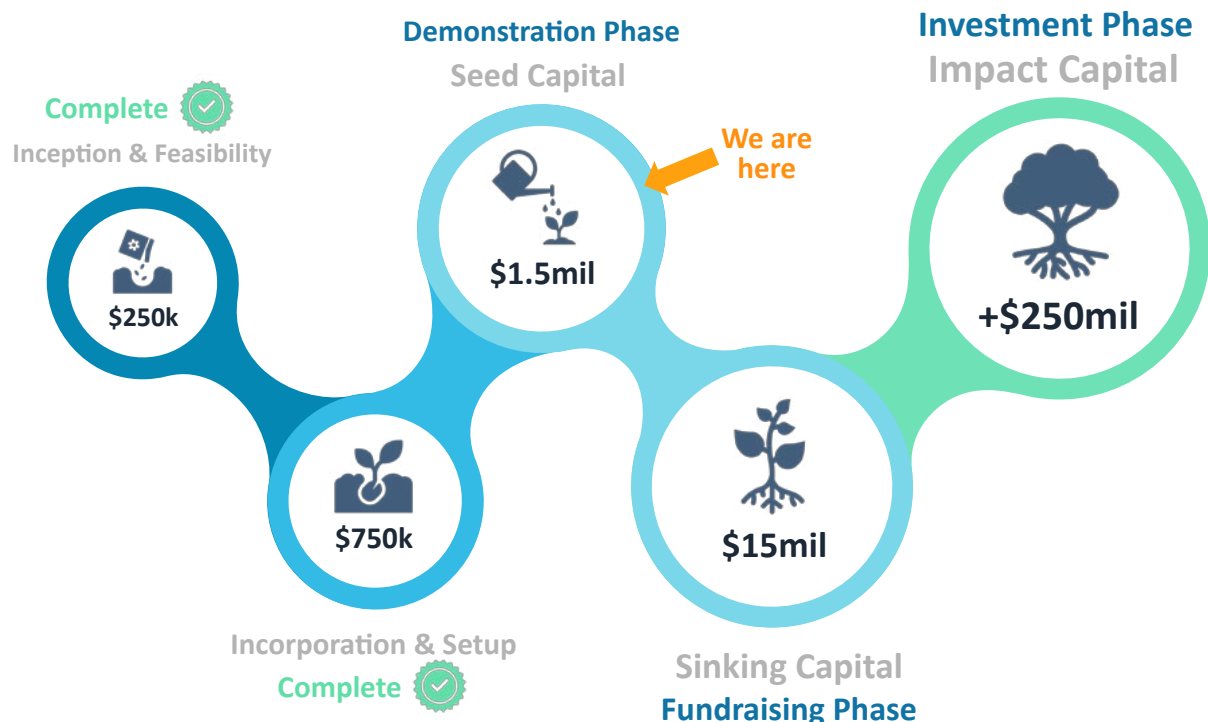


Figure 10: The CORB Fund's Capitalisation Plan.



INTERVENTIONS FOR RESILIENCE

Community support is essential to the CORB Fund's success. People living in and around the forests, rivers and wetlands the Fund seeks to protect can either participate in activities that degrade them, or they can work with authorities to detect, report and prevent illicit activities that damage the Basin's ecological infrastructure and contribute to its conservation and restoration through changes in the ways they interact with the ecosystem.

Successful conservation and sustainable development interventions involve stakeholders through participatory assessment, planning and monitoring processes. During the past three years, a group of specialists undertook ground-truthing site visits at numerous stages of the Fund's development, and it actively engaged stakeholders at all levels to design the Resilient Development interventions proposed in this Value Proposition.

The Team conceptualised three categories of interventions – governance/community resilience, social and environmental – to assess the impact of the Fund on efforts to support livelihoods and conservation in the Basin. They would be implemented in all three Member States, in villages and landscapes across the full extent of

the CORB (Figure 11; Figure 12). Experts with a deep understanding of the region and many years of experience implementing similar interventions elsewhere designed these interventions, which were then adjusted based on directly observed results from the field to make them more appropriate to the Basin's unique context. Prior to their implementation, the CORB Fund would perform additional planning work to ensure the interventions add value for the people and communities they aim to benefit.

GOVERNANCE AND COMMUNITY RESILIENCE

Community ownership and effective governance are fundamental to ensuring sustainable impact from the CORB Fund. The Fund should strongly consider support of **Community Resilience Hubs** to engage local people and promote their participation in the resilience, social and environmental interventions. Hubs are physical centres, staffed and managed by local residents, that provide training and skills development, as well as technical support, extension services within a mobile proximity of the communities, villages and/or towns that participate



Figure 11: Spatial extent of Interventions and Impacts of the CORB Fund.

RESILIENT DEVELOPMENT INTERVENTIONS

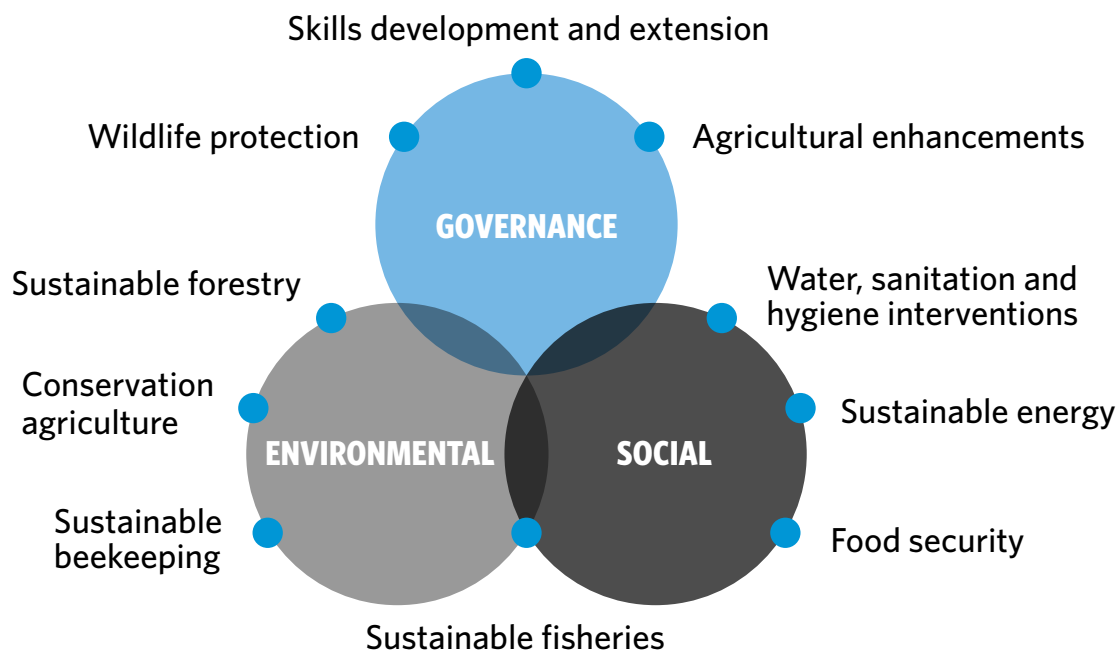


Figure 12: Overview of the Cubango-Okavango River Basin Fund interventions.

in and benefit from the Fund's interventions. These hubs would empower local residents, making them protagonists for the long-term sustainable management and restoration of the CORB.

Each town/village benefiting from the Fund's intervention suites (Table 1) would select a committee of up to 10 members, who would be responsible for overseeing the running of the intervention or suite of interventions. These committees would ensure interventions are maintained over their useful economic life. Committee members would complete extensive, practical training in matters relating to the running of the committee, operation of the intervention, and proper communication protocols within the community and with external parties. Each community resilience hub would be staffed with up to two full-time employees (members of the community), who are skilled labourers or moderately skilled technicians who might perform regular operation and maintenance (O&M) services.

SOCIAL INTERVENTIONS

Social interventions focus primarily on enhancing the livelihoods of the Basin's inhabitants at the household and community levels. While motivated by their potential to enhance livelihoods and well-being, in some cases these interventions would also contribute to enhanced ecosystem resilience. The selection of socially-focused interventions depends on the number of households in a village, as well as road access and groundwater availability. Social interventions are organized into three suites:

Suite 1 includes four interventions, which seek to provide communities with improved water and sanitation, more efficient means of cooking, and better living conditions inside their homes. These are considered to be the minimum type and number of interventions that one could implement in a given location, whilst delivering value for money to investors. Under the progression of the intervention suites, **Suite 2** builds on the Suite 1 interventions with the addition of interventions to improve the supply of drinking water and further improve the efficiency of homes by adding insulation. Suite 2 contains a total of seven interventions. **Suite 3** offers its beneficiaries enhanced vehicular access roadways into and out of their communities and more advanced, small-scale energy solutions. Suite 3 is comprised of a total of 10 interventions.

