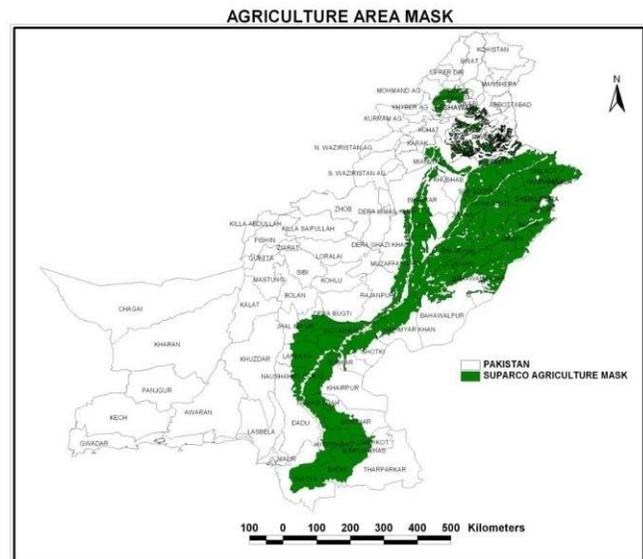


# Satellite Based Crop Monitoring System in Pakistan

By Dr. Muhammad Hanif

Pakistan is a country of diverse agro-climatic regions. The climate is predominantly arid to semi arid. The mighty Indus and its tributaries have facilitated the establishment of a network of dams, barrages and a profuse delivery system of water supplies. Pakistan's agriculture is predominantly converged in the Indus basin.

In 2005 erstwhile Ministry of Food and Agriculture (MINFA) opted to invest in advanced technologies for gathering spatial information on agriculture/ crops sector. For this purpose, MINFA invited SUPARCO, the National Space Agency of Pakistan, to develop crop area algorithms and crop yield models, based on the application of satellite remote sensing, GIS technology, crop agronomy and agro-meteorology.



## Worldwide Satellite based crop Monitoring Systems

A number of countries and organizations, worldwide are currently involved in monitoring crops, using satellite technology and allied systems. The most important of these include Food and Agriculture organization of the United Nations, European Union, USA, China, and a number of others. Description of these programs is as follows.

### FAO: Global Information and Early warning System (GIEWS),

GIEWS provides up to dated information on the food security situation of developing countries. It furnishes country specific information on current agricultural season and the harvest prospects for main staple food crops and livestock situation. In addition, the system provides estimates and forecasts of

cereal production and imports together with food price and policy developments. The briefs are updated no less than four times per year.

### **MARS, European Union (EU)**

The EU is running a program titled Monitoring Agriculture Resource System (MARS) at Joint Research Center (JRC), Milan Italy. The basic purpose of this program is to provide timely information pertaining to crop yield forecasting system

### **USA: Crop Explorer; Foreign Agricultural Service (FAS), USDA**

The Crop Explorer web portal features near-real-time global crop condition information based on satellite imagery and weather data. Thematic maps of major crop growing regions are updated every 10 days to depict the latest statistics pertaining to vegetative vigor, precipitation and temperature, and soil moisture. Time-series charts depict current and historical growing season data for specific agro-meteorological zones.

### **China Crop Watch System (CCWS)**

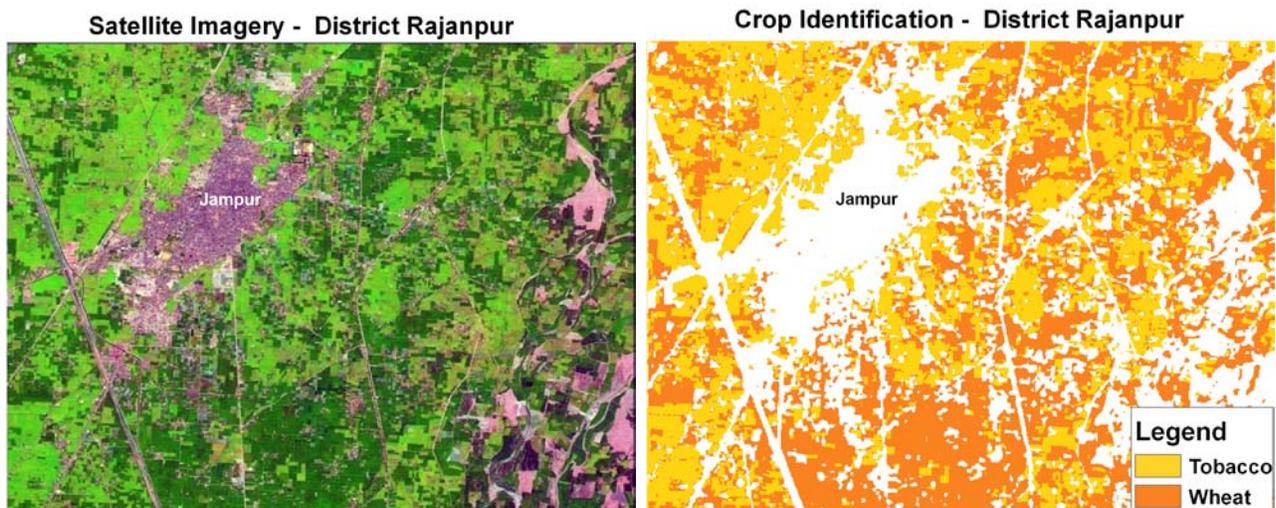
The China Crop Watch System (CCWS) was developed by the Institute of Remote Sensing Application (IRSA) of the Chinese Academy of Sciences (CAS) in 1998. CCWS covers entire China and 46 major grain-growing countries of the world. The System monitors the condition of the growing crop, crop production, drought, crop plantation structure and cropping index.

### **Pakistan: Satellite based Crop Monitoring System (Pak-SCMS)**

SUPARCO in collaboration with erstwhile MINFA, started developing a satellite based crop Monitoring system during 2005 to provide fast track and accurate information on crops and also cover any catastrophic situations. Agricultural mask of Pakistan was developed based on high resolution data acquired during peak growth seasons of February for Rabi crops and September for Kharif crops. SUPARCO carries out wall to wall coverage of the agriculture area of the country using remote sensing data. This data is utilized

to monitor various crops across the seasons. SUPARCO also has developed a regional crop calendars for sowing and harvesting of crops to be used for acquisition of satellite data during Rabi and Kharif seasons. Field surveys are also organized to collect spectral signatures of crops and land surface features.

In addition to satellite imaging program, SUPARCO has developed an area frame system for Pakistan, based on satellite image acquisition. This was done through Stratification of land-cover area. The decadal NDVI (Normalized Difference Vegetation Index) was used to stratify the land-cover features at maximum peak vegetation stages in the last decade of February for Rabi crops and second decade of September for kharif crops.



The crop yield models are based on the concept of harmonization and integration of historical data of crops, weather systems, fertilizers and satellite vegetation information, with corresponding data of these variables during the year under study.

Now that MINFA has been devolved and the subject is being handled by the provincial Governments, SUPARCO continues to interact with all the concerned departments in the provinces ensuring extending remote sensing & GIS tools for better agriculture planning & monitoring in Pakistan.

## **Conclusion**

The satellite remote sensing and GIS technology has helped to overcome the limitations of manual system. This technique has been useful to supply temporal and synoptic data of high quality in advance of crop harvests. This has also helped to monitor natural calamities as floods and drought. A monthly web based crop forecasting service (<http://www.suparco.gov.pk/pages/pak.scms.asp>) has been started to provide country wide authenticated and scientific information on crops. The planners, policy makers, public, private sector and other end users have greatly benefitted from this service.