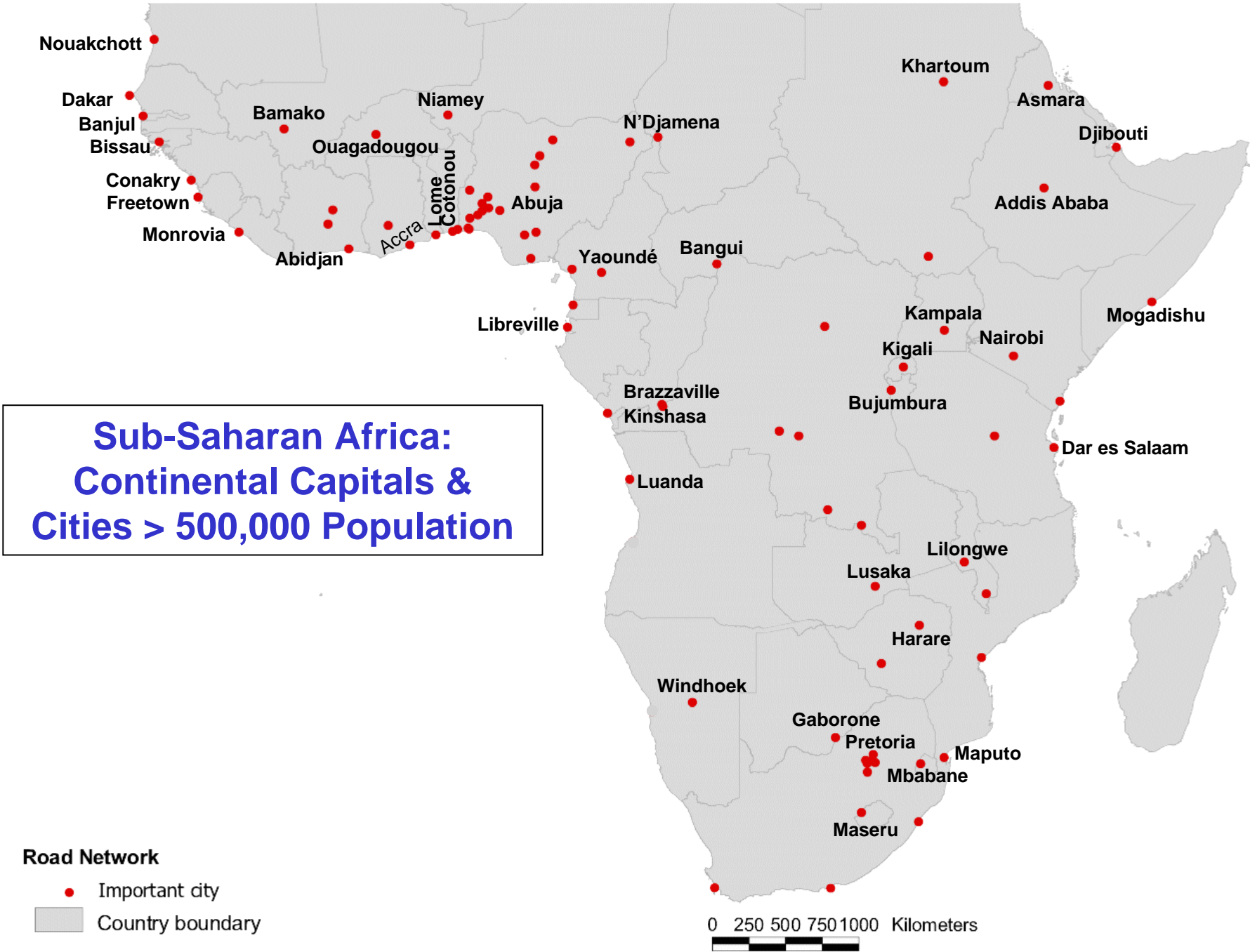




Road Network Upgrading And Overland Trade Expansion In Sub-Saharan Africa

Piet Buys
Uwe Deichmann
David Wheeler

Development Research Group
World Bank



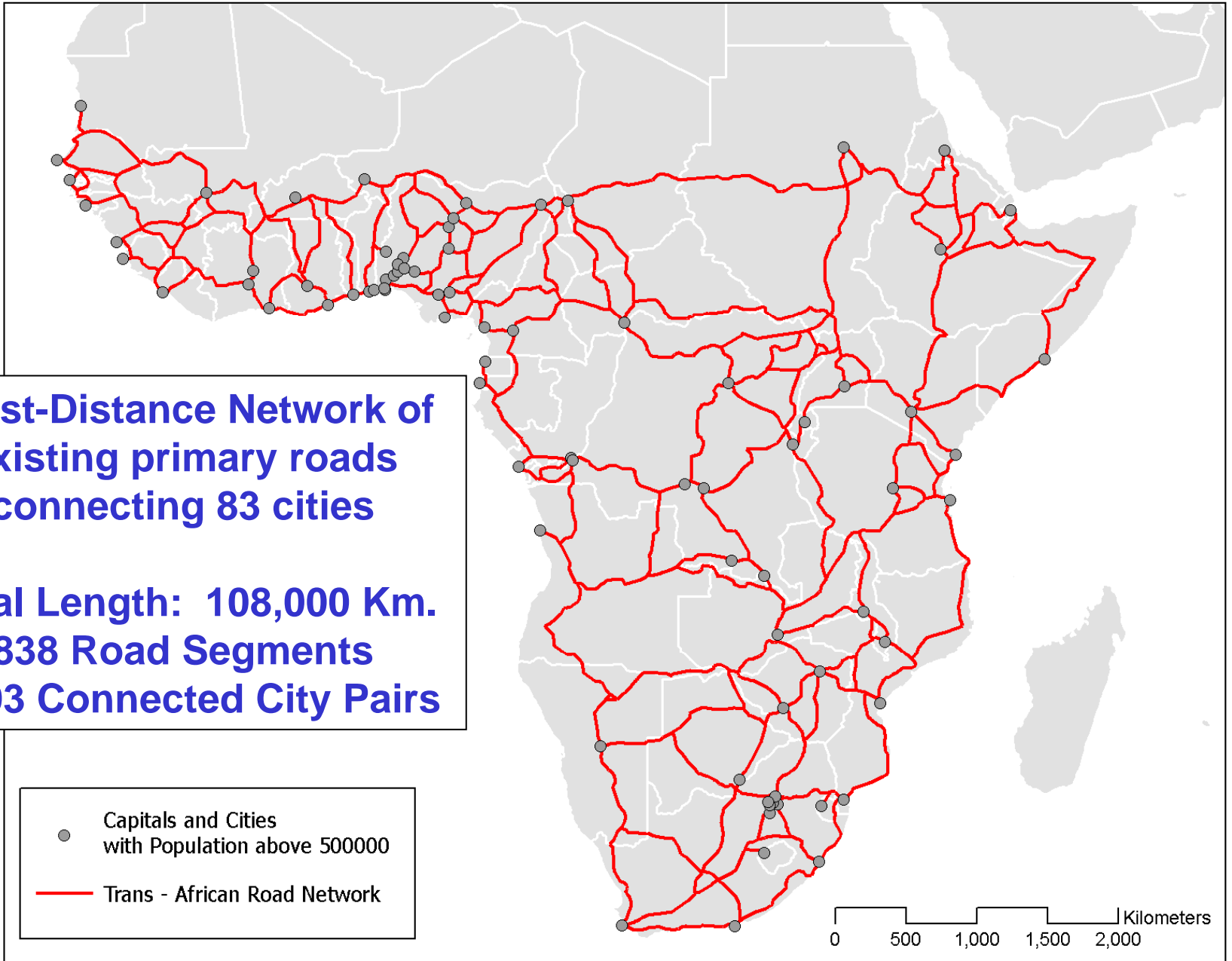
**Least-Distance Network of
existing primary roads
connecting 83 cities**

