

# Agriculture Resources Management and Micro-level Planning

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Agriculture is the primary source of livelihood for about 58% of India's population. The Indian food industry is poised for huge growth, increasing its contribution to world food trade every year due to its immense potential for value addition, particularly within the food processing industry. Smallholder agricultural interventions improve access to natural resources, productive inputs, technologies, financial services and markets, and increase employment opportunities for small family farmers.

**In news:** Agriculture Resource Management

**Placing it in syllabus:** Agriculture

## **Dimensions**

- Resource mapping and soil zones
- Water resources and watershed management
- Micro Level Planning and KVK,VRC and ATMA
- Agriculture clusters
- Fodder development zones
- Rainbow revolution and agriculture extension

## **Content:**

### **Resource Mapping and Soil Zones:**

- Timely and reliable information on soils with respect to their nature, extent, spatial distribution is very crucial for optimal utilization of available natural resources on a sustained basis.
- The technological **advances in the field of remote**

**sensing, Global Positioning System (GPS) and Geographic Information System (GIS)** have augmented the efficiency of soil survey.

- The management of resources on a sustainable basis emphasizes the overall development of the region without diminishing the environment.
- The integrated use of advanced computer technologies with databases can be used to assist decision makers for future plans.
- **Earth Observation Satellites of ISRO** has been successfully able to establish many operational applications in the country.
- Both at Central and State level, there are large number of users who utilise space based inputs for various purposes
- Remote Sensing applications projects at National, State and Local levels are being carried out through a well-established multi-pronged implementation architecture of **National Natural Resources Management System (NNRMS)**
- Indian Remote Sensing Satellite constellation has taken giant strides in ensuring many areas of application, operational. Some of the most prominent ones are Agricultural Crops Inventory, Water Resources Information System, Ground Water Prospects, etc
- **Web Geoportals and mobile technologies (Bhuvan Geoportal)** are the other popular platforms, being used by Governments, to provide information services and solutions at all levels, which are proving to be effective.



## Soil Types and Zones

### **Laterite Soil:**

- Laterite soil is found in those regions of the country which receive heavy rainfall with an alternate dry and wet period – mainly, near the coasts.
- This kind of soil becomes soft when wet and hardens when dry. In these climatic conditions, leaching of soil takes place, which is a process in which a fertile portion of the soil gets washed away by heavy rains.
- They are formed from the decomposition of rocks and contain iron oxide, which gives them red or pink colour.
- This type of soil is ordinarily deficient in nitrogen and is weak in lime content; it is acidic soil.
- It is found in several parts of the country mainly Western and Eastern Ghats, Vindhyas, Malwa plateau and Satpuras.
- The states where this type of soil can be found are West Bengal, Andhra Pradesh, Bihar, Meghalaya, Assam, Odisha, to name a few.
- Laterite soil supports crops like Rice, Ragi, Sugarcane, rubber, coconut, tea, coffee and Cashew nuts.

### **Mountain Soils:**

- Mountain soils are formed due to the accumulation of organic matter which is derived from the forest growth and is generally shallow in depth and immature.
- This type of soil is rich in humus but has poor lime, potash and phosphorus content. It is usually sandy and has gravel.
- It is mainly found in the Himalayan region, Sikkim, Arunachal Pradesh, Assam, and also in Peninsular India, and the Eastern Ghats.

### **Black Soil:**

- This type of soil is made up of volcanic rocks and lava.
- Black soil is also known as 'regur' which is derived from a Telugu word 'reguda'.
- Black soil is also known as Black Cotton Soil as cotton is an important crop which is grown in this type of soil.
- This soil is rich in calcium carbonate, potash, lime and magnesium carbonate but has poor phosphorus content.
- It is mostly found in areas such as Gujarat, Madhya Pradesh and Maharashtra. It is also found in states like Tamil Nadu, Andhra Pradesh and Karnataka.
- Black soil is excellent and clayey and can hold a lot of moisture. It becomes sticky in the rainy season and develops cracks when dry.
- Black soil is good for producing cotton, oilseeds, wheat, linseed, millets, and tobacco.

### **Red Soil:**

- This type of soil is formed as a result of weathering of metamorphic and igneous rocks.
- The red colour of the soil comes from the high percentage of iron content. In the presence of moisture it turns yellow. Hence it's also called **Red and yellow Soil.**

- The soil's texture varies from being sandy to clayey, but it is mainly loamy.
- It is rich in potash content but lacks phosphate, humus and nitrogen content. The red soil is found in regions such as Tamil Nadu, Madhya Pradesh, Jharkhand, Odisha, some parts of Karnataka and southeast Maharashtra.

