

# Estimation of Wheat Growing Areas in Afghanistan

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## Importance of mapping wheat growing areas for Afghanistan

Afghanistan is a land locked country with arid and semi-arid climate. Eleven percent of the arable land lies in temperate ecological zones. Wheat is a major crop and staple food covering 80% of the total cereal planted area in Afghanistan. Climatic conditions such as droughts, increased incidences of pests and crop disease, lack of irrigation, changing farming practices – increased use of pesticides and insecticides, land preparation etc. are some of the factors that have further hampered wheat productivity. Despite being a significant producer, Afghanistan still imports wheat from other countries.

The timely forecast/estimation of wheat production is highly important for planning and ensuring food security in case shortages are predicted.

## Role of Remote Sensing in mapping wheat growing areas

Remote Sensing (RS) provides global coverage and a synoptic view with a high temporal revisit time. Availability of satellite datasets from various sensors at different spatial and temporal resolutions renders remote sensing as a powerful, time and cost effective solution for crop area estimation.

## Objectives

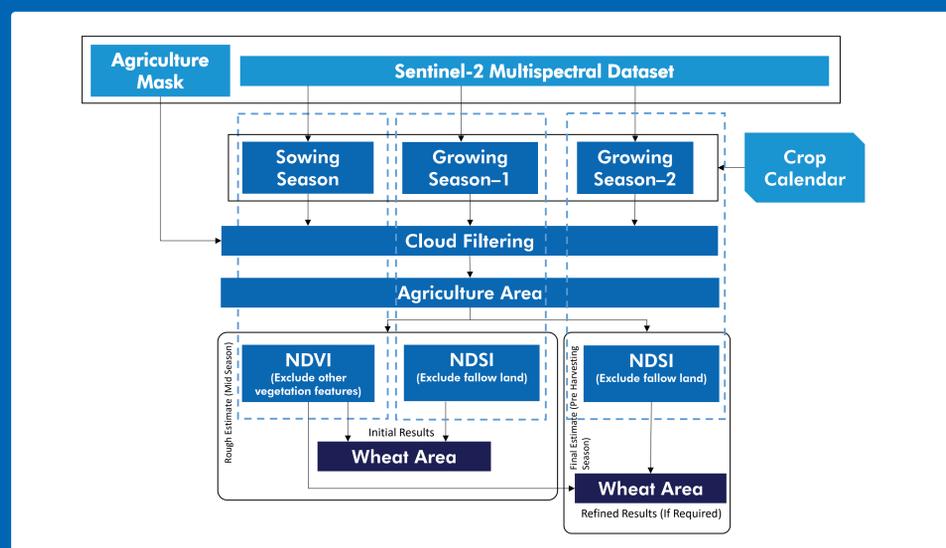
The objective of this study is to utilize remote sensing techniques for estimation of wheat growing areas in Afghanistan using a phenology based approach with multi-temporal satellite imagery.

This study will be further developed to encompass the following:

- Development of an operational system for in-season monitoring of wheat crops at high spatial resolutions
- Quantitative estimation of wheat growing areas to support yield estimation at national, provincial, and district levels



