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Comparative Study of Greenhouse Locations through Satellite Images and Geographic Information System: Methodological Evaluation in Venezuela

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Abstract : During the last decades, agricultural productivity in Latin America has increased with precision agriculture and more efficient agricultural technologies. The use of automated systems, satellite images, geographic information systems, and tools for data analysis, and artificial intelligence have contributed to making more effective strategic decisions. Twenty years ago, the state of Mérida, located in the Venezuelan Andes, reported the largest area covered by greenhouses in the country, where certified seeds of potatoes, vegetables, ornamentals, and flowers were produced for export and consumption in the central region of the country. In recent years, it is estimated that production under greenhouses has changed, and the area covered has decreased due to different factors, but there are few historical statistical data in sufficient quantity and quality to support this estimate or to be used for analysis and decision making. The objective of this study is to compare data collected about geoposition, use, and covered areas of the greenhouses in 2007 to data available in 2021, as support for the analysis of the current situation of horticultural production in the main municipalities of the state of Mérida. The document presents the development of the work in the diagnosis and integration of geographic coordinates in GIS and data analysis phases. As a result, an evaluation of the process is made, a dashboard is presented with the most relevant data along with the geographical coordinates integrated into GIS, and an analysis of the obtained information is made. Finally, some recommendations for actions are added, and works that expand the information obtained and its geographical traceability over time are proposed. This study contributes to granting greater certainty in the supporting data for the evaluation of social, environmental, and economic sustainability indicators and to make better decisions according to the sustainable development goals in the area under review. At the same time, the methodology provides improvements to the agricultural data collection process that can be extended to other study areas and crops.

Keywords : greenhouses, geographic information system, protected agriculture, data analysis, Venezuela
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