THE WILDERNESS PROJECT

EXPEDITION OVERVIEW

WEST LUNGA RIVER

ZAMBIA

THE WILDERNESS PROJECT

ABOUT THE WILDERNESS PROJECT

By 2035, in partnership with local communities, governments, researchers and NGOs, The Wilderness Project aims to explore, study and better protect 1.2 million square kilometres of irreplaceable African wilderness. Central to this effort is establishing detailed hydrological and ecological baselines of the largely undocumented sources and watersheds of Africa's greatest river basins — Zambezi, Congo, Nile, and Okavango.

ACKNOWLEDGEMENTS

Our research transects would be impossible without the collaboration of our partners, who provide access to the river, permissions to camp, and invaluable local perspectives. For their continued support for our work along the West Lunga River, we thank Department of National Parks and Wildlife, Department of Fisheries, Copperbelt University, African Parks, the Water Resources Management Authority, the University of Zambia, and the Wild Bird Trust.

WILD BIRD TRUST

Ministry of Fisheries and Livestock

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INTRODUCTION

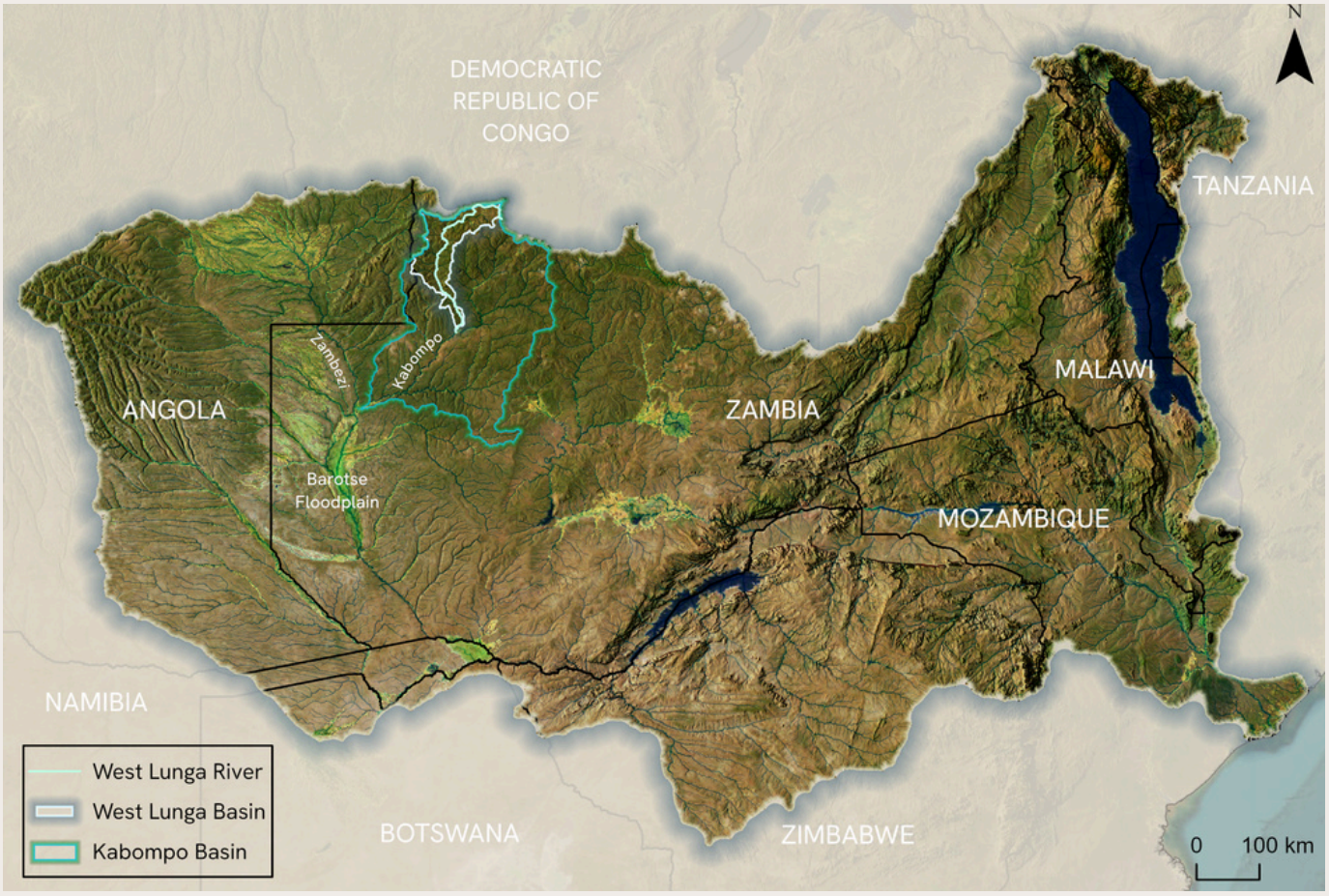
The West Lunga River rises in peatlands near the Zambia–DRC border and flows south for 578 km. Along its course, it cuts through miombo woodlands and wetland mosaics before defining the western boundary of West Lunga National Park. As one of the few perennial rivers in this seasonal landscape, it sustains the park's endemic *Cryptosepalum* ("mavunda") forests, grasslands, and papyrus swamps, and supports wildlife year-round.

