

# Inventory Mapping of Ownership, Authorization, Use, and Utilization of Land based on Geographic Information System (GIS) on Tanjung Uma Village in 2019

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**Abstract:** Land is very important need for human life both in the present and in the future. Land does not only function as a place to live, but also an economic one as a livelihood both for industrial use and rental such as rented house, etc. Over time, as the population increased, the demand of land increase for various using, authorization and ownership of the land. This study aims to determine the distribution of land use and utilization in Tanjung Uma Village in 2019. This study using 2015 Aerial Photography data from the DJII 3 Phantom Pro Drone and administrative map of Tanjung Uma Village. Based on the results of Inventory of Ownership, Authorization, Use, and Utilization of Land/*Inventarisasi Penguasaan, Pemilikan, Penggunaan, dan Pemanfaatan Tanah* (P4T) data collection of 3,229 parcels of land carried out in Tanjung Uma Village. The application of Geographic Information System (GIS) in making P4T maps to process the data collection is using ArcMap software. The application of GIS in the data collection of land parcels produces 4 maps namely Utilization, Authorization, Use and Ownership Maps of each Role of maps the could makes it easy to provide information and data collection processes on interconnected land parcels.

## 1 INTRODUCTION

In accordance with the decision of the Head of National Land Affairs of the Republic of Indonesia Number 3 of 2006 stipulates that Duty the is to equate and carry out policies in the field of land management and arrangement, based on the regulation one of its functions is to carry out an inventory of Ownership Authorization, Use and Utilization of Land/*Inventarisasi Penguasaan, Pemilikan, Penggunaan, dan Pemanfaatan Tanah* (P4T) (Wiadi, 2010).

Because the land has a fixed amount, controlling the use and utilization of land needs to be done, one stewardship purposes land ie realizing orderly land which includes the control, use and control of land use and regulate the control, use and use of land for various development activities accordingly with the Regional Spatial Planning, it is very necessary to use land use data (Peraturan Pemerintah, 2004).

There is enhancement in total population will causing an increase in socioeconomic activities, also in service needs, and in harmony with that will happen enhancement infrastructure. As a City System, Infrastructure (infrastructure) is a basic complement of the environment, region, city, or region (spatial or spatial), where with these developments will affect level density and also population movement patterns in an area (Wardhana, et al., 2007). Therefore, the need for land will increase and the more diverse use and use of the land.

Data generated from P4T activities in the form of physical and juridical data, physical data is information on the location, boundaries, and area of land parcels. While juridical data is information on the legal status of the field (Mujiati, 2015), land tenure can be interpreted legally and physically. civil and public perspective (Mulyadi & Wijaya, 2004). Land Ownership is a legal relationship between individuals or legal entities that are equipped, with proof of ownership both registered and unregistered (Mujiati, 2015). Land use can be grouped into two

major groups, namely land use agriculture and non-agricultural land use (Arsyad, 1989). Land use data can be obtained from field surveys or satellite imagery data (Gustin & Roziqin, 2019).

Land use is an activity to obtain added value without changing the physical form of land use. Each data from the measurement of land parcels whether carried out systematically or sporadically must be made a map of the land parcels (Peraturan Pemerintah, 1997).

According to Aronoff (1989) and Prahasta (2001), GIS is a computer-based system that has the ability to handle data that is geographically referenced, namely data entry, data management (storage and retrieval).

GIS applications are widely used for agricultural planning and land use. Integrated analyzes of soil types, slope, tillage, and crop types have been carried out to predict soil erosion so that control programs can be determined (Aronoff, 1989).

The drone is a vehicle equipped with a flight control system through waves, precision navigation (Ground Positioning System (GPS), and flight control electronics so that it is able to fly according to flight planning (autopilot) (Zarco, et al., 2014). This aircraft is controlled automatically through a computer program designed (Bahar, 2016). According to Djaenuddin (1997), using GIS as an automated system to support the mapping and evaluation of land and land resources in Indonesia (Wiradisastra, 2000).

