

EXPEDITION OVERVIEW

# KWANZA RIVER ANGOLA



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 to establish detailed hydrological and ecological baselines of the largely undocumented sources and watersheds of Africa's greatest river basins – Zambezi, Congo, Nile, Chad and Niger.

## **ACKNOWLEDGEMENTS**

This work would be impossible without the collaboration of our various partners, who enable information-sharing, provide invaluable guidance, and grant permissions wherever we work. For input and collaboration, we thank the Fundação Lisima, African Parks and The Wild Bird Trust. We thank Angola's leadership and particularly Angolan President João Lourenço, for supporting this survey of the Kwanza River. Finally, we thank the traditional custodians who granted us permission to navigate the waters and lands of the Kwanza.



**870km**

Traversed by foot,  
motorbike, and mokoro

**19 people**

From three countries

**86**

Fixed survey sites  
established

**41 days**

14 July – 26 August  
2024

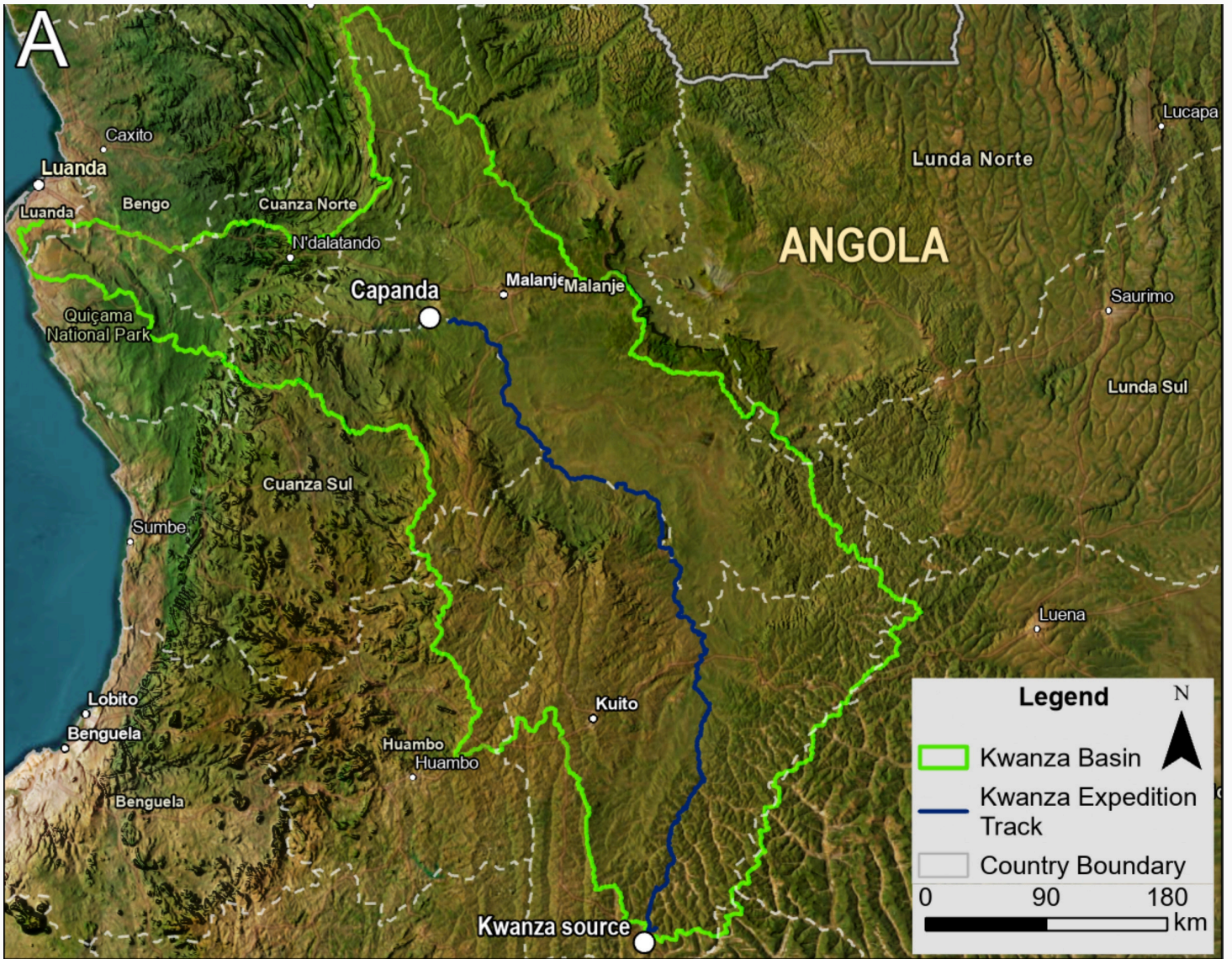
# INTRODUCTION

The Kwanza, Angola's longest river, originates in the Bie Plateau and flows over 960 km to the Atlantic Ocean south of Luanda. Its basin spans 157,000 km<sup>2</sup> – approximately 12.5% of Angola's land area – and includes protected areas like Cangandala National Park and Luando Strict Nature Reserve. These are the last strongholds of the giant sable antelope, a rare, iconic species that is endemic to Angola.

Despite its unique biodiversity, the Kwanza River is increasingly under threat from competing interests, including mining. Moreover, the Kwanza River is poorly studied owing to decades of national conflict, which stymied investment in research efforts. As a result, there is limited information about the hydrology, water quality, biodiversity and human activity along the river.

The Wilderness Project conducted the Kwanza River transect in July–August 2024 to collect several important baseline datasets that will allow for an assessment of the river's health. The transect covered 870 km over 41 days, beginning at the Kwanza source and ending at the hydropower dam at Capanda (map below).

The data collected on this transect offer a snapshot of the Kwanza River using modern scientific techniques. This report, presenting an overview of the preliminary assessment, will be followed by a comprehensive expedition report. It is our hope that these resources will support the researchers, river authorities, local communities and NGOs as they share in the wonder of this unique river.



A) The 870 km track traversed by the expedition team from the Kwanza source to Capanda dam.  
 B) Located in Angola, the Kwanza Basin provides critical resources for diamond mining and hydropower.  
 C) The Kwanza River is the longest river in Angola. It empties into the Atlantic Ocean just south of the national capital Luanda.