**Total Length: 108,000 Km.
838 Road Segments
3,403 Connected City Pairs**

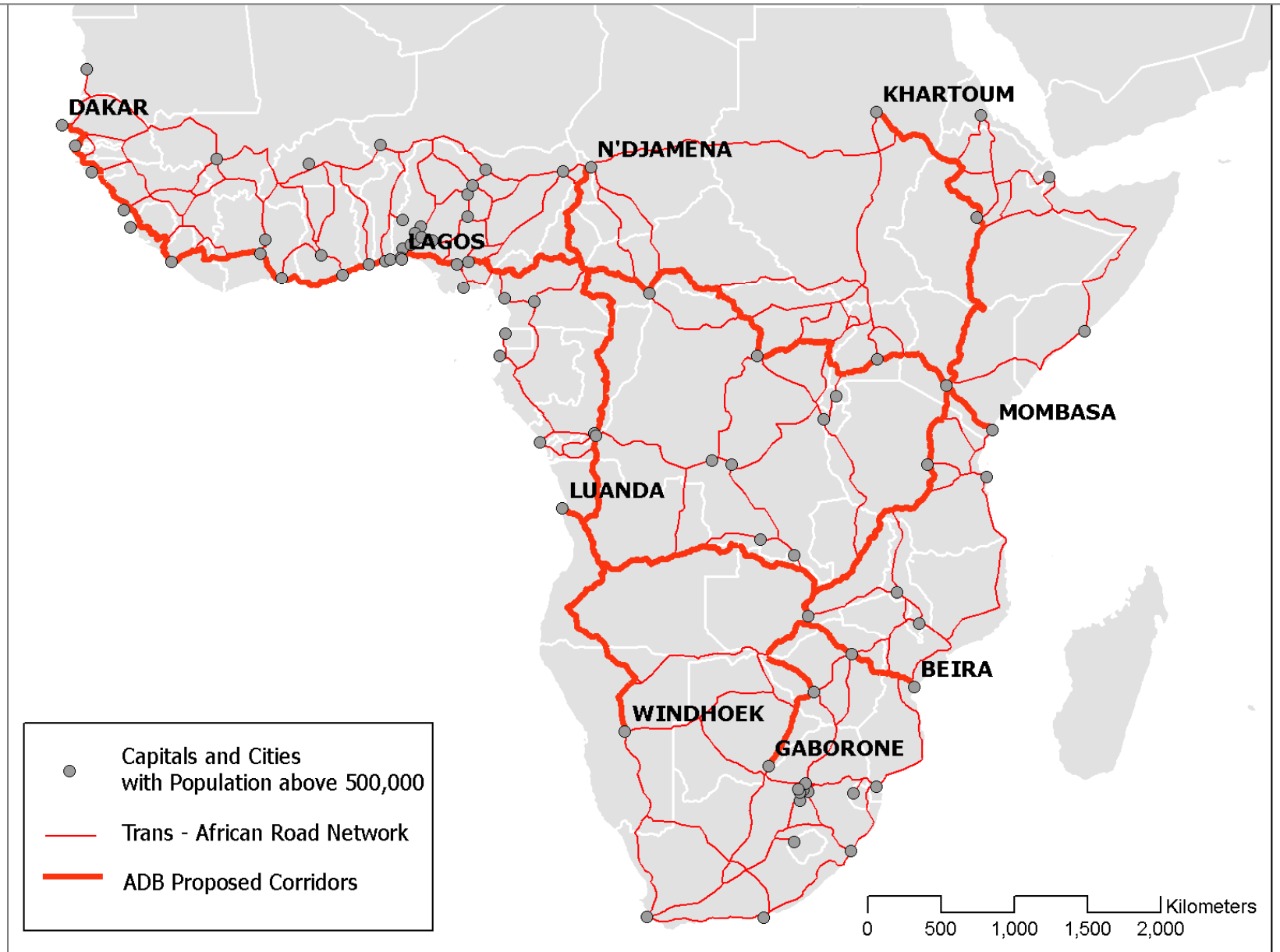
● Capitals and Cities
with Population above 500000

