

An Agenda for Green Industrialization in Zambia

Robin Burgess (LSE, IGC)

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Introduction

Today I'm going to talk about the opportunities for green industrialisation in Zambia - four overarching themes

- 1 Occupational Change
- 2 Climate Change
- 3 Innovation and Leapfrogging
- 4 Data and Digitalisation

Guiding principle → how to make people more productive → occupational change → the wealth of people

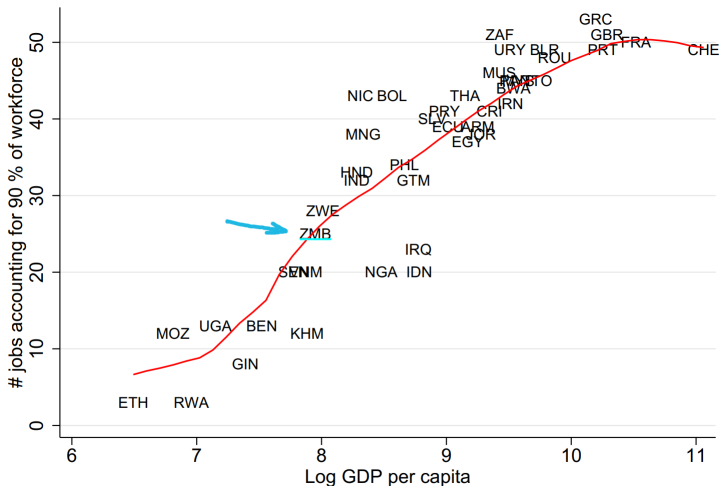
Draw on experience working in Bangladesh, Brazil, China, India, Indonesia, Pakistan, Uganda, South Korea

Three Potential Areas for Innovation

- 1 Industrial Policy
- 2 Redistribution
 - 2.1 Access to Energy
 - 2.2 Big Push Anti-poverty Programs
- 3 Natural Capital