ENVIRONMENTAL INTERVENTIONS

The CORB Fund's environmentally-focused interventions would deliver both conservation and livelihood improvements by protecting and restoring the natural systems in the Basin and the ecosystem services they provide. These interventions are predominantly larger in scale than the social interventions and less dependent on the number of households in a village or access to roads. The agricultural, forest, fisheries and beekeeping interventions address the key drivers of forest and fisheries resource degradation in the Basin while concomitantly improving local resource-dependent livelihoods. Intervention categories used in the Value Proposition modelling are described below.

Smallholder agricultural interventions seek to reduce the rate of deforestation by making farmland productive for longer periods of time, thus decreasing the turnover rate of land and slowing the expansion of the agricultural frontier. The CORB Fund would work with small-scale farmers to improve the productivity of their farming systems by introducing and improving farmers' capacity to effectively use inorganic fertilizer and small-scale irrigation. This requires extension services, education and support for farmers to acquire fertilizers at reduced cost. To limit the impact of agricultural production on the Basin's rivers, the CORB Fund would also work with farmers to protect riparian buffer areas. Angolan law requires 200 metres of buffer along main rivers. Improved management and enforcement efforts would concentrate on stretches of river that run close to villages and agricultural lands.

The Fund's **forest interventions** aim to increase the area under formal protection and improve management of existing protected areas. This would contribute to conserving remaining forest cover and regenerating degraded areas in the CORB watershed, which would enhance the sustainability of the resource base and its livelihood contributions to the people living in the Basin. The area identified for protection is the only one in the Basin where forests are reasonably intact. It supports rich biodiversity and provides important ecosystem services, and it is at risk of rapid deforestation following infrastructure development and removal of landmines. The identified area has lower transaction costs and higher ROI than other areas. The area

NO.	SUITE 1	NO.	SUITE 2	NO.	SUITE 3
1	Groundwater well-point	1	Groundwater borehole	1	Watercourse abstraction
2	Communal ventilated compostable latrines	2	Raw water treatment package plant	2	Raw water treatment package plant
3	Improved cook stoves	3	Communal water supply points	3	Potable piped networks
4	Solar rechargeable lanterns	4	Communal ventilated compostable latrines	4	Communal ventilated compostable latrines
		5	Improved cook stoves	5	Small-scale biogas systems
		6	Solar-rechargeable lanterns	6	Improved cook stoves
		7	Improved insulation in dwellings	7	Solar PV package plant
				8	Solar-rechargeable lanterns
				9	Vehicular access gravel road
				10	Improved insulation in dwellings

Table 1: Social interventions suites.

chosen for improved management in the CORB is situated within the KAZA TFCA and borders the Caprivi with links into Botswana, Namibia, and Zambia. This section of KAZA in Angola holds great potential for expanded ecotourism, and its protection would help increase wildlife numbers through improved habitat management.

Forest restoration interventions would focus on heavily degraded areas. Forests that have been lost because of unsustainable agricultural practices, logging, and charcoal production could be restored through **assisted natural regeneration** (ANR), which contributes to enhancing key ecosystem services, such as flow regulation and sediment retention. ANR accelerates natural successional processes by removing or reducing barriers to natural forest regeneration, such as soil degradation, competition with weedy species, and recurring disturbances, including grazing, uncontrolled fires, illegal timber harvesting and charcoal production. The resulting productive forests would support greater biodiversity and hydrological services and could provide for sustainable livelihoods for local people.

Measures to **reduce charcoal demand** and reform its production are essential because the impact of charcoal production on forest cover change is believed to be on the same order of magnitude as deforestation from agricultural expansion. Approximately half of the forest lost between 2000 and 2017 can be attributed to charcoal production.

The charcoal sector could become less destructive through the introduction of economic incentives for sustainable and formalized production, better policy and improved institutional and regulatory frameworks, systematic monitoring and enforcement, and adoption of fuel efficient cookstove technologies and alternative fuels such as LPG. To promote sustainable forest management, the Fund would also make **payments for ecosystem services (PES)** to villagers who implement improved forest management practices and who generate ecosystem services and associated co-benefits.

The Fund would promote **sustainable livelihoods**, including beekeeping, small-scale native species aquaculture, and community-co-managed fisheries reserves. **Sustainable beekeeping** would be introduced in the same areas where the PES scheme is implemented. Honey harvesters would be provided with wooden Kenyan High-Top Beehives, which are hung from trees and thus encourage forest conservation. Technical staff would also work with beekeepers to create cooperatives and establish market connections that could allow households to earn more by adding value to their honey and through collective commercialization of their products.

Sustainable fisheries and **aquaculture** opportunities exist to the west of Rundu on the Cubango-Okavango River. Pond-based smallholder aquaculture could improve household protein intake, improve household food security, and provide increased income opportunities.



DEVELOPMENT SCENARIOS

The CORB Fund Value Proposition considers two different scenarios – Business-as-Usual and Resilient Development. It draws upon a series of internationally funded studies, done in conjunction with OKACOM, that have begun to paint a picture of the ecological and economic ramifications of a Business-as-Usual Development Scenario for the Okavango Basin, along with some basic alternatives. These include past work under the GEF-FAO-UNDP funded Environmental Protection and Sustainable Management of the Cubango-Okavango River Basin project and the World Bank’s Multi-Sector Investment Opportunities Analysis (MSIOA).

In the MSIOA, researchers designed several Basin Development Scenarios (BDSs), to represent different combinations of projects, and then modelled to determine their impacts and benefits. After consultation with the technical committee of OKACOM, the OBSC, and the existing Directors of the CORB Fund Company, it was agreed that a potential “no development option” is not a plausible scenario to model for the CORB because this is already leading to high levels of poverty and increasing degradation of the Basin. The only sustainable solution is to address the underlying drivers of poverty through targeted investments that

improve the lives of the Basin’s population within ecologically sustainable limits of change. As such, the most plausible large-scale development scenario was BDS No. 6, and that two macro scenarios could be reasonably employed for the purpose of comparative analysis in the Value Proposition, namely:

1. **Business-as-Usual Development Scenario:** wherein BDS No. 6 is the basis of the economic analysis over the 30-year period between 2021 and 2050, and specific, near-term timelines are assumed for the commissioning of large-scale water supply, power, and irrigation infrastructure.
2. **Resilient Development Scenario:** wherein BDS No. 3 is the basis of the economic analysis over the 30-year period between 2021 and 2050. However, the livelihood intervention suites and conservation interventions are systematically implemented through the Fund, resulting in significantly delayed timelines for the commissioning of large-scale water supply, power, and irrigation infrastructure.

BUSINESS-AS-USUAL

A Business-as-Usual Development Scenario would likely lead to accelerated deforestation and more shifting agriculture in the Angolan source water area. The ultimate result of this trend would be

decreased water quantity and quality delivery from the upstream Cubango and Cuito systems through to the mainstem Okavango River and the Okavango Delta. These land use driven water quantity and quality changes would exacerbate the impacts of new dams and diversions in the upper Basin, leading to wildlife and ecosystem service threats all the way into the Delta.

Assumptions about the underlying development projects and their associated impacts are those included in the MSIOA BDS6, as well as some anticipated developments based on consultations with Angolan Ministry of Energy and Water and other stakeholders, as illustrated in Figure 13 and Figure 14.