— Trans - African Road Network

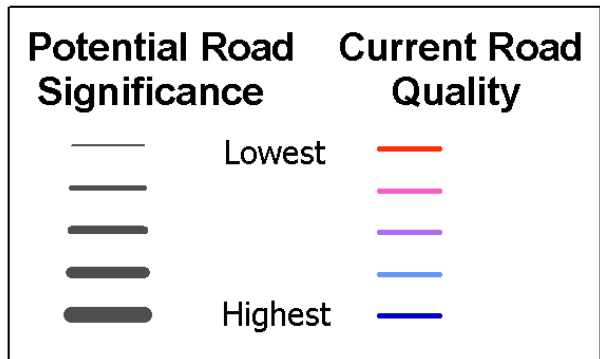
0 500 1,000 1,500 2,000 Kilometers



The ADB's Proposed Trans-African Corridors

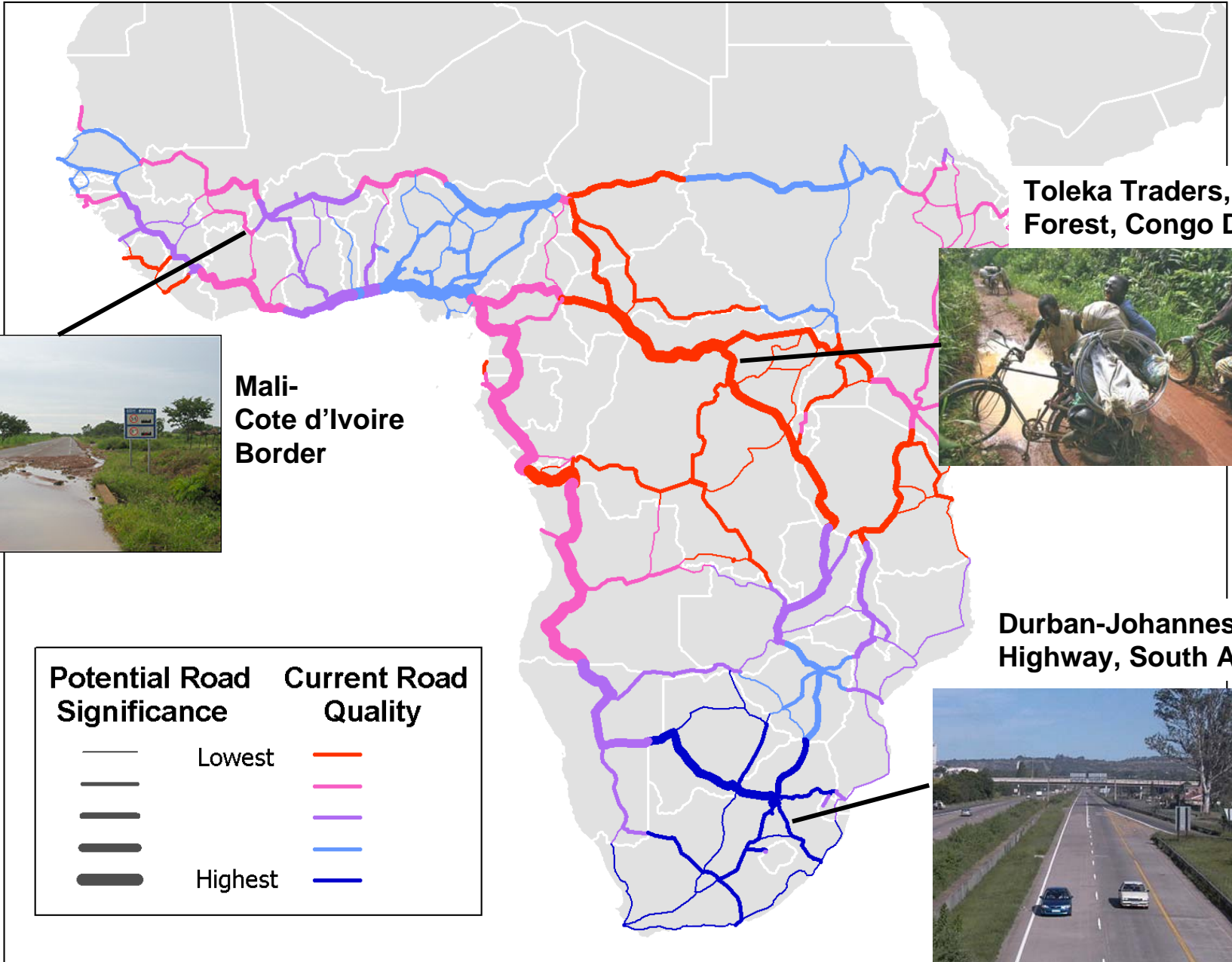


Road Network: Estimated Quality and Importance of Links



0 500 1,000 1,500 2,000 Kilometers

Road significance: number of times segment is used when connecting each city with all other cities



Toleka Traders, Ituri Forest, Congo D.R.