At the park's southern edge, the West Lunga joins the Kabompo River, a major tributary of the upper Zambezi. At this confluence the West Lunga contributes more water than the Kabompo, making it a dominant source of flow. These contributions provide vital baseflows that buffer downstream systems during the dry season and help sustain the Barotse Floodplain—a Ramsar-listed wetland of global importance. The floodplain supports exceptional biodiversity and underpins the livelihoods of tens of thousands of people who depend on its fisheries, grazing, and agriculture[1].

The expedition team navigating the West Lunga River, with dense riparian woodland on the left bank and open wetland on the right.

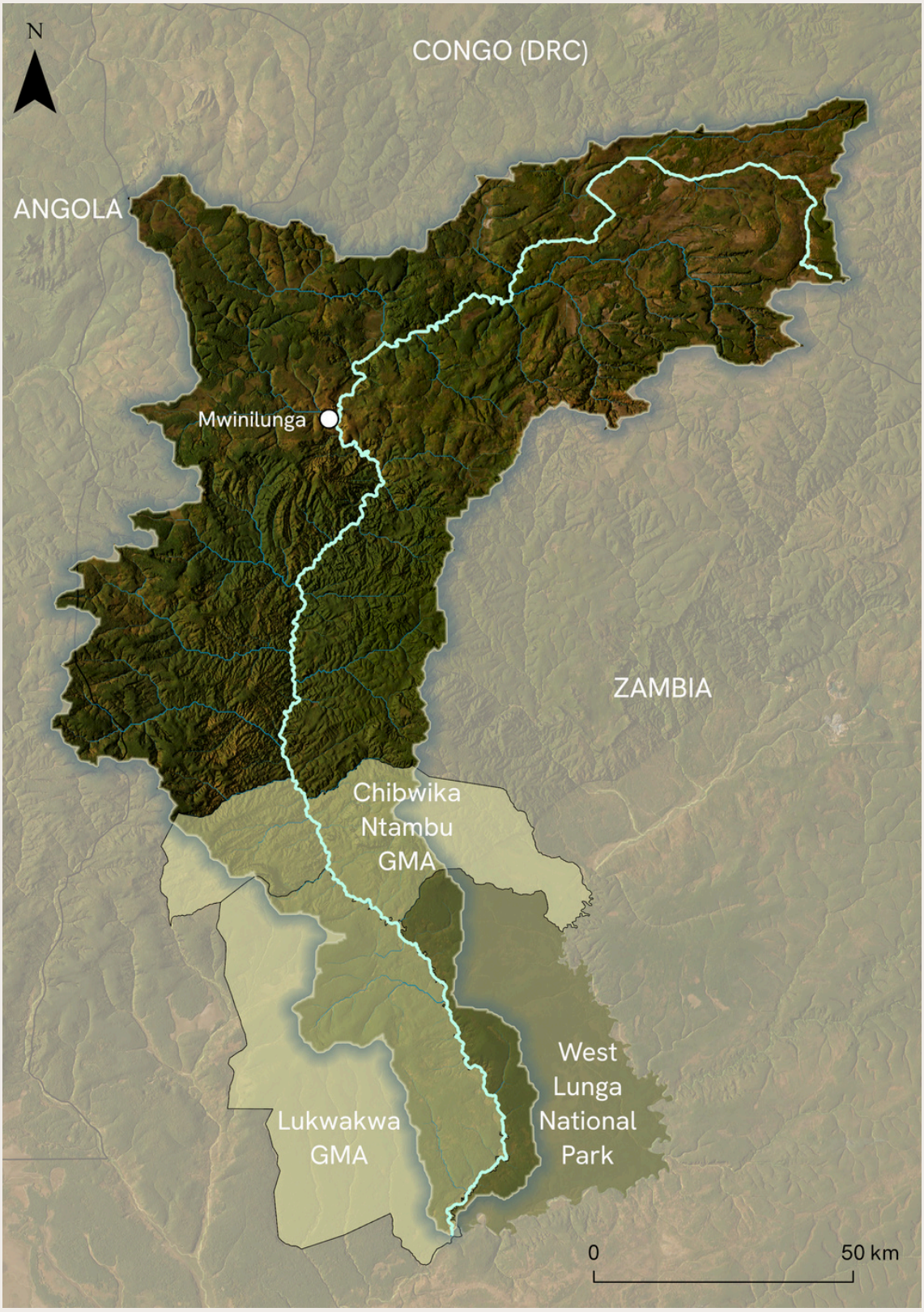
THE ZAMBEZI BASIN

The West Lunga River forms part of the vast Zambezi Basin, southern Africa's largest transboundary river system. Within this system, it lies in the Kabompo sub-basin—designated a priority Water Resource Protection Area. Its headwaters rise close to the watershed divide that separates the Zambezi from the Congo Basin, placing the river at a critical hydrological transition between two of Africa's great drainage systems.



The West Lunga River and its basin (light blue, 12,000 km^2) within the Kabompo Basin (green, 72,000 km^2) in northwestern Zambia near the Angolan border.

WEST LUNGA RIVER BASIN



Map of the West Lunga River Basin, showing the river's course from its headwaters near the DRC border southwards through Mwinilunga, with surrounding Game Management Areas (Chibwika Ntambu and Lukwakwa) and West Lunga National Park at its southern extent.