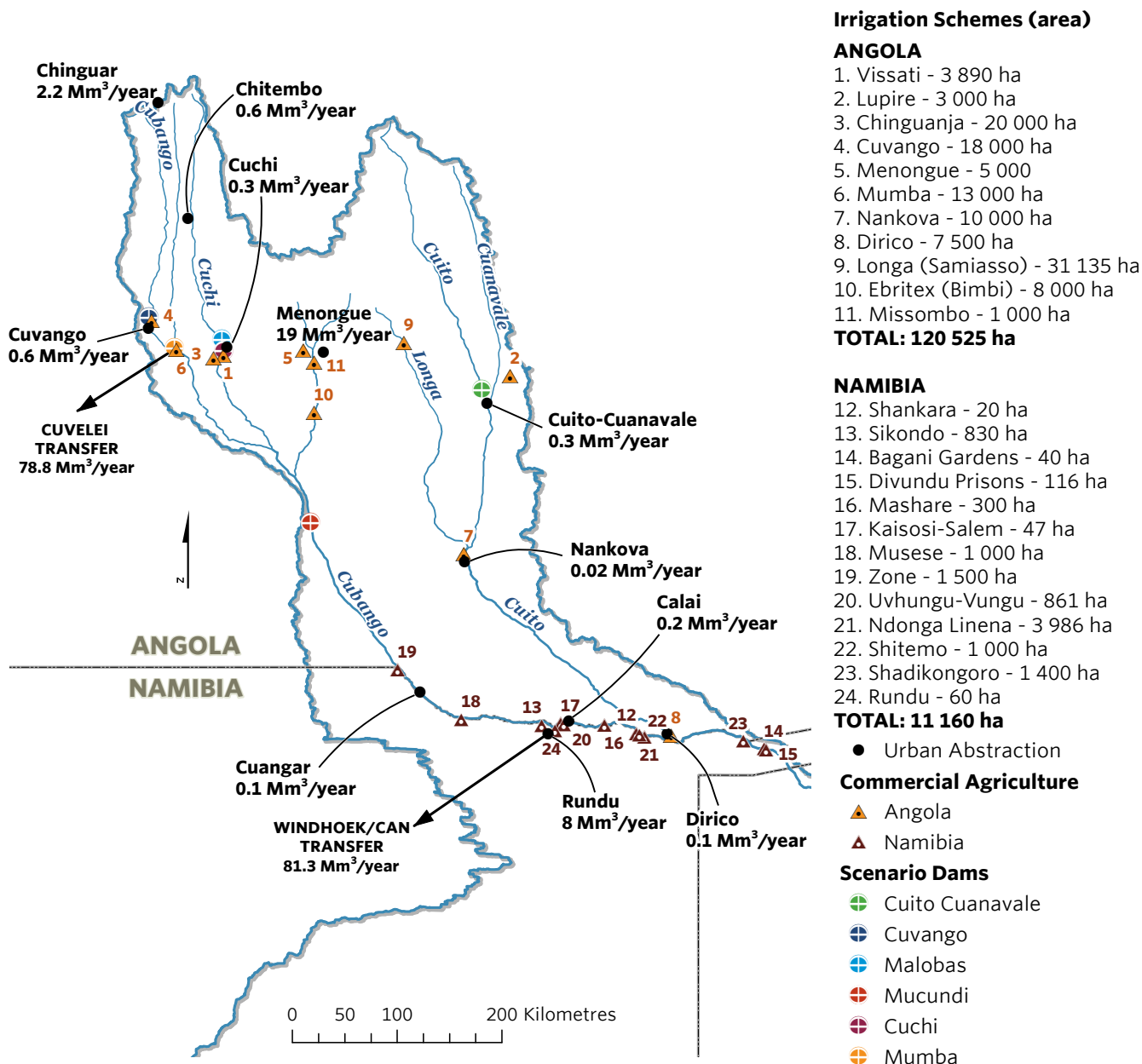


Figure 13: Commercial agriculture and hydropower assumptions Business-as-Usual scenario

Hydropower development

- Mucundi – 104.3 MW
- Malobas – 53.3 MW
- Cuito-Cuanavale – 16.2 MW
- Cuvango – 27.6 MW

Commercial irrigated agriculture

- Angola – 120,525 ha
- Namibia – 11,160 ha

Irrigation storage

- Cuchi and Mumba storage dams

Domestic water supplies

- 31.5 Mm³ per annum for 10 cities in Angola and Rundu

Water transfers

- 81.3 Mm³ per annum for Central Areas of Namibia
- 78.8 Mm³ Cuvelai River basin in Angola

Land use change

- Converted to small-scale agriculture
 - 102,940 ha of miombo woodlands
 - 3,240 ha of riparian vegetation
- 67,318 ha miombo woodlands degraded
- 87,030 ha of additional urban

Figure 14: Water abstractions and land use assumptions for the Business-as-Usual scenario.

RESILIENT DEVELOPMENT

A Resilient Development Scenario is still possible and could both reduce ecological threats and enhance economic benefits across the Basin. In the MSIOA, the impact studies generally focused on large-scale hydropower and irrigation projects, but tended to not consider small-scale agriculture, tourism, and alternative energy development projects that could yield similar economic benefits without significant downstream ecological and ecosystem services costs.

A holistic, ecosystem-focused development scenario should consider these alternative development projects and account for the economic, social, and livelihood benefits they could yield. Such a scenario should also take into account the costs that could result from degradation under a business-as-usual development approach of the Basin's ecosystems and the livelihood support they provide throughout the Basin. Incorporating economic data tied to ecosystem services makes the case for addressing ecosystem degradation

at scale while safeguarding livelihood options for poor rural communities. The Resilient Development trajectory ascribes to the hypothesis that poverty, unsustainable land use practices, and environmental degradation are inextricably linked in the CORB. Therefore, enhancing livelihoods is essential to the betterment of vulnerable rural inhabitants in the Basin and to promoting ecological preservation and resilience. Under this scenario, the social and environmental interventions, as well as support for community governance and active engagement as part of the solution, would be implemented as described in the preceding subsections.

The Resilient Development Scenario would also blend lower-impact, ecological infrastructure investments, tourism development, and livelihood development interventions with traditional, well-sited, conventional infrastructure in a way that, through calculated trade-offs, can optimise delivery of the desired development outcomes while safeguarding vital ecological and socioeconomic attributes and functions (Figures 15-17).

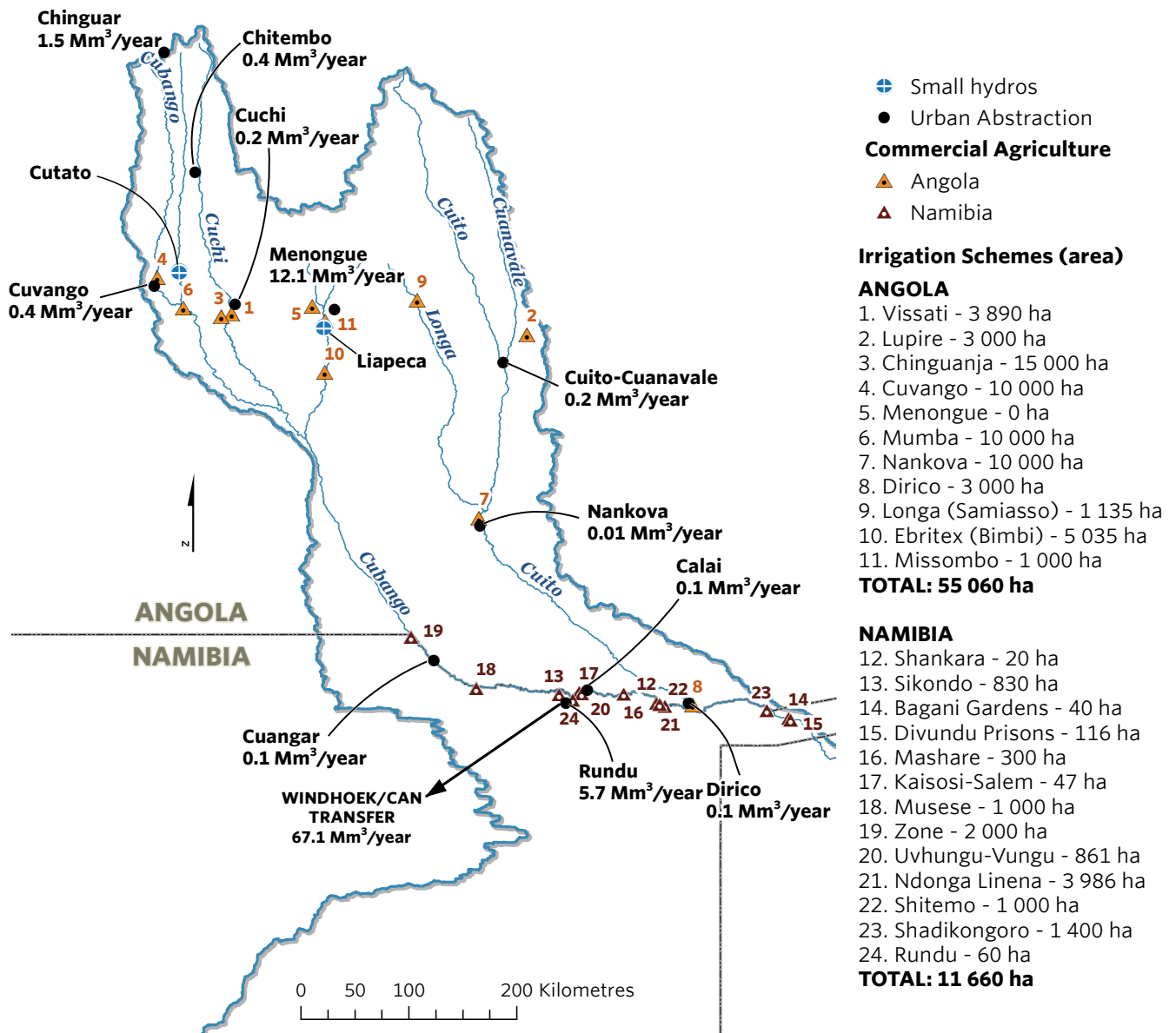


Figure 15: Water abstractions and land use assumptions for the Resilient Development scenario.