Mali-Cote d'Ivoire Border



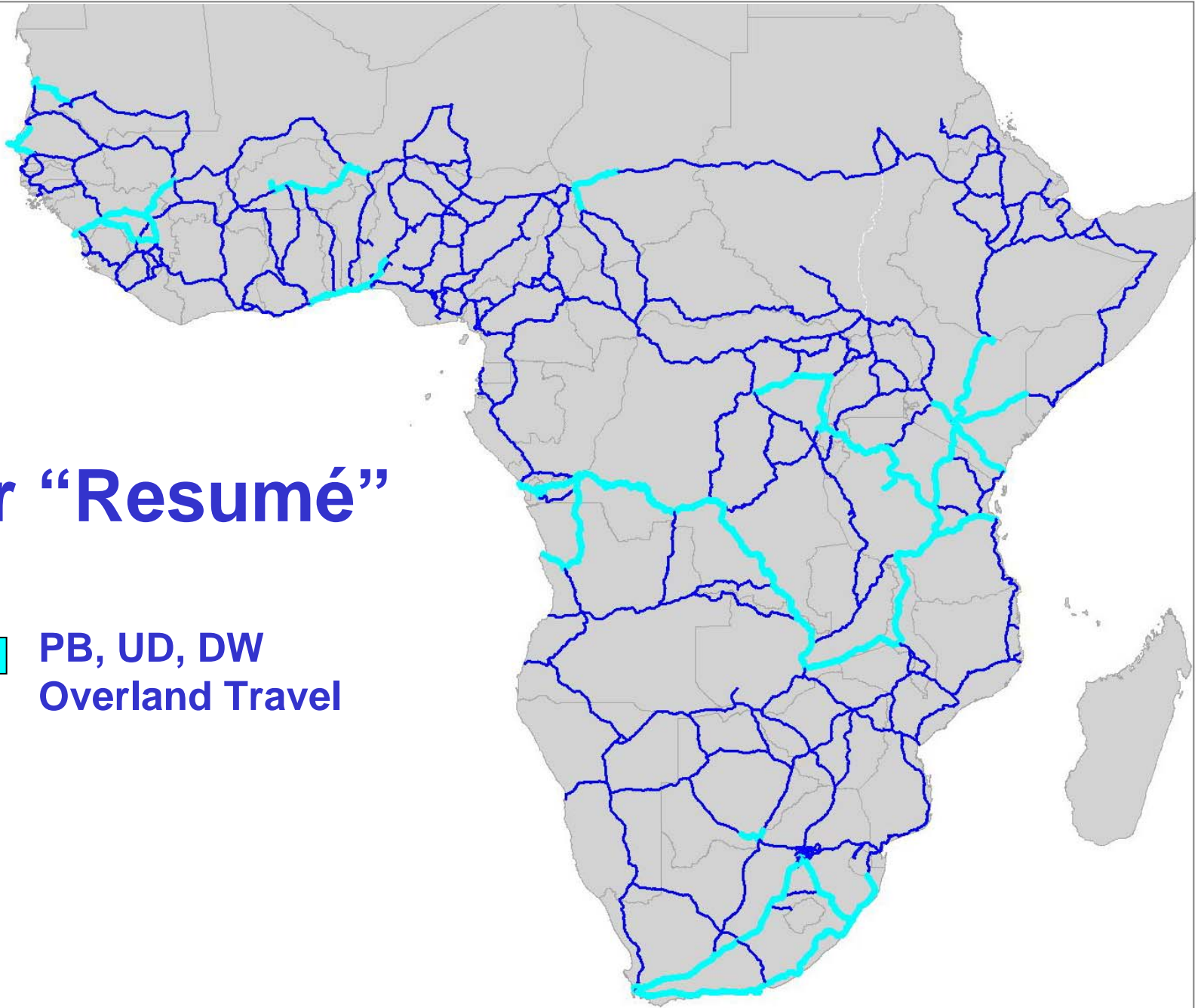
Durban-Johannesburg Highway, South Africa



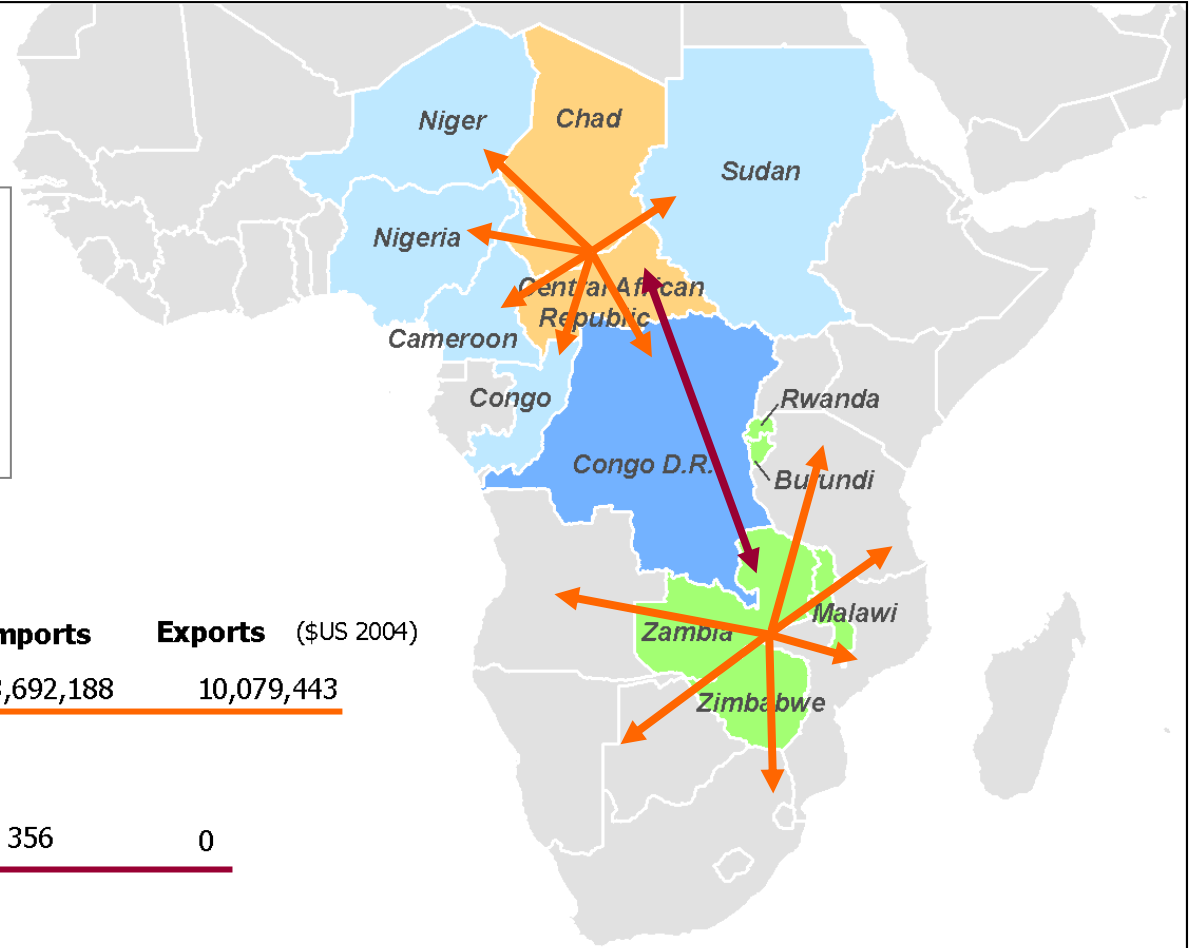
Our “Resumé”