THE EXPEDITION

578 km

traversed by foot, inflatable ark and kayak

10	58	20
team members from five African countries	research sites established	days on expedition

The Wilderness Project (TWP) conducted a 578 km research transect along the West Lunga River from 7 – 29 June 2025. The aim was to collect baseline data on hydrology, water quality, biodiversity, and human activity to inform future monitoring and support sustainable river management. The study also identified key conservation insights, including ongoing threats to the river.

Starting at the source, the team walked the first 30 km and paddled the remainder of the expedition. The expedition team consisted of African researchers, storytellers, expert river guides, and a land support team.

RECOMMENDATIONS

Protection and Research of West Lunga Source Peatlands

The West Lunga River originates from a small source lake surrounded by peatlands on the Zambia–DRC border. These peatlands are critical to the river's resilience, regulating flow, storing carbon, and sustaining biodiversity, yet they remain poorly studied. It is recommended that detailed field research—including sampling for peat depth and carbon content—be undertaken to map and characterize these headwater peatlands. Such work would provide the first baseline for understanding their role in regional hydrology and climate regulation.

Support for the West Lunga Conservation Project

Wildlife surveys revealed extremely low densities—just 5 animals per 10 km inside protected areas compared to 50 animals per 10 km along the Lunga in Kafue. Supporting the West Lunga Conservation Project (WLCP) is essential to restore this depleted landscape. Direct support from government agencies, international NGOs, and conservation donors is needed to expand anti-poaching patrols, strengthen community-based natural resource management, and finance habitat recovery programmes.

Fish biodiversity and taxonomic research

Fish surveys during the expedition recorded 25 species, including a potentially new Mormyrid genus and an undescribed Lacustricola species. These discoveries highlight the West Lunga as a hotspot for ichthyological diversity and possible endemism. It is recommended that systematic fish studies be carried out along the full course of the river—from its source to its confluence with the Kabompo—to catalogue species diversity, establish population baselines, and inform conservation priorities.

Hydrological Monitoring at the Confluence

At its junction with the Kabompo River, the West Lunga was flowing at 56 m^3/s whereas the Kabompo was flowing at 38 m^3/s. Establishing a permanent monitoring station at this confluence is strongly recommended, with regular measurement of discharge and water quality. Such a station would enable detection of seasonal variability, climate-driven shifts, while quantifying the West Lunga's role in sustaining the upper Zambezi and the Barotse Floodplain.

Invasive Redclaw Crayfish research

Although no invasive redclaw crayfish (*Cherax quadricarinatus*) were detected during the expedition, the species has already established populations downstream in the Barotse Floodplain, and previous studies suggest it may also be present in the West Lunga system. Given its rapid spread, it is highly likely that redclaw crayfish will invade the West Lunga. Continuous monitoring of their invasion front is therefore recommended, alongside targeted sampling using traps and baited remote underwater cameras to verify presence or absence and enable early detection and rapid response.

Management of Alien Invasive Plants

Alien plant species such as *Tithonia diversifolia* and *Ricinus communis* are already widespread along the riverbanks near Mwinilunga. A focused removal programme around Mwinilunga is recommended to contain these species and prevent further spread downstream. Such action would help safeguard riparian habitats and sustain the ecological integrity of the West Lunga system.

METHODS

CONTINUOUS MONITORING

During the transect, teams collected continuous survey data and 360° imagery. Each team included an observer and a recorder. Observers scanned the river and both banks — up to 100 m from the edge — identifying features such as land use, infrastructure, biodiversity, and signs of disturbance. Recorders logged observations in real time using the Survey123 (ESRI) app on a smartphone, ensuring spatially referenced data across diverse indicators.

FIXED SURVEY SITES

Fixed survey sites were established at regular intervals to capture detailed information on water quality, biodiversity, and land use. These sites offer a strong foundation for long-term monitoring by communities, river authorities, and NGOs involved in river stewardship.

- *Every 10km*: using drone imagery and water analysis, researchers revealed patterns not visible through observation alone.
- *Every 50-75km*: eDNA sampling, macroinvertebrate surveys, and further testing provide a foundation of river health and biodiversity.

OPPORTUNISTIC SITES

To complement continuous observations, researchers conducted targeted sampling at selected sites along the transect. Leveraging local river conditions and insights from visual surveys, they deployed overnight bat recorders, set traps for freshwater fish and crustaceans, collected water samples, and measured river discharge. This approach enabled more detailed assessments of the river's hydrochemistry, hydrology, and biodiversity.

