



Python Package for Agro-Ecological Zoning

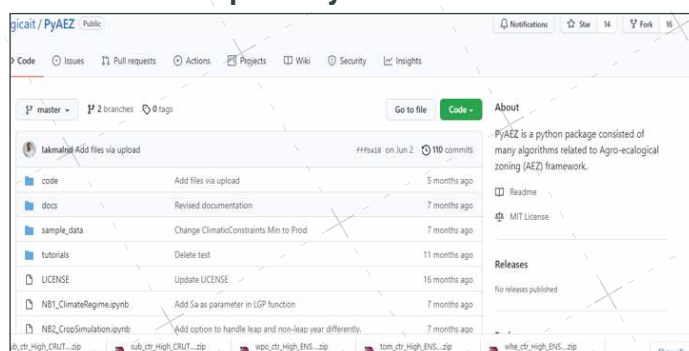
Strengthening Asia-Pacific agriculture practices with Agro-Ecological Zonation

Context

PyAEZ is a Python package consisting of several algorithms related to the Agro-Ecological Zoning (AEZ) framework. PyAEZ attempts to encapsulate all complex calculations available in AEZ and provide a user-friendly and intuitive interface for data input and view results.

The PyAEZ package was developed to support AEZ implementation at the national level. This was initiated by the Geo-informatics Centre (GIC) of the Asian Institute of Technology, Thailand, under a regional initiative on “Capacity building for Agro-Ecological Zone (AEZ) mapping and modelling to project climate suitability of crops and land uses” in collaboration with the FAO Regional Office for Asia and the Pacific (FAO-RAP) and the SAMIS¹.

GitHub Code Repository



Actors and stakeholders

GIC, FAO-RAP, and the SAMIS Project team jointly worked to develop the PyAEZ in close collaboration with the FAO Geospatial Unit of the Land and Water Division and the Department of Agricultural Land Management (DALaM), Ministry of Agriculture and Forestry (MAF) of Lao PDR. Inputs from the Ministries related to Agriculture and Environment from the Asian region were received through workshops.

¹ Strengthening agro-climatic monitoring and information systems to improve adaptation to climate change and food security in Lao PDR (GCP/LAO/021/LDF).



Actors and stakeholders

FAO and the International Institute for Applied Systems Analysis (IIASA) released the updated GAEZ v4 Data Portal, a database widely and easily accessible that provides information about the current and future agricultural production, irrigation demand, and development options.

The Global AEZ provides comprehensive information relevant for decision-making. It is of particular interest to national and international organizations dealing with aspects of agriculture, land and water resources, food security, agricultural development and policies, or with climate variability and climate change.

Objectives

- Strengthen the in-country capacities to undertake AEZ analysis using local data.
- Improve the use of the AEZ approach to understanding the potential impacts of climate change on the suitability of key staple and cash crops, which is crucial for designing more effective adaptation measures and overall agricultural resilience

Challenges

- Limited availability of updated, accessible, and accurate input data (climate, soil, and crop data). A newly established climate projection CIMIP6 is also available with a coarse resolution which requires downscaling.
- Technical capacities, financial and other resources for research and development of PyAEZ.

PyAEZ provides

PyAEZ provides a standard framework for land resource inventory and appraisal adhering to the established FAO Land Evaluation Framework. PyAEZ's underlying algorithm uses numerous data as inputs for simulating crop cycles and assessing the suitability and productivity of crops. It also estimates maximum yield under prevailing climate, soil, and terrain conditions.

Core Modules

PyAEZ includes six main modules, as listed below. A new module on utility calculations has been added in PyAEZ to make it robust.

