Precision Agriculture for optimum Agri Output: Uttarakhand State, India

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Presentation Outline

❖ Introduction
❖ Objectives
❖ Parameters Studied
❖ Analysis & Mapping
❖ Mapping of Dominant Crop Types
❖ Soil Suitability Mapping
❖ Concluding Remarks
INTRODUCTION

- Precision Agriculture based APIB (Agro Climatic Planning and Information Bank) is a single window Knowledge base for Agricultural and allied Sector.

- Help farmers, agri sector, Government to make decisions for improving agriculture productivity.

- Large Scale mapping at 1:10,000 Scale integrated with all relational information, both spatial and non spatial.

- Effective Management of Agricultural Resources and Planning for Sustainable Development.

- Timely & Reliable Information on Agricultural Resources with respect to their Nature, Extent, Magnitude and Spatial Distribution.
COVERAGE

❖ Capturing all Agriculture Spatial and Non Spatial Database, analyse and map information at 1:10,000 scale;
❖ Integration of agro-climatic and agro-ecological data, Agricultural Practices, Seeds, Fertilizers, Plant Protection, Agricultural Implements, Agricultural Credits, Insurance Schemes, Subsidy, Agriculture Market Infrastructure, Weather Information, Socio-economic Infrastructure etc,
❖ Decision Support on Precision Agriculture application for optimum Agri Output production.

BENEFITS

❖ Single window access of information in Agricultural Sector
❖ Information on Agro-climatic farming system.
❖ Information on Land use/ Land cover and shift pattern
❖ Redefining land use pattern based on land suitability
❖ Provide scientific information on High yield varieties/Hybrid seeds, Tissue culture seedlings, Improved package of practices and Efficient irrigation schemes.
❖ Market related information
❖ Encouragement for contract farming
❖ Information on production of export-oriented commodities
❖ Help to conserve precious top soil and natural resources to arrest soil erosion, avoid silting of Dams & rivers and production of fertile agriculture land
❖ Suitability of land for alternative use-agriculture, horticulture, Afforestation, pasture development, recreation sites and wildlife habitat development.
❖ Real time monitoring of crops.
❖ Interlinkages with Existing Databases(NIC (DISNIC), NBSS & LUP, NNRMS, etc).
❖ Act as sectoral node for Ministries, State Govt, District Admn, Agrl Dept, KVK, Research Organisations, etc.
❖ Crop Acreage Estimation
❖ Crop Condition Forecasting
❖ Crop Yield Forecasting
❖ Soil Mapping
Monitoring
❖ Crop Production Monitoring
❖ Land use Monitoring
❖ Salt Affected Soil Monitoring
❖ Wasteland Monitoring
❖ Drought Monitoring

Management
❖ Irrigation Management
❖ Cropping System Analysis
❖ Contract Farming
❖ Precision Farming

Spatial Decision Support System (SDSS)
❖ Analytical Modelling Capabilities
❖ Database Management System
❖ Graphical Display Capabilities
❖ Tabular Reporting Capabilities
❖ Expert Knowledge
**Study Area**

- The study area comprise of two Districts namely Dehradun and Champawat districts of Uttarakhand State, India.
THEMATIC LAYERS

❖ Cultural Features (Roads, Settlements, Canals etc.)
❖ Terrain Characteristics (Digital Elevation Model)
❖ Slope
❖ Aspect (Direction of Slope)
❖ Drainage Characteristics (Delineation of Micro Watershed Boundaries)
❖ Land Use Land Cover
❖ Irrigated / Unirrigated Land Area
❖ Geomorphology (Land Forms Characteristics)
❖ Soil Map (Type of Soil & Detail Characteristics)
❖ Hydrological Soil Characteristics (water and soil-moisture content)
❖ Extent of Soil Loss
❖ Land Degradation
❖ Land Irrigability
❖ Land Capability
❖ Land Productivity
❖ Crop Suitability
❖ Dominant Crop Types- A few selected crops
❖ Ground Water Potential
❖ Soil Mapping
❖ Soil Physico-Chemical Properties
DATA INPUTS

❖ Cartosat – 1 Satellite Images (2.5 mt Resolution)
❖ Resourcesat IRS P6 LISS – IV Images (5.8 mt Resolution)
❖ Survey of India Topo sheets 1:25,000 scale
❖ Soil Survey, Sampling & Analysis
❖ GPS / DGPS Data
❖ Census Data
❖ Meteorological Data
❖ Agronomy Practices

CULTURAL FEATURES MAP

❖ Cultural Features maps (roads, canals, villages, towns etc)
ASSESSMENT OF SOIL LOSS MAP

➢ Soil loss is directly related to soil erosion so the map indicates erosion status of the area. Three categories of erosion is shown on the map

➢ Slightly eroded
➢ Moderately eroded
➢ Severely eroded
Land degradation due to erosion, salinity and sodicity.

Map shows highly degraded, moderately degraded, slightly degraded and normal lands.

Degradation in hilly areas due to the loss of top fertile layer.

Terraced land protected and classed as slightly degraded lands.

In plain cultivated areas the degradation is slight to moderate, while open forest areas have moderate to severe degradation.
LAND IRRIGABILITY MAP

- Land irrigability map shows total 6 classes.
- Land Class 1 to 4 are irrigable.
- Land Class 5 is presently not suitable for irrigation.
- Land Class 6 is non-irrigable due to severe limitations of soil and topography.
LAND CAPABILITY MAP

- Classes I-IV are arable.
- Class V to VIII is non-arable.
- Class VI is mostly suitable for forestry and pasture.
- Class VII is suitable for wildlife.
- Class VIII is suitable for recreation.
LAND PRODUCTIVITY MAP

- Land productivity of cultivated areas is productivity based on the average rainfall, location, slope, soil texture, soil depth, macronutrients.

- The map shows the productivity rating based on Storie Index 1964.

- District has mostly fair to fairly good land productivity rating.
Total Number of Profiles
2027

Total Number of Profiles
4424
Soil Profile at Tilone Village, Champawat Block

Soil Profile at Koti Khanasar Village in Chakrata Block
DOMINANT CROP TYPES
CROP SUITABILITY MAP
Cadastral LULC Map

Cadastral Ground Water Potential Map
Cadastral Land Productivity Map

Cadastral Soil Map
Cadastral Crop Suitability Map
CONCLUDING REMARKS

➢ Natural Resources Data Bank generated for the 18 themes at 1:10,000 scale. (i.e., Cadastre level)

➢ Data Bank contains both Spatial and Non-Spatial Data

➢ APIB is a single window Knowledge base for Agricultural and allied Sector.

➢ Helps Government and empowers Farmers to take decisions for improving productivity of their crops.

➢ Farmers use Smart Mobiles to access data and take decisions, on Farming related activities.

➢ Farmers take soil suitable, agro metrology compatible, demand based, export oriented, income generating, optimum input cost based, food crops, horticulture, medicinal & Aromatics, spices, pulses, oil seed, etc, and derive greater economic benefits.

➢ Agro Farming Start Ups, Agro Industry, Retail & Wholesale Business, Banks, NGOs, CBOs, Agro Federations are taking interest for Agri Developmenet and Business Promotion.
THANK YOU
Namaskar