RESEARCH SITES

49 fixed sites

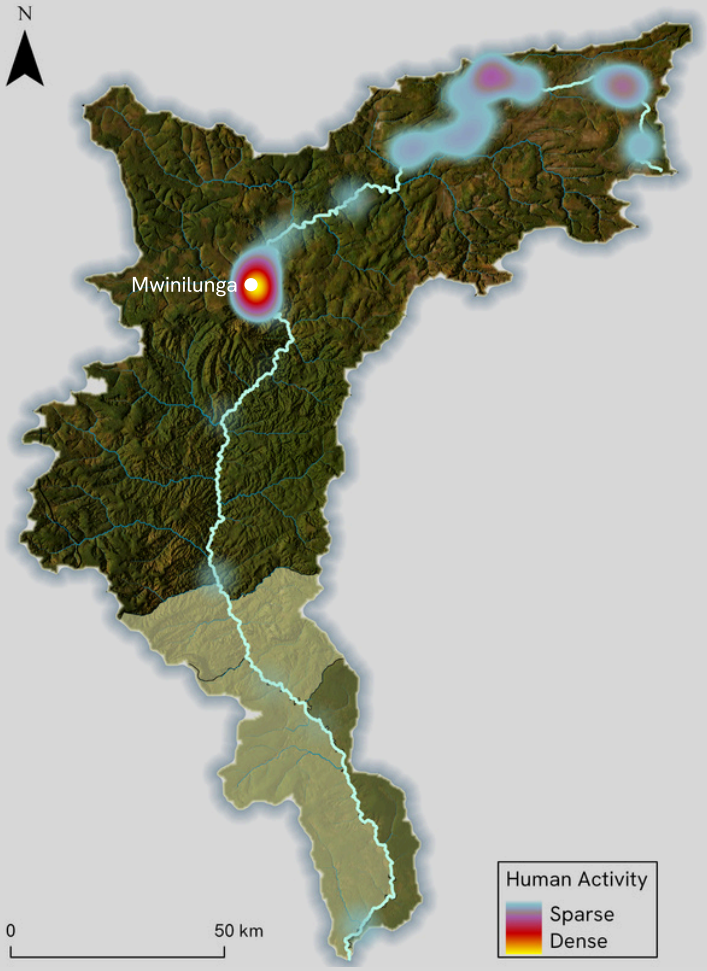
63	56	44
water quality measurements	aerial drone surveys	wetland bird species recorded

The locations of 49 fixed and 9 intensive research sites.

HUMAN FOOTPRINT

The West Lunga River exhibited a low population density of 8 people/10 km, with most human activity concentrated around Mwinilunga — the only permanent settlement along its course. The river is sparsely inhabited compared to other rivers in the Zambezi Basin (see comparison in table below).

Communities along the West Lunga rely mainly on fishing, small-scale farming, and beekeeping. Fishing pressure was greatest in the upper and middle sections, where basket traps, weirs, and nets were common, while downstream activity shifted to nets and lines. Subsistence farming, focused on maize, cassava, bananas, and vegetables, was concentrated around Mwinilunga, with little cultivation recorded further along the river. Beekeeping was also widespread, with numerous hives observed in the upper reaches. Dugout canoes remain the primary means of transport, used both for fishing and daily movement along the river.



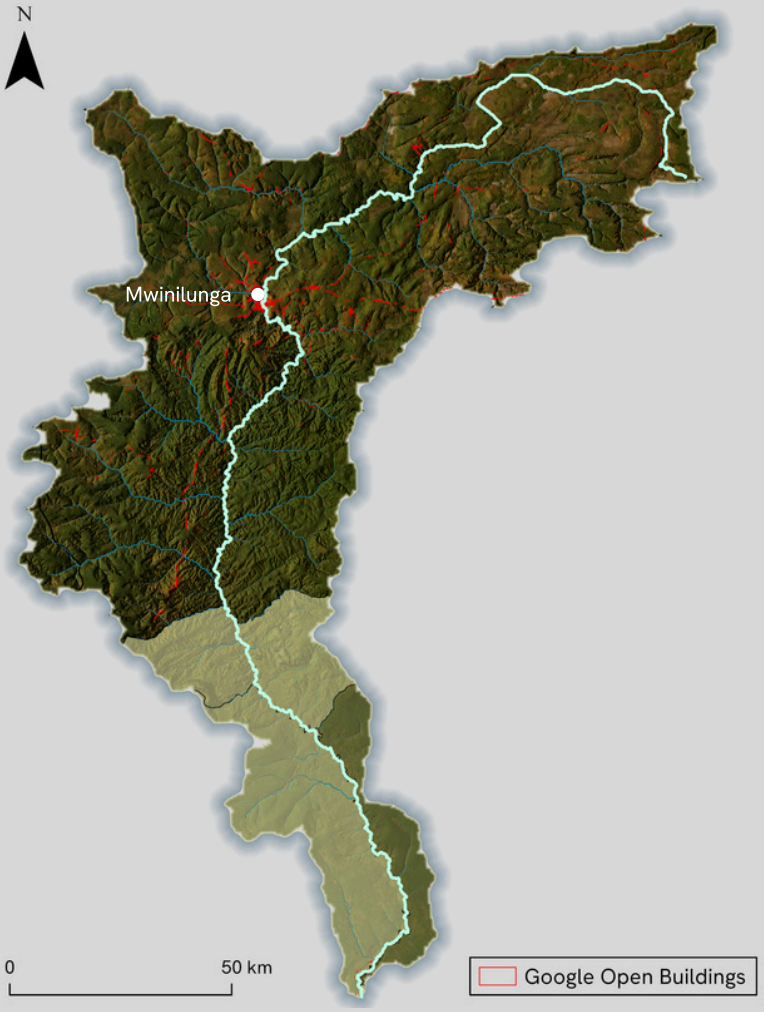
Observations	West Lunga River	Zambezi Basin Average
People/10 km	8	46
Fishers/10 km	<1	4
Vessels/10 km	5	23
Livestock/10 km	<1	35

Distribution of people along the transect (left). The summary of observations (right) shows several indicators of human activity, averaged per 10 km along the transect. Note the low levels of human interaction along the West Lunga River compared to the rest of the Zambezi Basin.