This activity is carried out to overcome the current condition, namely the still low parcels of land that have been registered, therefore the activity to inventory P4T from existing parcels throughout Indonesia is a fundamental activity that must be carried out, without the availability of P4T data, it is very difficult for agrarian renewal directions and can be formulated appropriately. P4T activities carried out by the Batam City National Land Agency (BPN) in 2019 were carried out in Tanjung Uma Village, Lubuk Baja Sub-District, Batam City. Tanjung Uma Village consists of 11 *Rukun Warga* (RW), with a target of 3,229 P4T activities. Of the 11 RWs, as many as 3 RWs (RW 04, RW 09 and RW 10) are not included in the P4T activities because the targeted files have been fulfilled by other RW.

## 2 RESEARCH METHOD

### 2.1 Location and Time of Research

This research was conducted at the Tanjung Uma Village, Lubuk Baja Sub-District of Batam City,

located in the Riau Islands Province (Figure 1), where the geographical location is in the coordinates 103°57'28.47"BT and 1°8'18.509"LU. Data retrieval and processing lasts for 4 months.

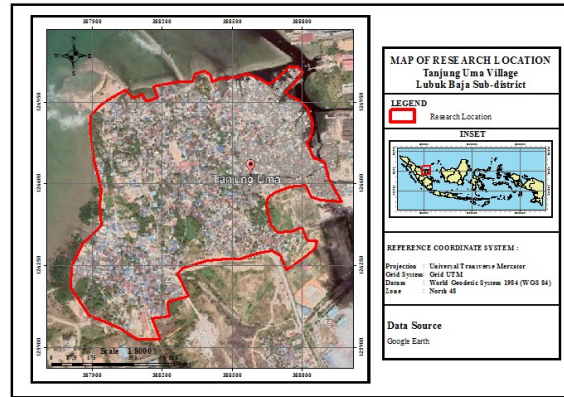


Figure 1: Research location.

### 2.2 Tools and Materials

In this research of course supported with some hardware and software for data collection and processing activities. The following tools are used in this study:

1. Hardware: Laptop and Drone DJI Phantom 3 Pro
2. Software: Microsoft Office 2010 and Arcmap 10.3

This study also uses several supporting materials from institutions to support data processing and also the final results. Materials needed in this study are Administrative Limits of Tanjung Uma Village, Lubuk Baja Sub-District, Batam City; Juridical Data; Utilization of land; Land Acquisition; Land Use; Land Ownership.

### 2.3 Data Collection Technique

The data collection technique in this stage aims to collect data needed in research, the data is primary data obtained from measurements in the field and secondary data obtained from certain agencies, techniques for data collection are from aerial photographs taken from drones dji phantom 3 pro (DJI, 2015) and village boundaries requested from the relevant agencies, then fill in P4T forms and submit identification and letters by residents.

### 2.4 Data Processing Technique

Data processing technique in this research aims to find out the steps to process P4T maps, aerial

photographs and Village boundaries in the form of shp in overlay and then become a work map after the work map so a field survey is carried out to get a plot of land.

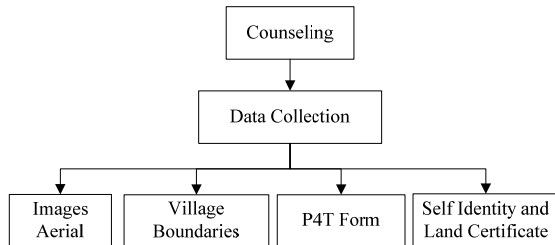


Figure 2: Data collection flowchart.

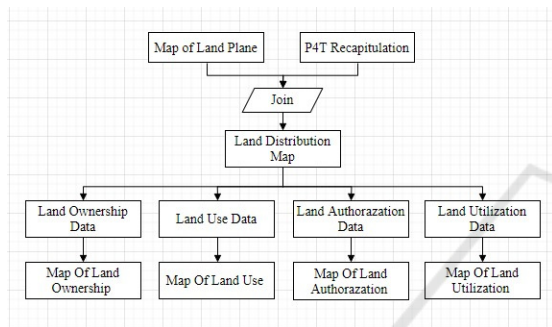


Figure 3: Data processing flowchart.

