Lobito Corridor – Prioritisation & Access Analysis

We use a province-agnostic, 1-km grid-based pipeline to answer 5 strategic questions:

Impact: How many people and how much cropland benefit from upgrades, especially the poorest?

Spatial coordination: Are we clustering investments where they reinforce each other, or scattering them?

Equity: Do priorities align with rural poverty and food insecurity, not just population and roads?

Synergies: Where can we stack with Government, World Bank and other partners?

Logistics: How do flows along the corridor (Origin-Destination patterns) intersect with these priorities?

Data foundations – what we have for each AOI

Spatial Coverage

- Provinces / AOIs: **Huambo, Moxico** (others can be added)
- Resolution: **1-km grid**, harmonised across indicators

Core Inputs

- **Population & Environmental variables:** gridded population, urban and rural classification, land-cover-derived cropland, nighttime light.
- **Accessibility:** travel time to markets/financial services
- **Poverty & food insecurity:** RAPP-based indices at Admin2
- **Infrastructure:** electrification, service indicators
- **Investments & Origin-Destination:** project locations; OD-Lite flows

Outputs per AOI (Step 00–14)

Administrative tables, priority surfaces & clusters, catchment KPIs, synergies, OD results

From inputs to decisions – corridor analysis pipeline

Step 01–07

Priority surface & clusters

Build 1-km composite score; extract Top-10% cells and cluster

Step 06–09

Municipal (Admin2) lens

Aggregate grid indicators to Admin2; build 0–1 composite score

Step 10–12

Sites & catchments

Evaluate candidate sites via 30/60/120-min isochrones

Step 13

Synergies

Count Government / WB / Other projects within 5/10/30 km

Step 14

Origin-Destination flows

Gravity model of municipality-to-municipality flows

S1 – High-intensity priority clusters along the corridor

The 1-km priority surface reveals a small number of high-intensity clusters where:

- Low baseline access, low electrification, and high rural poverty **stack together**
- There is enough **population and cropland** to justify concentrated investment

Example – Huambo

2 clusters, total ~53 km²

~1.1% of provincial population

0.3–0.4% of cropland in clusters

Moxico Example

Priority mask is empty

No municipalities cross selection threshold → 0 clusters, 0% coverage

S1 controls – what drives clusters and what we can adjust

Inputs & Weights

Weighted combination of: travel time, electrification, rural poverty, cropland, and RWI at 1-km resolution

Key Choices

- Cut-off: e.g. Top-10% of scores
- Minimum cluster size
- Smoothing / neighbourhood

Scenario Flexibility

Equity-heavy: higher weight on poverty

Growth-heavy: higher weight on access/cropland

Implication for Moxico

Zero clusters means scores never cross cut-off:

- Lower threshold (Top-15%)
- Re-weight for Moxico context

S2 – Municipal (Admin2) priorities and equity

For each municipality, we compute a **composite 0–1 score** that balances:

Need

Rural poverty, food insecurity, long travel times, low electrification

Opportunity

Share of territory in priority mask, potential beneficiaries and cropland

Example – Huambo (Top 5 Admin2s)

Ekunha, Huambo, Caála, Bailundo, Katchiungo rank highest

Some combine high poverty, large priority share, and good catchment potential

Quadrant View

- ~36% in High score & high poverty → good equity alignment
- Smaller share in Low score & high poverty → potential under-prioritised

S2 controls – composite score and quadrants

Variables Feeding Score

From municipality:

poverty_rural, food_insec_scale, traveltime, electricity

From priority surface:

share_selected and priority area km²

What We Can Tune

- Weighting need vs opportunity
- Normalization approach
- Use of RWI or other indicators

Quadrant Definitions

X: priority score; Y: rural poverty. Medians define 4 quadrants with municipality counts and rural poor shares

Outputs Available

- _priority_admin2_rank.csv
- summary_*quadrant_stats*.csv

S3 – Catchment beneficiaries around key sites

For each **candidate site**, we compute **30/60/120-minute travel-time catchments** on the existing + upgraded network.

This tells us:

- Sites reaching many people quickly
- Sites unlocking remote hinterlands
- How catchments overlap priority clusters

Example – Huambo

- Top sites reach ~40–46% of population within 60 minutes
- High-impact sites sit on/near priority clusters

Key Insight

Sites with high 60-min catchments provide strong immediate impact, while 120-min catchments reveal potential to serve remote areas

S3 controls – catchment thresholds and site definitions

Inputs

- **Sites:** markets, hubs, logistics nodes
- **Travel time:** from accessibility surface

Key Parameters

Time thresholds: **30 / 60 / 120 min**

Site set focus:

WB/Gov investments, proposed hubs, or combined

Outputs Available

- _catchments_kpis.csv
- summary_table_s3_top_sites_60min.csv

What We Can Change

- Introduce extra time bands (15, 90 minutes)
- Filter sites by type once metadata enriched
- Run baseline vs upgraded scenarios for incremental gains

S4 – Project synergies around clusters and sites

We measure how many projects from Government, World Bank, and Other partners lie within **5 / 10 / 30 km** of each priority cluster.

High-Opportunity Nodes
Clusters with many nearby projects (good for bundling)

Isolated Clusters
High need but few investments nearby

Bridge Areas
Areas bridging separate "project islands"

Current State

- For **Huambo**, clusters show strong WB project density within 30 km
- For **Moxico**, cluster_synergies table not yet populated

S4 controls – radii, project sources and density

Data Sources

- _cluster_synergies.csv
- PROJECTS_GOV, PROJECTS_WB, PROJECTS_OTH

Key Parameters

- Radius: 5 / 10 / 30 km
- Min projects to display

What We Can Refine

- Enrich with sector tags for sector synergies
- Apply logic to priority sites, not just clusters
- Harmonise radii for corridor-level comparisons

Caveat

Synergies strongest where Step 13 has complete inputs

S5 – Origin-Destination (OD) flows and priority along the corridor

OD-Lite Model (Step 14)

Builds **gravity model** of flows between municipalities:

- Based on population and distance
- Optionally tilted by RWI

We Use This to Identify:

- Top OD pairs (highest flows)
- Municipalities with highest throughput
- Where throughput nodes intersect priorities

Example – Huambo

- Top flows between **Huambo city and key neighbours** (Caála, Bailundo, etc.)
- Many high-flow pairs traverse **priority municipalities**

S5 controls – OD model assumptions

Inputs

- _od_zone_attrs.csv – Admin2 centroids + attributes
- _od_gravity.csv – OD matrix with flow and distance

Modelling Assumptions

- Gravity structure: more people, shorter distance → higher flows
- Currently symmetric
- Can extend with corridor-specific frictions

What We Can Change

- Strength of distance decay
- Degree of RWI tilt
- Overlay with actual traffic/trade data

Interaction with Priorities

Flag OD pairs where both municipalities are in top priority mask

Next steps – how the team can use this

Short Term

- Finalise summary tables & maps for all AOIs
- Agree on default weighting / thresholds

Medium Term?

- Co-design equity vs growth scenarios with sector teams
- Enrich project and site metadata

Longer Term?

- Integrate observed data (traffic, production, trade)
- Use pipeline as template for other corridors

Questions & Discussion