BUILDING ANALYSIS

Google's Open Buildings dataset is a global mapping resource that uses high-resolution satellite imagery to identify and outline individual building footprints[2]. By mapping the location and density of buildings, the data provides a landscape-wide view of human activity. This perspective allows for consistent, basin-scale analyses that help to identify areas of potential environmental impact.

The West Lunga River remains relatively underdeveloped, with a building density of just 4 buildings/km^2 — less than half that of the Kabompo River, which averages 10 buildings/km^2 within a 4 km buffer. This low level of development is largely attributed to limited road access and the presence of a national park along its banks. Notably, building density within the 4 km buffer of the West Lunga is higher than in the wider basin, primarily because Mwinilunga falls within this zone.



Building density within 4 km of the river

4 buildings/km^2

Building density within the Basin

2 buildings/km^2

The distribution of buildings within the West Lunga Basin. Note the higher density of buildings within a 4km buffer of the river compared to the entire basin.

WETLAND BIRDS

Birds are among the most responsive indicators of habitat availability. Wetland birds in particular depend on healthy, intact wetlands to forage, breed, and roost, making them sensitive to habitat degradation. Continuous monitoring of birds can reveal early warning signs of environmental degradation and help to identify critical nesting and foraging areas that require conservation attention.

Along the transect, a total of 964 individuals representing 44 species were recorded. The most abundant species were the White-fronted Bee-eater, Shining Blue Kingfisher, Giant Kingfisher , African Darter, and Hadada Ibis. There were also 72 raptors observed, including the Western Banded Snake Eagle (n = 22), African Harrier Hawk (n = 11), and Bateleur (n = 9). The presence of both fish-dependent species and a range of raptors suggests that the river continues to provide productive foraging grounds and supports a relatively intact riparian habitat.

The 10 most common wetland bird species along the transect:

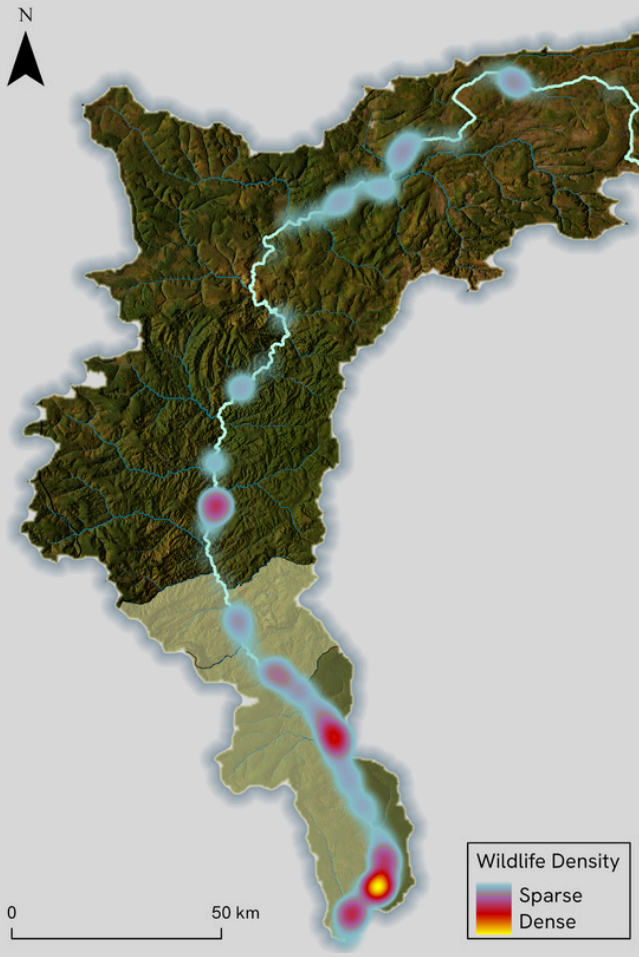
White Fronted Bee-eater	297
Shining Blue Kingfisher	129
Giant Kingfisher	79
African Darter	51
Hadada Ibis	46
Pied Kingfisher	42
Malachite Kingfisher	37
Brown Hooded Kingfisher	34
Striated Heron	32
African Black Duck	30

WILDLIFE

Wildlife sightings along the West Lunga were sparse. During the survey, 249 individuals from eight species were recorded, including monkeys, otters, hippopotamus, and crocodiles. Within protected areas, wildlife densities remained low, averaging 5 animals/ 10 km. For comparison, the stretch of the Lunga River bordering Kafue National Park held about 50 animals/ 10 km. This low detectability may partly reflect the dense riparian vegetation, which restricted the observers' field of view.

The scarcity of sightings along the West Lunga likely also reflects the park's history of intensive poaching and neglect. Decades of uncontrolled hunting have severely reduced large mammal populations, leaving the ecosystem biologically depleted — leaving behind a skeleton ecosystem[3].