### 3 RESULTS AND DISCUSSION

Land Use in Tanjung Uma Village which is processed based on P4T Activities is the main task and function of the directorate General of Agrarian Arrangement, P4T activities in fiscal year 2019. Land Office Activities, namely the National Land Agency which has an area of 28,421, Work Maps are made to obtain an overview general and location of land parcels in one village and determine the relative position of each parcel of land contained in a village location of P4T activities. Work Map is made using Basic Map of the Directorate General of Agrarian infrastructure products (Registration Map or Map of PTSL results) as implementation "One map". If not available, the Work Map can also be derived from line maps, satellite imagery, aerial photographs, google earth/map and other maps.

The work map project was made from counselling to residents / communities who live in the Tanjung Uma area consisting of 3,229 fields and includes 11 RWs, counselling is carried out by giving P4T forms (no inventory, owner's name, owner ID number, street owner, household owner, household owner, village owner, sub-district owner, regency / city owner,

occupation of owner, age of owner, marriage status of owner, number of owner members.

#### 3.1 Land Authorization

From the 2020 BPN data in Figure 4 and Table 1 we can see that of 3,229 parcels of land carried out in the P4T data collection, 2,838 parcels with an area 147,580 m<sup>2</sup> is controlled alone by the community. A total of 383 fields are not their own, but are leased by their owners. There are 7 (seven) are joint ownership, namely prayer rooms, mosques, churches and others also 1 field owned by the government, namely education facilities or schools. In Tanjung Uma village, the most control of land is control with an average area of 1-100 m<sup>2</sup> while the largest control of land is the field land with an area of > 1,000 m<sup>2</sup> owned by the community, not the owner but leased by the owner, jointly owned and owned by the government.

#### 3.2 Land Ownership

Based on the 2020 BPN data in Figure 5 and Table 2 the results of data collection as many as 3,229 fields carried out in Tanjung Uma Village, the results of data collection in this Village have not been registered yet, namely as many as 3,229 fields covering 168,693 m<sup>2</sup>.

#### 3.3 Land Use

Based on the 2020 BPN data in Figure 6 and Table 3 the data collection of 3,229 parcels, the most use of land is settlement, which is 2,324 parcels with a total area of 21,530 m<sup>2</sup>. There are 3 fields of land that are functioned for plantations (seasonal crops) to meet the food needs of the surrounding community (because according to its designation in Tanjung Uma village is not for agriculture, this plantation is only for a short time), and there are no rice fields. 10 hectares of vacant land or vacant land with a total area of 1,465 m<sup>2</sup>. While the land used for public and social facilities are 19 plots with a total area of 71,612 m<sup>2</sup>.

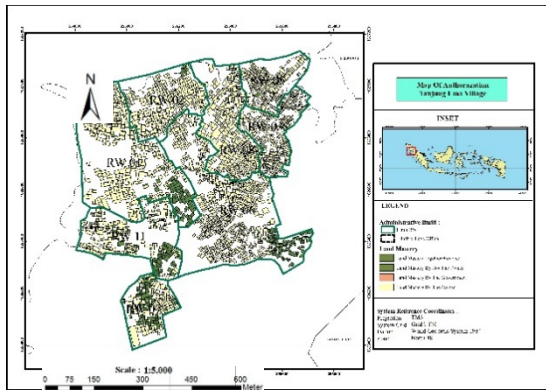


Figure 4: Map of land authorization.

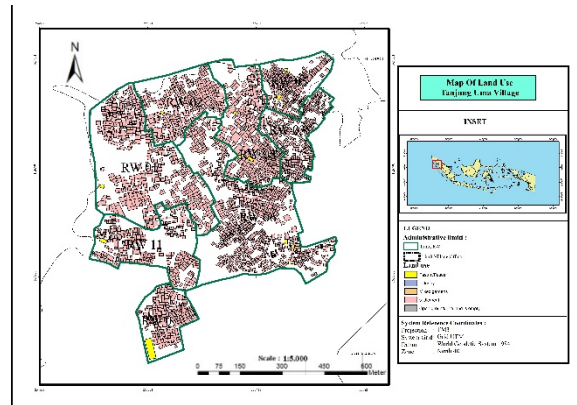


Figure 6: Map of land use.

