



Strengthening Afghanistan institutions' capacity for the assessment of agriculture production and scenario development

Agro-ecological zoning in support of evidence-based decision making for sustainable agriculture development

Context

Agriculture is crucial for the national economy of the Islamic Republic of Afghanistan and in particular so for the agriculturally dependent population which is constituting 60 percent of the total population. Adoption of new strategies for agriculture monitoring, rural land use planning and land management are urgently required to reduce hunger and poverty among rural population and to assure sustainable food and feed production for future generations. Productivity in the agricultural sector has been relatively low and farmers and decision-makers are facing the challenges of climate change. Afghanistan has the potential to increase its output of cereals, fruits and vegetables. The availability of reliable information on natural resources and agriculture for its monitoring and analysis is indispensable to planning and implementation of successful land and water development strategies.

Actors and stakeholders

The project "Strengthening Afghanistan institutions' capacity for the assessment of agriculture production and scenario development" (GCP/AFG/087/EC), funded by the European Union, is implemented by the Ministry of Agriculture, Irrigation and Livestock (MAIL) and the Food and Agriculture Organization of the United Nations (FAO). Within the context of this project FAO and IIASA support and implement a national agro-ecological zoning activity in Afghanistan (NAEZ) which assesses quality and availability of land resources and identifies crop cultivation potentials under given current or future agro-climatic conditions.

Replicability and upscaling

A standardized data format and a central information website were developed to facilitate data access, scenario analysis and knowledge exchange between the various Ministries and Institutions concerned with the sustainable use of land resources and agriculture sector development.



©FAO/ Giulio Napolitano

Objectives

Among the project objectives are improving the understanding of the country's national resources endowment and limitations as well as assessing agricultural production capacities under current climatic conditions and likely impacts of climate change.

- Establish a geospatial database with metadata on relevant AEZ indicators.
- Map and statistics of suitability and attainable yields for selected main crops under current and future conditions.
- Identify adaptation strategies for mitigation of climate change impacts and strengthening climate resilience in agriculture.
- Data validation and training
- Enhance national capacities in monitoring land, water and agricultural information.



©FAO/ Danijel Dennis

Challenges

- To establish an enabling stakeholder dialog on opportunities, risks and priorities of agriculture sector development.
- Financial, technical and institutional capacity to sustain, refine and systematically apply the AEZ results in land monitoring, sustainable land management and planning.

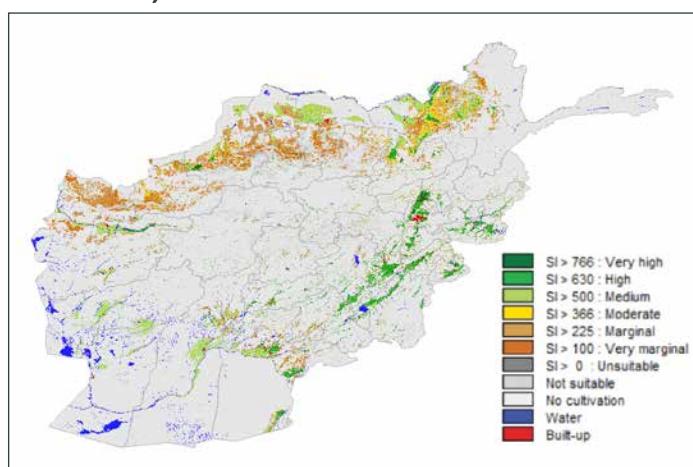
Approach and results

Agro-ecological suitability and production potential was assessed for nine cereals (barley, buckwheat, maize, millet, oat, paddy rice, rye, sorghum and wheat), two tuber crops (potato and sweet potato), two sugar crops (sugarcane and sugar beet), four pulses (beans, chickpeas, gram and dry peas), six oil crops (groundnut, olive, rapeseed, sesame, soybean and sunflower), three industrial crops (cotton, flax and tobacco), three vegetables (cabbage, onion and tomato), three fodder crops (alfalfa, pasture legumes and grasses), and one perennial fruit (citrus).

Crops were assessed for intermediate input and high input/advanced management assumptions, for rain-fed and irrigated production on current cropland. The land was assessed in terms of area extents of prime, good, moderate and marginal quality crop land for baseline climate (1961–1990; 1981–2010) and climate scenario ensemble means pertaining to different representative concentration pathways (RCP) in the 2020s, the 2050s and 2080s, without and with CO₂ fertilization effects.

The results of the crop suitability assessment were tabulated for historical and future 30-year periods, by major land cover types, by agro-ecological zones, by input/management level, and by three administrative levels (for eight regions; for 31 provinces; for 399 district administrative units). While suitability results were quantified for all land, the analysis was particularly focused on current rain-fed and irrigated cropland. Wheat is by far the most important staple crop of Afghanistan.

Agro-ecological suitability of wheat on current rain-fed and irrigated cropland (climate of 1981–2010)



Source: FAO and IIASA, 2019 modified to comply with UN. 2020. Map of the World [online]. [Cited May 2021]

Maps of suitability, attainable agro-ecological yields and of crop water demand have been produced and tabulated for all crops and time periods.

The boundaries and names shown and the designations used on this/these map(s) do not imply the expression of any opinion whatsoever on the part of FAO concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers and boundaries. Dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

Impact

The AEZ system for Afghanistan has been used to assess likely spatial shifts of agro-climatic characteristics of land due to projected climate change in the period 2041–2070 (the 2050s) and 2071–2100 (the 2080s). Climatic conditions in Afghanistan will become warmer and mostly drier in the future. Where natural soil moisture limitations can be overcome with irrigation, the multiple cropping potential of the land is expected to increase with climate change in the currently temperature-limited North Eastern and Central region. Warming will have negative impacts on water resources and rain-fed cropping in most other regions.

Climate change impacts on potential production of wheat on current cropland

Production, at intermediate input level	Current cropland 1981–2010 (‘000 t)	Change of potential production (% of base=100)		
		ENS+	ENS	Change 2050s
REGION		2050s	2050s	
North Eastern	1 682	135.9	118.6	↑
North Western	2 026	105.6	92.0	↓
Eastern	516	95.5	84.1	↓
Central	1 138	116.9	102.9	↔
West Central	1 360	116.3	102.3	↔
Western	1 875	106.9	93.8	↓
South Eastern	1 197	104.5	92.2	↓
South Western	2 464	105.5	93.4	↓
TOTAL	12 259	111.6	98.1	↔

Note: arrows show results without CO₂ fertilization effects and indicate changes of less than 5 percent (↔) and 5–20 percent (↓,↑) compared to baseline conditions.

Results shown denote potential wheat production on current rain-fed and irrigated cropland, attainable at an intermediate level of inputs and management under baseline climate and for an RCP8.5 climate scenario ensemble mean in the 2050s with (ENS+) and without (ENS) CO₂ fertilization effects.

The project produced an Agro-Ecological Zones Atlas comprising of two complementary parts. Part 1: Agro-climatic indicators, and part 2: Agro-ecological assessments.

Related resources

FAO and IIASA (2019). The Islamic Republic of Afghanistan – Agro-ecological zoning atlas. Part 1: Agro-climatic indicators. <http://www.fao.org/3/ca6889en/ca6889en.pdf>. Data portal: <https://lirmsfaoaf.ait.ac.th>.

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

Contact: GAEZ@fao.org



Some rights reserved. This work is available under a CC BY-NC-SA 3.0 IGO licence