Utilization of Spatial Data on Agricultural Activities Case Study of Tebas District

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Abstract

The dominant potential of agricultural activities is not in line with the dissemination of adequate information on agricultural activities, thus causing agricultural activities in Tebas District to be unknown to the wider community. Information about agricultural activities will be more easily accessed by the community in Tebas District with the existence of a web-based geographic information system where people can get non-spatial information and also spatial information from agricultural activities in Tebas District. The purpose of the study is to determine the use of GIS web applications in monitoring agricultural activities. The research location focused on the Tebas Komplek agricultural area which is designated as a sustainable food agriculture area in Sambas regency which includes Tebas Sungai Village, Pangkalan Kongsi Village, Dungun Perapakan Village, Serumpun Buluh Village and Mekar Sekuntum Village. The research method used in this study used remote sensing and waterfall methods. The remote sensing method is used to build spatial data by using remote sensing imagery, while the waterfall method is used to build a home GIS web for spatial data to be placed. The technique of collecting data on attributes of agricultural activities is carried out by filling out questionnaires, while spatial data collection is carried out by interpreting satellite images and testing the accuracy and tracking of land in the field. The results of the study stated that: 1) A Web Gis application design has been composed which contains the home page, poktan data page, poktan detail page, whole rice field data page, member detail page, login page, poktan data input page, and rice field data input page; 2) The agricultural land system in Serumpun Buluh Village has its own uniqueness compared to Mekar Sekuntum village, Tebas Sungai, Dungun Perapaakan and Pangkalan Kongsi in Tebas Agricultural Area Complex, which uses an overlay system. Serumpun Buluh Village uses a domicile system, which is based on the domicile of farmers and some are based on the location of land owned by farmers; 3) There are differences in the variation in the area of poktan spatial data in each gappoktan located in the Tebas Complex Agricultural Area. The conclusion of the use of the gis web application will make it easier for extension workers and gapoctans to monitor agricultural activities in the Tebas Komplek agricultural area.

Keywords: Spatial Data, GIS WEB Application



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INTRODUCTION

Geographic Information System which is then abbreviated as GIS is a computer-based system that provides the ability to handle geographically referenced data including input, management, manipulation and analysis as well as data output. In the current era, it is a technological era where all computer-based activities, including spatial data, both processing, analysis, and digital-based visualization are known as GIS. The ease, speed, efficiency, and low cost offered in GIS, so that various disciplines in data management, analysis, and visualization utilize GIS (Tricahyono and Dahlia, 2017). According to Sumaryono, et al (2017) explained that GIS is a computer-based information system that combines map elements (geographic) and information about the map (attribute data) designed to obtain, process, manipulate, analyze, demonstrate and display spatial data to complete planning, process and researching the

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problem. The use of GIS which is oriented towards the use of spatial data is widely used in various fields of study, one of which is to map agricultural activities. By using GIS spatial data analysis processing for agricultural activities can be digitally and faster and better with a relatively larger amount of spatial data storage than manual spatial data. Tebas Subdistrict is a subdistrict located in Sambas Regency, West Kalimantan Province. Tebas Subdistrict is located between 0o59' North Latitude and 1o17' North Latitude and 109o 25' East Longitude. The Agricultural Sector contributes a lot to the survival of the community, especially its contribution as a source of food, a source of employment for some people and a source of state income through export activities. No different from the case in Tebas District, Sambas Regency is an area that has potential in agriculture. In 2017 the rice harvest area in Tebas District was 10,603 ha consisting of 10,588 ha of paddy rice and 15 ha of paddy rice. The picture of the high area of rice harvest in Tebas District is an indication that agricultural activities in Tebas District dominate compared to non-agricultural activities where the data was published by the Agriculture and Food Security Service of Sambas Regency in 2017. Agricultural activities have an important contribution to the economy in Tebas District where the agricultural sector is still the leading sector. This can be seen from the economy of rural communities in Tebas District, which in general still rely on agriculture as their livelihood.

The development of the agricultural sector aims to increase the income and welfare of farmers through increased production and productivity. The potential for this dominant agricultural activity is not in line with the dissemination of adequate information on agricultural activities, thus causing agricultural activities in Tebas District to be unknown to the wider community. Information about agricultural activities will be more easily accessed by the community in Tebas District with the existence of a web-based geographic information system where people can get non-spatial information and also spatial information from agricultural activities in Tebas District. This system is expected to be able to introduce agricultural activities with the use of spatial data in Tebas District, especially in this study. Apart from being a medium in introducing agricultural activities, it is hoped that the spatial data built can be the basic data in preparing a regional development plan in general and agricultural development planning in particular in the Tebas sub-district area. The development of the application will focus on the Tebas Komplek agricultural area which is designated as a protected sustainable food agriculture area as well as one of the rice granaries of Sambas regency which includes Tebas Sungai Village, Pangkalan Kongsi Village, Dungun Perapakan Village, Serumpun Buluh Village and Mekar Sekuntum Village. Therefore, it is necessary to build a WEB GIS-based agricultural activity information application as a form and form of utilizing spatial data on agricultural activities in Tebas District, especially in the Tebas Complex agricultural area that has been determined. Based on the background above, the purpose of this study is to determine the benefits of the design of the use of spatial data on agricultural activities in presenting information on agricultural activities as basic data in agricultural development planning.