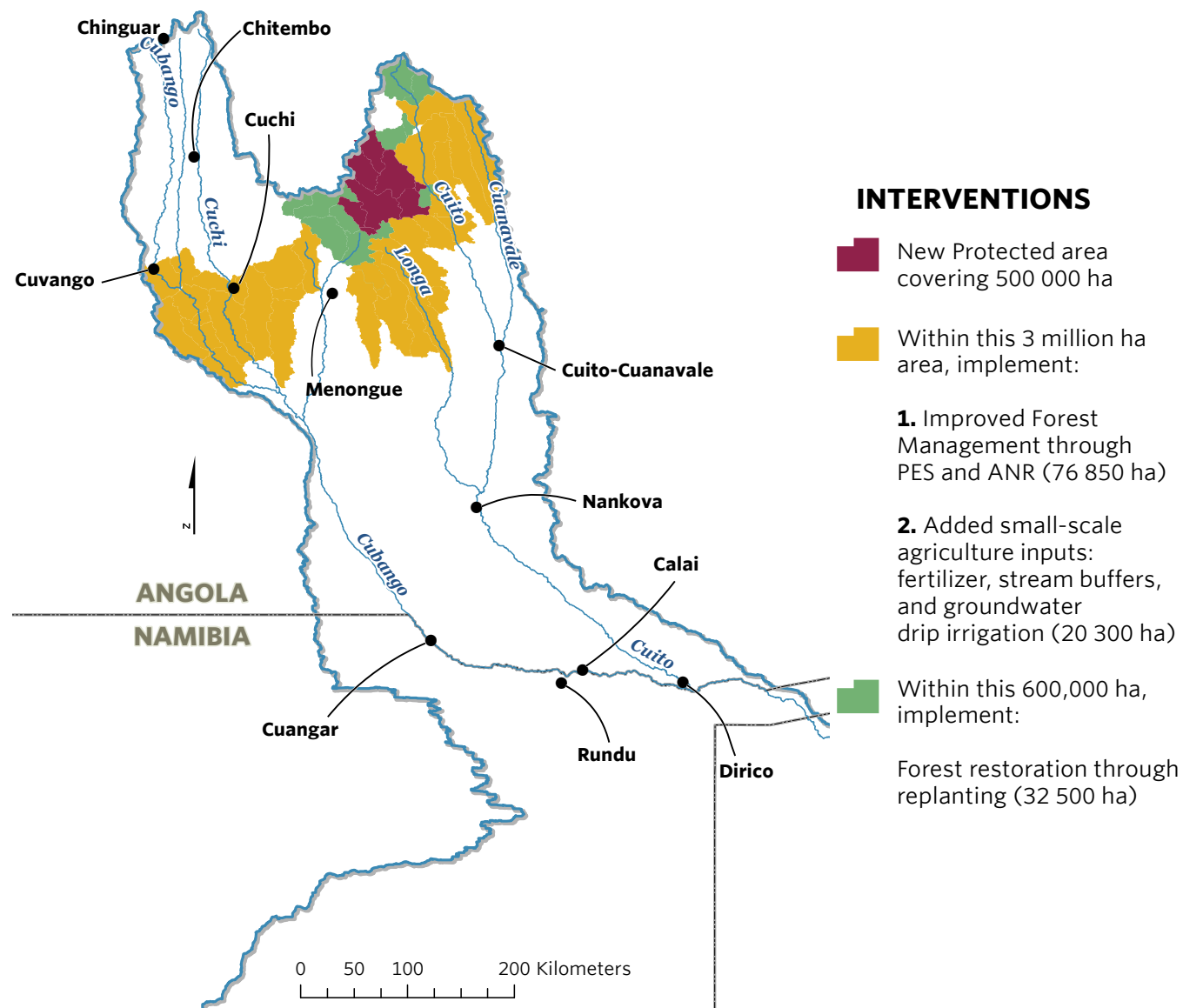


Figure 16: Landscape scale interventions under the Resilient Development Scenario.

Utility scale solar PV generation facilities (155 MW) linked with two run-of-river mini-hydroelectric schemes

- Liapeca (4 MW)
- Cutato (13 MW)
- Power output and security matching the BAU scenario

Commercial irrigated agriculture

- Angola – 55,060 ha
- Namibia – 11,060 ha

Irrigation storage

- Offtake-fed reservoir (Mumba Dam)

Domestic water supplies

- 20.7 Mm3 per annum for 10 cities in Angola and Rundu

Water transfers

- 67.1 Mm3 per annum for Central Areas of Namibia

Land use change

- Converted to small-scale agriculture
 - 84,088 ha of miombo woodlands
- 61,145 ha miombo woodlands degraded
- 87,030 ha of additional urban

Fisheries

- 390 ha Community co-managed fisheries reserves
- 39 ha Pond-based smallholder aquaculture

Smallholder agriculture

- 20,300 ha croplands with increased productivity

Figure 17: Water abstractions and land use assumptions for the Resilient Development Scenario.



ANALYSIS

The analysis of the CORB Fund compares the Fund's benefits and costs in a quantitative, rigorous manner. In addition to quantifying total benefits and costs, the analysis also identifies the distribution of benefits and costs across stakeholders. This allows the Return on Investment (ROI) of the Fund overall to be evaluated as well as the ROI of discrete intervention bundles implemented by the Fund. The Value Proposition can thus serve as an important tool for mobilising financing for the CORB Fund, both from sources external to the Basin, as well as from individuals and organisations within the Basin who stand to benefit financially from improved basin management.

The Team used a differential analysis approach to assess the impact of the Fund's interventions on the biophysical systems and human well-being in the basin under Business-as-Usual and Resilient Development Scenarios. This differential approach treats the Business-as-Usual Scenario as the counterfactual (i.e., the trajectory of the Basin in the absence of Resilient Development interventions) and calculates the ROI of Resilient Development as the ratio of expected incremental benefits and incremental costs of the Resilient Development scenario versus the Business-as-Usual Scenario. The analysis uses the hydrological modelling tools to assess the Fund's biophysical impacts and a range of economic valuation tools to estimate the socio-economic and livelihoods

impacts. It analysed a 30-year time horizon from 2020 to 2050 and an estimation of population growth and associated land-use change projected spatially through 2030, based on an average annual growth rate of 2.42% across the basin.

The analysis assessed the effect of Resilient Development interventions using various modelling techniques. The effect of interventions on landscape structure and functioning, as well as the resulting changes in key ecosystem services flows were assessed using biophysical modelling based on local information and expert input. The Team estimated the welfare effects of the interventions in a socio-economic modelling exercise by identifying the direct improvements in basic service delivery and economic productivity. The changes in ecosystem services, and improvements in basic service delivery and economic productivity resulting from the interventions were translated into quantitative welfare changes using appropriate metrics and parameters that determine the size of benefits (benefit-relevant indicators). Finally, the analysis uses economic valuation to express the welfare changes in monetary terms to calculate the projected ROI and the economic net benefit of select intervention suites and of the Resilient Development Scenario overall. The Appendices describe the modelling methodologies in detail.



ECONOMIC RATIONALE

The CORB Fund would finance socially- and environmentally-focused interventions, both of which would generate a combination of market and non-market benefits in the Basin (Figure 18). **Social interventions** focus primarily on the enhancement of the lives and livelihoods

at the household, local and sub-regional scale. While motivated by their potential to provide sustainable livelihoods and improve wellbeing, in some cases these interventions could also generate other benefits, including climate stabilisation and increased ecosystem resilience.