# FIXED SURVEY SITES



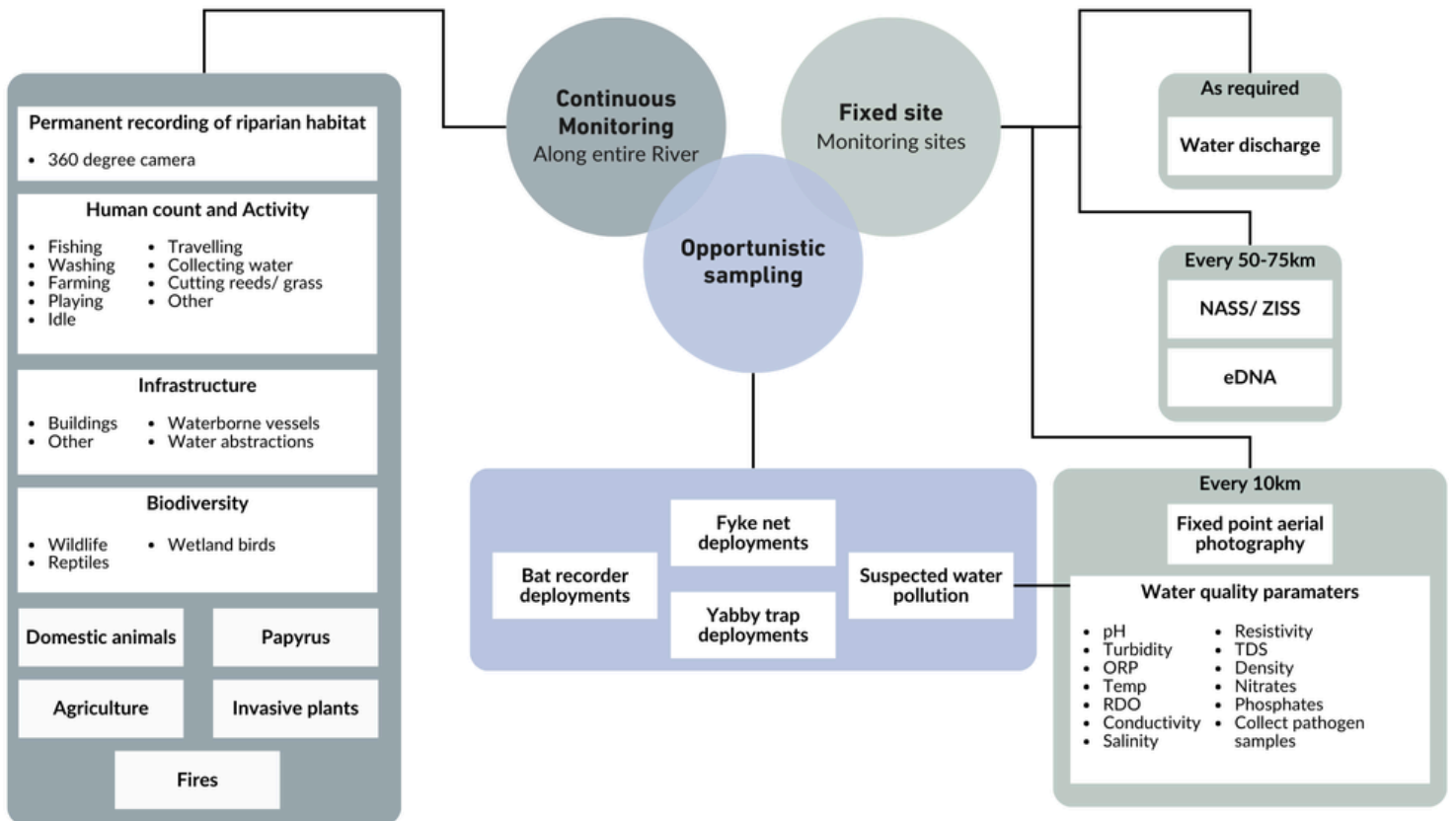
