

# Estimation of Wheat Growing Areas in Afghanistan

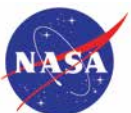
## Importance of mapping wheat growing areas for Afghanistan

Afghanistan is a landlocked country with an 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, and land preparation, among others, hamper wheat productivity. Despite being a significant producer, Afghanistan still imports wheat from other countries.

The timely forecast of wheat production is highly important for planning and ensuring food security in cases where 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. The availability of satellite datasets from various sensors at different spatial and temporal resolutions renders remote sensing a powerful, time- and cost-effective solution for crop area estimation.



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## 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 and Google Earth Engine (GEE) platform.

This study will be 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
- Automation of the estimation process and hand-over to the Ministry of Agriculture, Irrigation and Livestock (MAIL), Government of Afghanistan
- Capacity building of MAIL staff for operation and maintenance of the system

## Datasets and tools used

- Sentinel data (optical and microwave)
- Agriculture mask developed from land cover data provided by the 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
- GEE platform

## Research highlights

- The methodology was tested for the national wheat area estimation for 2017
- The GEE platform presented itself as a viable platform to efficiently estimate wheat growing areas at high spatial resolutions (10 metres)
- Use of Sentinel-2 10m data (optical and microwave) at different stages of the cropping calendar
- Use of a combination of RADAR and optical data for higher accuracy

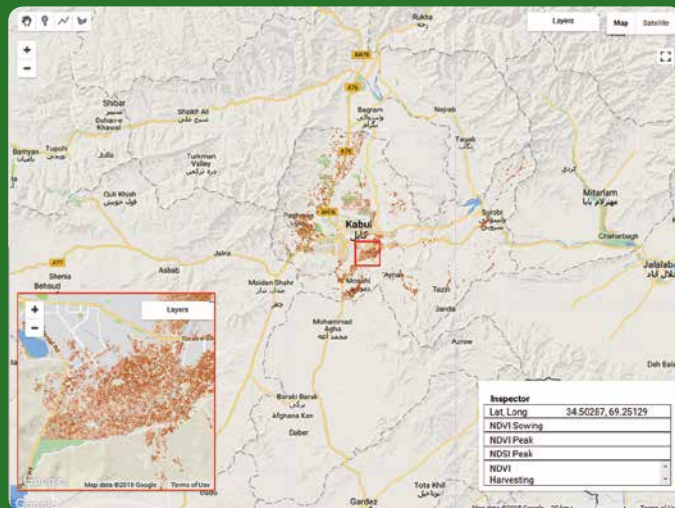
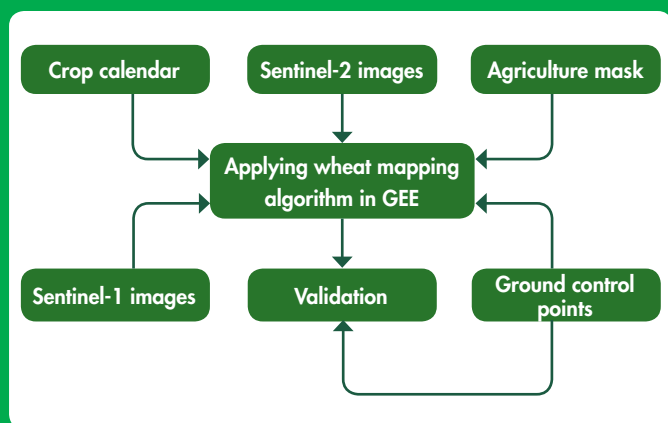
## The way forward

- The current study will be optimized further to make future analyses semi-automated. A web application in a cloud based environment is being deployed for real time estimation of wheat growing areas and monitoring of crop health for next year's assessment
- Capacity building activities are underway for relevant government agencies. The improved capacity of MAIL professionals in crop monitoring and use of advanced methods on cloud computing will increase efficiency as well as transparency in monitoring system
- Timely estimates on crop sown area at province levels will enable national institutions to effectively deal with crisis in provinces as well as provide decision support on grain import policies to ensure food security for the entire country

## Partners

MAIL, and NASA Science Coordination Office

## Methodology



Source: Google Earth Engine.

## Team

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## About SERVIR

SERVIR is a joint development initiative of the United States Agency for International Development (USAID) and the National Aeronautics and Space Administration (NASA). SERVIR Hindu Kush Himalaya (SERVIR-HKH) is implemented by the International Centre for Integrated Mountain Development (ICIMOD) in its regional member countries, prioritizing activities in Afghanistan, Bangladesh, Myanmar, Nepal and Pakistan.

## For further information

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**Photos:** Alex Treadway

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