PB, UD, DW
Overland Travel



Consequences of poor road conditions



Trade of Chad and Central African Republic with:

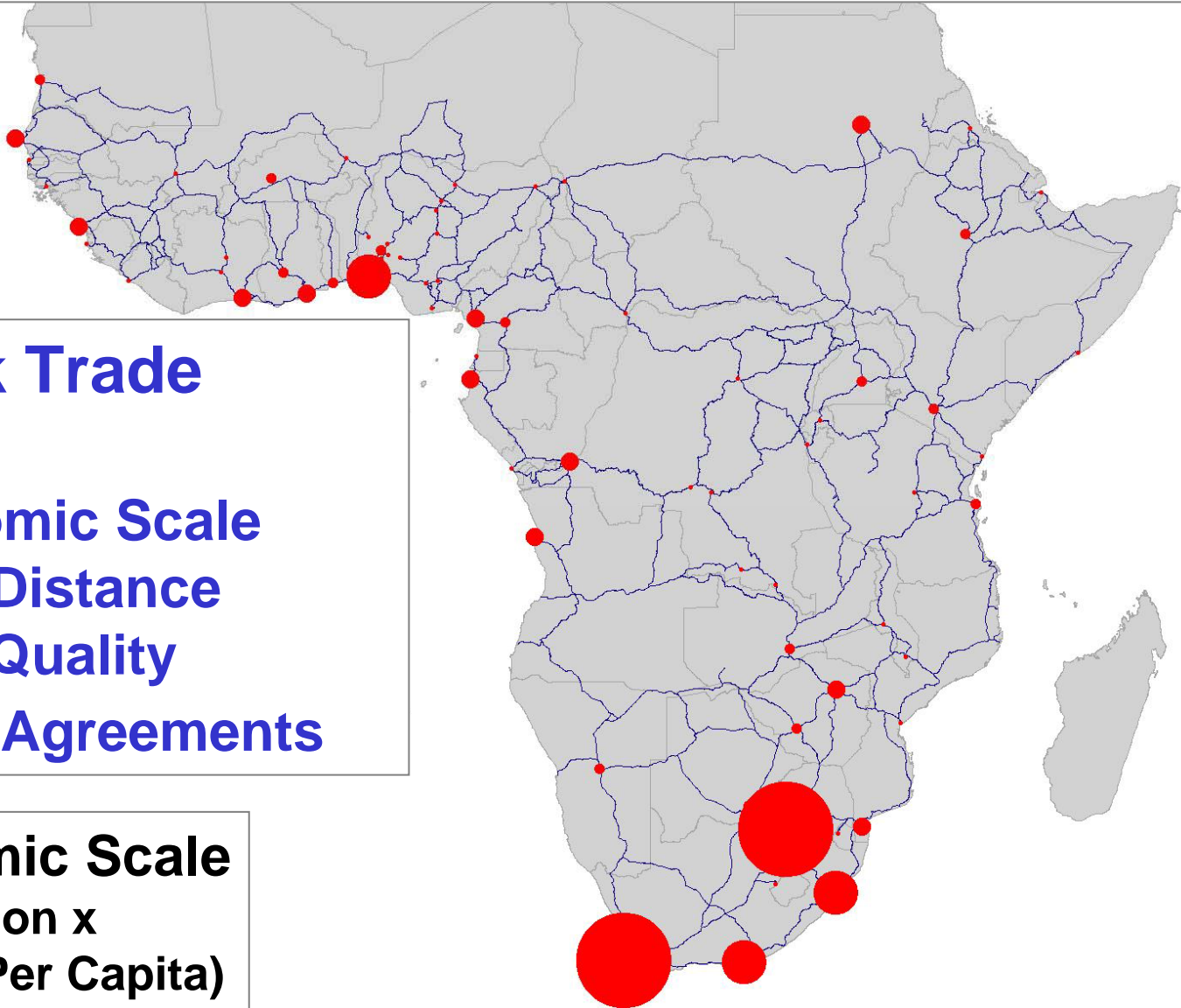
	Imports	Exports (\$US 2004)
Neighboring countries	<u>103,692,188</u>	<u>10,079,443</u>
African Landlocked Countries	<u>356</u>	<u>0</u>

African Landlocked countries with other African countries

	<u>3,252,777,590</u>	<u>1,640,256,173</u>
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African Landlocked Countries: Rwanda, Burundi, Malawi, Zambia, Zimbabwe

Analysis of Trade Flows Between Countries & Cities



Network Trade Factors

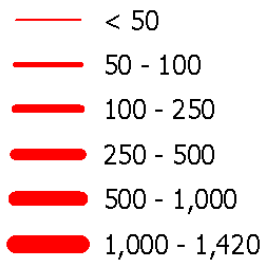
- Economic Scale
- Road Distance
- Road Quality
- Trade Agreements

Economic Scale
(Population x
Income Per Capita)

