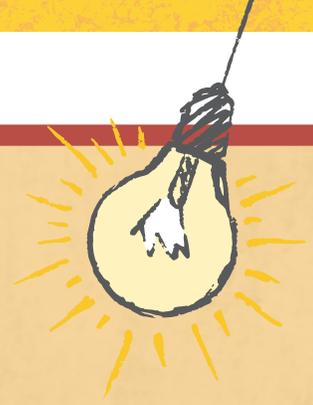


## ESTIMATING THE IMPACT OF ROAD NETWORK IMPROVEMENTS



*What is the impact of transport infrastructure improvements on agricultural intensification in rural Mozambique?*

### Integrated Feeder Road Development Project

**TARGET AREA:**

10 priority districts in the provinces of Nampula and Zambézia.

**IMPLEMENTING AGENCY:**

Road Fund  
National Roads Administration  
(Administração Nacional de Estradas, ANE)

**PROJECT COMPONENTS:**

Rehabilitation and Maintenance of Feeder Roads; Rehabilitation of Primary Road Network; Pilot Rural Transport Services; Capacity Building and Project Administration; and Contingent Emergency Response

More information about the Integrated Feeder Road Development Project can be found online at <http://projects.worldbank.org/P158231/?lang=en&tab=overview>



Credit: Tillmann von Carnap-Bornheim, Basemap: World Imagery from ESRI.

### Context

Despite strong, sustained economic growth between 2005 and 2015 rural poverty in Mozambique persisted due to low agricultural productivity, particularly in the agricultural zones of the Northern and Central provinces. Poor physical connectivity is a contributing factor, including limited access to agricultural extension services, credit markets, and market information. Limited transport infrastructure in Mozambique also means that economic activity is effectively segmented into three geographical regions (North, South, and Central), creating conditions for regional price swings that are not smoothed by integrated trade (Suit and Choudhary, 2015).

Much of the Mozambique's National Road Administration's efforts have focused on construction of new roads and maintenance of primary infrastructure. An Integrated Feeder Roads Project, financed by the World Bank, will focus on rehabilitation and maintenance of tertiary roads, with a large percentage of the investments targeting construction and repair of bridges and culverts that improve accessibility, particularly during periods of heavy rain or flooding.

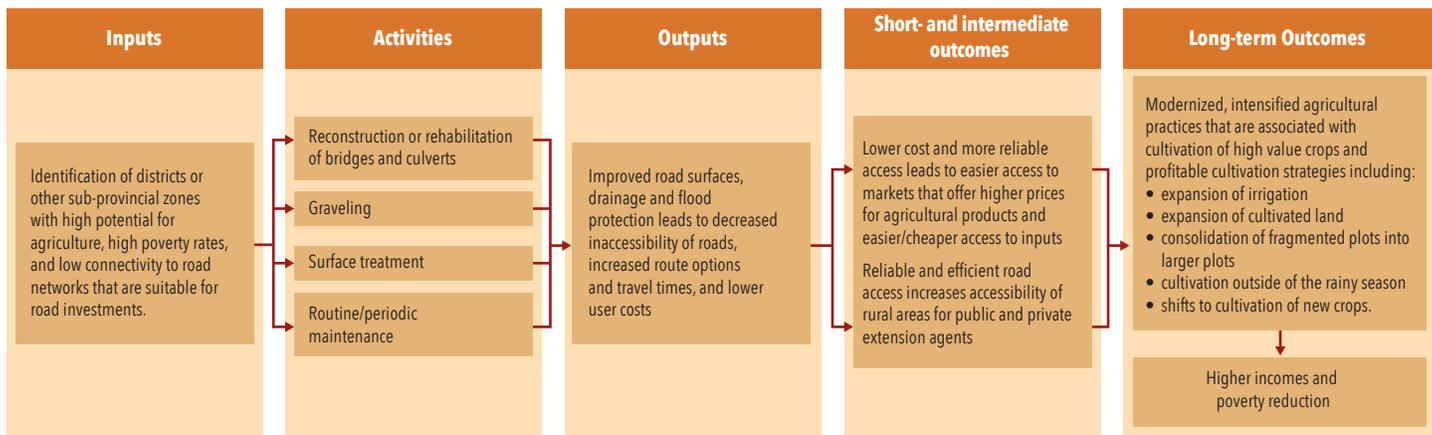


Figure 1: Theory of Change

## Impact Evaluation Research

This impact evaluation (IE) aims to evaluate the impact of improving rural transport infrastructure on agricultural development in northern Mozambique. Maintenance of roads and upgrading of bridges and culverts is expected to improve agricultural productivity by reducing the vulnerability of market access to weather-related disruptions, and by increasing access to extension information, credit and input markets (Figure 1: Theory of Change). Researchers will use data derived from satellite imagery to examine whether the repair and maintenance of rural roads and river crossings leads to agricultural intensification.

The evaluation will focus on the first component of the World Bank financed Integrated Feeder Road Development Project, which supports the construction and maintenance of rural ‘feeder’ roads in 10 priority districts in the provinces of Nampula and Zambézia in Mozambique. The research team will distinguish the causal effects of the intervention from other activities that may also influence agricultural intensification by exploiting sharp changes in travel times generated by repairs and upgrades to river crossings, which constitute the largest component of the program. Researchers will leverage remote sensing data as well as advances in machine learning to measure changes in land use that would indicate agricultural intensification. Outcomes of interest include predicted presence of irrigation, dry season Normalized Difference Vegetation Index (NDVI), plot size and forest cover. The approaches this IE uses to measure agricultural intensification have the potential

to be extended to other contexts where administrative data is lacking, and data collection is costly.

## Policy Relevance

The cost of infrastructure projects in rural areas with high agricultural potential and low agricultural productivity are often justified on the assumption that improved road access will stimulate agricultural investment. Sub-Saharan Africa, and Mozambique in particular, have much lower agricultural productivity, higher potential gains in yields, and much less binding constraints on availability of land for cultivation, so it is expected that the effects of road improvements would be very different. However, the effect has not been tested or demonstrated in practice for these areas, in part because of a lack of data. This IE will contribute to demonstrating the use of remote sensing data and machine learning to measure these linkages in sub-Saharan Africa that can be applied across countries.

Given that road density in Mozambique is low relative to the rest of the region and that national investment in roads has experienced recent shortfalls (World Bank, 2018), the international donor community is likely to play an increased role in transport investments. Therefore, this research on the returns to transport infrastructure relative to other investments can be directly incorporated into the design and implementation of future programs.

For more information email [dimettransport@worldbank.org](mailto:dimettransport@worldbank.org) or visit [www.worldbank.org/en/research/dime/brief/transport](http://www.worldbank.org/en/research/dime/brief/transport)



The ieConnect for Impact program links project teams with researchers to develop rigorous and innovative impact evaluations that both substantially improve the evidence-base for policy making and induce global shifts in transport policy. The ieConnect program is a collaboration between the World Bank’s Development Impact Evaluation (DIME) group and the Transport Global Practice. This program is part of the Impact Evaluation to Development Impact (i2i) multi-donor trust fund and is funded with UK aid from the UK government and by the European Union.