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Geographical Indication of Goods and Impact on Agriculture

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Abstract:
Agriculture has been out of the news for 20 years due to the increase in food insecurity and poverty caused by rising food prices, but it is back in the news now. It will be crucial in the upcoming years to boost food production and productivity in developing nations, particularly in sub-Saharan Africa and with smallholders.
Finding workable answers to a multitude of intricate technical, institutional, and policy problems is necessary to achieve this, though. These problems include land markets, agricultural extension, credit, rural infrastructure, market connectivity, non-farm employment in rural areas, trade policy, and food price stabilization.

Keywords: IP, Geographic Information Systems (GIS), Geographical Indication (GI), and PPVFR Act.

INTRODUCTION

Agriculture is the foundation of the Indian economy. The population of India mostly depends on agriculture for their livelihood, and agriculture contributes to 40 percent of the total GDP of the country. Where agriculture contributes to several environmental issues that cause environmental degradation, including climate change, deforestation, and biodiversity loss, it also provides employment opportunities to rural agricultural as well as non-agricultural labor. It is the source of food and fodder. It also plays an important role in international business in import and export activities—ones, genetic engineering, irrigation problems, pollutants, soil degradation, and waste.
When evaluating environmental impact, experts use two types of indicators: "means-based," which is based on the farmer's production methods, and "effect-based," which is the impact that farming methods have on the farming system or emissions to the environment.
An example of a means-based indicator would be the quality of groundwater, which is affected by the amount of nitrogen applied to the soil. An indicator reflecting the loss of nitrate to groundwater would be effect-based. The means-based evaluation looks at farmers' practices of agriculture, and the effect-based evaluation considers the actual effects of the agricultural system.
For example, the means-based analysis might look at pesticides and fertilization methods that farmers are using, and the effect-based analysis would consider how much CO_2 is being emitted.

Agriculture and development: A brief review of the literature the agricultural sector continues to play a crucial role in development, especially in low-income countries where the sector is large both in terms of aggregate income and total labor force.

Having been a key preoccupation of developing country governments, donors, and the international community during the 1960s and 1970s, agriculture disappeared from the development agenda in the 1980s and 1990s, only to reappear in the first decade of the 21st century because of neglect and underinvestment.
There is renewed interest in the problems of the sector, not to a small extent, thanks to the World Development Report 2008.

Agriculture for Development

(World Bank 2007) and Agriculture at a Crossroads (IAASTD 2009), both of which came from the global consultative processes of scientists, decision-makers, and donor agencies.

Highlights

Food security means increased smallholder productivity, and social safety nets to mitigate chronic poverty are instruments to guarantee.
Price stabilization policies are not promising.

Agriculture, growth, and poverty reduction

Developing economies have generally been described as dual economies with a traditional agricultural sector and a modern capitalist sector.
Productivity is assumed to be lower in agriculture than in the modern sector.
Lewis (1954) put forward the canonical model and subsequently extended by Ranis and Fei (1961). Lewis' model rests on the idea of surplus.

Research methodology in agriculture

Practices and techniques employed in agriculture to improve yields and productivity.
Over the last few decades, they have undergone big changes: tilling, sowing, and harvesting have become increasingly mechanized, and the methods of applying fertilizers and pesticides have become more sophisticated.

The problem faced by the farmers

One of the major farmers' problems has to be the loss of agricultural land, as when more land is lost, it becomes increasingly difficult to produce the right volume of food required to feed the entire population**.**
Agriculture contributes to several environmental issues that cause environmental degradation, including climate change, deforestation, biodiversity loss, dead zones, genetic engineering, irrigation problems, pollutants, soil degradation, and waste.

The Main Benefits and Use Cases of GIS in Agriculture

Knowing the basic fields in which GIS innovations can improve, it's time to look deeper at the advantages they provide for a farming business.

- Better decision-making. GIS solutions are a great fit for consulting and regulatory agencies in agriculture, as they provide more accurate and informative data about specific problems and optimization opportunities.

- Cost savings result from greater efficiency. A vast number of case studies prove that these services can significantly optimize farming expenses. Artificial neural networks can lower the cost of analysis of geologic and hydrologic information by reducing the amount of time spent interpreting data.
- Improved communication. GIS technology enables a better understanding of the current state of affairs and improves the partnership. Most data within your organization relates to a geographic location, such as client addresses, sales figures for geographic regions, statistics to target specific groups of people, and more.
- Better geographic information. GIS software also features various digital tools to provide relevant, up-to-date geological and hydrological data for a certain area. Therefore, farmers and agriculture specialists are always aware of the resources they have for achieving the best outputs.

Agricultural policy and food security

We now turn to the international dimensions of agricultural policy. The past decade has experienced a worrisome rise of protectionism despite the ongoing World Trade Organization Doha Round of trade talks, which put developing country needs at the top of the agenda. Both developed and developing countries maintain high protection for agriculture, which creates a drag on developing countries' agricultural exports. In addition, in the name of food security, some countries have reacted to food.

