The International Journal of Business Management and Technology, Volume 6 Issue 1 January-February 2022
ISSN: 2581-3889

Research Article Open Access

Utilization of Geospatial Intelligence for Agriculture

Giant Nugroho[1],Trismadi, Gentio Harsono[2],Rudy A.G Gultom[3]
[123]*Defense Technology Faculty, Defense University of Republic of Indonesia*

Abstract: *Geospatial intelligence is carried out to get a clear and real picture of a location so that it can be used for extracting agricultural information. The agricultural sector has a characteristic that it has a specific location and a certain area for activities, because agricultural activities require a land. This research was conducted with the method of literature study and descriptive analysis. The researcher aims to convey that geospatial intelligence can be used as a good tool to create policies in the agricultural sector. The role of geospatial intelligence (geoint) in agriculture and food can be included in the estimation of rice production. Production estimation using geoint is carried out with remote sensing data sources in the form of satellite images. Remote sensing images record spectral reflections from the earth's surface, so if the earth's surface is recorded as agricultural land, the spectral patterns of growing agricultural crops will also be recorded. Geoint can play an important role in agriculture, specifically the process of estimating rice production.*

Keywords: Geospatial intelligence, rice, estimation, satellite images, and pixel.

I. INTRODUCTION

Geospatial information is a basic need of various things, geospatial information is information that contains a phenomenon and has a certain location on the surface of the earth. Geospatial information is a very useful form of information because it has a specific location which is generally expressed in the form of coordinates. A location is important in relation to information, because a location is definitely related to the surrounding area and has links to other areas that are more distant so that understanding phenomena with geospatial information will be easier and more detailed.

Geospatial information consists of two types, namely basic information and thematic information. Basic geospatial information is information obtained from basic spatial data made by mapping general information from a location such as roads, land cover and administrative boundaries of an area. While thematic information is information obtained from spatial data extraction with certain themes such as disaster data, population data, settlement distribution data, agricultural data, forestry data and so on. Making thematic information must refer to basic information, because basic information is made as a reference for thematic information, basic information must have a high accuracy and level of truth, if the basic information is wrong, it is certain that the spatial information made will also be wrong.

Geospatial intelligence according to Supriyatno and Dadang[1] is the exploitation of information from satellite imagery and geospatial information to identify more about physical and non-physical phenomena on the earth's surface geographically. Geospatial intelligence is a series of analyzes using geospatial data and information for the extraction of intelligence information without direct contact so as to minimize the possibility of loss or danger that must be faced to obtain accurate information. Geospatial intelligence is carried out to get a clear and real picture of a location so that it can be used for extracting agricultural information. The agricultural sector has a characteristic that it has a specific location and a certain area for activities, because agricultural activities require a land.

Food is the main basic need for humans that must be met at all times. The right to obtain food is one of human rights, as stated in Law number 27 of the 1945 Constitution[2]. According to Law number 7 of 1996[3], food security is defined as the condition of the fulfillment of food for every community as reflected in the availability of sufficient food, both in quantity and quantity. and quality, safe, equitable, affordable, and based on the diversity of local resources. Based on the definition of food security from Law number 7 of 1996, there are four components that must be met to achieve food security conditions, namely 1) Adequate food availability, 2) Stability of food availability without fluctuations from season to season or from year to year, 3) Accessibility and affordability of food, and 4) Food safety

quality. Indonesia's population is still experiencing hunger, the main causes are poverty and the scarcity of basic foodstuffs. There are still many Indonesians who are unable to meet their food needs, especially in the eastern part of Indonesia, such as NTT, Maluku and Papua.

One of the supporting factors for food security in Indonesia is agriculture. Indonesia consists of various tribes and nations, this causes the food consumption habits of each tribe to be different. However, one of the most familiar and staple foods for the Indonesian population is rice made from paddy. Rice production in Indonesia in each region does not produce the same amount, but there are areas that are able to produce high rice productivity and some are only able to produce low rice productivity. One of the factors that can affect rice productivity is regional characteristics. Based on data from the Central Statistics Agency[4], Indonesia has always experienced an increase in rice productivity every year, starting from 1993 at 48,129,321 tons to 75,397 in 2015. 841 tons. One area that is able to produce high rice productivity is West Sumatra Province, which in 2015 was able to produce 2,550,609 tons of rice.