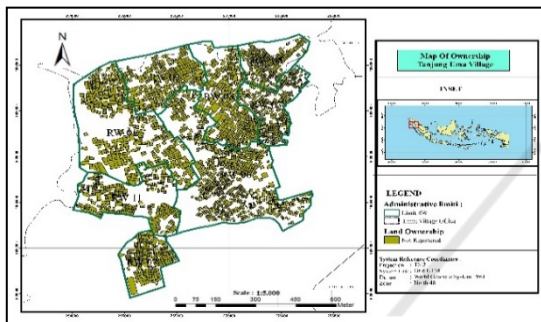


Figure 5: Map of land ownership.

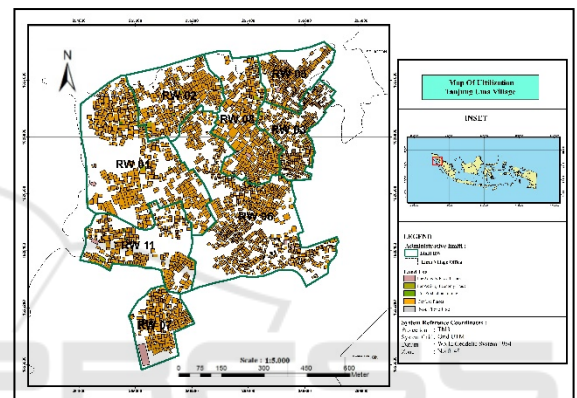


Figure 7: Map of land utilization.

Table 1: Structure of land authorization.

| No           | Land Authoraza-tion Area Group (m2) | Owner        |               | Not The Owner |               | Belong together |              | Legal Entity |             | Government |             |
|--------------|-------------------------------------|--------------|---------------|---------------|---------------|-----------------|--------------|--------------|-------------|------------|-------------|
|              |                                     | Σ Parcels    | Σ Area (m2)   | Σ Parcels     | Σ Area (m2)   | Σ Parcels       | Σ Area (m2)  | Σ Par-cels   | Σ Area (m2) | Σ Parcels  | Σ Area (m2) |
| 1            | 1 - 100                             | 1,972        | 9,749         | 364           | 11,882        | 2               | 170          | -            | -           | 1          | 36          |
| 2            | 101 - 200                           | 652          | 3,012         | 13            | 1,523         | 3               | 589          | -            | -           | -          | -           |
| 3            | 201 - 300                           | 105          | 43,193        | 3             | 694           | 1               | 287          | -            | -           | -          | -           |
| 4            | 301 - 400                           | 45           | 15,658        | -             | -             | -               | -            | -            | -           | -          | -           |
| 5            | 401 - 1.000                         | 38           | 24,599        | 2             | 1,083         | -               | -            | -            | -           | -          | -           |
| 6            | > 1.000                             | 26           | 51,369        | 1             | 2,849         | 1               | 2000         | -            | -           | -          | -           |
| <b>Total</b> |                                     | <b>2,838</b> | <b>147,58</b> | <b>383</b>    | <b>18,031</b> | <b>7</b>        | <b>3,046</b> | <b>0</b>     | <b>0</b>    | <b>1</b>   | <b>36</b>   |



Table 2: Structure of land authorization.