Outside Protected Areas	Inside Game Management Areas	Inside West Lunga National Park
2 animals /10 km	5 animals / 10 km	5 animals / 10 km



Wildlife distribution along the transect, highlighting a significant concentration within Kafue National Park

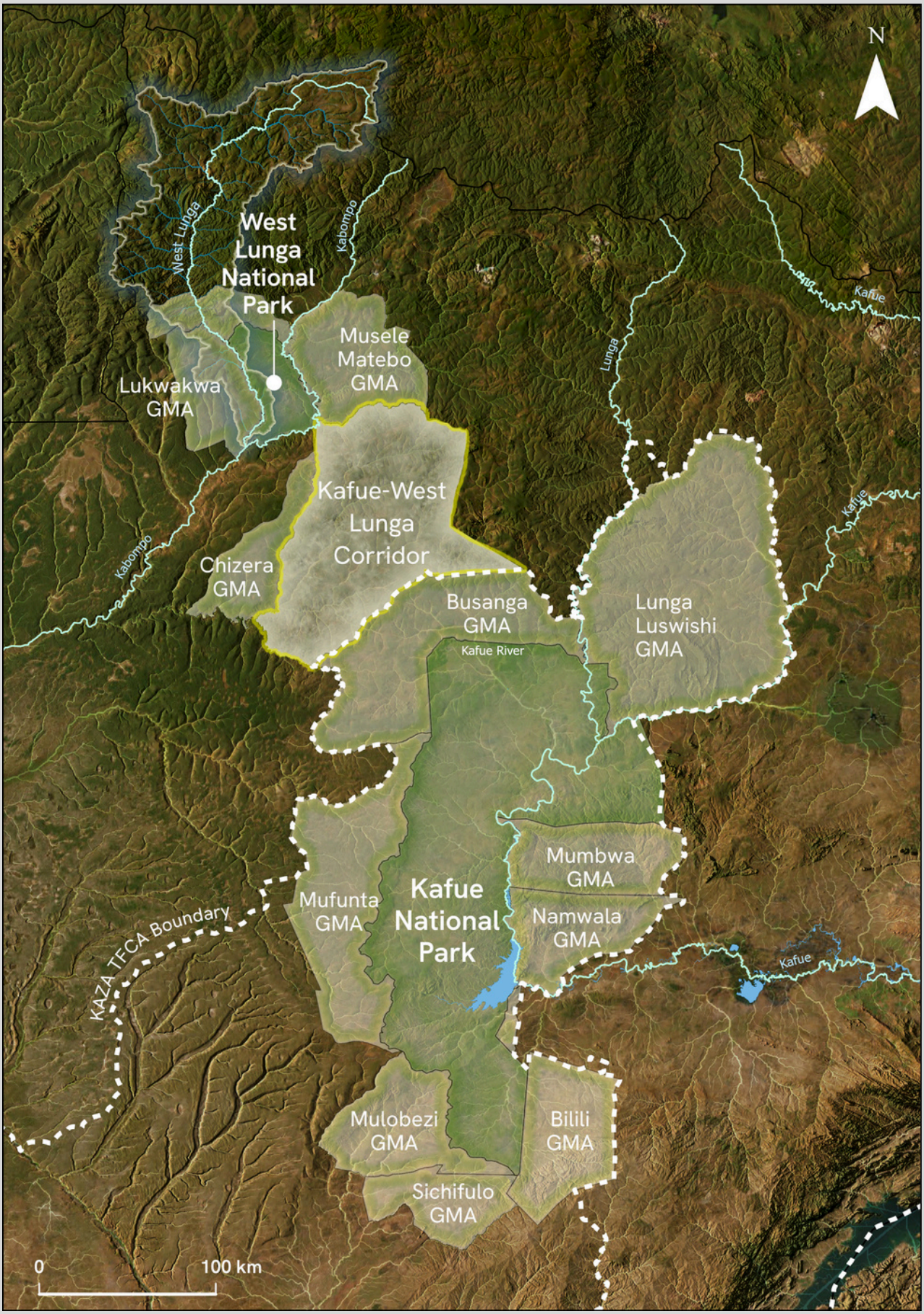
GREATER KAFUE-WEST LUNGA MEGA LANDSCAPE

The Greater Kafue–West Lunga Mega-Landscape is one of Zambia's most ecologically significant yet under-recognized wilderness regions[4]. Stretching from Kafue National Park in the east to West Lunga National Park in the west, this vast area forms a vital ecological continuum across northwestern Zambia. At its core lies the proposed Kafue–West Lunga Conservation Corridor — an ancient migratory pathway that links these two national parks.

West Lunga National Park protects a rare and largely undisturbed expanse of *Cryptosepalum* forest, a dense evergreen thicket endemic to the park. These forests, along with seasonally inundated grasslands, peatlands and riverine systems, support a rich diversity of flora and regulate water for the Kabompo Basin. While the park's remoteness has helped preserve its flora, it has also led to its long-standing neglect.

Since its designation in 1941, West Lunga has received little in the way of investment or infrastructure. For much of its history, there was no formal management presence, leaving the area vulnerable to poaching. Decades of poaching reduced populations of large mammals such as elephant, buffalo, roan, sable, and hartebeest. Predator species disappeared, and the park's ecological processes began to unravel. By the early 2000s, West Lunga had collapsed into what ecologists call a "skeleton ecosystem" — habitat largely intact but stripped of its keystone fauna[3].