- Module I: Climate Regime
- Module II: Crop Simulations
- Module III: Climate Constraints
- Module IV: Soil Constraints
- Module V: Terrain Constraints
- Module VI: Economic Suitability Analysis
- Module (New): Utility Calculations

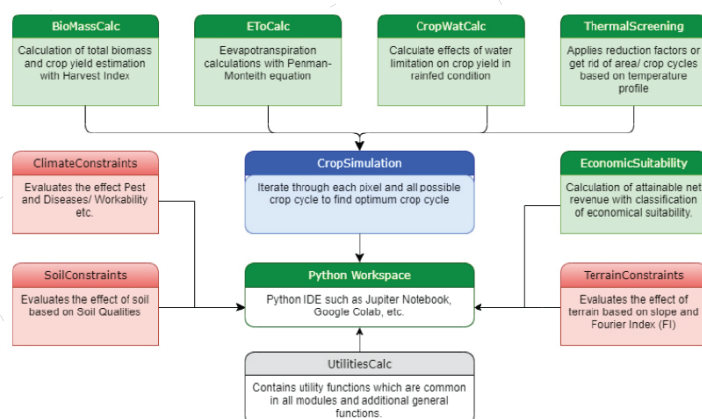
Additional Modules:

Three major algorithms related to AEZ also are included in PyAEZ as separate modules and can be utilized individually without running the whole PyAEZ.

- Biomass Calculations
- Evapotranspiration Calculations
- CropWat Calculations

Users can use the whole PyAEZ package as well as individual components of PyAEZ package based on their requirements.

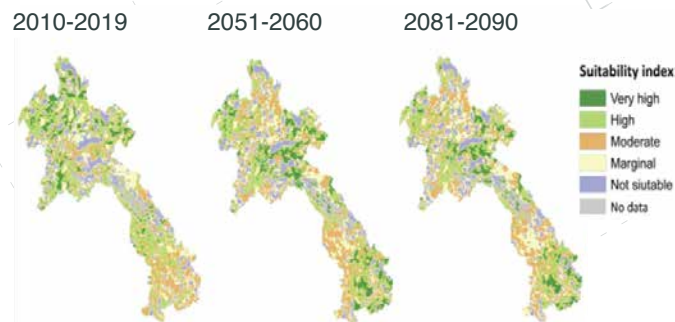
Overall module structure of PyAEZ



All those modules are connected to provide intuitive access to PyAEZ package. Users can use the whole PyAEZ package as well as individual components of PyAEZ package based on their requirements.

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Suitability of Coffee (Robusta)

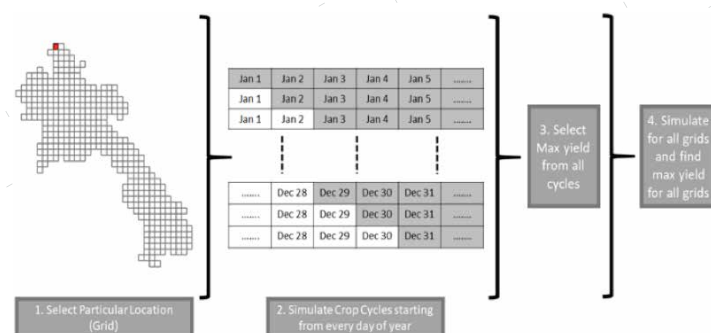


Source: SAMIS 2021

Replicability and upscaling

All source codes, sample data, and documents of PyAEZ are available in open source. Currently, the PyAEZ can be accessed on GitHub (<https://github.com/gicait/PyAEZ>). All future development, as well as bug fixing, will be carried out within this GitHub repository.

Schematic representation of the crop simulation process



Several training programs in PyAEZ were organized to promote the applications of PyAEZ. Further, the utilization of PyAEZ in project development and policy planning is being planned across the Asia and Pacific region with a potential for replication elsewhere in the world.

Related resources

<http://www.climatologylab.org/terraclimate.html>

National Agro-Economic Zoning for Major Crops in Thailand (NAEZ) (Project TCP/THA/3403) <http://www.fao.org/3/i7077e/i7077e.pdf>

Pilot country and first case study results: Lao People's Democratic Republic

<http://www.fao.org/3/cb4907en/cb4907en.pdf>

<https://www.fao.org/3/cb5061en/cb5061en.pdf>

<https://github.com/gicait/PyAEZ>

SAMIS home-page

<http://www.fao.org/in-action/samis/ru/>



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