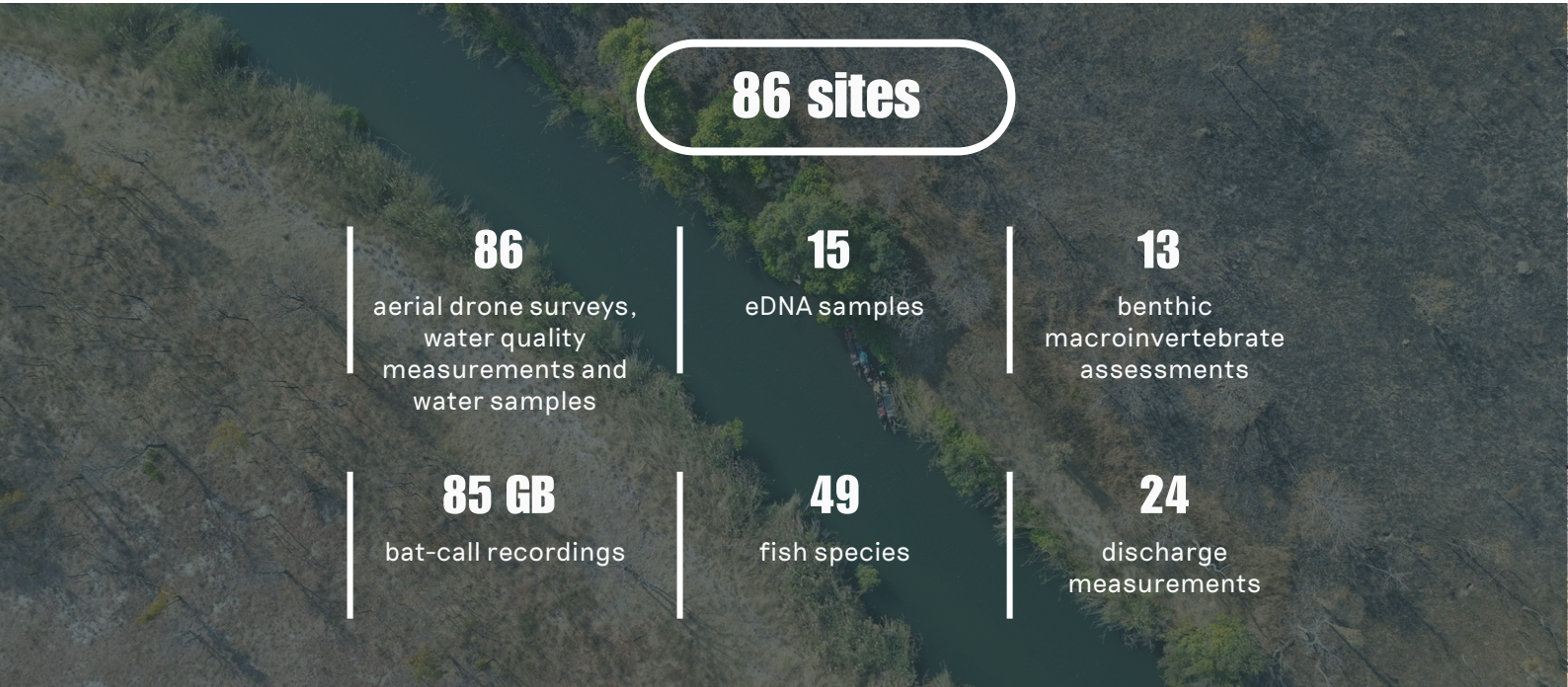
Joao Gomes de Oliveira, an Angolan researcher, collecting eDNA