Significant applications of GIS in agriculture:

Crop Sown Area Estimation: Remote sensing plays a crucial role in mapping and monitoring various crop-sown areas in different agro-climatic zones and different crop seasons, such as Kharif, Rabi, and Zaid. IGiS, being an integrated GIS software, supports the ingestion of various satellite data, such as optical, SAR, and hyperspectral images, to provide an accurate area sown under a given crop in all weather and climate conditions by integrating with plot-level maps.

Crop condition assessment: Crop condition assessment is important for the improvement of crop yield through continuous monitoring and timely interventions at the onset of problems. Crop condition assessment is the evaluation of a crop's health based on insect attacks, moisture deficiency, fungal and weed attacks, etc. In particular, remote sensing and GIS techniques are used to visualize field data on a map for further planning or analysis activities. Remote sensing technology supports frequent imaging using satellite and drone band combinations to identify crop conditions. IGiS enables fast and comprehensive processing of satellite or drone images to produce crop maps along with various health indices like the NDVI (Normalized Difference Vegetation Index).

NDVI is used to assess crop health precisely. Depending on data resolution, IGiS can provide micro-level crop assessments like crop classification, sowing patterns, unhealthy crops, etc.

Smart Farming: Smart farming is based on the use of geospatial and digital data for crops being grown throughout the entire crop period and helps to improve the effectiveness and efficiency of crop management practices. The digital map or data access of the farm or agricultural land ultimately leads to the betterment of crop yield, quality, and hence profit by optimizing the use of fertilizer, pesticides, and water. These digital or spatial data enable managers or farmers to make the right decision in the right situation to optimize agricultural processes.

Application of GIS in Sustainable Agriculture : With the growing population, ensuring that there will always be enough food for everybody is critical. With the help of GIS technology, governments, activists, scientists, and agriculture producers may study and develop methods to ensure food supply and, by extension, the survival of the human species. For instance, the Food and Agriculture Organization (FAO) has been using GIS and other **geospatial technologies** to establish sustainable food systems worldwide for over 30 years.

You can apply GIS for sustainable agriculture in many ways, including switching to organic farming, pinpointing the most productive and environmentally friendly locations for planting new crops, and allocating farmland to keep food production going in the future. Organizations working on sustainable development use GIS to:

- monitor water supplies and forecast droughts.
- estimate and predict yields
- evaluate the economic and environmental effects of human activities and natural phenomena.
- combine and analyze agriculture data from several sources.
- share data and maps between departments and organizations
- serve as an online information and guidance resource for local communities.

By incorporating a spatial dimension into **sustainable agricultural practices** and policies, GIS technology helps the farming industry remain viable for future generations. The ability to guarantee agriculture sustainability will only increase as technology develops.

Agriculture Technology from Location

Today's farmers use sophisticated **agriculture technology** because they can save time and money. Because crops are location-based, this makes **Geographic Information Systems (GIS)** are an extremely relevant tool for farmers. For example, farmers use precision GPS on the field to save fertilizer. Also, satellites and drones collect vegetation, topography, and weather information from the sky.

Challenges in Precision Agriculture and Geoinformatics:

The integration of precision agriculture and geoinformatics introduces a host of policy implications and regulatory considerations. Governments worldwide grapple with devising frameworks that foster innovation while safeguarding data privacy, land use, and environmental sustainability. For instance, regulations may govern the collection and sharing of spatial data, intellectual property rights for precision farming technologies, and the ethical use of AI in agriculture. In the European Union, the Common Agricultural Policy (CAP) acknowledges the role of digital technologies, including geoinformatics, in enhancing agricultural productivity.

Financial incentives are provided to encourage farmers to adopt precision farming practices that align with environmental and sustainability goals. This example illustrates how policy can drive technology adoption for collective benefit.

However, the adoption of geoinformatics technologies in agriculture presents significant benefits, yet it's accompanied by challenges, particularly for farmers of varying scales. Small-scale farmers often face financial limitations, lacking the resources for technology acquisition and training.

Larger operations encounter data management complexities due to the scale of their activities. Technical knowledge gaps are common, with both small and large farmers requiring training to effectively utilize geoinformatics tools.

Limited infrastructure and connectivity hinder access, especially in remote areas. Customization struggles arise, as solutions may not fit small farms or integrate seamlessly into larger operations.

Cultural resistance to change and concerns over data privacy affect adoption universally. Government policies, ROI uncertainties, and interoperability issues further impede progress.
Addressing these challenges will demand tailored strategies to ensure that geoinformatics benefits all farmers, regardless of scale.

Conclusion:
The seamless integration of geoinformatics into modern agriculture holds transformative potential. By harnessing the power of spatial data, farmers and other agricultural stakeholders can make informed decisions, optimize resource utilization, and foster sustainable practices. Whether it's predicting crop yields, managing water resources, or enhancing precision agriculture, GIS emerges as a guiding light, shaping a more efficient, resilient, and productive future for the world of farming.

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