The future of crop production

Innovative geospatial portal on agro-ecological zoning

Climate change will affect how, when and where farmers produce their crops in the future. For example, crops that today grow well in an area might not do so in coming years. That means that farmers will have to adapt their practices and perhaps grow crops differently. Governments and development agencies need to anticipate the impacts of climate change so they can design programmes to support these transitions. The fourth version of the Food and Agriculture Organization of the United Nations (FAO) new Global Agro-Ecological Zoning portal (GAEZv4) provides policymakers and analysts with a wealth of data on agricultural production and the factors that influence it.

Figure 1. The portal gives access to a number of useful layers such as the one shown above. In this case the number of days where agricultural production is possible for the period 1981 to 2010. Similar information is also available for future years.
GAEZv4 provides a huge range of geospatial data to support project managers and decision makers. The platform covers up to 53 major crops, from alfalfa to yams. It presents crop-specific potential productivity, land suitability, actual production and yield gaps in the form of customizable maps. Users can relate this information to land and water resources (such as soil type and slope), and to climatic information such as rainfall, temperature, and growing period. Various time frames can be chosen: from 1961-present or until 2099, based on forward looking climate models.

That allows them to generate a wide range of information for many uses. Some examples:

- **Climate change.** A programme preparing for climate-change adaptation can use the platform to forecast the expected climate changes and their likely effects on crop production in each location across a country.

- **Land suitability.** Ministries of agriculture can see which areas of the country are suitable for growing certain crops.

- **Economic and financial analysis.** Economists can use the yield and production data to predict the costs, incomes and profits for crops in particular areas, or to compare the profitability of different land use options.

- **Land use planning.** Agencies focusing on particular land types (such as rangeland or irrigated areas) can extract the data for land use planning and infrastructure developments.

**Data portal**

The data portal allows users to search, view and download a specific layer. The data cover the whole world at a common spatial resolution of around 9 x 9 km per pixel, with some types of data (such as soil suitability, slope and land cover) at a higher resolution of under 1 km per pixel. It is possible to extract and download the information in GIS formats so they can be combined with other geospatial information to allow further analysis.

See webinar link to the right for guidance on how to use the data portal.
Six themes

The data in the portal are organized in six themes that reflect different stages of data analysis and user needs. The first two concern the resources that influence crops and their productivity:

1. Land and water resources. This is used mainly as input to the models to characterize land use, soil resources, topography, water resources, and selected socio-economic data.

2. Agroclimatic resources. This provides an overall characterization of climate regimes and agro-climatic conditions affecting the overall agricultural productivity and suitability. This information includes historical time-series and 30-year averages covering 1961-2010, plus predictions for the future – the periods 2011-2040, 2041-2070, and 2070-2099 for multiple climate models and scenarios.

The remaining four themes concern the crops themselves:

3. Agroclimatic potential yield. This provides information for each crop on its agroclimatic yield, constraint factors, growth cycle attributes, and land utilization types.

4. Suitability and attainable yield. This has information for 53 crops on land suitability, agroecological attainable yield, and crop-water deficit.

5. Actual yields and production. This includes the actual harvested area, yield and production for 26 major crops or crop groups, separately in rainfed and irrigated cropland, plus the estimated value of production at 2000 prices.

6. Yield and production gaps. This calculates the difference between the actual and potential yields of 22 major crops for rainfed and irrigated cropland.

Development

GAEZv4 is jointly developed by FAO and the International Institute for Applied Systems Analysis (IIASA), in collaboration with a number of partners including the Asian Institute of Technology (AIT) and the Environmental Systems Research Institute (ESRI). The fifth version of the Global Agro-Ecological Zoning (GAEZv5) is under development.