RESEARCH METHODS

The engineering method (design) or research method used in this study uses 2 main methods, namely the remote sensing method and the Waterfall method. The remote sensing method is a method used to build spatial data by using Remote Sensing Image interpretation techniques, while the Waterfall method is used for web GIS as a container of spatial data to be displayed. In detail the two engineering methods in this study can be described as follows: 1. Remote Sensing Method

Image intepretation techniques as a special tool or means of carrying out remote sensing methods. The interpretation of imagery is carried out by certain methods and techniques, based on certain theories as well. In the image interpretation technique, there is a profitable way that can be interpreted in terms of ease of interpretation implementation, more accurate interpretation results or more information that can be obtained (Sutanto, 2013). The method adopted and modified in this study is:

- a. Reference Data. The reference data used in this study is data on the coordinate points of the location of land plots owned by members of farmer groups.
- b. Setting Up Remote Sensing Data. In this study using imagery data.
- c. Building the Key to Interpretation. The key interpetation for paddy objects in this study was built from the colors on the remote sensing imagery, namely green, square shape, fine texture, broad pattern with regular plots, sites there are irrigation canals and associations adjacent to other regular land plots and settlements.
- d. Interpretation of Imagery. The image interpretation technique used in this study refers to 2 main activities, namely 1) tapping data from images and 2) using the data for specific purposes. Tapping data from imagery in the form of recognition of objects and elements depicted on the image and its presentation to thematic maps which in this case is a map of plots of land ownership of members of farmer groups. In addition to convincing the correctness of the results of image interpretation and correcting it when necessary, terrain work is also needed to add the necessary data and cannot be intercepted from the image. In this study, terrain work was carried out by checking the location of land plots owned by members of the farmer group shown by the head of the farmer group. Furthermore, data that is intercepted from the image and has been tested for accuracy, must be utilized according to a specific purpose. In this study, data intercepted from images in the form of spatial data was used for analysis in the field of agricultural activities.
- 2. Waterfall Method

The next research method after the spatial data is available that is applied to this study is the development of the waterfall method. The waterfall method or what is often called the waterfall method is often called the classic life cycle, where it describes a systematic and also sequential approach to software development, starting with the specification of user needs and then continuing through the stages of planning, modeling, construction, and system delivery to customers / users (deployment), which ends with support for devices complete software generated (Pressman, 2012). The stages of the waterfall method are: requirement (needs analysis), system design (system design), Coding (coding) & Testing (testing), Program Implementation, maintenance.

Data Collection Techniques

Secondary data sources In this study, one of them was carried out using literature studies which is the stage of collecting materials in the form of books, articles, data data, regulatory regulations as a legal basis relevant to the research topic for research reference. Primary data sources include:

- 1. Spatial Data. The main source of spatial data used in this study was to use Quickbird Remote Sensing Imagery of Agricultural Area Slash Complex of medium resolution. There are three layers that can be depicted on the spatial data of the complex slash area, namely:
 - a. Points that show the position or location of geographical appearances such as coordinate points of ownership of agricultural land. Coordinate points are obtained from the plotting process directly into the field using GPS (Global Positioning System) which is then converted to arc.gis software.

- b. line that is a collection of connected points, such as describing roads and administrative boundaries. Roads and administrative boundaries are obtained from the process of tracking areas in the complex slash agricultural area using GPS which is then converted into arc.gis through the process of digitizing and interpreting images in the complex slash agricultural area.
- c. Area (polygon) which is an area covered by a line describing a region such as rice fields and plantations in the agricultural area of tebas complex. Polygon rice fields are obtained from the process of digitizing and interpreting images in the complex slash farm area.
- 2. Attribute Data. In the early stages of compiling attribute data in this study, it was carried out through FGD activities to solicit input from related parties who are competent in providing input related to agricultural activity data. The FGD in this study was carried out starting from verification activities, initial seminars to consulting the contents of questionnaires with Bappeda experts and the Agriculture Office. After the contents of the questionnaire are agreed, this attribute data becomes a source of data on agricultural activities. The data in the questionnaire consists of data on the identification of farmer groups and the identification of farmers which are then specifically described as follows:
 - a. Farmer Group Identification: Group Biodata and Agricultural Infrastructure.
 - b. Farmer Identification: Group Membership Biodata, Personal Biodata, Agricultural Infrastructure, Agricultural Facilities, Agricultural Activities, Agricultural Commodity Production Data (Pridaningsih 2016, processed 2020).