II. METHOD

This research was conducted with the method of literature study and descriptive analysis. The researcher aims to convey that geospatial intelligence can be used as a good tool to create policies in the agricultural sector. The analysis is carried out comprehensively by conducting a literature review related to geospatial intelligence and agriculture in order to obtain a link between the two which can be used directly.

III. DISCUSSION

The role of geospatial intelligence (geoint) in agriculture and food can be included in the estimation of rice production. Aswin and Murti[5] explained that production estimation is a data collection activity to find out information on the number of agricultural harvests, but this activity is generally still carried out conventionally, namely by collecting data directly in the field which of course requires a lot of time and energy, therefore geoint is present as a solution for estimating more effective and efficient production. Geoint as a form of spatial data-based analysis will certainly produce accurate rice production estimation information because rice farming has certain aspects of location and area that can be mapped.

Production estimation using geoint is carried out with remote sensing data sources in the form of satellite images. According to Hornby in Sutanto[6]an image is a picture that appears in a mirror or through a camera lens, but in the context of geoint, an image can be referred to as a view of the earth's surface that is recorded using a sensor in a two-dimensional view. Rini and Sudaryatno[7] state that remote sensing data in the form of images is able to display a relatively complete picture of the earth's surface. Remote sensing images record spectral reflections from the earth's surface, so if the earth's surface is recorded as agricultural land, the spectral patterns of growing agricultural crops will also be recorded.

Production estimation is done by calculating the spectral value of each pixel in each agricultural area of rice fields with specific sample data on the number of rice harvests in an area of rice fields. The spectral value of each pixel in the image must represent the condition of rice at that location, such as its variety and age. Each pixel value is the smallest unit of mapping to calculate the overall rice harvest production in an area of rice fields. Then all the results of the calculation on the area of the rice fields will be added up to get the total rice production in an area, in this way it is only necessary to take field data at several points as samples for reference in calculating the rice harvest. there is no need to collect data in the field as a whole as in the conventional method.

Figure 1. Sentinel Image
Source: www.usgs.gov.

IV. CONCLUSION

Geoint can play an important role in agriculture, specifically the process of estimating rice production. The application of geoint analysis to the process of estimating rice production will increase the effectiveness and efficiency of these activities because there is no need for comprehensive data on all farmers. This can be done because of the advantages of spatial data that has dimensions of area and attributes so that production estimates can be done easily.be included and should indicate clearly the advantages, limitations, and possible applications of the paper. Although a conclusion may review the main points of the paper, do not replicate the abstract as the conclusion. A conclusion might elaborate on the importance of the work or suggest applications and extensions.

REFERENCES

[1] M. Supriyatno and D. Dadang, *Geospatial Intelligence (GeoInt) Concept for Universe Defense System (Sishanta) Support* (Jakarta: CV Makmur Cahaya Ilmu, 2019).
[2] Law number 27 of the 1945 Constitution of The Republic of Indonesia.
[3] Law number 7 of The Republic of Indonesia.
[4] *Statistik Indonesia 2015*, (Jakarta: Central Bureau of Statistics, 2015).
[5] R. Aswin and SB. Murti, Estimation of Rice Production Based on OLI Landsat 8 Image Processing in Ponorogo Regency, *Jurnal Bumi Indonesia, 5,* 2016.
[6] Sutanto, *Basic Remote Sensing* (Yogyakarta: Publishing Agency of The Faculty of Geography (BPFG) Universitas Gadjah Mada, 1995).
[7] M. Rini and Sudaryatno, Determination of Green Open Space (RTH) With NDVI Vegetation Index Based on ALOS AVNIR-2 Image and Geographic Information System in Yogyakarta City and Surrounding Areas, *Journal of Masters, 26*, 2014.