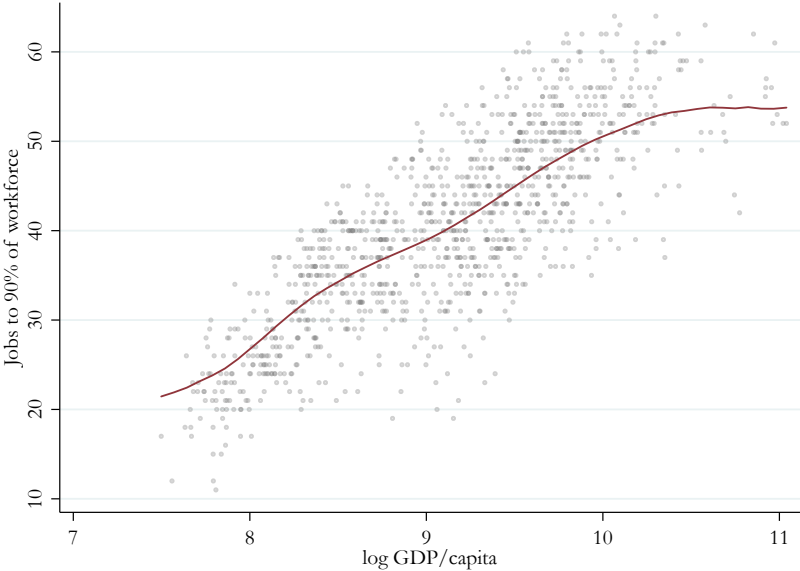
Industrial Policy

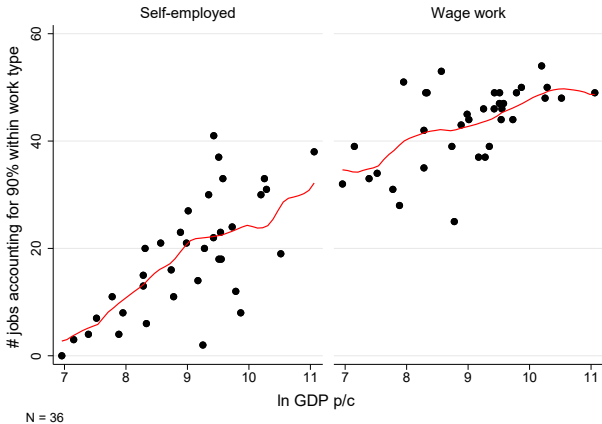
World Employment Share



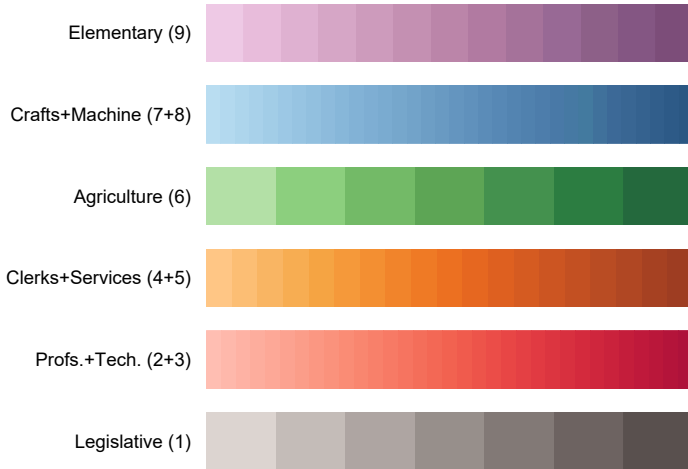
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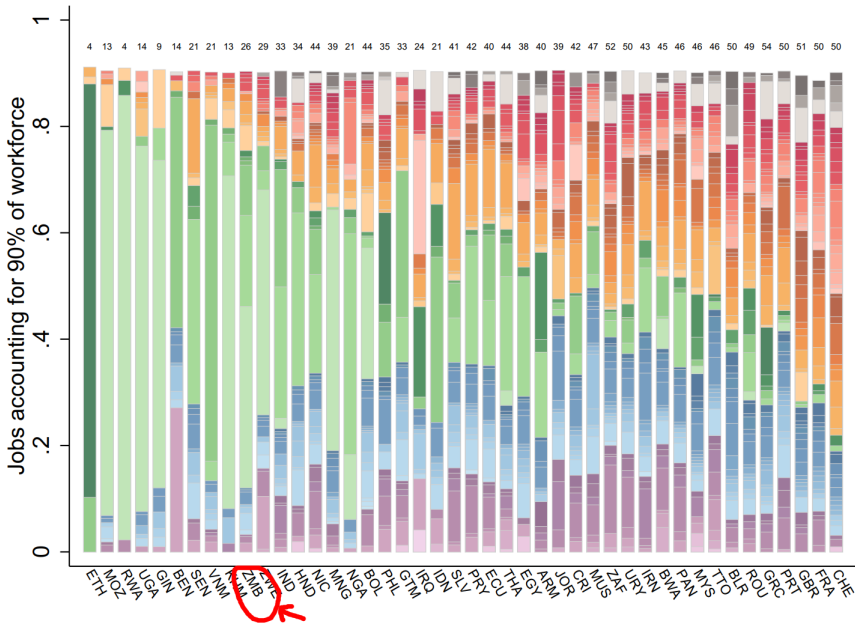
Employment Share - Brazil



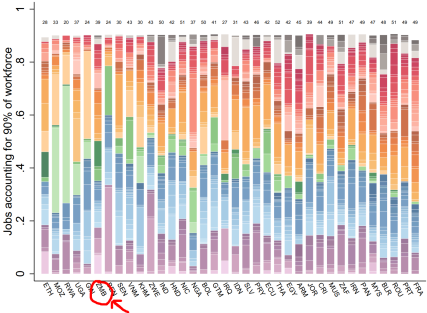
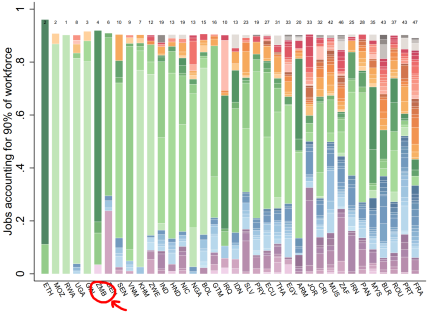


Legend





Rural vs Urban



Four jobs account for 90% of the workforce in rural areas

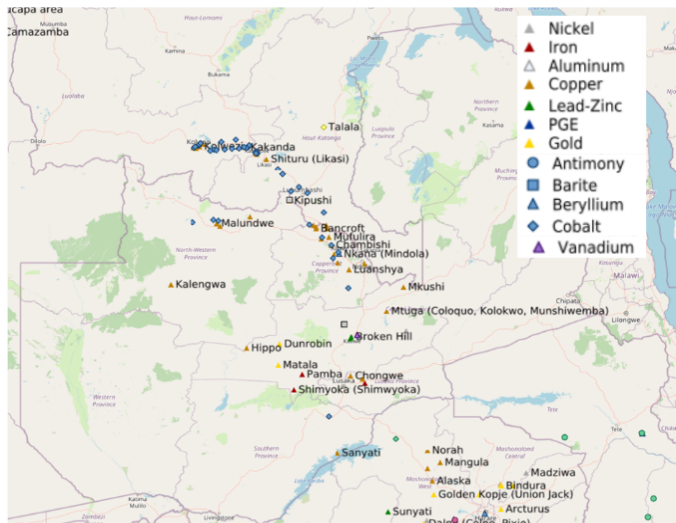
- Market-oriented crop and animal producers (72%)
- Agricultural, fishery and related labourers (12%)
- Fishery workers, hunters and trappers (4%)
- Other elementary agricultural labourers (3%)

Service led development?

The top 10 urban jobs include:

- Market-oriented crop and animal producers (10%)
- Other elementary agricultural labourers (6.4%)
- Business services agents and trade brokers (5.7%)
- Street vendors and related workers (5.6%)
- Shop salespersons and demonstrators (5.5%)
- Protective services workers (4.5%)
- Other salesperson (4.5%)
- Agricultural, fishery and related labourers (4.3%)
- Motor-vehicle drivers (4.2%)
- Building frame and related trades workers (4.2%)

Can mineral resources play a role in jobs focused industrial policy?