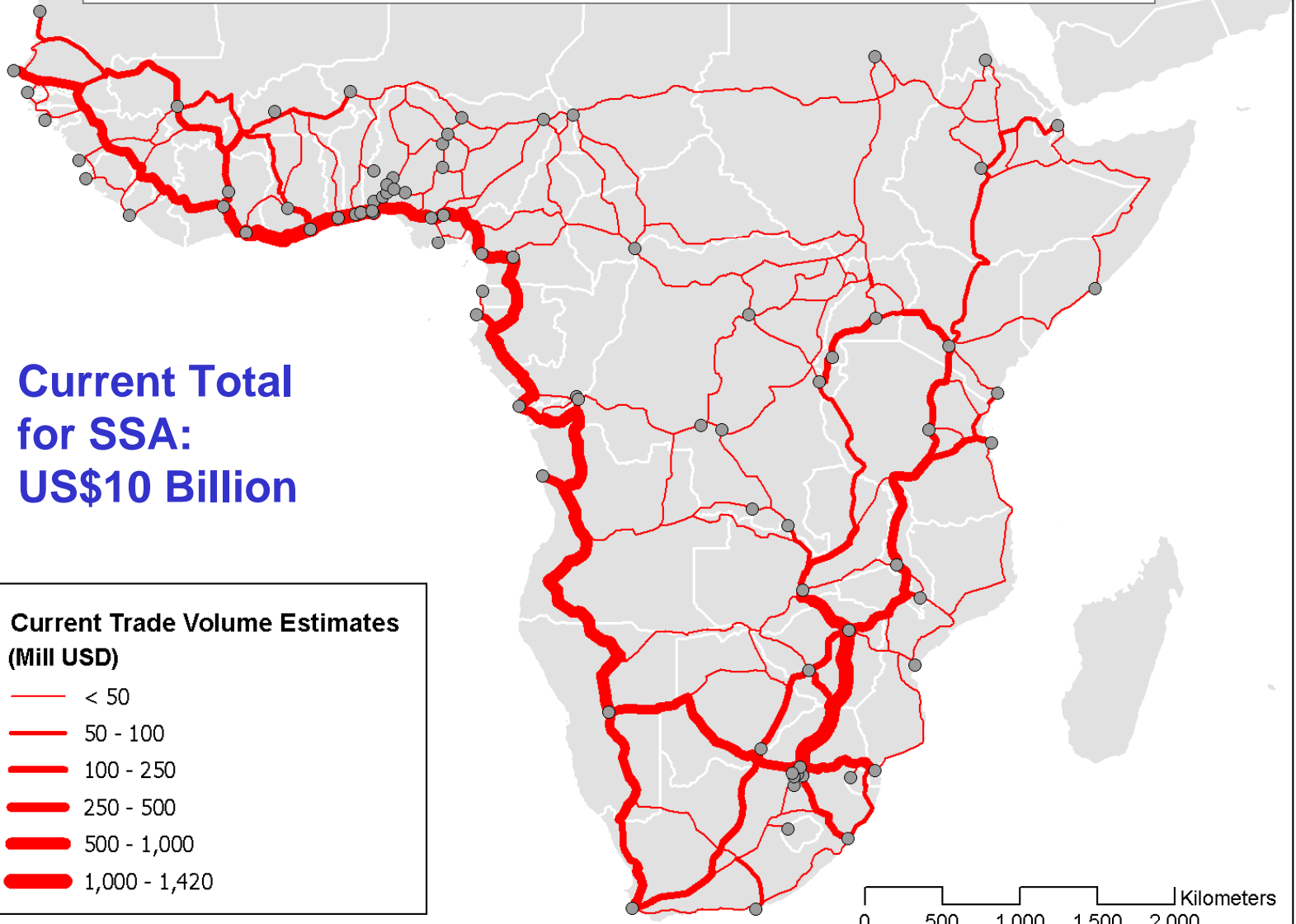
Gravity Model Application: Current Network Trade Flows (\$US)

**Current Total
for SSA:
US\$10 Billion**

Current Trade Volume Estimates (Mill USD)