After the data in the questionnaire is prepared, the next step is to fill out the questionnaire. The stages of filling out the questionnaire in Figure 1 below.

1	2	3	4	5
KETUA POKTAN	SELURUH POKTAN	FOTO WAJAH & FOTO KTP	VALIDASI AWAL	VALIDASI LAPANGAN
1. ISI FORM 1	 ISI FORM 2 ISI FORM 3 ISI FORM 4 	1. FOTO WAJAH 2. FOTO KTP	 FORM 1 FORM 2, 3, 4 MENUNJUKKAN LOKASI SAWAH 	1. KOORDINAT LOKASI SAWAH

Figure 1. Questionnaire Filling Stage Source: Pridaningsih 2016, processed 2020

Spatial Data Processing Techniques and Attributes of GIS Web Databases

- 1. Spatial Data Processing. The process of image interpretation and accuracy testing in the field was carried out with the head of the farmer group. After the spatial data is obtained, then this spatial data is processed using Arc GIS 10.3 software, after which it is continued to be inputted and processed in the GIS web application that has been completed.
- 2. Attribute Data Processing. The processing of attribute data intended in this study is the process of entering attribute data into spatial data. The process of entering attribute data is carried out through a GIS web application that has been completed online.

RESULTS OF RESEARCH AND DISCUSSION Research Results

Results of GIS Web Application Design for Agricultural Activities

1. Home Page. The Home page referring to Figure 2, there is tile information for each poktan along with tile information for each poktan member.



Figure 2. Home Page

2. Poktan Data Page. The poktan data page which refers to Figure 3, there is a list of each poktan that provides information on the name of the poktan, the name of the farmer group, the address, the total land area, superior commodities.

Data P						
Show	10 entries			3	Search:	
	Nama	Narsa Kelompok		Total Luas	Komoditas	
No	Gapoktan	Tani	Alamet	Lahan	Unggulan	Action
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2	Mekar Bersetu (Desa Tebas Sungai)	San Meloti Koncone	Desa Tebes Songai, Dusun Mawar HT/RW 036/018. Kecamatan Tebas, Kabupaten Sambas	42,43 Ha	Padi	
3	Hekar Bersatu	Jaya Abadi	Desa Mokar Sokuntum, Dusun Compoka RT/RW 01.000/5, Kesamatan Tetara, Kabupaten Sembus	23.17 Ha	Padi	Line LiberLine
4	Mekar Bersatu	Burni	Desa Mekar Sekuntarn, Dusun Cempaka RT/RW	29.14	Padi dan	

Figure 3. Poktan Data Page

3. Poktan Details. Poktan detail page which refers to Figure 4, there is detailed information about Poktan and its members.

	Detail Informa	asi Poktan						
	Nama Gap	oktan		Pangkalan Kongsi				
itan	Nama Kelo	mpok Tani		Sungai Perak I				
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	Kode Kabu Sesanan K Tampika Show 10 No Ti 1	epengurusen n Semua e entries Nama Perrill Aswadi	8 TI	Perode Perode Jabatan Dalam Kalompok Anggota	n	Periode 11 2020	Search: Action	11

Figure 4. Poktan Detail Page

4. Data Page of the entire rice field. The data page of all rice fields referring to Figure 5, there is a list of members that provide information on the name, name of the farmer group, position, period and action view, print and view locations that can be clicked by the user.

Beranda							
	Data Kej						
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r ewin Data Kapoktan	Show 1	0 e entries				Search:	
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	з	Duhadi	Dewi Sri	Sri Ayu	Anggota	2020	Lines Conso Lines Lobers
	4	Thamrin	Mekar Bersatu	Candra Kencana Terranh	Anggota	2020	

5. Member Details Page. Member details page referring to Figure 6, there is detailed member information whose data corresponds to the filling out of the questionnaire.



Figure 6. Member Details page

6. Login Page. The Login page referring to Figure 7 is the main page before the user enters the system, where the admin is required to enter the username and password that have been registered.

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RUTE	
Sawah	Login
LIHAT DATA	Username
📰 Data Kapoktan	username
📰 Data Seluruh Sawah	Password
	password Login
	Copyright © Permanfaatan Data Spasial Terhadap Keglatan Pertanian Study Kasus di Kacamatan Tebas

Figure 7. Login Page

7. Poktan Data Input Page. The poktan data input page referring to Figure 8, the form in the gis application corresponds to the form in the questionnaire.

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RUTE © Sawah	FORM	1 I IDENTIFIKASI KELOMPOK (KELOMP	ок)					
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	No	Administrasi Kelompok			Jun	alah	Satuan	
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Figure 8. Poktan Data Input Page

8. Rice Field Data Input Page. Rice field data input page referring to Figure 9, the form in the gis application according to the form on the questionnaire.