Mining value chain



Mining and extraction



Processing



Smelting



Control & Optimise



Sales

Exploration & Geology

Design & Plan

Drill & Blast

Load & Haul

Stockpile

Maintenance & Support

Budget & Plan

Crush & Convey

Grinding

Flotation & CIL

Load & transport

Smelting

Refine & EW

Accounting, Reporting

GHG Accounting

Digital process analysis

Cost accounting

Maintenance & Support

Financial accounting

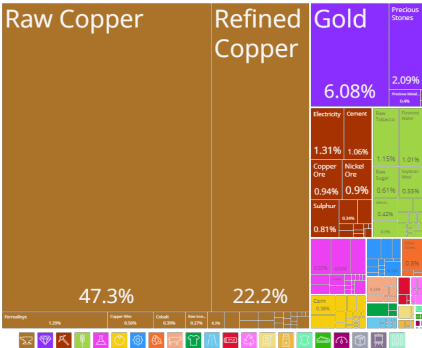
Manage inventory

Transport & Logistics

Many potential value chains

Exports (2021)
[Click to Select a Product]

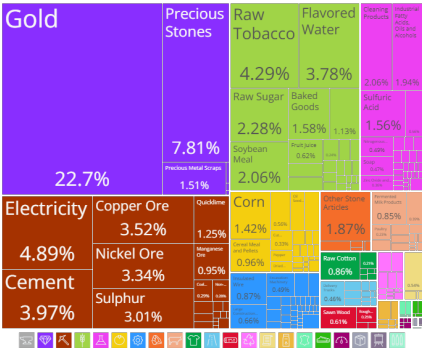
Total: \$13.4B



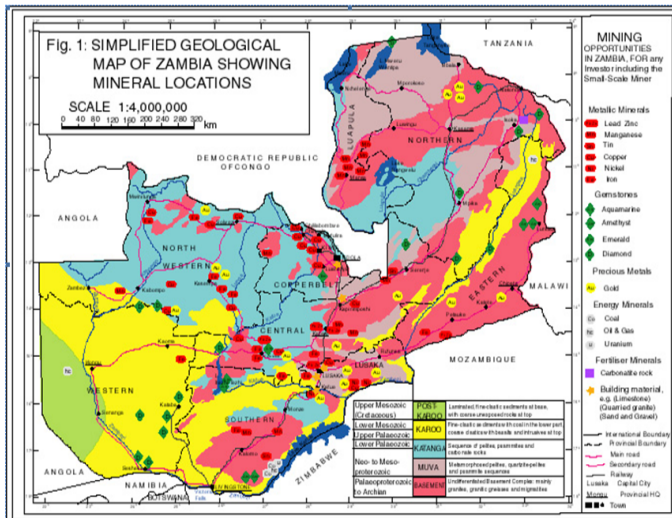
oec.world

Exports (2021)
[Click to Select a Product]

Total: \$3.59B



oec.world



2. Redistribution

Redistribution

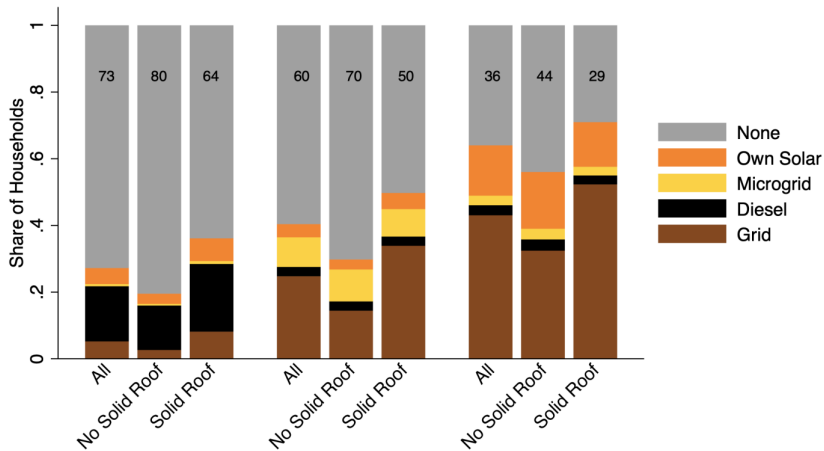
Two approaches to redistribution are core to a green industrial agenda for Zambia

- 1 Access to energy for both households and firms
- 2 Big push asset transfers

These are both means by which we can foster occupational change that enable people to protect themselves from the effects of climate change.

2.1 Access to Energy

Between 2000 and 2016, India dominated world electrification, contributing over 80% of the total gain in the number of households connected to the grid (International Energy Agency, 2017)