Rivers are inherently dynamic – experiencing changes through the seasons and years. Implementing fixed survey sites allows researchers to accurately monitor rivers, allowing for comparisons between different sections of the river over the long term. Undertaking regular drone flights, eDNA assessments, macroinvertebrate surveys, and water quality monitoring at fixed sites, allows researchers to detect patterns that only emerge over time. This methodology provides decision-makers and stakeholders, such as water authorities, local communities and NGOs, with a structured way of understanding river variation in terms biodiversity, water quality and human use.



The team travelling along the Kwanza River.

# OVERVIEW OF DATA COLLECTED

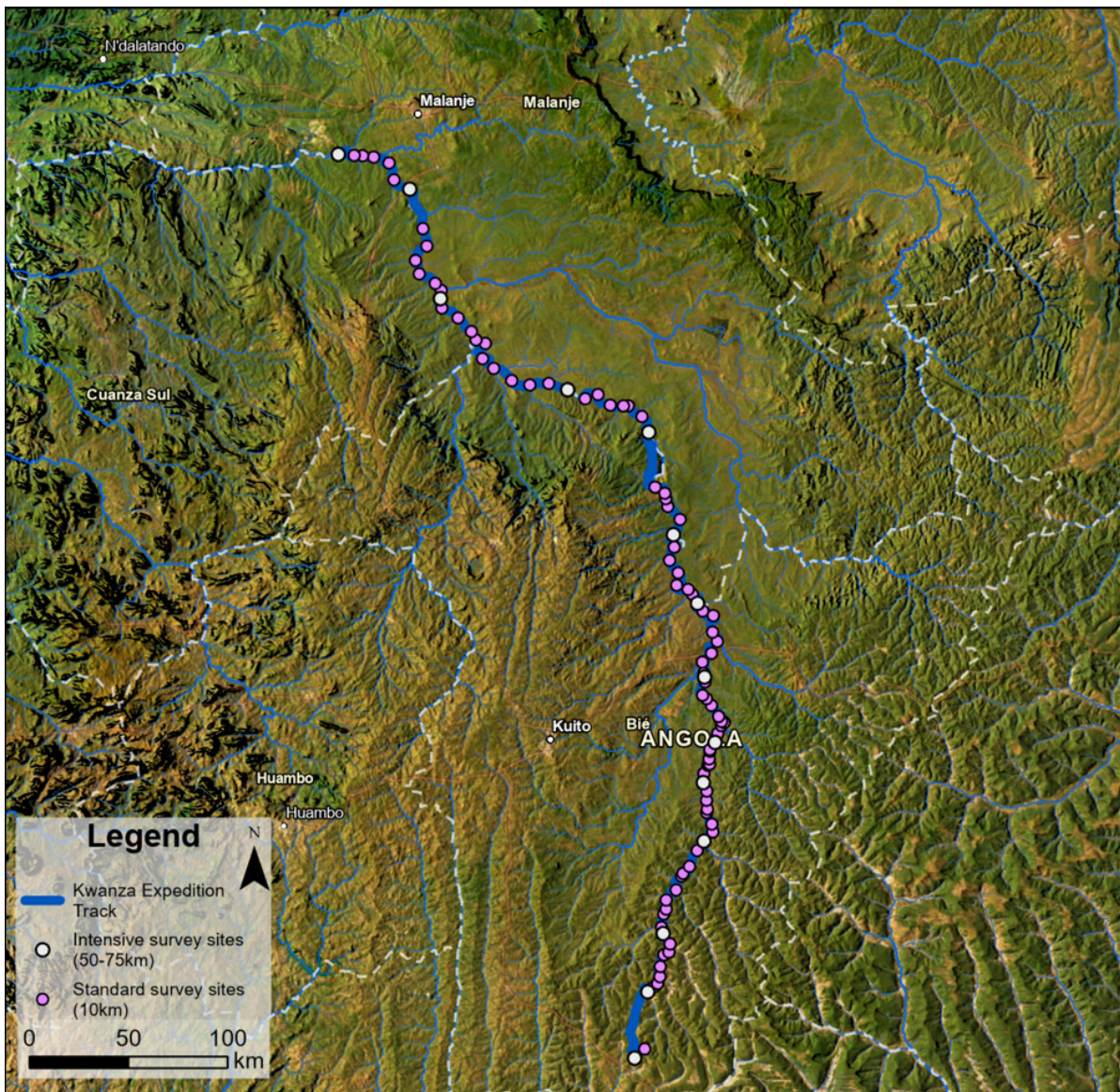


| Summary of data collected on the river.

# OBSERVATIONAL SURVEY RESULTS

Human Impact						Biodiversity	
People/ km	Fishers/ km	Fishing Gear/km	Vessels/ km	Livestock/ km	Cropland (% of transect)	Wetland birds/ km	Wildlife/ km
1.66	0.16	2.08	0.82	0.02	0.18%	2.66	0.38

Summary table showing observations averaged out per kilometer of river surveyed. Notably, no agriculture was observed within 100 m of the Kwanza River, and livestock were only found in a few areas. Diamond mining was prevalent, and this is discussed in detail on page 10.