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RUTE © Sawah	FORM 2 IDENTIFIKASI PERTANIAN (PETANI)				
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	○ Ketua ○ Sekretaris ○ Bendahara ○ Anggota ○ Lainnya	Pekerjaan Utama	Choose file Browse		
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	Pengolahan Lahan Tanam	Pemeliharaan	Panen / Pasca Panen		
	Nama *	Jenis Kelamin			

Figure 9. Rice Field Data Input Page

Discussion

The discussion of farmer group activities based on the content of the agricultural activities GIS web above will be described in 2 discussions as follows:

- 1. Data Analysis of Agricultural Activities
 - a. Mekar Sekuntum Village. The farmer groups whose expanse is included in the study area are as many as 3 farmer groups including Jaya Abadi, Sumber Karya and Bumi Bertuah.
 - 1) Jaya Abadi. This group has a Group Leader named Bujang Jirin. The leading commodity in this group is the type of food crop business in the form of rice. Agricultural activities show that the Jaya Abadi group consists of farmers with the majority engaged in business or types of farming businesses, namely food crops and horticultural crops, then there are also business fields or types of farming businesses in the form of food crops only and there are also plantations.
 - 2) Source of Work. This group has a Group Leader named Karnadi. The leading commodities in this group are types of food crop businesses in the form of rice and horticultural crops in the form of oranges. Agricultural activities show that the Sumber Karya group consists of farmers with the majority engaged in business or types of farming businesses, namely food crops and horticultural crops, then there are also business fields or types of farming businesses in the form of food crops only.
 - 3) Sorcerer's Earth. This group has a Group Leader named Asmadi. The leading commodities in this group are types of food crop businesses in the form of rice and horticultural crops in the form of oranges. Agricultural activities show that the Bumi Bertuah group consists of farmers with the majority engaged in business or types of farming businesses, namely food crops and horticultural crops, then there are also business fields or types of farming businesses in the form of some set.
 - b. River Slash Village. The farmer groups whose expanses are included in the study area are as many as 11 farmer groups including Sari Melati Kencana, Sinar Desa, Candra Kencana, Candra Kencana Tengah, Yuta Mekar, Candra Kencana Timur, Candra Makmur, Candra Karya, Sinar Pagi, Candra Mekar and Sinar Desa Baru.
 - 1) Sari Melati Kencana. This group has a Group Leader named Indra. The leading commodity in this group is the type of food crop business in the form of rice. Agricultural activities show that the Sari Melati Kencana group consists of farmers with the majority engaged in business or types of farming businesses, namely food crops. For the type of food crop cultivated by farmers in the form of rice.

- 2) Village Rays. This group has a Group Leader named Mastur. The leading commodity in this group is the type of food crop business in the form of rice. Agricultural activities show that the Sinar Desa group consists of farmers with the majority engaged in business or types of farming businesses, namely food crops only. For the type of food crop cultivated by farmers in the form of rice.
- 3) Candra Kencana. This group has a Group Leader named Syamsudi. The leading commodity in this group is the type of food crop business in the form of rice. The agricultural activities of the Candra Kencana group consist of farmers engaged in business or types of farming businesses, namely food crops only. For the type of food crop cultivated by farmers in the form of rice.
- 4) Candra Kencana Tengah. This group has a Group Leader named Sahal. The leading commodity in this group is the type of food crop business in the form of rice. The agricultural activities of the Candra Kencana Tengah group consist of farmers engaged in business or types of farming businesses, namely food crops only. For the type of food crop cultivated by farmers in the form of rice.
- 5) Yuta Blooms. This group has a Group Leader named Asnida. The leading commodity in this group is the type of food crop business in the form of rice. The agricultural activities of the Yuta Mekar group consist of farmers engaged in business or types of farming businesses, namely food crops only. For the type of food crop cultivated by farmers in the form of rice.
- 6) Candra Kencana Timur. This group has a Group Leader named Imam Mustafirin. The leading commodity in this group is the type of food crop business in the form of rice. The agricultural activities of the Candra Kencana Timur group consist of farmers engaged in business or types of farming businesses, namely food crops only. For the type of food crop cultivated by farmers in the form of rice.
- 7) Candra Prosper. This group has a Group Leader named Mulyadi. The leading commodity in this group is the type of food crop business in the form of rice. The agricultural activities of the Candra Makmur group consist of farmers engaged in business or types of farming businesses, namely food crops only. For the type of food crop cultivated by farmers in the form of rice.
- 8) Candra Works. This group has a Group Leader named Abu Kalahan. The leading commodity in this group is the type of food crop business in the form of rice. Candra Karya's agricultural activities consist of farmers engaged in business or types of farming businesses, namely food crops only. For the type of food crop cultivated by farmers in the form of rice.
- 9) Morning Rays. This group has a Group Leader named Muhammad. The leading commodity in this group is the type of food crop business in the form of rice. The agricultural activities of the Sinar Pagi group consist of farmers engaged in business or types of farming businesses, namely food crops only. For the type of food crop cultivated by farmers in the form of rice.
- 10) Candra Blooms. This group has a Group Leader named Karman. The leading commodity in this group is the type of food crop business in the form of rice. The agricultural activities of the Candra Mekar group consist of farmers engaged in business or types of farming businesses, namely food crops only. For the type of food crop cultivated by farmers in the form of rice.
- 11) New Village Rays. This group has a Group Leader named Budang. The leading commodity in this group is the type of food crop business in the form of rice. The agricultural activities of the Sinar Desa Baru group consist of farmers engaged in

business or types of farming businesses, namely food crops only. For the type of food crop cultivated by farmers in the form of rice.

