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## **Data Driven Agriculture for Natural Resource Management: Opportunities and Challenges**

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The rapid developments in sensing technologies, management information systems, advances in farm machinery, appropriate agronomic and economic models made Precision Agriculture a reality. This innovative and technological approach to agriculture is set to transform traditional farming methods and opening the avenues for eager, tech-savvy millennials looking for a challenging and rewarding career in data driven agriculture. Climate change, population explosion and food security has forced the agriculture sector to seek innovative approaches that enhance production with lesser impact to the environment, where technology and data-driven agriculture comes into rescue. It marks the digitalization of food and agriculture systems using artificial intelligence (AI), internet of things (IoT), automation and other technologies to create a hyper-connected network of farms, machines and factories that result in data explosion in agriculture sector.

During last three decades the academicians and researchers have profoundly demonstrated the usefulness of data in soil management, water management, land use suitability, land use planning and crop selection respective to weather and climatic conditions. While applying Geographic information system (GIS), remote sensing (RS), global positioning system (GPS), management information system (MIS), and enterprise resource planning (ERP) along with decision support system (DSS) in agricultural domain, we arrive at highly crucial and huge amount of data that further assists both scientific and farmer community to achieve sustainable agricultural practice. Along with tremendous changes in agricultural practice data driven agriculture brings new opportunities and challenges for both researchers and farmers though their nature and amount may differ for both communities.

### **Opportunities for researchers**

- i. Facilitates geo-environmental information that allows decision makers to sustainably use natural resources.
- ii. Determining Land use suitability for crops.
- iii. Crop simulations and predictions.
- iv. Spatial Identification of current vegetation.

Data driven agriculture provides a platform for market innovation where advanced farmers develops their own markets online to sell their products at good prices which in turn increases their profitability and sustainability. It also accelerates economic growth of farmers and other stakeholders involved in food supply chain that further contributes to sustainable economic growth of nations. Information and communications technology (ICT) based agriculture directly helps in improving the natural resources involved in agriculture, and further, the improvement in natural resources directly or indirectly shapes the economic development and growth.



### **Opportunities for farmers**

- i. Avails online consulting services for farmers.
- ii. Web based GIS and DSS for farmers where they can access online data and make their own decisions in irrigation management.
- iii. Soil property management using fertilizers
- iv. Understand spatial weather conditions.
- v. Rise in crop yield and profit.

### **Challenges for Researchers**

To transform the huge amount of data into useful information, Spatial variations in natural resources, Software system selection, National and regional land use policies

### **Challenges for Farmers**

Inadequate ICT Facilities and infrastructure such as unstable power supply, cost of hardware and software and improper installation of devices etc. Farmer's perception of ICT Skills and their inability to use software and mobile applications.