2004

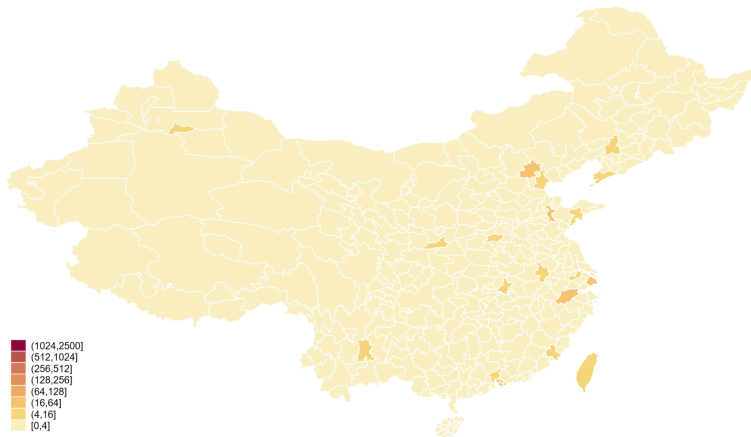


Figure: Solar Innovation and Policy Support in China

2019

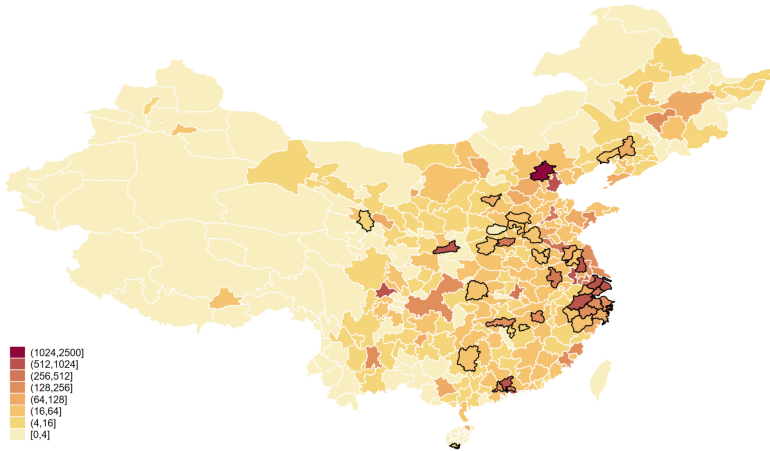
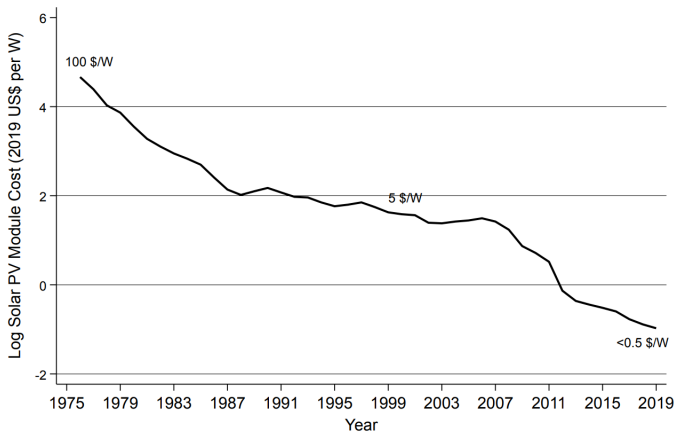


Figure: Solar Innovation and Policy Support in China

Cost of solar has fallen dramatically

Figure: Global average price of solar PV modules (in 2019 US\$ per Watt)



Source: LaFond et al. (2017) & IRENA Database

Huge fall in cost of solar relative to other energy sources (1880-2020)

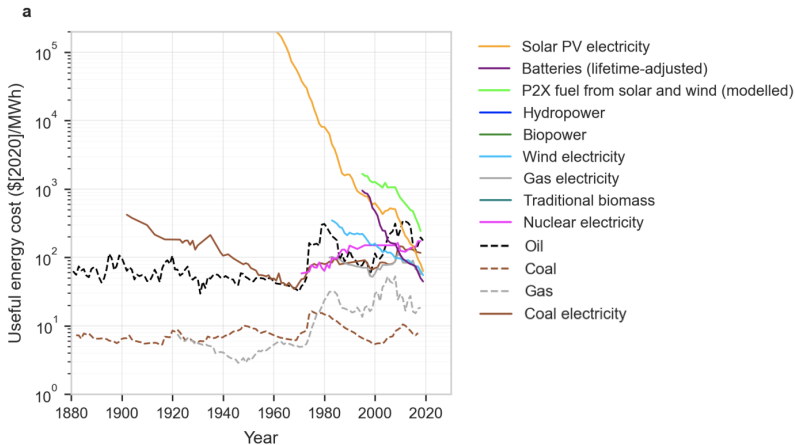
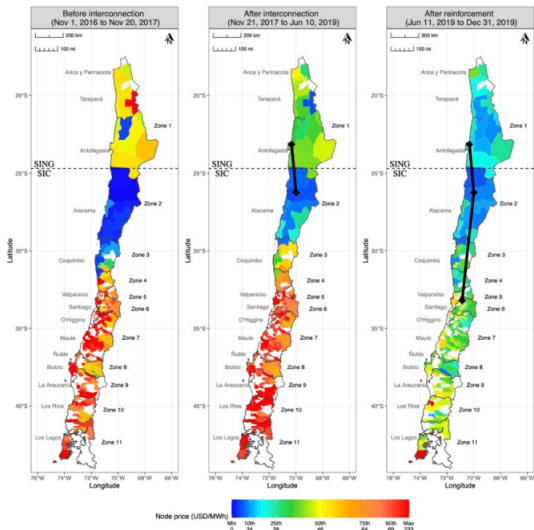
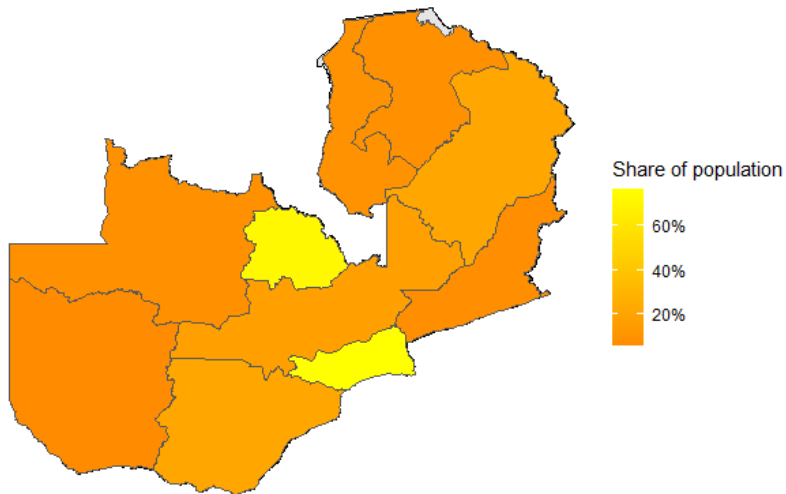