- c. Dungun Parapakan Village. The farmer groups whose expanse is included in the study area are as many as 4 farmer groups including Sumber Rezeki, Sumber Ayu, Cempaka and Sri Menanti.
 - 1) Source of Sustenance. This group has a Group Leader named Kasnen. The leading commodity in this group is the type of food crop business in the form of rice. Agricultural activities show that the Sumber Rezeki group consists of farmers with the majority engaged in business or types of farming businesses, namely food crops and horticultural crops only. For the type of food crop cultivated by farmers in the form of rice. For the type of horticultural crops that farmers work on in the form of citrus fruits.
 - 2) Cempaka. The group has a Group Leader named Wasli. The leading commodity in this group is the type of food crop business in the form of rice. Agricultural activities show that the Cempaka group consists of farmers with the majority engaged in business or types of farming businesses, namely food crops, but there are also farmers engaged in horticultural crop farming types although there are fewer of them. For the types of food crops cultivated by farmers in the form of rice and for the types of horticultural crops that farmers cultivate in the form of citrus fruits.
 - 3) Sri Ayu. The group has a Group Leader whose real name is Real. The leading commodity in this group is the type of food crop business in the form of rice. Agricultural activities show that Sri Ayu's group consists of farmers with the majority engaged in business or types of farming businesses, namely food crops, but there are also farmers engaged in horticultural crop farming types although there are fewer of them. For the types of food crops cultivated by farmers in the form of rice and oranges.
 - 4) Sri Waiting. The Sri Menanti group is a farmer group chaired by Jamli. Agricultural commodities in the Sri Menanti group consist of food crops in the form of rainfed rice and horticultural crops in the form of oranges. Agricultural activities in the Sri Menanti group, the dominant business fields or types of business carried out by farmers, namely food crops and horicultural crops. The type of land planted is paddy fields, with a multicultural agricultural system with an intercropping method, namely planting two or more types of crops such as rice and oranges on a planting land at the same time or somewhat at the same time.
- d. Kongsi Base Village. The farmer groups whose expanses are included in the study area are as many as 7 farmer groups including Tanjung Pandan I, Usaha Baru, Tanjung Pandan II, Sungai Perak II, Sungai Perak I, Harapan Kita and Sepakat.
 - 1) Tanjung Pandan I. This group is chaired by Abidin with superior commodities, namely rice and oranges. Agricultural activities show that the average agricultural activity in the Tanjung Pandan I group is for the field of business or the type of business carried out, namely food crops and horticultural crops. The type of land planted is paddy fields. Paddy farmland is agricultural land in the form of plots with characteristics limited by ripeners, there are waterways and usually rice paddy fields. The majority of farmers use a multicultural farming system with an intercropping method, namely planting two or more types of crops such as rice and oranges on a planting field at the same time or somewhat at the same time.
 - 2) New Ventures. The New Business Group is chaired by Erli, with the leading commodity, namely rice. Agricultural activities in the New Business group, namely the dominant business field or type of business, namely food crops. The type of land planted is paddy fields, with a monoculture farming system, namely only planting one commodity,

namely rice without any variation because the maintenance is easy, so you don't have to adjust different treatments according to the character of each plant but focus enough on caring for one crop commodity. One of the agricultural commodities that is expected to move positively in terms of increasing production and income is rice because the sustainability of rice production is very important to maintain considering its role as a staple food and plays an important role in maintaining food security.