### **Alluvial Soil:**

- Alluvial soils are formed by the deposits of the sediments brought by rivers. Most of the rivers originate from the Himalayas and bring along a high amount of sediments with them.
- The soil is made up of particles like silt, sand and clay. It has an adequate amount of phosphoric acid, potash and lime.
- Alluvial soil is of two types – (i) old alluvium known as bangar, and (ii) new alluvium called khadar.
- It is the most important type of soil found in the country as it covers about 40% of the total land. It is located in the northern plains beginning from Punjab to West Bengal and Assam.
- It is also found in deltas of different rivers such as Krishna, Godavari, Kaveri and Mahanadi in peninsular India.
- Alluvial soil is highly fertile and is light grey in colour. Crops mainly cultivated include wheat, rice, maize, sugarcane, pulses, and oilseed.

### **Desert Soil:**

- The desert soil or Arid Soil is found in regions with low rainfall in an arid and semi-arid climate.
- The sand in the desert areas is partly original and partly blown from Indus Valley.
- The soil content has 90-95% of sand and 5-10% of clay. The phosphate content in the soil is high, while the nitrogen content is low.

- Desert soil lacks humus and moisture, and the water content in this soil is fulfilled through irrigation only.
- This type of soil is found in arid and semi-arid areas. Desert soil is found mostly in areas of Rajasthan extending to Rann of Kutch, and also in some areas of Haryana and Punjab.
- Cacti and shrubs are the permanent vegetation which can be seen in the deserts as it is very well adapted to living without moisture for long periods.
- Also when it rains, the presence of phosphates and nitrates make desert soil fertile, and the desert blooms as dormant seeds wake up to life.

### **Peat Soil:**

- The accumulation of a high amount of organic matters in the soil in humid regions results in the formation of peaty soils.
- These types of soils constitute about 10 to 40% of the organic matter and also a reasonable amount of soluble salts.
- Peaty soils are heavy, black and have high acidic content. They are low in phosphate and potash content.
- Peaty and marshy soils are found in a few districts of Kerala. On the other hand, marshy soils are found in coastal areas of some states such as Tamil Nadu, Bihar, Almora district of Uttaranchal and Sunderbans of West Bengal.

## **Water resources and watershed management**

- A watershed, also called a drainage basin or catchment area, is defined as an area in which all water flowing into it goes to a common outlet.
- People and livestock and the integral part of watershed and their activities affect the productive status of

watersheds and vice versa.

- The rain-fed areas are the hotspots of poverty, malnutrition, food insecurity, prone to severe land degradation, water security and poor social and institutional infrastructure.
- The Watershed Development program is, therefore, considered as an effective tool for addressing many of these problems and recognized as a potential engine for agriculture growth and development in fragile and marginal rain-fed areas.
- Watershed management is the process of guiding and organizing the use of land and other resources in a watershed to provide desired goods and services without adversely affecting soil and water resources.
- Watershed management involves management of land surface and vegetation so as to conserve and utilize water that falls on the watershed, and to conserve the soil for immediate and long term benefits to the rural farmers, community and society.
- Each project is a micro-level effort to achieve this objective by treating the under-productive or unproductive land and taking up allied activities for the benefit of the landless.
- The programmes adopt a common strategy of multi resource management involving all stakeholders within the watershed who, together as a group, cooperatively identify the resource issues and concerns of the watershed as well as develop and implement a watershed plan with solutions that are environmentally, socially and economically sustainable.

***Watershed Development Component of Prime Minister Krishi Sinchayee Yojna (WDC-PMKSY):***

- **Pradhan Mantri Krishi Sinchayee Yojana (PMKSY)** has been formulated with the vision of extending the coverage of irrigation '**Har Khet ko pani**' and improving water use

efficiency **'More crop per drop'** in a focused manner with end to end solution on source creation, distribution, management, field application and extension activities.

- For optimum use of resources, sustainable outcomes and integrated planning several programs are consolidated as the **Watershed Development Component of Prime Minister Krishi Sinchayee Yojna (WDC-PMKSY)**.
- The main objectives of the WDC-PMKSY are to restore the ecological balance by harnessing, conserving and developing degraded natural resources such as soil, vegetative cover and water.
- The outcomes are prevention of soil erosion, regeneration of natural vegetation, rain water harvesting and recharging of the ground water table.
- This enables multi-cropping and the introduction of diverse agro-based activities, which help to provide sustainable livelihoods to the people residing in the watershed area.