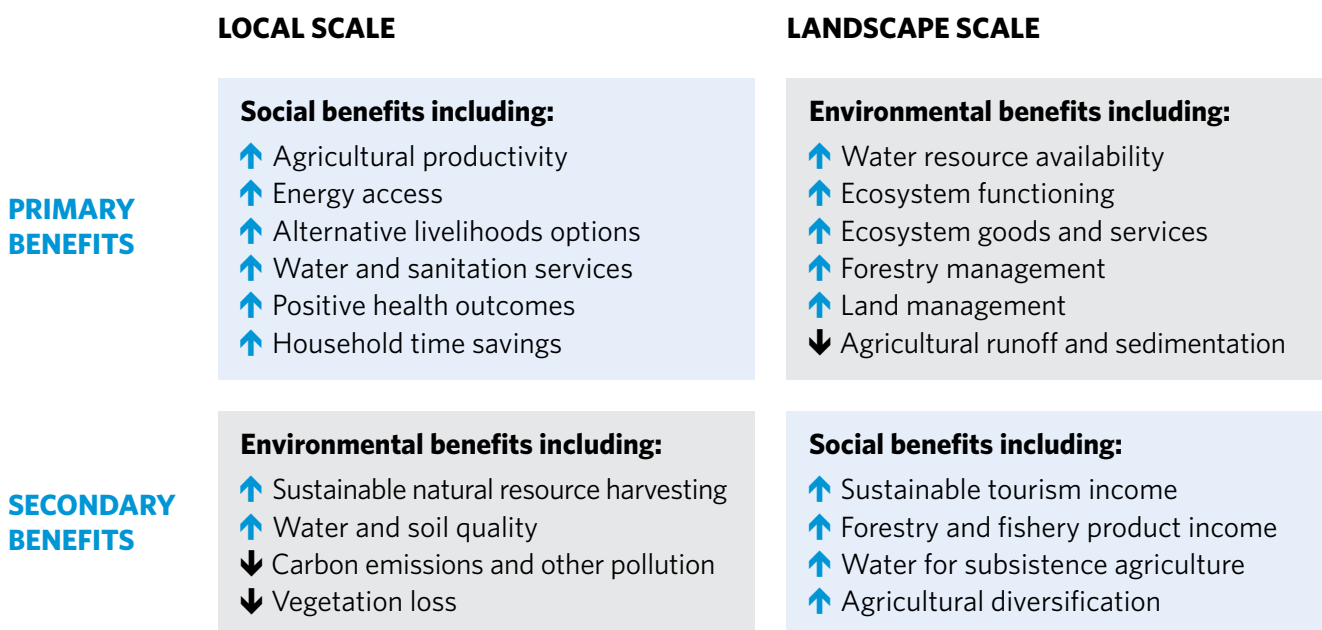


Figure 18: Analytical framework for intervention benefits.

Environmental interventions are mainly motivated by the enhanced ecosystem resilience and increased ecosystem services flows they deliver. These would be undertaken at the landscape level, delivering basin-wide and transboundary benefits, although in some cases they would also deliver benefits to specific groups of local households. The Fund would also deliver a range of other benefits that have not been valued in this analysis. In some cases, this is because, although the benefit could be monetized in principle, there was insufficient evidence of the value of that benefit within the intervention area.

For example, it has not been possible to source reliable evidence on how much value households might place on greater access to hot water. In other cases, benefits may be quantifiable but not easily or appropriately monetizable – for example, improved gender equality – while in other cases, the benefit cannot be quantified or monetised – for example improved community cohesion. The fact that only some of the benefits have been quantified in this Value Proposition emphasises that these should be considered conservative estimates of the value that the Fund could bring.



EVALUATING THE BENEFITS AND COSTS

The economic analysis assessed all interventions in terms of their estimated impacts and associated costs and benefits relative to the Business-as-Usual Scenario. Both benefits and costs are a function of the scale of interventions. The Team used a recent estimate of Angola's Ramsey social discount rate (3.24%)⁶ to convert all costs and benefits incurred during the 30-year analysis horizon to their present value equivalents.

SOCIAL INTERVENTIONS

MEASURING BENEFITS

The analysis used a baseline of Basin Development Scenario 6 (BDS 6)⁷ to specify what it is assumed would happen without the Fund's interventions. The analysis then calculated the changes in costs and benefits the interventions achieve relative to this baseline. Using the economic rationale described above, the modelling of benefits considered the

direct and measurable benefits from an intervention only. Using the economic rationale described above, the modelling of benefits considered the direct water abstractions and land use assumptions for the Resilient Development Scenario and measurable benefits from an intervention only (Figure 19).

COSTING SOCIAL INTERVENTION SUITES

The Team undertook a rigorous costing exercise, by drawing on the transactional costs from past projects. The costing exercise attempted to factor in practical considerations around implementing interventions in the Basin, among others, to ensure that the costs were realistic.

The costs for each of the seven intervention suite options, and the community resilience hub concept are summarised in Figure 20. Costs are broken out into three phases: project preparation ("PREP"); implementation ("BUILD"), and operation and maintenance ("O&M").

6 Addicott ET, Fenichel EP, Kotchen MJ. 2020. Even the representative agent must die: Using demographics to inform long-term social discount rates. *Journal of the Association of Environmental and Resource Economists* 7(2):379-415.

7 Basin Development Scenario 6 (BDS 6) is specified in OKACOM's Multi-Sectoral Investment Opportunity Analysis (MSIOA).

	INTERVENTIONS	MODELLED BENEFITS	UNMODELLED BENEFITS
WATER AND SANITATION	<p>Suite 1: Well point (or other access solution) + communal, non-potable water supply point + communal compostable pit latrine</p> <p>Suite 2: Borehole (or other access solution) + raw water treatment plant + communal potable water supply points + communal compostable latrines</p> <p>Suite 3: Raw water abstraction (or other access solution) + raw water treatment plant + potable piped network + communal compostable latrines</p>	<p>Reduction in time spent collecting water that is re-allocated to productive use</p> <p>Reduction in diarrheal disease reducing costs of health care, improving productivity, and reducing morbidity and premature deaths</p>	<p>Improved sanitation leading to an improvement in the local environment</p> <p>Non-market benefits from reduced morbidity</p> <p>Improved education outcomes</p> <p>Gender empowerment</p>
ACCESSIBILITY	<p>Suite 3: improved road access</p>	<p>Road access: improved market access leading to increased income from sale of produce</p>	<p>Improved access to health and education from better road access</p>
HOUSEHOLD AND ENERGY	<p>Suite 1: improved cookstoves + solar lighting</p> <p>Suite 2: improved cookstoves + solar lighting + improved insulation</p> <p>Suite 3: improved cookstoves + improved insulation + communal biogas reactor + solar PV package plant and rechargeable lanterns</p>	<p>Improved cookstoves: reduced time collecting firewood that is re-allocated to productive use, improvement in health from reduced indoor air pollution, reduction in CO₂ emissions</p> <p>Improved insulation: reduced time collecting firewood, improvement in health from reduced indoor air pollution, reduction in CO₂ emissions</p> <p>Communal biogas reactor: reduced time collecting firewood, improvement in health from reduced indoor air pollution, reduction in CO₂ emissions (yield increases from use of biogas digestate captured in agriculture yield interventions)</p> <p>Solar PV plant: improvement in wellbeing from more lighting, reduction in CO₂ emissions, reduced time spent charging mobile phones, increase in economic activity from reduced effective cost of mobile phone use</p>	<p>Cookstoves: reduction in deforestation, increase in safety for women and children from less time collecting wood</p> <p>Insulation: improvement in health and productivity from cooler indoor environment</p> <p>Solar PV plant: improved personal security from communal lighting</p>

Figure 19: Social Interventions and their direct and indirect benefits.