In response, the West Lunga Conservation Project (WLCP), working with the Department of National Parks and Wildlife, local authorities, communities, and private partners, has launched an ambitious programme to rebuild wildlife populations. Strengthened law enforcement, community stewardship, and habitat protection are laying the foundations for recovery. Already, elephants are beginning to move back into the park along their ancient migratory route[3]. Rivers such as the West Lunga and Kabompo are central to this resurgence, providing reliable dry-season habitats and anchoring the ecological connectivity needed to secure the long-term resilience of the entire landscape.



The Greater Kafue–West Lunga Mega-Landscape, encompassing Kafue National Park, West Lunga National Park, and the surrounding Game Management Areas (GMAs). This vast, connected conservation area extends into the northern section of the Kavango-Zambezi Transfrontier Conservation Area (KAZA TFCA).

FISH SAMPLING

Fish sampling is essential for understanding species diversity, monitoring ecosystem health, and informing sustainable fisheries management. The West Lunga has been included in basin-wide surveys[5], which indicate that fish assemblages in the Kabompo Basin are dominated by Cyprinidae, Cichlidae, and Mormyridae. Within the West Lunga itself, Cyprinidae such as *Labeo lunatus* are widespread. Despite these insights, detailed knowledge of local diversity remains limited, and further surveys are needed to assess the effects of pressures such as overfishing, habitat loss, and disease on fish populations.

To build on this baseline, field sampling was carried out along the West Lunga River. A fyke net was set overnight at 17 sites, complemented by opportunistic dip-netting. Fish were identified in the field, with photographs and voucher specimens retained for verification and future study.

In total, approximately 25 species were recorded during the transect. Two specimens were of particular taxonomic interest: one belonging to a known but undescribed *Lacustricola* species, and another provisionally identified as *Macusenius lambouri*, which may in fact represent a distinct genus. These findings highlight both the richness of the West Lunga's ichthyofauna and the importance of continued taxonomic and ecological research across the river's length.

Known but undescribed lacustricola species.

Currently identified as *Macusenius lambouri*, however potentially belongs to a different genus or requires a new genus.

INVASIVE SPECIES

Alien invasive plants (AIPs) can profoundly alter African river systems, displacing native vegetation, disrupting nutrient cycling, and reducing overall biodiversity. They also affect hydrology by raising evapotranspiration rates, lowering streamflow, and diminishing the dilution capacity of rivers[6,7]. Continuous monitoring is therefore essential, as early detection of AIPs provides the best chance to mitigate impacts before they escalate.

During the expedition, four alien plant species were documented along the West Lunga: *Tithonia diversifolia* (Mexican sunflower), *Ricinus communis* (castor oil bush), *Lantana camara*, and *Pinus spp*. *T. diversifolia* was widespread around Mwinilunga, *R. communis* was found at three separate points — from the river's source to downstream of Mwinilunga — while *Pinus* was largely restricted to the Mwinilunga area. *L. camara* was observed only once, near the source.

Although no redclaw crayfish (*Cherax quadricarinatus*) were detected during this survey, our sampling effort was limited and their presence cannot be ruled out. A basin-wide study[8] likewise found no crayfish in the Kabompo and West Lunga rivers, concluding that populations were either absent or present at undetectably low levels. Given the species' rapid spread elsewhere in the Zambezi Basin, the risk of invasion into the West Lunga remains high. More intensive trapping and the use of underwater baited cameras are recommended to improve detection and ensure rapid response if populations establish.

Mexican sunflower on the banks of the West Lunga.