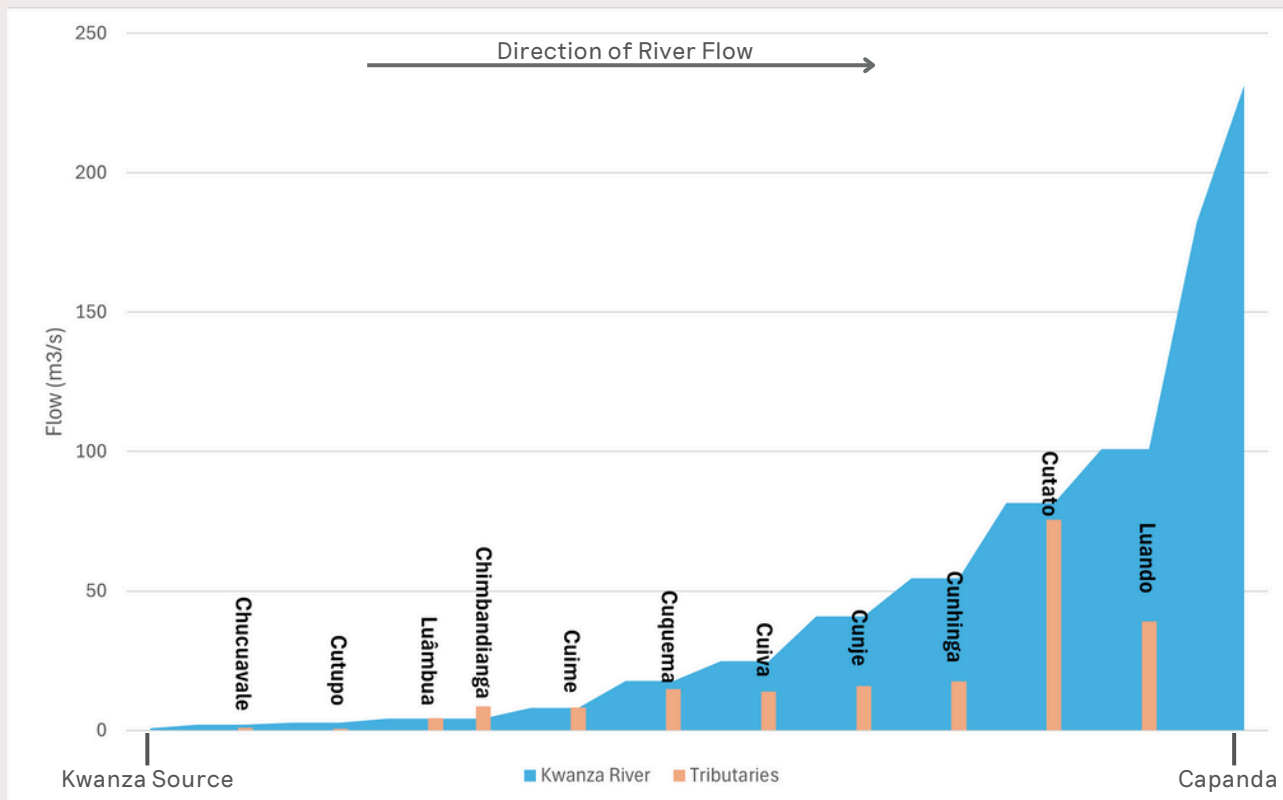
Water quality analysis and drone flights were conducted at fixed survey sites every 10 km along the river. At larger intervals of 50-75 km, eDNA and benthic macroinvertebrates were collected.

# Hydrology



An Acoustic Doppler Current Profiler (ADCP) being towed by canoe. The ADCP is used to collect river flow data.