- 3) Cape Pandan II. The Tanjung Pandan II group is chaired by Mr. Jamian. This group of farmers has superior commodities of rice and oranges. Agricultural activities in the Tanjung Pandan II group are dominated by the business field or type of business carried out, namely food crops with land types, namely paddy fields.
- 4) Silver River II. The Silver River II group is chaired by Errizar. The leading commodities of this farmer group are rice and oranges. The activities of most of the business fields or types of businesses carried out in the Perak II River group are food crops where the land is in the form of paddy fields. The agricultural system used is monoculture by planting only rainfed rice commodities with superior rice varieties.
- 5) Silver River I. Silver River Group I is chaired by Samsa. The leading commodity of this farmer group is rice. Agricultural activities in the Sungai Perak I group include business fields or types of businesses carried out, namely various ranging from food crops, horticultural crops, food crops and horticultural crops.
- 6) Our Expectations. The Our Hope Group is chaired by Ersan. Agricultural activities in this group for the field of business or type of business carried out are various ranging from food crops to food crops and horticultural crops. The type of land is paddy fields. Paddy fields are land used to grow rice. The agricultural system used is monoculture by planting only rice commodities.
- 7) Agreed. The Agreed Group is chaired by Rabudin. The leading commodities of this farmer group are rice and oranges. The Sepakat Group shows that most of the farmers carry out agricultural activities in the field of business or type of business, namely food crops and horticultural crops.
- e. Reed Cognate Village. Serumpun Buluh Village uses a domicile system, which is based on the domicile of farmers and some are based on the location of land owned by farmers. This is because it uses a domicile system, causing the agricultural land in Serumpun Buluh Village to be scattered, making it difficult to carry out a synchronous planting system or other activities related to agricultural cultivation. There are as many as 11 groups consisting of Berkah, Kurnia, Cempaka Biru, Joint Ventures, Flowers, Integrated Efforts, Gema Tani, Sinar Pagi, Cinta Damai, Serasi, and Sukses.
- 2. Analysis of Spatial Distribution of Land Ownership Area of Tebas Complex Area.
 - a. Mekar Sekuntum Village.
 - 1) 1) Jaya Abadi. The total area of agricultural land owned by the Jaya Abadi farmer group is 23.17 ha, of which there are 30 plots of land recorded and there are 11 plots of land that have not been recorded. The map of the distribution of ownership of agricultural land plots of the Jaya Abadi farmer group can be seen in Figure 10.



Figure 10. Map of Distribution of Ownership of Agricultural Land Plots of the Jaya Abadi Farmer Group

2) Source of Work. The total area of agricultural land owned by the Sumber Karya group is 23.01 ha, of which there are 43 plots of land recorded. The map of the distribution of agricultural land plots of the Sumber Karya farmer group can be seen in Figure 11.



Figure 11. Map of Distribution of Ownership of Agricultural Land Plots of Source Groups

3) Sorcerer's Earth. The total area of agricultural land owned by the Bumi Bertuah group is 29.14 ha, of which there are 64 plots of land recorded and 13 plots of land that have not been recorded. The map of the distribution of ownership of agricultural land plots of the Bumi Bertuah farmer group can be seen in Figure 12.





- b. Tebas Sungai Village.
 - 1) Sari Melati Kencana. The total area of agricultural land owned by the Sari Melati Kencana farmer group is 42.43 ha, of which there are 38 plots of paddy fields recorded and 3 plots of land that have not been recorded, there is also oil palm plantation land in this farmer group area, covering an area of 3.01 ha. The map of the distribution of agricultural land plots of the Sari Melati Kencana farmer group can be seen in Figure 13.



Figure 13. Map of Distribution of Ownership of Agricultural Land Plots of Sari Melati Kencana Farmer Group

2) Village Rays. The total area of agricultural land owned by the Sinar Desa group is 32.27, of which there are 61 plots of agricultural land recorded and 1 plot of land that has not been recorded. The map of the distribution of ownership of agricultural land plots of the Sinar Desa farmer group can be seen in Figure 14.



Figure 14. Map of Distribution of Ownership of Agricultural Land Plots of Sinar Desa Farmer Group

3) Candra Kencana. The total area of agricultural land owned by the Candra Kencana group is 23.71 ha, of which there are 57 plots of agricultural land recorded. The map of the distribution of ownership of agricultural land plots of the Candra Kencana farmer group can be seen in Figure 15.



Figure 15. Map of Distribution of Ownership of Agricultural Land Plots of Candra Kencana Farmer Group

4) Candra Kencana Tengah. The total area of agricultural land owned by the Candra Kencana Tengah group is 21.6 ha, of which there are 73 plots of agricultural land recorded. The map of the distribution of ownership of agricultural land plots of the Candra Kencana Tengah farmer group can be seen in Figure 16.



Figure 16. Map of Distribution of Ownership of Agricultural Land Plots of Candra Kencana Tengah Farmer Group

5) Yuta Blooms. The total area of agricultural land owned by the Yuta Mekar farmer group is 14.9 ha, of which there are 43 ownership plots of agricultural land recorded and 1 plot of land that has not been recorded. The map of the distribution of ownership of agricultural plots of the Yuta Mekar farmer group can be seen in Figure 17.



Figure 17. Map of Distribution of Ownership of Agricultural Land Plots of Yuta Mekar Farmer Group

6) Candra Kencana Timur. The total area of agricultural land owned by the East Candra Kencana farmer group is 24.02 ha, of which there are 70 plots of owned agricultural land recorded and there is an oil palm plantation area of 2.30 ha. The map of the distribution of ownership of agricultural land plots of the Candra Kencana Timur farmer group can be seen in Figure 18.