0 500 1,000 1,500 2,000 Kilometers

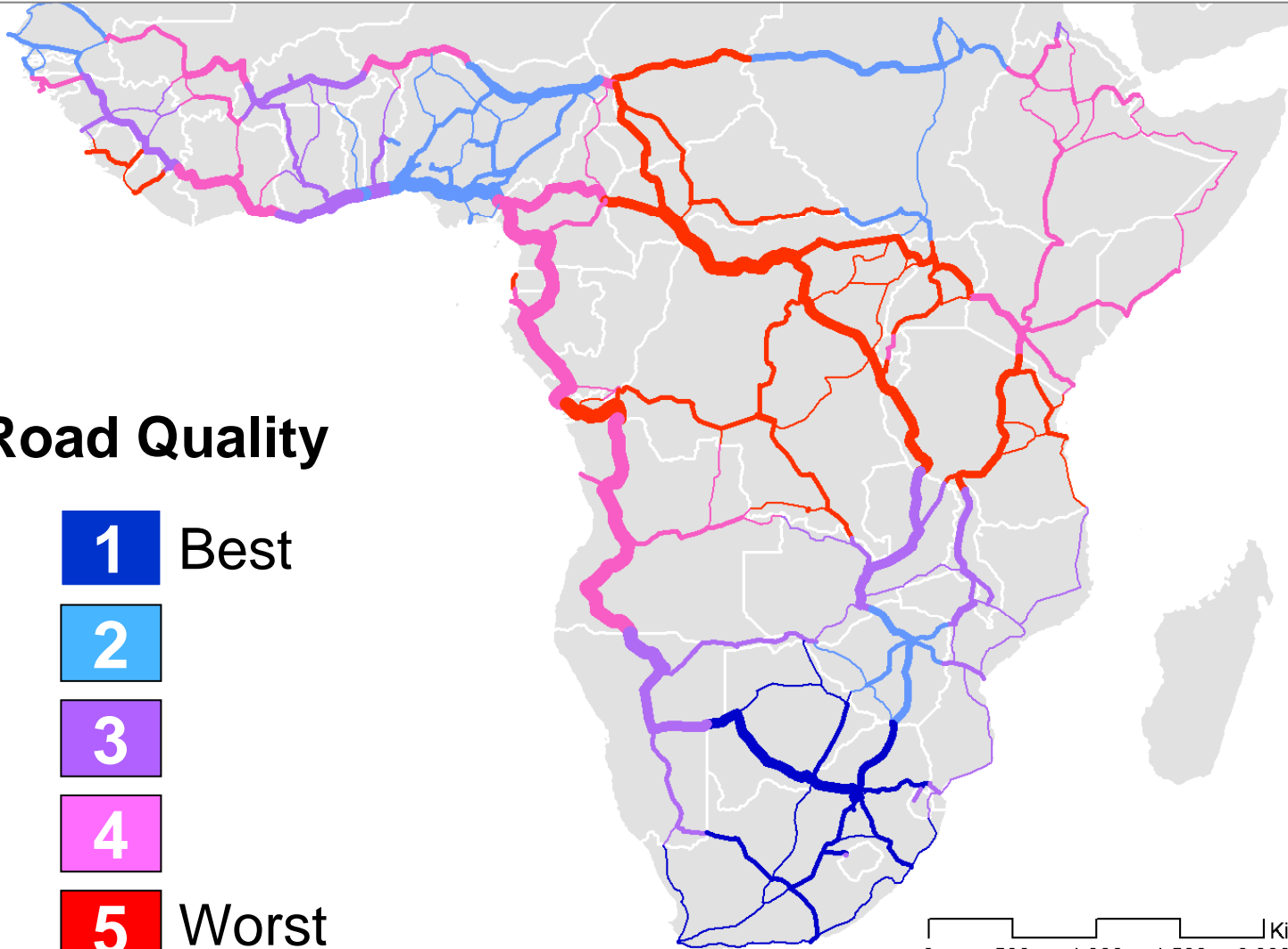


Benefits: Gravity Model Application Projecting Network Trade Flows (\$US) Program: Network Upgrade to Class

2

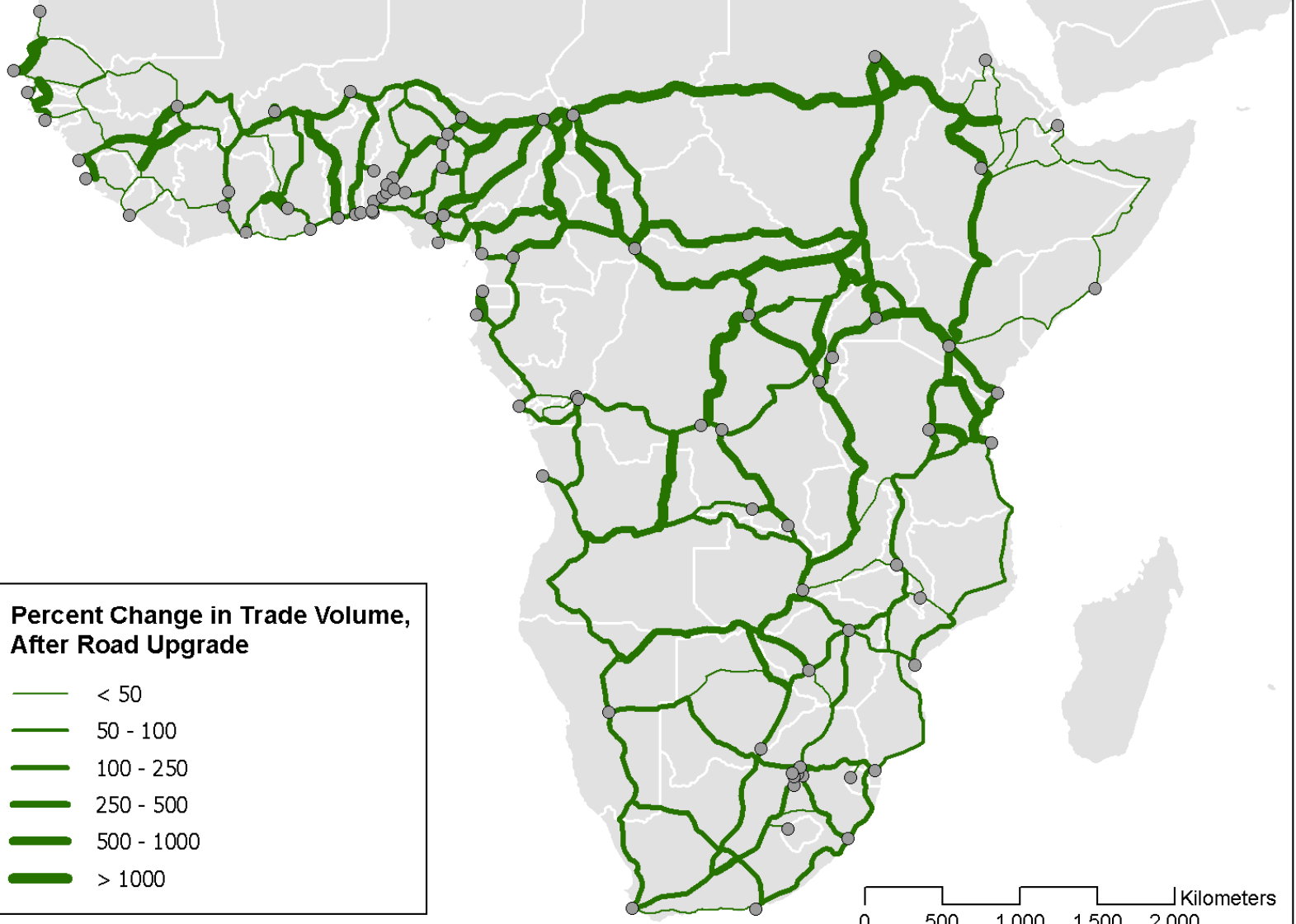
Road Quality

- 1** Best
- 2**
- 3**
- 4**
- 5** Worst



0 500 1,000 1,500 2,000 Kilometers

Percent Change in Estimated Trade Flows (\$US)



Gravity Model Application: Network Trade Flows (\$US)

Program: Network Upgrade to Class **2**

Econometric Projection: Annual Trade (\$Billion)