Figure: Market Integration and Spatial Variation in Electricity Prices
(Gonzales et al. 2023)



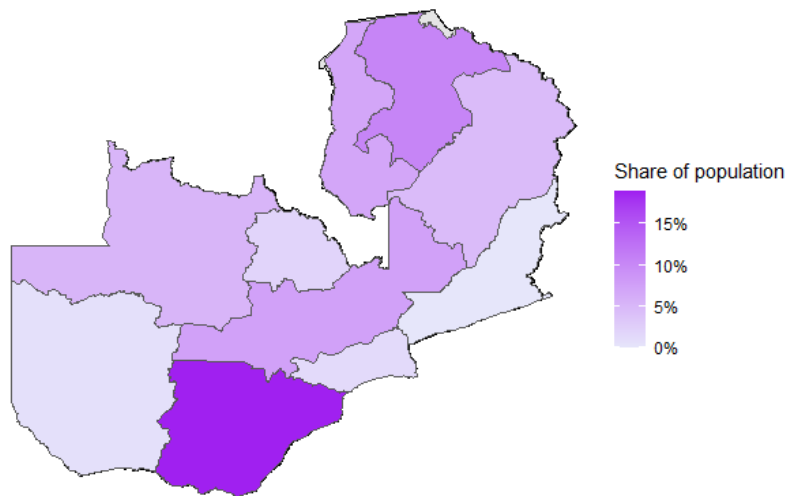
Disparities exist in how electricity is accessed

Households with access to grid electricity



Disparities exist in how electricity is accessed

Households with off-grid electricity access



The opportunity of solar energy

SOLAR RESOURCE MAP

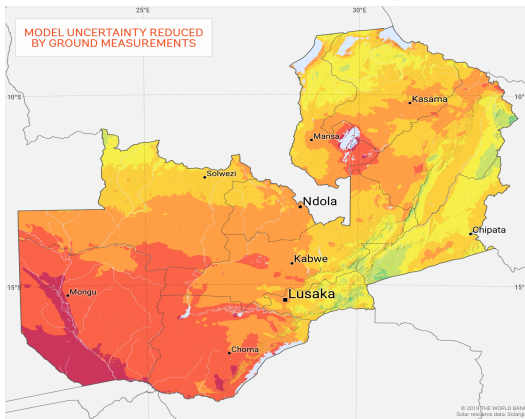
PHOTOVOLTAIC POWER POTENTIAL

ZAMBIA



ESMAP

SOLARGIS



Long-term average of PVOUT, period 1994-2017

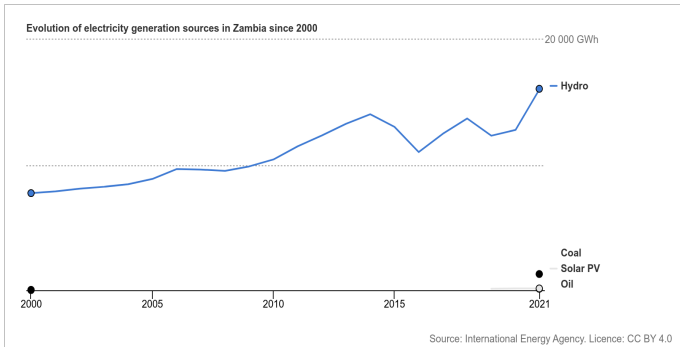
Daily totals: 4.2 4.4 4.6 4.7 kWh/m²



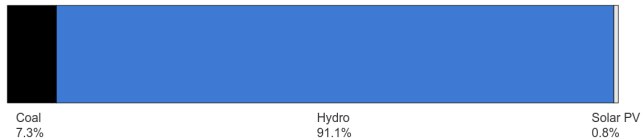
Yearly totals: 1534 1607 1680 1716

This map is published by the World Bank Group, funded by ESMAP, and prepared by Solargis. For more information and terms of use, please visit <http://globalsolaratlas.info>.

In Harm's Way?