### ***Neeranchal Watershed Program:***

- Neeranchal is a **World Bank assisted National Watershed Management Project**.
- Neeranchal is designed to **further strengthen and provide technical assistance to the Watershed Component of PMKSY**, in particular and all components of PMKSY, in general, to enhance its delivery capacity.
- The programme is being **implemented in nine participating states** – Andhra Pradesh, Chattisgarh, Gujarat, Jharkhand, Madhya Pradesh, Maharashtra, Odisha, Rajasthan and Telangana.

### **Micro Level Planning and KVK,VRC and ATMA**

- The aim in 'micro-planning' is on planning from the lowest level i.e., from the functional community upward to a clearly defined region to fulfill the needs of the local areas and ensure the process of integration of the



different areas with an objective to attain balanced regional development.

- Location of specific socio-economic activities and their inter-linkage over a region or particular geographical area are the major concerns of micro-level planning.
- Micro-planning is suggested for the all-around socio economic development of a geographically diverse country like India against the single national level sectoral planning.
- Because the space in which the people live and work is real and to ignore the space and its community is to ignore the basic reality of interface between habitat, economy and society.
- Thus, crop planning at broader level becomes imperative in consultation with the micro level planning objectives

### **Krishi Vigyan Kendra (KVK)**

- The KVK scheme is 100% financed by Govt. of India and the KVKs are sanctioned to Agricultural Universities, ICAR institutes, related Government Departments and Non Government Organizations (NGOs) working in Agriculture.
- KVK, is an integral part of the **National Agricultural Research System (NARS)**
- It aims at assessment of **location specific technology modules** in agriculture and allied enterprises, through technology assessment, refinement and demonstrations.
- KVKs have been functioning as Knowledge and Resource Centre of agricultural technology supporting initiatives of public, private and voluntary sector for improving the agricultural economy of the district and are linking the NARS with extension system and farmers

### **Village Resource Centre (VRC)**

- ISRO has initiated the setting up of the VRC with a view to integrate its capabilities in satellite communications and satellite based earth observations.

- It disseminates a variety of services emanating from the space systems and other IT tools to address the changing and critical needs of the rural community.
- This project strives to promote a need based single window delivery system for providing services in the areas of education, health, nutrition, weather, environment, agriculture and livelihoods to the rural population and to empower them to face the challenges.
- The VRC is a totally interactive VSAT (Very Small Aperture Terminal) based network.
- VRCs are set up in association with grass root level organisations, who have a strong field presence and experience of mobilising communities to act for development and a proven track record.
- The VRC provides agri-based services using ICTD tools such as audio-conferencing, video conferencing, phone-in programmes, Skype calls, voice and audio messages with content prepared by MSSRF scientists along with other experts from universities and institutes situated in the region.
- One of the activities of the VRC is providing seasonal crop based advisories, from sowing to harvesting season. It has so far helped the farmers who have registered with the VRC.
- The VRC also provides advisories on livestock management, which have proved useful for the residents of the nearby villages.

### **Agriculture Technology Management Agency (ATMA)**

- ATMA is a society of key stakeholders involved in agricultural activities for sustainable agricultural development in the districts.
- It is a focal point for integrating Research and Extension activities and decentralising day to day management of the district level.
- As a society, it would be able to receive and expend

project funds, entering into contracts and agreements and maintaining revolving accounts that can be used to collect fees and thereby recover operating costs.

- The ATMA at district level would be increasingly responsible for all the technology dissemination activities at the district level.
- It would have linkage with all the line departments, research organizations, non-governmental organizations and agencies associated with agricultural development in the district.

## **Agriculture Clusters**

- An agro-based cluster (AC) is simply a concentration of producers, agribusinesses and institutions that are engaged in the same agricultural or agro-industrial subsector.
- These interconnect and build value networks when addressing common challenges and pursuing common opportunities.
- Farmers and small and medium agro-enterprises can benefit from participation in agro based clusters. This is because a well-developed concentration of related agribusiness spurs increased productivity.
- Agro-based Cluster achieves this through specialized inputs, access to information, synergies, and access to public goods and more rapid innovation through cooperative research and competitive striving.
- Also, clusters can contribute to develop national or regional brand identity.
- Agro-based cluster growth has positive spill-over effects on local and rural development.
- However agro-based clusters need to be induced and fostered through public and private entities owing to lack of managerial competence and information among the stakeholders