Figure 18. Map of Distribution of Ownership of Agricultural Land Plots of Candra Kencana Timur Farmer Group

7) Candra Prosper. The total area of agricultural land owned by the Candra Makmur farmer group is 14.8 ha, of which there are 47 ownership plots of agricultural land recorded and 1 plot of land that has not been recorded, there are also oil palm

plantations with an area of 1.07 ha in the farmer group. The map of the distribution of ownership of agricultural land plots of the Candra Makmur farmer group can be seen in Figure 19.



Figure 19. Map of Distribution of Ownership of Agricultural Land Plots of Candra Makmur Farmer Group

8) Candra Works. The total area of agricultural land owned by the Candra Karya farmer group is 21.59 ha, of which there are 70 ownership plots of agricultural land that have been recorded and 1 plot of land that has not been recorded. The map of the distribution of ownership of agricultural land plots of the Candra Karya farmer group can be seen in Figure 20.



Figure 20. Map of Distribution of Ownership of Agricultural Land Plots of Candra Karya Farmer Group

9) Morning Rays. The total area of agricultural land owned by the Sinar Pagi farmer group is 19.01 ha, of which there are 24 ownership plots of agricultural land that have been recorded and 2 plots of land that have not been recorded. The map of the distribution of agricultural land plots of the Sinar Pagi farmer group can be seen in Figure 21.



Figure 21. Map of Distribution of Ownership of Agricultural Land Plots of Sinar Pagi Farmer Group

10) Candra Blooms. The total area of agricultural land owned by the Canrda Mekar farmer group is 43.28 ha, of which there are 101 ownership plots of agricultural land that have

been recorded and 5 plots of land that have not been recorded. The map of the distribution of ownership of agricultural land plots of the Candra Mekar farmer group can be seen in Figure 22.



Figure 22. Map of Distribution of Ownership of Agricultural Land plots of Candra Mekar Farmer Group

11) New Village Rays. The total area of agricultural land owned by the Sinar Desa Baru farmer group is 22.04 ha, of which there are 42 ownership plots of land that have been recorded and 2 plots of land that have not been recorded. The map of the distribution of agricultural land plots of the Sinar Desa Baru farmer group can be seen in Figure 23.



Figure 23. Map of Distribution of Ownership of Agricultural Land Plots of Sinar Desa Baru Farmer Group

- c. Dungun Perapaakan Village.
 - 1) Source of Sustenance. The total area of agricultural land owned by the Sumber Rezeki farmer group is 33.77 ha, of which there are 67 ownership of agricultural land plots that have been recorded and 2 plots of land that have not been recorded. The map of the distribution of ownership of agricultural land plots of the Sumber Rezeki farmer group is seen in Figure 24.



Figure 24. Map of Distribution of Ownership of Agricultural Land Plots of Farmer Groups Source of Sustenance

2) Cempaka. The total area of agricultural land owned by the Cempaka farmer group is 37.39 Ha, of which there are 91 ownership plots of land recorded and 2 plots of land that have not been recorded, there are also non-agricultural areas which include settlements and intercropping gardens covering an area of 8.91 Ha. The map of the distribution of agricultural land plots of the Cempaka farmer group can be seen in Figure 25.



Figure 25. Map of Distribution of Ownership of Agricultural Land Plots of Cempaka Farmer Group

3) Sri Ayu. The total area of agricultural land owned by the Sri Ayu farmer group is 11.42 ha, of which there are 50 land plot holdings recorded. The map of the distribution of ownership of agricultural land plots of the Sri Ayu farmer group can be seen in Figure 26.



Figure 26. Map of Distribution of Ownership of Agricultural Land Plots of Sri Ayu Farmer Group

4) Sri Waiting. The total area of agricultural land owned by the Sri Menanti farmer group is 8.35 ha, of which there are 23 land plot holdings recorded. The map of the distribution of ownership of agricultural land plots of the Sri Menanti farmer group can be seen in Figure 27.



Figure 27. Map of Distribution of Ownership of Agricultural Land Plots of Sri Menanti Farmer Group

- d. Pangkalan Kongsi Village.
 - 1) Tanjung Pandan I. The total area of agricultural land owned by the Tanjung Pandan I farmer group is 14.86 ha, of which there are 36 ownership plots of agricultural land recorded. The map of the distribution of ownership of agricultural land plots of the Tanjung Pandan I farmer group can be seen in Figure 28.



Figure 28. Map of Distribution of Ownership of Agricultural Land Plots of Tanjung Pandan I Farmer Group

2) New Ventures. The total area of agricultural land owned by the Usaha Baru farmer group is 19.31 ha, of which there are 37 land plot holdings recorded. The map of the distribution of ownership of agricultural land plots of the New Business farmer group can be seen in Figure 29.