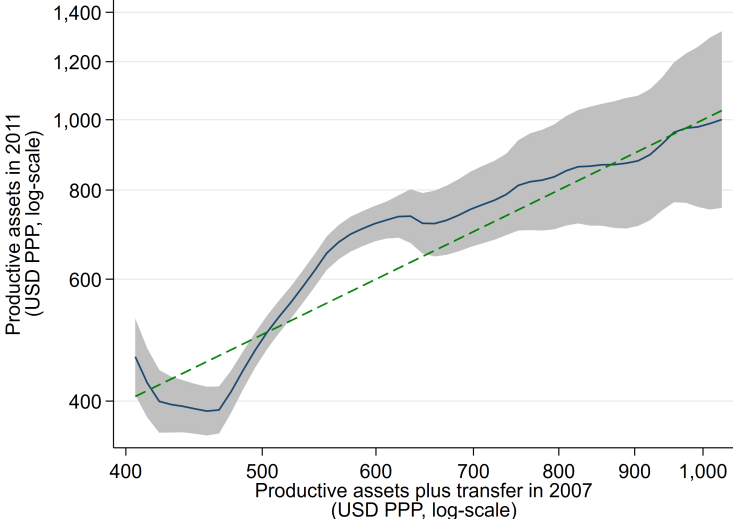


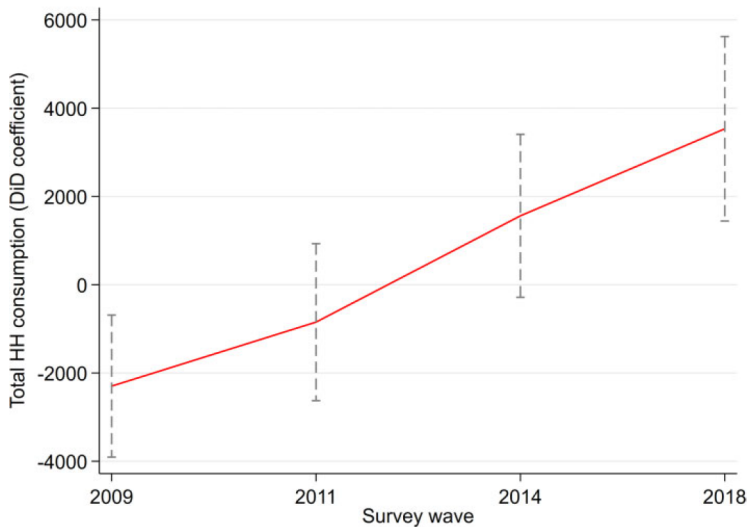
Electricity generation, Zambia, 2021



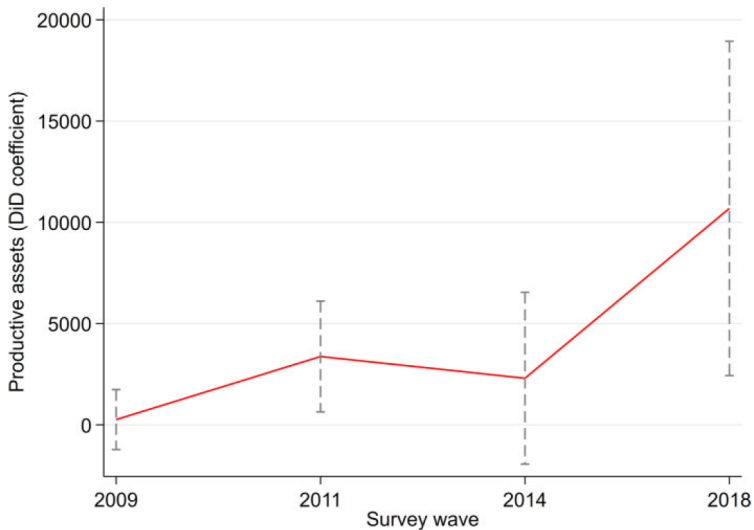
2.2 Big Push Anti-poverty Programs

Poverty Traps



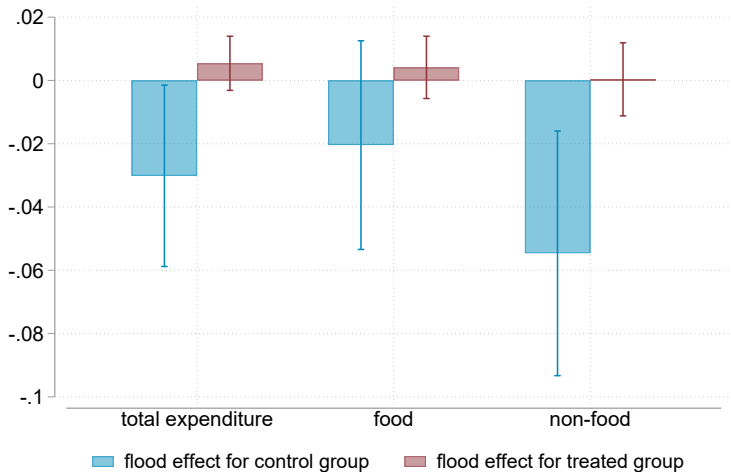


(B) Total Consumption

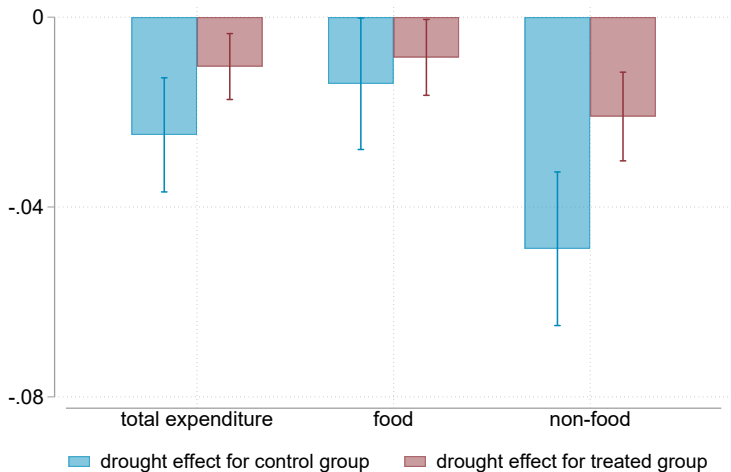


(A) Productive Assets

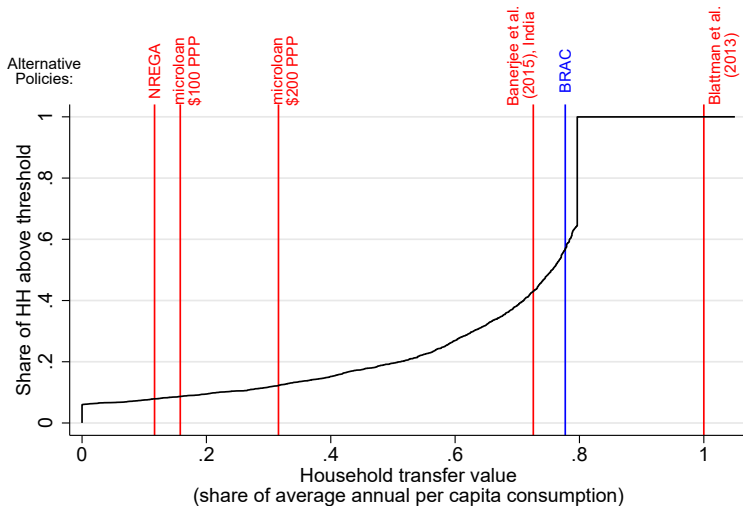