Current

10.1



Upgraded

29.8

55.5 [+1 Std. Error]

16.4 [-1 Std. Error]

Program: Network Upgrade to Class 2

Econometric Projection: Upgrade Cost (\$Billion)

Upgrade

20.7 $\left[\begin{array}{l} 28.4 \text{ [+1 Std. Error]} \\ 15.6 \text{ [-1 Std. Error]} \end{array} \right.$

Maintenance

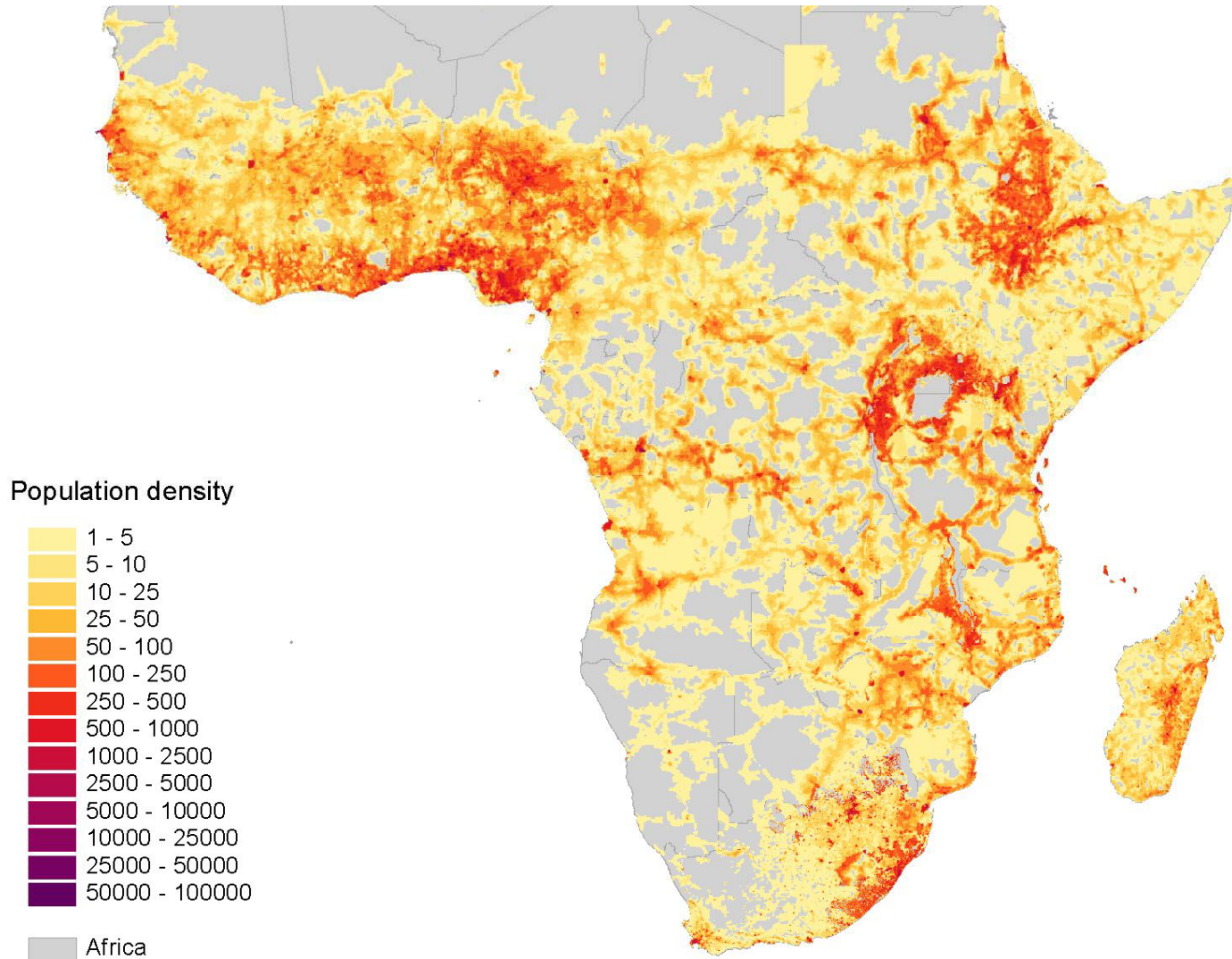
0.9 $\left[\begin{array}{l} 1.2 \text{ [+1 Std. Error]} \\ 0.7 \text{ [-1 Std. Error]} \end{array} \right.$

Network Upgrade Program: 5-Year Upgrade; 10-Year Operation

Trade Category	Annual Trade Growth (\$Bill.)	Upgrade Cost Category	Upgrade Cost (\$Billion)	Maint. Cost Category	Maint. Cost (\$Bill.)	Total Trade Growth (\$Bill.)	Total Cost (\$Bill.)	Net (\$Bill.)
Low	6.2	High	28.4	High	1.2	77.5	43.4	34.1
Low	6.2	Benchmark	20.7	Benchmark	0.9	77.5	32.0	45.6
Low	6.2	Low	15.6	Low	0.7	77.5	24.4	53.2
Benchmark	19.7	High	28.4	High	1.2	246.25	43.4	202.9
Benchmark	19.7	Benchmark	20.7	Benchmark	0.9	246.25	32.0	214.3
Benchmark	19.7	Low	15.6	Low	0.7	246.25	24.4	221.9
High	45.3	High	28.4	High	1.2	566.25	43.4	522.9
High	45.3	Benchmark	20.7	Benchmark	0.9	566.25	32.0	534.3
High	45.3	Low	15.6	Low	0.7	566.25	24.4	541.9

The trade gain estimates are very conservative: They do not include rural and inter-city trade expansion within countries or with the rest of the world. Plus, investments (costs) can translate into major economic benefits from work programs.

Beneficiaries: The People of Africa



Estimate: 8.4 million person-years of rural construction employment during initial upgrading.
365,000 rural jobs for annual maintenance.

Thank you!