## Methodology



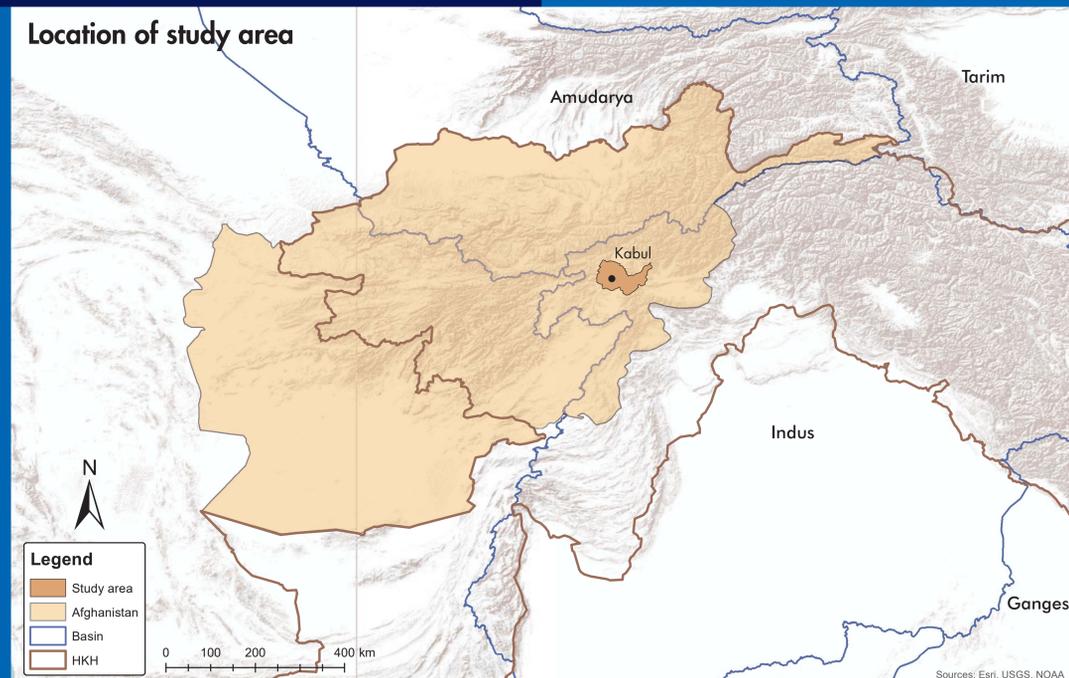
## Google Earth Engine

The Google Earth Engine is a cloud computing platform for processing satellite imagery and other Earth Observation data. It helps detect changes, map trends, and quantify the physical characteristics of the Earth surface.

Using the Google Earth engine platform has its fair share of advantages – increased speed, lowered computation costs and complexity, and enhanced transparency and data security among others.

This platform can be used to design and develop user friendly applications to help governments, universities, and policymakers monitor land use, desertification, forest change, and land-use dynamics.

## Location of study area



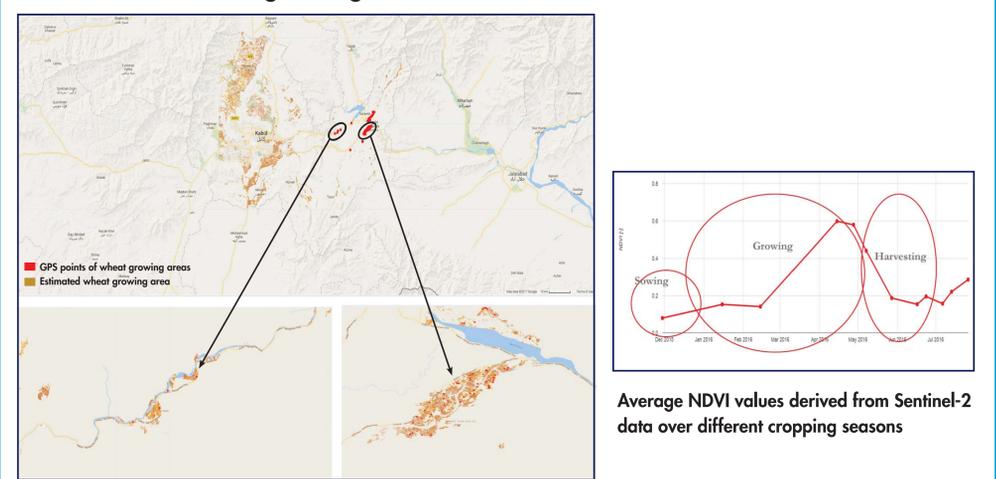
## Datasets and Tools used

- Sentinel-2 data
- Agriculture mask developed from land cover data provided by Ministry of Agriculture, Irrigation and Livestock (MAIL), Government of Afghanistan
- Crop calendar data from field provided by MAIL
- Global Positioning System (GPS) from the field for training and validation, provided by MAIL

## Research Highlights

- The methodology was used for the Kabul Province as a test case scenario.
- The overall accuracy of the exercise was found to be 92.11 %.
- The Google Earth Engine platform presented itself as a viable platform to efficiently estimate wheat growing areas at high spatial resolutions (10 m).

## Estimation of wheat growing areas



## Way Forward

- Field campaigns for field data collection are being conducted for validation of the estimated area for the whole of Afghanistan.
- The current study will be optimized further to make future analyses fully automated. A web application in a cloud based environment will be deployed for real time estimation of wheat growing areas and monitoring of crop health.
- An operational system will be developed to estimate of wheat growing areas to support yield estimation at national, provincial, and district levels.
- Capacity building activities are planned for relevant government agencies.

## Partner

Ministry of Agriculture, Irrigation and Livestock (MAIL), Government of Afghanistan.