## **Agro Processing Cluster Scheme**

- It is being implemented by the Ministry of Food Processing Industries
- The scheme aims at development of modern infrastructure and common facilities to encourage groups of entrepreneurs to set up food processing units based on cluster approach by linking groups of producers/ farmers to the processors and markets through well-equipped supply chains with modern infrastructure.
- Each agro processing clusters under the scheme have two basic components i.e. Basic Enabling Infrastructure (roads, water supply, power supply, drainage, ETP etc.), Core Infrastructure/ Common facilities (warehouses, cold storages, IQF, tetra pack, sorting, grading etc) and at least 5 food processing units with a minimum investment of Rs. 25 crore.
- The units are set up simultaneously along with creation of common infrastructure.
- At least 10 acres of land is required to be arranged either by purchase or on lease for at least 50 years for setting up of Agro Processing Cluster.

## **Fodder development zones**

- Green fodder is an economic source of nutrients for the livestock.
- With the limited land under fodder cultivation, there is a need to focus to improve productivity of fodder crops & common grazing lands and demonstrate to conserve surplus green fodder to enhance availability during the lean period.
- To improve the availability of fodder throughout the year, there is hardly any scope to increase the area under fodder cultivation specifically during summer/lean season due to growing demand of human beings for food, fiber and shelter and also unavailability of ground water.

- Therefore it is necessary to focus on increasing the productivity of available land under fodder cultivation, improve the efficiency of fodder utilization and minimizing the fodder wastages and also fodder conservation.

### ***Fodder Development Scheme***

The Department Animal Husbandry, Dairying and Fisheries is implementing a central sector scheme.

The Centrally Sponsored Fodder Development Scheme is being implemented from 2005-06 with the following four components:

- Establishment of Fodder Block Making Units
- Grassland Development including Grass Reserves
- Fodder Seed Production and Distribution.
- Biotechnology Research Projects

### **Rainbow revolution and agriculture extension**

- The concept of Rainbow revolution is an integrated development of crop cultivation, horticulture, forestry, fishery, poultry, animal husbandry and food processing industry.
- The various colors of the Rainbow Revolution indicate various farm practices such as Green Revolution (Food Grains), White Revolution (Milk), Yellow Revolution (Oil seeds), Blue Revolution (Fisheries); Golden Revolution (Fruits); Silver Revolution (Eggs), Round Revolution (Potato), Pink Revolution (Meat), Grey Revolution (Fertilizers) and so on.
- Economic survey 2015-16 observed, "Indian agriculture is in a way, a victim of its own past success, especially the Green revolution". It suggested an Integral development programme to make the agricultural sustainability and Rainbow revolution as a concept was developed eventually.

## **Objectives of Rainbow revolution:**

- **Sustainability:** Agricultural practices have to be reoriented to maintain environmental sustainability as well as resource sustainability. E.g, promotion of zero budget natural farming/organic farming to reduce use of chemicals in agriculture.
- **Elimination of Regional disparity in agriculture:** Rainfed areas are mostly reeled with low farmer income and productivity. Rainbow revolution through climate specific and farmer specific selection of crops and inclusion of allied sectors to increase farmer income is an objective.
- **Crop diversification** in water stress areas like Punjab and Haryana.
- **Promoting soil health** through schemes like soil health cards, practices like rain water harvesting made compulsory etc.
- **Promoting lab to land exhibition**, investing in research and development of agricultural technologies.
- **Farm income:** To increase the annual growth rate in agriculture over 4%.
- **Scale of agriculture production:** Objective is to increase the collective cropped area which would help in increased capital investment and use of latest agricultural technologies and machines to increase agricultural productivity. E.g. greater private sector participation through contract farming, promote cooperative farming, leasing of farm machines, subsidizing the purchase of new machines (sub mission on agricultural mechanization) etc.,
- **Price protection to farmers:** Agricultural contracts, promotion of practices like warehouse receipts, promotion of agricultural exports through improved quality of agricultural produce (latest Agriculture export policy) etc.,
- **Market availability to farmers:** To dismantle the

restrictions on movement of agricultural commodities throughout the country. Ensuring sufficient number of godowns, warehousing and cold storage facilities etc.,

- **Insurance protection to farmers:** inclusion of all farmers in agricultural insurance scheme (PM Fasal Bima yojana) and eventually to cover all crops (horticulture produce is introduced lately on a pilot basis).

**Mould your thought:** What is agriculture resource management? How is it being achieved in India?

***Approach to the answer:***

- Introduction
- Define agriculture resource management
- Mention the need for it
- Discuss the programs for agri resource management in India
- Conclusion