Climate Resilience



Climate Resilience

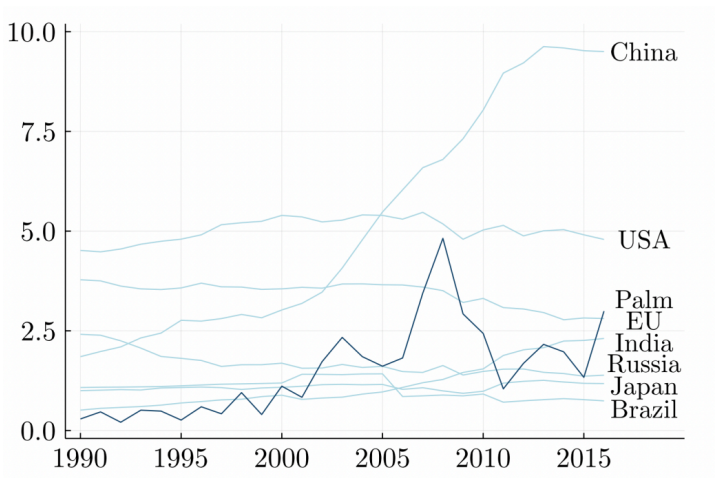


Getting people out of poverty requires a big push

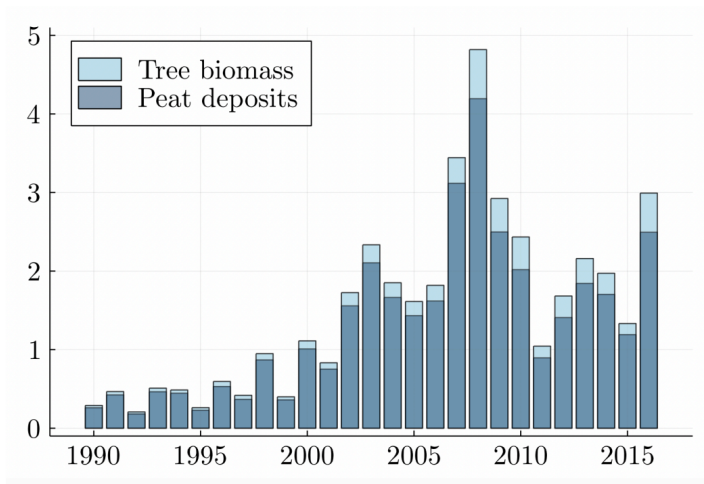


3. Natural Capital

Smart Conservation

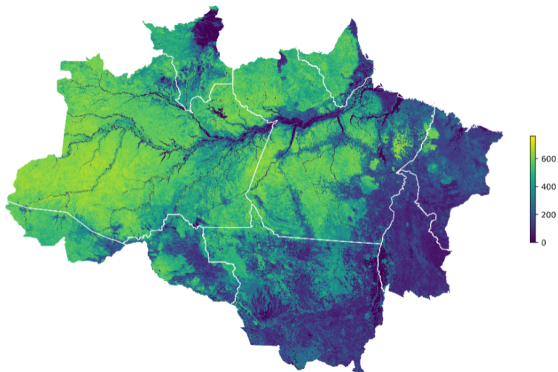


Smart Conservation



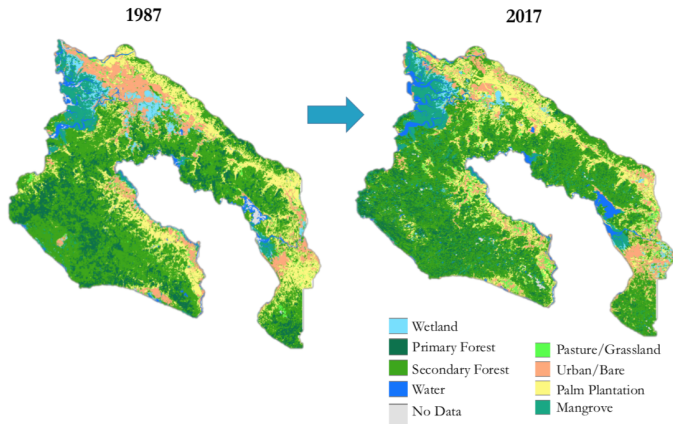
Carbon stock in the Brazilian Amazon in 2000