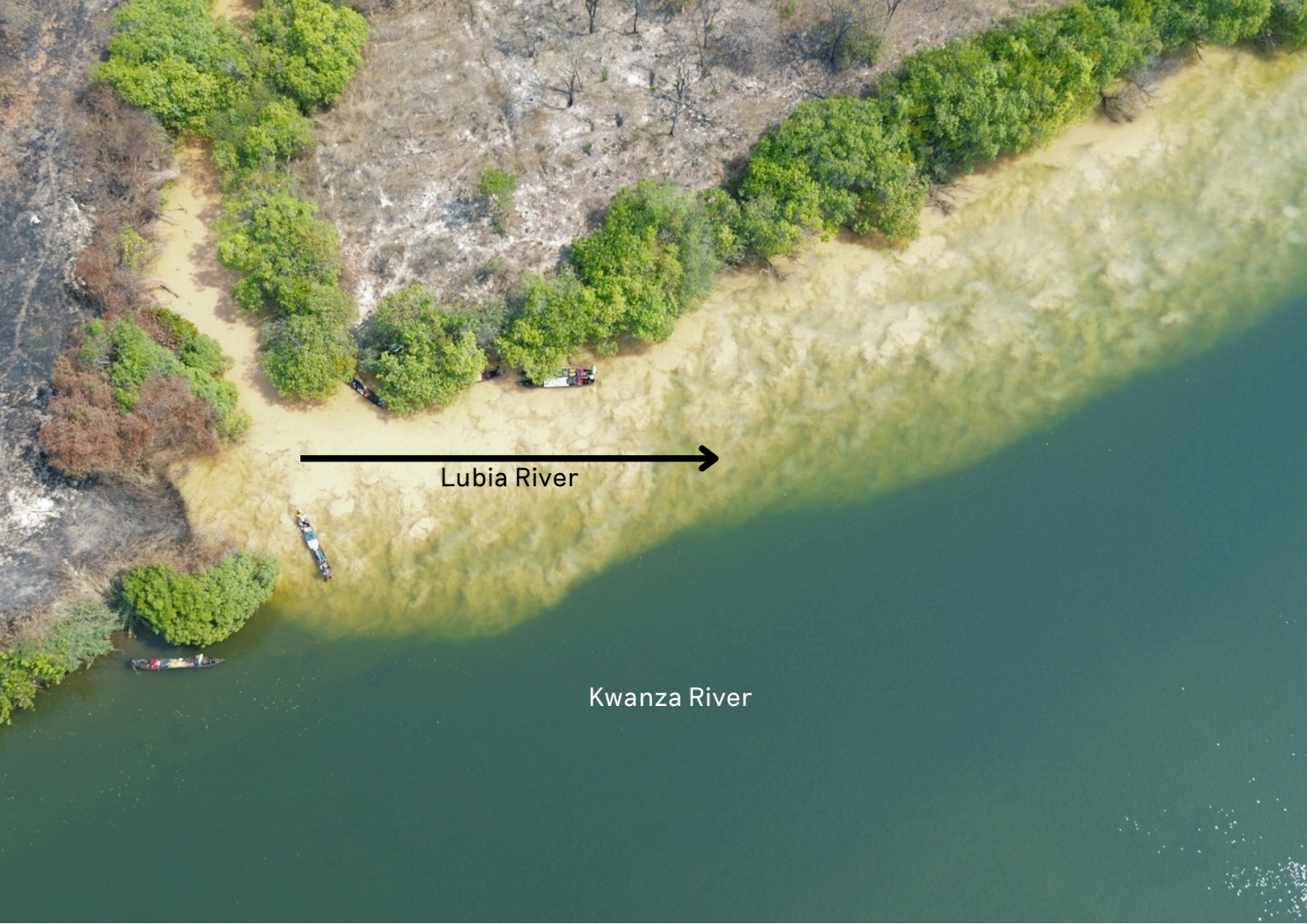
Hydrology data was collected at 24 sites to determine river flows at the time of the expedition, including 13 measurements on the Kwanza River and 11 on its major tributaries. Peak flows on the Kwanza River ( $>1,500 \text{ m}^3/\text{s}$ ) typically occur in June following heavy rainfall. Measurements taken during this expedition captured high but receding water levels in the early dry season.



Cumulative flow ( $\text{m}^3/\text{s}$ ) of the Kwanza River (blue graph) and its tributaries (orange bars). The top 3 tributaries, by flow, are Cutato, Luando and Cunhinga, contributing 57 % of total measured flow of the Kwanza at Capanda.

The 11 tributaries contributed  $\approx 200 \text{ m}^3/\text{s}$ , accounting for 87% of the Kwanza's surface water. The Luãmbua and Chimbandianga are notable headwater tributaries, each carrying more water at their confluences than the mainstream Kwanza River. In addition, tributaries influencing overall flow include the Cutato, Luando, Cunhinga, Cunje, Cuquema, and Cuiva.

Flow measurements provide information that is critical to the management of the Kwanza River's water resources, particularly given the importance of hydropower generation and domestic and commercial water supply. Ongoing, regular flow monitoring will enable decision-makers and researchers to quantify the impacts of human activities and climate change on the availability of fresh water, thereby supporting more effective management of Angola's inland water resources.