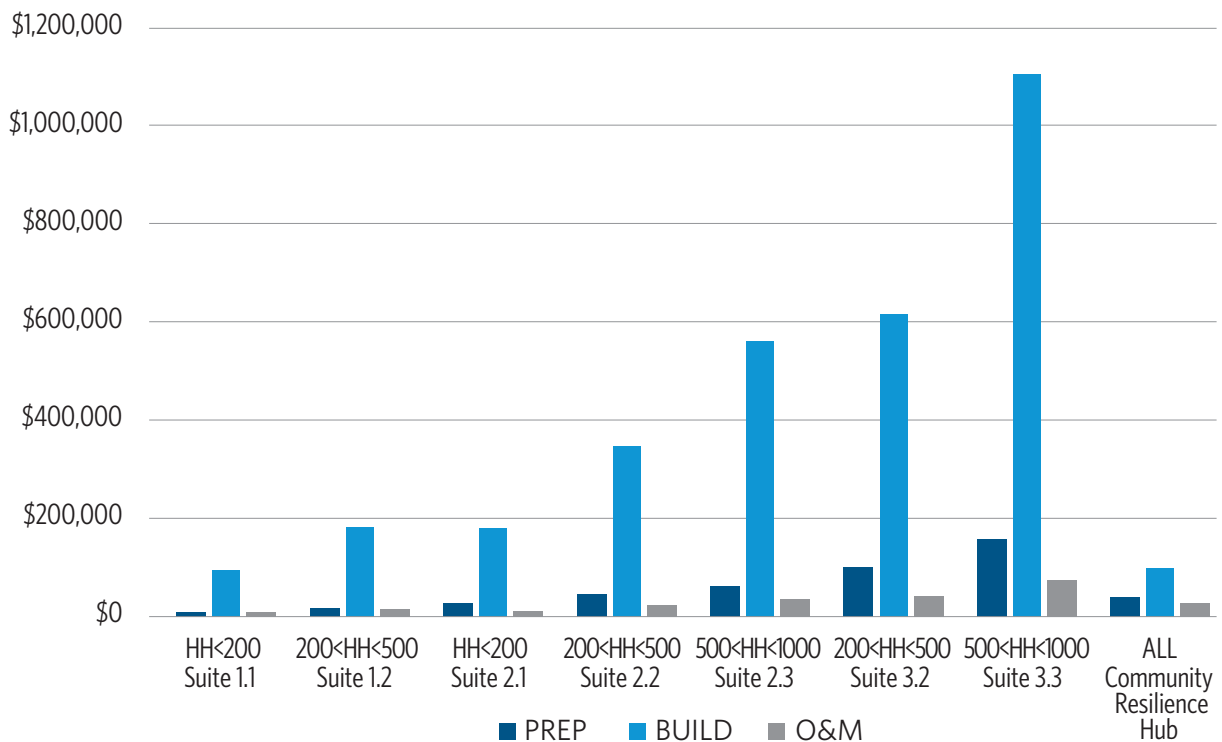


Figure 20: Social Intervention cost estimates.

ENVIRONMENTAL INTERVENTIONS

To maximize the ROI of the environmentally-focused interventions, the Team generally targeted them across the Basin based on the ratio of the value of the benefits an intervention provides by mitigating current or expected future loss or degradation of key natural assets and associated ecosystem services, and the cost of the intervention. The budget share allocated to each intervention was the main constraint within which this ROI-based targeting was implemented. Approximately one-fifth of the total budget for environmentally-focused interventions was allocated to agricultural interventions, based on the rationale that increasing smallholder agricultural productivity on a sufficiently-large scale was critical for slowing deforestation and improving local livelihoods. The new protected area in the upper Cuito catchment received a budget allocation sufficient to cover transaction costs associated with delineating, gazetting or any resettlement, while the charcoal intervention received the budget deemed necessary for implementing its comprehensive suite of component measures. The creation and management of three fishery reserves and smallholder pond-based aquaculture accounted

for eight percent of the environmental intervention budget, with the remaining budget allocated roughly equally to the other forest interventions. Table 2 shows the analysed interventions and their associated key benefits. The benefits shown in **bold** are the ones quantified in the present analysis and are included in the reported ROI results.

MEASURING BENEFITS

Estimation of benefits takes into account the phased-in deployment of most interventions due to budget constraints and necessary preparatory actions, as well as the fact that many interventions gradually increase their functionality and associated benefit delivery over time.

Economic valuation of the impacts of environmentally-focused interventions relied on market prices for commercial and subsistence crops and honey, as well as on prices for harvested natural resources from forests and floodplains reported in the socio-economic analysis for Angola under the Transboundary Diagnostic Analysis for the Okavango Basin, and in household surveys undertaken in the Caprivi region in Namibia and the Delta in Botswana. Tourism value was based on leisure tourist spending in the Angolan portion

of the study area calculated from World Travel & Tourism Council data, spatially disaggregated using Flickr data. This value was assumed to increase in protected areas with improved management, to values closer to those found in other southern African protected areas. The analysis valued increases in carbon stocks at USD 227/tCO₂e (in 2020 USD) globally. This is the average of the median value of the global social cost of carbon (SCC), which is defined as the increment in global climate damages caused by one additional ton of carbon dioxide emitted reported in the literature (Ricke et al. 2018) and of a much lower SCC value estimated by Nordhaus (2017).⁸ The analysis valued carbon storage at only 0.8% and 0.2%, respectively, of the global SCC which represent Angola's and Botswana's shares of the global SCC, respectively.⁹

COSTING OF ENVIRONMENTALLY-FOCUSED INTERVENTIONS

As in the case of benefits, the economic analysis estimated costs by considering the phased implementation of interventions. Cost estimates for each intervention were calculated using market prices and were based on local expert assessments and published studies. Wherever possible, the Team used full cost accounting to capture the total cost of interventions, including implementation, opportunity and transaction costs.

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- 8 The median SCC from the literature is reported in Ricke et al. (2018) is USD 413/tCO₂ (in 2020 USD). Nordhaus (2017) estimates a median SCC of USD 41 (in 2020 USD). Ricke K, Drouet L, Caldeira K, Tavoni M. 2018. Country-level social cost of carbon. *Nature Climate Change* 8:895-900. Nordhaus, W. D. 2017. Revisiting the social cost of carbon. *Proceedings of the National Academy of Science* 144 (7):1518-1523.
- 9 Ricke K, Drouet L, Caldeira K, Tavoni M. 2018. Country-level social cost of carbon. *Nature Climate Change* 8:895-900.

AGRICULTURAL INTERVENTIONS		BENEFITS
Increased crop productivity	Inorganic fertilizer	Climate mitigation; biodiversity (from reduced forest loss & degradation); Increased smallholder crop yields
	Gravity-fed drip irrigation	
	Enforcement of legally-mandated riparian buffers near villages and on agricultural lands	Reduced sedimentation; biodiversity
FOREST INTERVENTIONS		BENEFITS
Increased extent and improved management of formally protected area	Formal gazettement of at least 5000 km ² of largely-intact forest in the upper Cuito catchment as a community-supported protected area (note that this has not been proposed by Angolan government to date, but was developed for illustrative modelling purposes)	Climate mitigation; biodiversity); increased local tourism income (Angola)
	Improved management of the existing protected area (Luengue Luiana NP as part of the Kavango Zambezi TFCA) by designating a wildlife management zone of 7500 km ² (e.g., through a public-private partnership entity and/or additional public investment)	
Reduced forest degradation from charcoal production	Implementation of charcoal-specific monitoring strategies	Climate mitigation; biodiversity; wood & other resource availability for local use
	Creation of a detailed forest inventory	
	Updating & improvement of charcoal regulatory and fiscal frameworks	
	Promote adoption of fuel efficient cookstove technologies (short term) and adoption of alternative fuels (longer term)	
	Promote supply of sustainably sourced wood fuel or charcoal (e.g. from areas with invasive alien plants, bush encroachment or areas with effective management plans)	
	Subsidize sustainably sourced fuels to crowd out illegal charcoal	
	Provide financial incentives (e.g., REDD+; payments for ecosystem services) to local farmers to help to protect their local forests	
	Awareness raising and social mobilization against illegal charcoal production	
Forest restoration and improved management	Ecological restoration and reforestation of areas that have been lost to crops, fallow land, charcoal production and logging, coupled with protection and strengthened management	Restored hydrologic functioning (flow regulation); biodiversity; climate mitigation

Table 2: Environmentally-focused interventions and associated benefits (only benefits in bold quantified in this analysis).
(continued on next page)

FOREST INTERVENTIONS		BENEFITS
Assisted natural forest regeneration	Removing or reducing barriers to natural forest regeneration such as soil degradation, competition with weedy species, and recurring disturbances (e.g., fire, grazing, and wood harvesting)	Maintaining availability of forest resources for subsistence use ; biodiversity; restored hydrologic functioning (flow regulation); climate mitigation
Incentives for better forest management (PES)	Payments for improved forest management practices that supply target ecosystem services such as wildlife habitat, soil retention or improved water quality	Biodiversity; restored hydrologic functioning (flow regulation); forest resources for subsistence use ; climate mitigation
Sustainable beekeeping	Introduce Kenyan High-Top hives and honey market value chain	Local incomes
Community co-managed fishery reserves	Formal gazettement of fishery reserves co-managed by local communities	Increased local fish populations supporting local subsistence fisheries and income from tourism
Smallholder fishponds	Installation of simple, gravity-fed small fish ponds using native species for subsistence use, where soils, elevation gradients and access to stream water permit	Household food security and income
Grid-connected solar-PV power plant coupled with mini hydros instead of Mucundi hydropower dam		Avoided flow regime alterations and associated avoided losses in floodplain ecosystem services and tourism values ; difference in energy infrastructure costs

Table 2: Environmentally-focused interventions and associated benefits (only benefits in bold quantified in this analysis).
(continued from previous page)



RETURN ON INVESTMENT

The analysis demonstrates that the Fund would significantly improve livelihoods, ecosystem health and the resilience of the Basin under the Resilient Development Scenario. Figure 21 summarises the tangible impacts to households across the CORB. The results show that key threats to livelihoods

and ecosystems are minimised, while supporting development goals.