Figure 29. Map of Distribution of Ownership of Agricultural Land Plots of New Business Farmer Groups

3) Cape Pandan II. The total area of agricultural land owned by the Tanjung Pandan II farmer group is 63.07 ha, of which there are 47 ownership plots of agricultural land that have been recorded and 8 plots of land that have not been recorded. The map of the distribution of ownership of agricultural land plots of the Tanjung Pandan II farmer group can be seen in Figure 30.



Figure 30. Map of Distribution of Ownership of Agricultural Land Plots of Tanjung Pandan Farmer Group II

4) Sungai Perak I. The total area of agricultural land owned by the Sungai Perak I farmer group is 27.84 Ha, of which there are 35 ownership plots of land that are recorded and 1 plot of land that has not been recorded. The map of the distribution of ownership of agricultural land plots of the Sungai Perak I farmer group can be seen in Figure 31.



Figure 31. Map of Distribution of Ownership of Agricultural Land Plots of Sungai Perak I Farmer Group

5) Silver River II. The total area of agricultural land owned by the Sungai Perak II farmer group is 27.46 ha, of which there are 42 ownership plots of land that have been recorded and 1 plot of land that has not been recorded. The map of the distribution of agricultural land plots of the Sungai Perak II farmer group can be seen in Figure 32.



Figure 32. Map of Distribution of Ownership of Agricultural Land Plots of Sungai Perak Farmers Group II

6) Our Expectations. The total area of agricultural land owned by the Harapan Kita farmer group is 44.47 ha, of which there are 71 ownership of agricultural land plots recorded and 1 plot of land that has not been recorded. The map of the distribution of ownership of agricultural land plots of the Harapan Kita farmer group can be seen in Figure 33.



Figure 33. Map of Distribution of Ownership of Agricultural Land Plots of Harapan Kita Farmer Group

7) Agreed. The total area of agricultural land owned by the Sepakat farmer group is 50.79 ha, of which there are 71 ownership of agricultural land plots recorded. Map of the distribution of ownership of agricultural land plots of farmer groups Agreed seen in Figure 34.



Figure 34. Map of Distribution of Ownership of Agricultural Land Plots of Farmer Groups Agreed

e. Reed Cognate Village. The pattern of distribution of agricultural land plots in Serumpun Buluh Village is slightly different from the other four villages that have been described before. This is because the agricultural system in Serumpun Buluh Village uses a domicile system, where the land owned by farmers is based on the farmer's domicile or farmer's residence in the Reed Cognate Area itself. The domicile agricultural land system owned by Serumpun Buluh Village has a pattern of spreading scattered land ownership, for example in the POKTAN A agricultural land area, not all members registered in POKTAN A have land in the POKTAN A agricultural area, it can be in the POKTAN B agricultural area. Each farmer group has an area of agricultural land, namely Berkah covering an area of 9.3 Ha, Kurnia covering an area of 2.23 Ha, Cempaka Biru covering an area of 12.79 Ha, Flowers covering an area of 10.12 Ha, Integrated Business covering an area of 4.38 Ha, Gema Tani covering an area of 12.55 Ha, Sinar Pagi covering an area of 3.71 Ha, Peaceloving covering an area of 7.27 Ha, Serasi covering an area of 2.12 Ha, Success covering an area of 2.04 Ha, Agreeing to Advance covering an area of 2.78, Semambu Kuning 8.38, Green Lush covering an area of 0.56, Global Jaya covering an area of 0.30, and unregistered groups 18.94. Map of the distribution of ownership of agricultural land plots of the Reed Cognate farmer group seen in Figure 35.



Figure 35. Map of Distribution of Ownership of Agricultural Land Plots of Reed Cognate Farmer Groups

CONCLUSION

The design of a web-based geographic information system makes it easier for users to get access to geospatial information in real time. The use of a web-based geographic information system allows users to access the GIS Web anytime, anywhere, and with any type of device connected to the internet. The analysis for the design that has been carried out is by collecting, analyzing and processing spatial data in the form of maps using remote sensing image interpretation techniques and accuracy tests in the field. Then proceed to build a database in the form of spatial data, namely maps and attribute data, namely questionnaire data into the GIS Web, which finally the data can be integrated and implemented into an information system that contains agricultural activities in the Tebas Complex area, Tebas District. The map presentation displayed is divided into per gapoktan (combined farmer groups), per poktan (farmer group) and per plot of farmer land. Users can get information on the use of agricultural land owned by farmers in the form of a table consisting of farmer membership information, farmer biodata information, area and ownership of agricultural land, agricultural facilities and infrastructure, agricultural activities and agricultural production products. The existence of the Agricultural Activity Information System application in the GIS Web-Based Tebas Complex Area can make it easier for users to get non-spatial data information and spatial data in the form of the distribution of agricultural land locations in the Tebas Komplek area, where there are 5 gapoctans in 5 villages with a total of 41 farmer groups whose land is scattered and included in the Tebas Komplek area.

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