Figure 1: Carbon Stock in 2000

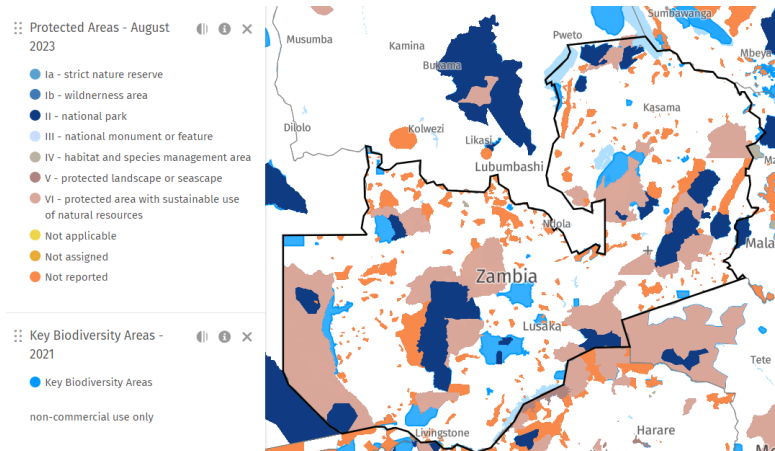


This map plots carbon stock density (tons of CO_2 per hectare) at 30 meter resolution. The values vary from blue (less carbon) to yellow (more carbon).

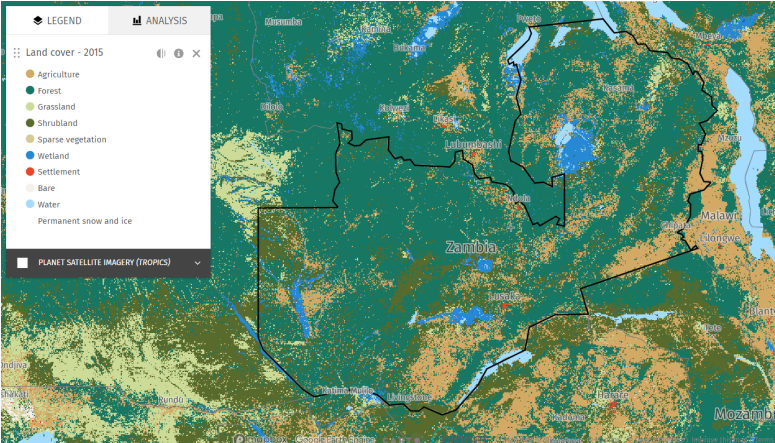
Costa Rica - Annual growth rate of tourist arrival = 7.4% per annum since 1990; Tourism = 5% of GDP in 2016; Employs 150,000 people; Main source of foreign exchange



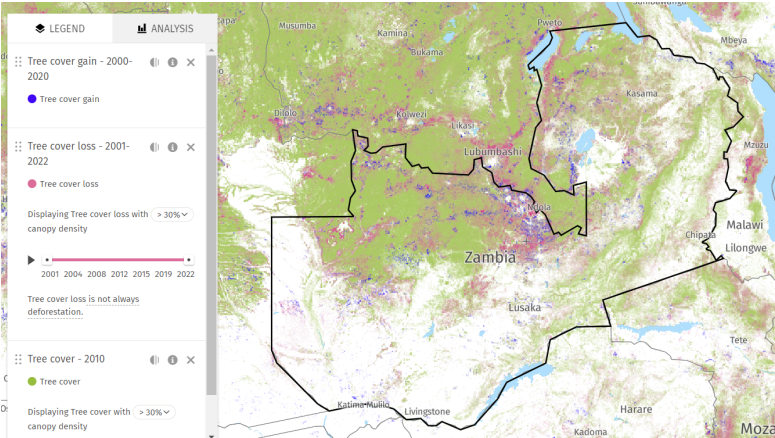
Protected areas cover much of Zambia



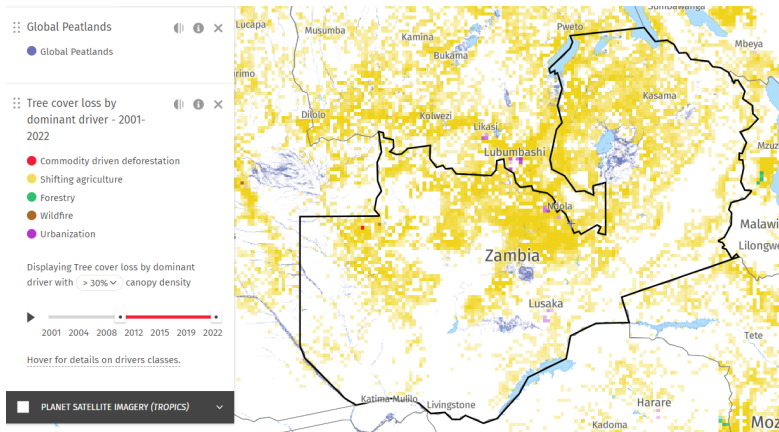
Natural capital in Zambia is an asset with increasing value



Deforestation is degrading natural capital

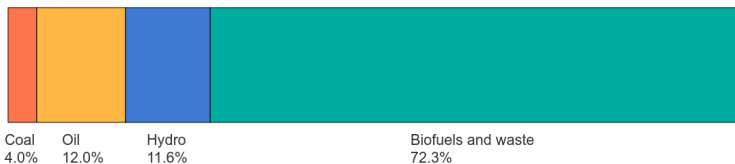


Subsistence agriculture = main driver of deforestation



Much of energy comes from fuelwood

Total energy supply, Zambia, 2021



● Coal ● Oil ● Hydro ● Wind, solar, etc. ● Biofuels and waste

Source: International Energy Agency. Licence: CC BY 4.0