The monetary value of the CORB Fund's impact was estimated using the benefit-relevant indicators identified in the modelling exercises, literature

METRIC OF INTEREST	BaU	RD	METRIC OF INTEREST	BaU	RD
River low flows	▼	●	Energy access	●	▲
River high flows	▲	●	Rural food security	●	▲
Groundwater recharge	▼	●	Artisanal fisheries production	▼	●
Sediment yield	▲	●	Sustainable honey production	●	▲
Agricultural yield (combined)	▲	▲	Forest cooperative income	●	▲
Protected/conserved forest	▼	▲	CO ₂ emissions	▲	▼
Municipal water treatment costs	▲	▲	Water-related disease burden	▲	▼
Ecotourism income in Angola	●	▲	Time spent collecting water/wood	▲	▼
Ecotourism income in Namibia	▼/●	●	Accessibility to markets	●	▲
Ecotourism income in Botswana	▼/●	●	Household indoor air quality	▼	▲
Water and sanitation access	▼/●	▲	Skills development and training	●	▲

▲ Favorable increase ▼ Unfavorable increase ● No change

▼ Favorable decrease ▲ Unfavorable decrease

Size of arrow indicates relative amount of change

Figure 21: Resilient Development outperforms Business-as-Usual in both metrics for development goals and ecosystem health.

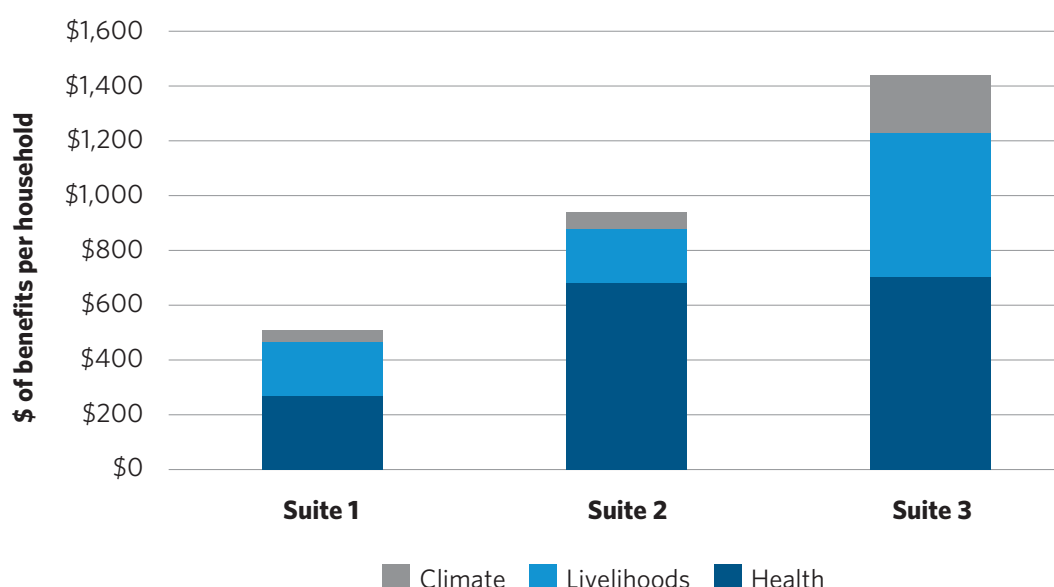


Figure 22: Annual social benefits across intervention Suites.

review and thorough expert input. The Team then compared the value of these benefits with the costs associated with implementing all Resilient Development interventions over the 30-year period (2020-2050) to calculate an overall benefit-cost ratio that indicates the potential ROI for the Fund.

SOCIALLY-FOCUSED INTERVENTIONS

The socially-focused interventions would generate substantial benefit at the household level in the form of improved livelihoods and health outcomes, as well as reduced negative climate impacts. Figure 22 provides a comparison of the average annual benefits per household across the different intervention suites. Suite 1 interventions yield benefit valued at over \$500 per household per

year, of which 90% accrue directly to individuals and households living in the Basin. The annual household benefits rise to around \$1000 per household in Suite 2 interventions and to around \$1400 for each household in the Suite 3 interventions.

The net benefits and ROI shown in Table 3 reflect how the economic values of health, livelihood and climate benefits outweigh costs of implementation and maintenance of socially-focused interventions. In all cases, all net benefits are substantially positive, highlighting the substantial benefits that the Fund would bring. The Benefit Cost Ratios (BCRs) as well as the discounted net benefits are higher when the intervention is applied at a larger scale.

SUITE	SCALE OF INTERVENTION	DISCOUNTED BCR	DISCOUNTED NET BENEFIT, \$M
Suite 1	Small (average 100 HH)	3.8	0.6
	Medium (average 100 HH)	8.8	3.7
Suite 2	Small (average 100 HH)	3.9	1.3
	Medium (average 300 HH)	7.9	5.7
	Large (average 700 HH)	16.3	19.9
Suite 3	Medium (average 300 HH)	5.4	6.4
	Large (average 700 HH)	9.3	22.0

Table 3: Net benefit values, benefit cost ratios and internal rates of return for socially-focused interventions

INTERVENTION	BUDGET ALLO- CATION (%)**	DISCOUNTED NET BENEFITS (\$/ha)	DISCOUNT- ED BCR	AREA (ha)
Increase and improve management of protected areas	1	239*	165	1 250 000
Assisted natural forest regeneration	21	1910	3.1	41 850
Improve forest management (PES; beehives)	21	1511	2.4	35 000
Reduce urban charcoal demand	6	n/a	4.5	n/a
Replant (forest restoration)	22	616	1.5	32 500
Smallholder crop productivity (fertilizer, riparian buffers, gravity-fed irrigation)	22	16 634	9.4	20 300
Community co-managed fishery reserves and smallholder pond aquaculture	8	4939	1.2	429

* Includes only transaction costs for protected areas, not management costs.

** Percentage of the budget of environmentally-focused interventions. Does not sum to 100 due to rounding.

Table 4: Budget allocation, present value net benefits per hectare, benefit-cost ratio and implementation area of the environmentally-focused interventions (30 years, global SCC value).

ENVIRONMENTALLY-FOCUSED INTERVENTIONS

Even with the limited quantification of the benefits that the environmentally focused interventions produce (Table 2), all interventions have individual ROIs that exceed unity (1) (Table 4), indicating that the present value (PV) of their benefits exceeds the present value of their costs over the 30-year analysis horizon.

The net benefits and ROI values shown in Table 4 reflect only the avoided Angolan portion (0.8%) of the global social cost of carbon (USD227/tCO₂e) under the Resilient Development scenario. The overall ROI of the environmentally-focused interventions is 6.2, meaning that each dollar invested in this intervention suite generates over six dollars in returns, and the environmentally-focused interventions together generate an estimated \$958 million in net present value over the 30-year analysis horizon (Table 5). It bears reiterating that

these results are based on counting only Angola's (0.8%) and Botswana's (0.3%) shares of the global SCC because the analysis considers only costs and benefits that accrue within the Basin. If instead the global SCC is used – as it would be in an analysis that captures all benefits and costs of climate change mitigation regardless of where they accrue – the ROI of the environmentally-focused interventions increases to over 200.

Use of a higher discount rate (e.g., 6% instead of the 3.24% baseline rate) does not affect the ROI but does reduce the estimated 30-year net present value benefits from \$958 million to \$705 million.

