



Reversing land degradation in the Central Plateau of Angola

Agro-ecological zoning in support of evidence-based decision making for sustainable land management

Context

Agriculture is a major sector of the Angolan economy, employing about 68 percent of the active adults yet productivity is low, and the country's abundant resources of land and water remain underutilized. Less than 15 percent of the potential agricultural land is used due to low productivity because of lack of mechanization and processing technology, lack of access to market information, finance and inputs, poor infrastructure, the effects of climate change and land degradation.

People in rural areas are further affected by poverty, illiteracy, and limited access to social services which is partly an outcome of the 27-year civil war. The Angolan government hence, aspires to improve the sustainability and productivity of small-holder farming as a strategy for contributing to food security and fighting rural poverty, whilst reducing its overdependence on the oil sector and food imports through the Land Degradation Neutrality (LDN) initiative to monitor, halt and revert land degradation basing on the systematic mapping and assessment of land suitability and productivity, delivered through FAO's approach to Agro-Ecological Zoning (AEZ).

Actors and stakeholders

With FAO's assistance through the project "Sustainable land management in target landscapes of Central Angola", the Angolan Ministry of Culture, Tourism and Environment (MCTA) and the Ministry of Agriculture and Fisheries (MINAGRIP) will adapt Global Agro-Ecological Zoning (GAEZ v4) information to the national context with a particular focus on the provinces of Huambo and Benguela, located in the Central Plateau of Angola.

Replicability and upscaling

The processes developed and piloted by this project in the two provinces will be upscaled and replicated across all Angolan provinces at national scale. As the global datasets are ground-truthed and become more refined through the NAEZ, the latter will also be used to enrich the former in a two-way loop.



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Objectives

- Build on the Global Agro-Ecological Zones (GAEZ v4) to develop the national agro-ecological zoning approach, in support to sustainable land management.
- Guide sustainable land management and land degradation neutrality through improved access and use of robust and updated data and information, national plans and strategy for agricultural development.
- Provide access to the most current, consistent, documented and reliable information on land degradation, agro-ecological zoning, sustainable land management at national level and high-resolution disaggregated information for the provinces of Huambo and Benguela.
- Inform national partners through a single web-based platform, considering the latest international standards for data documentation and information and communications technology (ICT) development.
- Use the data for planning, implementing and monitoring multi-objective land and water management and development activities.
- Enhance national capacities in monitoring land, water and agricultural information.

Challenges

- Development of an innovative and integrated approach combining field and remote sensing, biophysical and socio-economic aspects while access to accurate and updated data.
- Financial and technical sustainability affect the sustainability of agro-ecological zoning, land monitoring and sustainable land management.

An application of GAEZ v4 for maize production

Maize is grown as a subsistence crop across all of Angola's provinces, with a production of 2.8 million tonnes in 2020 (FAOSTAT). The extent of suitable land areas for maize cultivation, was calculated using the crop Suitability Index from GAEZ v4 (for 1981–2010 and 2041–2070¹).

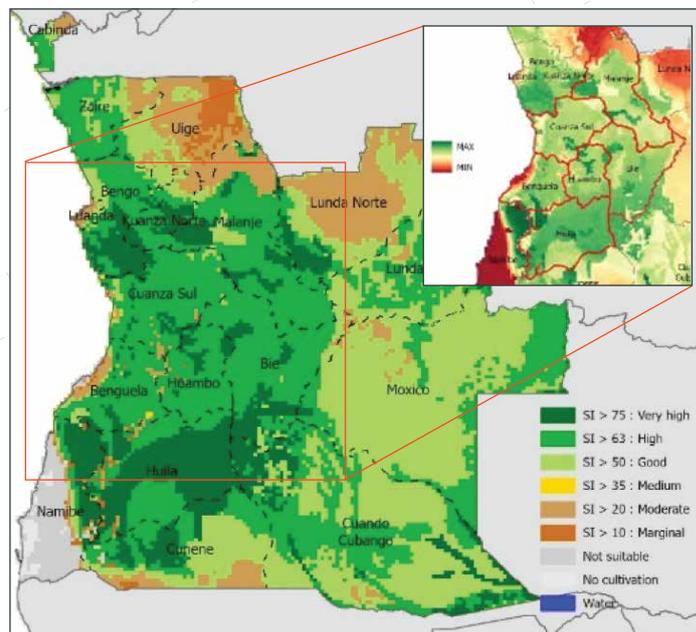
The results show that the extent of suitable cropland area for maize production is expected to increase by 45% by 2050. In addition, the average attainable yield for current cropland for maize is expected to increase across the country for the time period 2041–2070 with highest values in Bie, Cuanza Sul, Huila and Lunda Sul provinces. The Angola's 'Planalto' provinces – Benguela, Bié, Cuanza Sul, Huambo, Huila and Malanje – are also characterized by a significant increase (55 percent) in suitable areas and for average attainable yield (46 percent) for maize by 2050, with CO₂ fertilization.

Provinces	Cropland (km ²)	Suitable land area change (%)	Attainable yield change (%)
Bengo	2 636.2	-1%	7%
Benguela	2 712.1	45%	22%
Bié	1 484.2	162%	48%
Cabinda	252.0	-	48%
Cuando Cubango	10 423.1	41%	5%
Cuanza Sul	1 694.0	48%	48%
Cunene	6 902.4	23%	18%
Huambo	1 112.8	543%	65%
Huila	6 970.5	47%	49%
Kuanza Norte	899.7	1%	29%
Luanda	289.9	-68%	-30%
Lunda Norte	913.2	0%	34%
Lunda Sul	1 051.2	-	61%
Malanje	947.9	-	23%
Moxico	3 333.4	-	13%
Namibe	1 802.2	26%	11%
Uige	2 331.5	-	15%

¹ GAEZ v4 climate data include historical (time-series and 30-year averages covering 1961–2010) and future periods (30-year average of years 2011–2040, 2041–2070, and 2070–2099) using recent IPCC AR5 Earth System Model (ESM) outputs for four Representative Concentration Pathways (RCPs).

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Crop suitability for maize for the time period 2041–2070 using climate model NorESM1-M based on RCP8.5 (map on the left). Average attainable yield for maize (kg DW/ha) for the period 2041–2070 for 'Planalto' provinces (zoomed map on the right).



Source: FAO and IIASA, 2021 (both maps) modified to comply with UN. 2020. Map of the World [online]. [Cited May 2021]

Impact

Six modules have been developed under GAEZ v4 and will be adapted to the national context to provide information about (1) land and water resources, (2) agro-climatic resources, (3) agro-climatic potential yield, (4) suitability and attainable yield, (5) actual yields and production and (6) yield and production gaps as well as to support economic development (FAO and IIASA, 2021). The AEZ methodology is a successful approach used in land evaluation to support sustainable agricultural development by providing information about current and future agricultural production risks and opportunities based on a time series of historical data of 1961–2010 and a selection of future climate simulations.

- National and sub-national high-resolution information about land degradation, land cover change, land productivity and soil organic carbon are being prepared in support to national and international development plans.
- A full capacity development plan in agro-ecological zoning, with a national specific geospatial database and platform are under development, with targeted 15 capacitated national staff.

Related resources

FAO and IIASA. Global Agro Ecological Zones version 4 (GAEZ v4) <http://www.fao.org/gaez/>

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