*Aerial image showing the confluence of the Lubia and Kwanza Rivers. The colour of the river water indicates increased sediment loads in the Lubia River, likely being a result of dredging and/or mining of diamond or gold-bearing gravels and terraces of the Lubia River. This increased sediment load is highly damaging to river environments, making water unfit for human consumption and destroying riverine habitats by suffocating aquatic organisms and introducing other pollutants. As observed, this contamination is spreading into the Kwanza River with the potential to negatively impact downstream habitats and users. Local community leaders confirm they observed these impacts as early as 2014.*

# Water Quality

For the parameters measured in the field, the Kwanza River's water quality broadly aligns with the World Health Organization (WHO) guidelines for potable water<sup>2</sup>. Exceedances of the WHO values were recorded for pH, and turbidity at several points, and communities in these areas should treat their water prior to consumption. In addition, spatial variability appears in all measured water quality parameters along the transect, likely due to: i) anthropogenic activities near and in the river, such as mining, ii) modifications to river water quality from tributaries flowing into it, and iii) daily weather fluctuations that influence the river's physicochemical properties (e.g., water temperature).

The Cuquema, Lubia, and Cunhinga tributaries show signs of pollution, including contaminants and sediments originating from upstream mining activities and other anthropogenic disturbances. Increased sedimentation can degrade aquatic habitats, smothering benthic organisms and reducing biodiversity. For hydropower generation, sediment accumulation in reservoirs diminishes storage capacity and efficiency, necessitating costly maintenance and impacting energy production. Further water quality testing for heavy metals, coliforms, water chemistry changes and other contaminants on these tributaries is recommended for a more comprehensive assessment.

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2.WHO. 2008. Guidelines for drinking-water quality. Volume 1.Geneva.

# People and the River



Gold panning on the Kwanza River

The Kwanza River's riparian zone has a sparse population, averaging 1.6 people per km. Satellite imagery shows a building density of 2.93 buildings per km within a 4 km buffer of the river, significantly lower than the basin-wide average of 7.01 buildings per km. Despite the low population density, some human activities disproportionately affect the health of the river. The most obvious human activities along the Kwanza River are fishing and extraction of gold and diamonds.

Fishing on the Kwanza is highly seasonal and techniques vary regionally. Near the source, traditional fishing methods such as weirs and traps are common, while gillnetting becomes the dominant technique further downstream, especially near towns and mining areas. Despite relatively low levels of fishing activity on the Kwanza (0.16 fishers per km), there is still a risk of overfishing due to the extensive use of gillnets. More than 29 km of monofilament gillnetting was observed on the Kwanza River. Gillnetting at this scale in the Kwanza system is unsustainable and poses a significant risk of fisheries collapse. This is especially concerning given that the Kwanza River supports at least 105 fish species.

Diamond mining is prevalent along the Kwanza River, with commercial activities such as dredging and open-pit mining causing significant and lasting impacts on the ecosystem. These impacts include: i) deforestation; ii) erosion around mining sites; iii) increased risk of chemical leaks and contamination; and iv) heightened sedimentation. Mining activities on the Kwanza, as well as on the Lubia and Cunhinga Rivers, contribute to degraded water quality, adversely affecting local communities and the broader Kwanza ecosystem. Additionally, increased erosion and sedimentation associated with diamond mining may compromise the productivity and longevity of the Capanda hydropower dam.




# Preliminary Recommendations

- Given the potential impacts of unregulated mining activities on hydroelectric powerplants, through increased sediment loads and changed water chemistry, mining activities should be documented and monitored throughout the Kwanza Basin. Such a basin wide assessment can be done using satellite imagery.
- Develop and deploy a series of gauge stations for monitoring water levels and quality. This approach will facilitate real-time data collection, enhancing decision-making in cases of drought, or flooding.
- Conduct a detailed fisheries assessment to evaluate the impacts of monofilament gillnets on the Kwanza River. If necessary, develop and implement laws to ban the importation and use of fine-meshed gillnets on the river.
- Establish a network of fish and wildlife-protected areas along the Kwanza River. These zones will serve as refuges that can support the long-term stability of wildlife populations and promote biodiversity in the region.

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