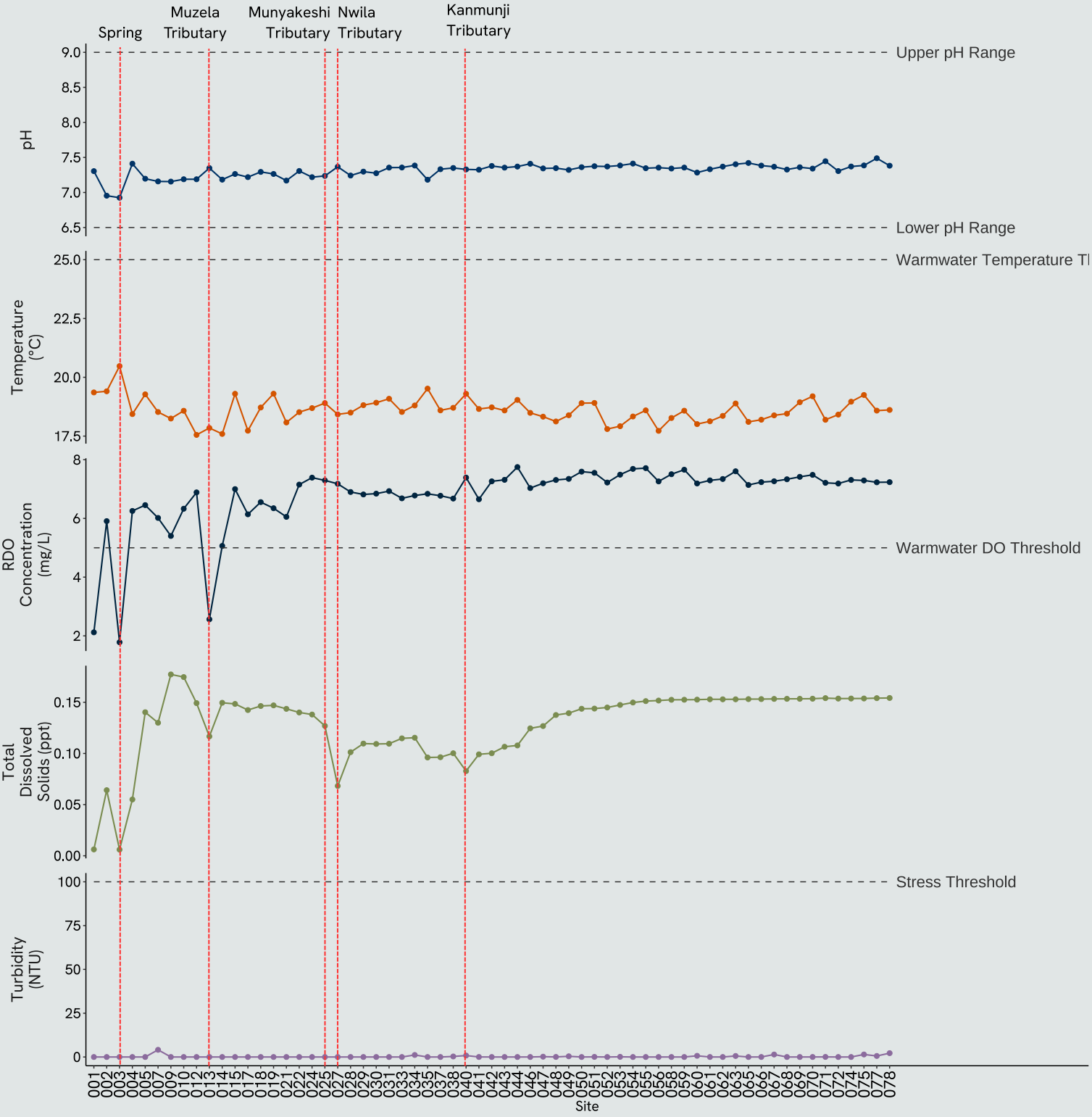
WATER QUALITY

Temperature, pH, dissolved oxygen, total dissolved solids (TDS), and turbidity are measurable physical and chemical characteristics that reflect the water's suitability for uses such as drinking, recreation, or sustaining aquatic life. Monitoring standard water chemistry along the West Lunga River supports the assessment of ecosystem health, helps detect potential pollution sources, and reveals temporal or spatial shifts in water quality.

Water quality conditions along the West Lunga River reflect a largely undisturbed system with high ecological integrity. Although tributaries exhibited distinct water chemistry, with slight differences in conductivity and related measures, these inputs did not alter mainstem conditions. Results remained consistent before and after tributary confluences, indicating localized natural influences without signs of disturbance. Site 3, a spring source, also displayed distinct water chemistry due to its origin from groundwater, which naturally carries different chemical characteristics than surface flows.

A clear pattern emerged in the upper reaches of the river, where TDS increased from the source to site 10. This rise likely reflects the cumulative effect of dissolved ions acquired as the river flows away from its low-ion, peaty wetland source. Inputs may include minerals leached from soils and rocks, groundwater enriched with dissolved salts, and surface runoff carrying ions from the surrounding catchment. Conductivity decreased, probably due to dilution from the Muzela, Munyakeshi and Nwila tributaries.

WATER QUALITY



It’s important to note that these findings represent a snapshot of water quality during the time of sampling, and conditions may shift seasonally or in response to land use changes, rainfall, or other environmental factors. While field parameters offer valuable insight into the river’s condition, they cannot detect all contaminants — such as heavy metals or certain organic pollutants. To supplement this dataset, water samples from selected sites have been submitted for laboratory analysis, with results pending.

RIVER FLOW

The West Lunga River forms part of the Kabompo catchment, which has been designated a national Water Resource Protection Area under Zambia's water governance framework. This designation reflects the importance of safeguarding flows across the catchment that sustain aquatic ecosystems and buffer downstream hydrological systems. As a key tributary feeding into the Kabompo and ultimately the upper Zambezi, the West Lunga contributes to the resilience of one of southern Africa's most important transboundary watersheds.

Discharge measurements at the confluence showed the West Lunga carrying 56 m^3/s compared with 38 m^3/s from the Kabompo, making it the dominant tributary. This contribution shapes the magnitude and timing of flooding pulses, supports nutrient transport to the mainstem, and secures the continuity of aquatic habitats. In doing so, the West Lunga helps sustain biodiversity within the river corridor and underpins the ecological productivity of floodplains that support downstream communities.

The confluence of the West Lunga (Right) and Kabompo (right) rivers. The difference water colours is due to variation in suspended sediments and water chemistry.

RIVER FLOW

Site Number	Description	Discharge (m^3/s)
1	Mainstem	5
2	Muzera Tributary	<1
3	Mainstem	5
4	Mainstem	4
4	Mainstem	36
6	Mudyamyana Tributary	4
7	Mainstem	60
8	Mainstem	56
9	Kabompo Tributary	38

River discharge measurement sites along the transect.

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