INTEGRATED RETURN ON INVESTMENT ANALYSIS

The Resilient Development scenario assumes an effective average annual intervention budget of USD 20.8 million, allocated to socially-focused and environmentally-focused interventions in a 1-to-1 ratio. For both the socially and the environmentally

COSTS	182.5
Agricultural interventions (fertilizer, gravity-fed irrigation, riparian buffers)	40.0
Fishery reserves and smallholder aquaculture	13.8
Expansion & improved protected area management	1.8
Measures to reduce urban charcoal demand	11.7
Improved forest management (PES)	37.7
Assisted natural regeneration (ANR)	37.8
Replanting (reforestation)	39.7
BENEFITS	1,140.8
Increased smallholder crop yields	377.7
Gains in subsistence fish yields from smallholder aquaculture + fish reserves	15.9
Tourism gains relative to BaU	368.1
Harvested wild resources in the basin	146.3
Carbon mitigation in basin (Angolan SCC value)	174.6
Avoided losses in human uses of floodplains	28.2
Avoided losses in carbon mitigation in the Delta (Botswana SCC value)	29.8
NET PRESENT VALUE	958.2
BENEFIT: COST RATIO (ROI)	6.2

Table 5: Present value (PV) costs and benefits of the environmentally-focused interventions (million USD).

focused intervention portfolios, implementation is assumed to ramp up gradually during the first five years of interventions (2021–2025) before attaining full deployment of its annual intervention budget in 2026.

Over the 30-year analysis period, the socially-focused (ROI=7.6) and the environmentally-focused interventions (ROI=6.2) have a combined ROI of 6.9 – meaning that for every dollar spent on Resilient Development interventions, nearly USD 7 worth of benefits are generated for basin beneficiaries – and generate present value net benefits of USD 2.1 billion. Figure 23 shows the annual, undiscounted costs (dark blue line), benefits (blue line) and net benefits (grey line) of the Fund over the 30-year period.

The integrated ROI analysis also considered the broader opportunity costs and wider benefits associated with resilient development. In principle, these include the development opportunities that

are foreclosed by the activities of the CORB Fund (opportunity costs) as well as any reductions in business-as-usual costs from, for example, the lower-cost energy infrastructure development under resilient development but also the substantial broader economic stimulation and resilience building that occurs as a result of the CORB Fund's direct interventions. The CORB Fund would also play a key role in catalysing additional investment from bi- and multi-lateral actors, as well as a range of investors seeking social and environmental impact in addition to financial returns. Evaluating the full spectrum of these wider impacts quantitatively is beyond the scope of this analysis. However, the analysis quantified some of the broader impacts to present the ROI in a number of wider contexts.

The Resilient Development Scenario assumes that several large hydropower plants will be replaced by grid-connected solar-photovoltaic electricity plants coupled with low-impact smaller hydropower

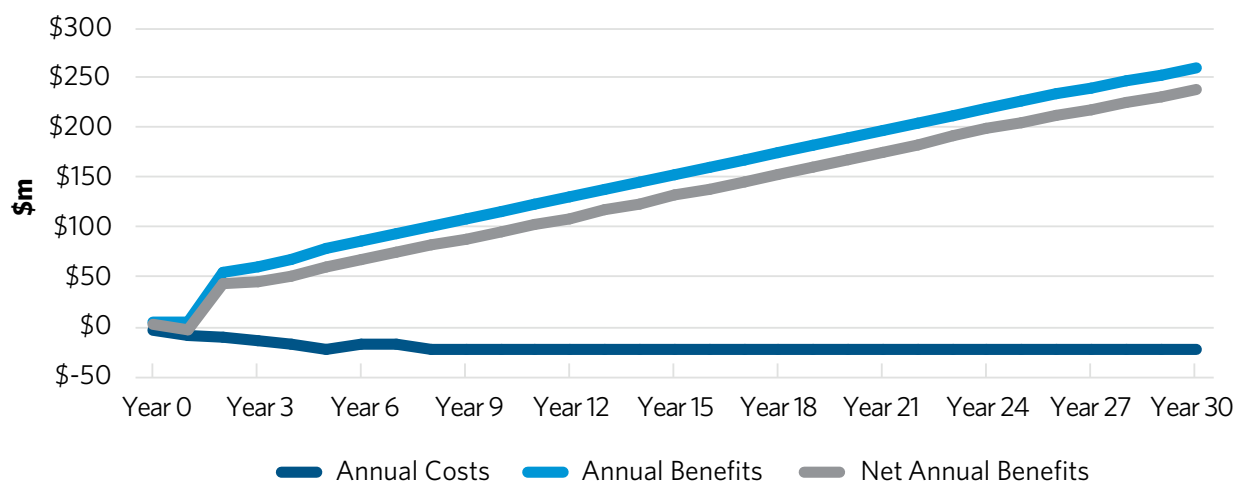


Figure 23: The annual benefits of the Fund's interventions exceed the expected costs to implement them.

facilities. This alternative would be sized and coupled with battery storage sufficient to supply a system-level secure contribution equivalent to that of the large hydropower facilities it replaces. This alternative energy infrastructure development would result in USD 187 million in infrastructure cost reductions over the 30-year period compared to the Business-as-Usual scenario.¹⁰ Importantly, the resulting avoidance of large-scale hydropower impacts on the Basin's flow regime drives several of the benefits listed in Table 5, including for human floodplain uses (fisheries, reed and other plant harvests, floodplain recession agriculture and *molapo* fields, and carbon storage and tourism in the Delta).

On the other hand, the Resilient Development Scenario also foresees a reduction in the expansion of irrigated commercial crop area in the upper Basin by 65,465 hectares. Based on MSIOA data on the capital costs of irrigated cropland development, predicted crop types and acreage and net revenues by crop, this reduced expansion of croplands carries an estimated present value net cost of USD 917.5 million over the 30-year analysis period.

Including the cost reductions associated with the alternative energy development and the costs associated with the reduction in irrigated cropland development in the upper Basin, the Resilient Development Scenario still has on overall integrated ROI of 2-to-1 and generates total net present value benefits of USD 1.4 billion. This result highlights that the alternative pathway holds greater benefit for the Basin, even when accounting for significant development options that the Resilient Development Scenario forecloses.

10 Gesto and VIG World. 2021. Okavango Basin – Energy feasibility study for Cuando-Cubango Province: Alternative generation scenarios. AN.2021.A.008.0. March 2021. 80 pp.



MEASURING IMPACT AND PROGRESS

A successful CORB Fund would include a robust, dynamic monitoring, reporting and verification (MRV) system to capture data on progress towards key deliverables at the project level through to strategy and programme level, assess the continued appropriateness and effectiveness of the social and environmental interventions, remain accountable to program participants and communities, and demonstrate the Fund's impact to the Member states, funding partners and other key stakeholders.

The MRV system's main objectives would include ensuring meaningful livelihoods and conservation impact through explicit beneficiary-centric results measurement; frequent, informative and harmonized reporting to funding partners; and, the incorporation of feedback into the strategy, grant disbursement and project mechanisms. To achieve these objectives, the institutions involved in Fund must adhere to good governance, practice prudent and adaptive management, consistently revisit and adapt the Fund's Theory of Change.

The MRV system should be designed as a continuous monitoring, feedback and improvement loop. This sort of adaptive management approach can increase both the efficacy and efficiency of management actions by enabling decision makers to target resources where they will achieve the most impact. Additionally, it will allow managers to make timely adjustments to improve performance and to adapt to the ever-changing context in the Basin.



CONCLUSION

The Cubango-Okavango River Basin is a unique, global treasure. It is one of the largest remaining, near-pristine river basins on Earth. The jewel of the CORB, the Okavango Delta, depends on a natural pattern of river flows and good quality water from Angola. Changes to the Basin are imminent, and the way in which infrastructure is developed will have a lasting impact on the health of the rivers, the Delta and more than a million people who depend on the Basin's natural resources. Continued forest loss, curtailment of the seasonal flood pulse and reductions in the area of seasonally flooded wetlands threaten the whole system.

The economic value of increased resilience and decreased threats made possible by targeted funding through the CORB Fund and other Resilient Development Scenario interventions is estimated to exceed USD 2.1 billion. This translates into a projected benefit-cost ratio of almost 7-to-1, meaning that for every USD 1 spent on Resilient Development interventions, an estimated USD 7 worth of benefits are generated for Basin beneficiaries.

This Value Proposition demonstrates that modest investments, catalysed by the CORB Fund, in lower-impact, ecological infrastructure, sustainable tourism and rural livelihood development, along with traditional, well-sited, conventional infrastructure would generate significant, equitable impacts and economic benefits across Angola, Namibia and Botswana. Securing investments from development partners that share the CORB Fund's vision would give the Fund the resources it needs to put the entire Basin on a more sustainable trajectory, ensuring the future of the ecosystem and the people and wildlife who call it home.