| No           | Land Ownership Area Group (m <sup>2</sup> ) | Registered         |                          |                 |                          |                    |                          |              |                          |           |                          | not listed |                          |                |
|--------------|---|--------------------|--------------------------|-----------------|--------------------------|--------------------|--------------------------|--------------|--------------------------|-----------|--------------------------|------------|--------------------------|----------------|
|              |   | Right of ownership |                          | Building rights |                          | Cultivation Rights |                          | Usage Rights |                          | HPL       |                          |            |                          |                |
|              |   | ∑ Parcels          | ∑ Area (m <sup>2</sup> ) | ∑ Parcels       | ∑ Area (m <sup>2</sup> ) | ∑ Parcels          | ∑ Area (m <sup>2</sup> ) | ∑ Parcels    | ∑ Area (m <sup>2</sup> ) | ∑ Parcels | ∑ Area (m <sup>2</sup> ) | ∑ Parcels  | ∑ Area (m <sup>2</sup> ) |                |
| 1            | 1 - 100                                     | -                  | -                        | -               | -                        | -                  | -                        | -            | -                        | -         | -                        | -          | 2,338                    | 21,63          |
| 2            | 101 - 200                                   | -                  | -                        | -               | -                        | -                  | -                        | -            | -                        | -         | -                        | -          | 667                      | 3,138          |
| 3            | 201 - 300                                   | -                  | -                        | -               | -                        | -                  | -                        | -            | -                        | -         | -                        | -          | 109                      | 1,071          |
| 4            | 301 - 400                                   | -                  | -                        | -               | -                        | -                  | -                        | -            | -                        | -         | -                        | -          | 46                       | 17,658         |
| 5            | 401 - 1.000                                 | -                  | -                        | -               | -                        | -                  | -                        | -            | -                        | -         | -                        | -          | 42                       | 38,698         |
| 6            | > 1.000                                     | -                  | -                        | -               | -                        | -                  | -                        | -            | -                        | -         | -                        | -          | 27                       | 86,498         |
| <b>Total</b> |   | -                  | -                        | -               | -                        | -                  | -                        | -            | -                        | -         | -                        | -          | <b>3,229</b>             | <b>168,693</b> |

Table 3: Structure of land use.

| No.          | A Land Use Map Area Group | Settlement   |                          | Rice fields |                          | Field     |                          | Open Land |                          | Public facilities |                          |
|--------------|---------------------------|--------------|--------------------------|-------------|--------------------------|-----------|--------------------------|-----------|--------------------------|-------------------|--------------------------|
|              |                           | ∑ Parcels    | ∑ Area (m <sup>2</sup> ) | ∑ Parcels   | ∑ Area (m <sup>2</sup> ) | ∑ Parcels | ∑ Area (m <sup>2</sup> ) | ∑ Parcels | ∑ Area (m <sup>2</sup> ) | ∑ Parcels         | ∑ Area (m <sup>2</sup> ) |
| 1            | 1 - 100                   | 2,324        | 21,53                    | -           | -                        | 2         | 80                       | 5         | 334                      | 7                 | 406                      |
| 2            | 101 - 200                 | 661          | 3,138                    | -           | -                        | -         | -                        | 2         | 262                      | 4                 | 769                      |
| 3            | 201 - 300                 | 104          | 4,745                    | -           | -                        | 1         | 290                      | 2         | 280                      | 3                 | 495                      |
| 4            | 301 - 400                 | 44           | 15,283                   | -           | -                        | -         | -                        | -         | -                        | 1                 | 375                      |
| 5            | 401 - 1.000               | 39           | 24,638                   | -           | -                        | -         | -                        | 1         | 589                      | 1                 | 875                      |
| 6            | > 1.000                   | 25           | 25,912                   | -           | -                        | -         | -                        | -         | -                        | 3                 | 68,692                   |
| <b>Total</b> |                           | <b>3,197</b> | <b>95,246</b>            | <b>0</b>    | <b>0</b>                 | <b>3</b>  | <b>370</b>               | <b>10</b> | <b>1,465</b>             | <b>19</b>         | <b>71,612</b>            |

## 4 CONCLUSIONS

Based on the results of the P4T data collection of 3,229 parcels of land carried out in Tanjung Uma Village, Lubuk Baja Sub-District, it can be concluded that Land Authorization on Tanjung Uma Village, which covers an area of 2,838 m<sup>2</sup>, is mostly is self-owned, the average land use group ranges from 1-100 m<sup>2</sup>. based on the results of data collection of P4T Land ownership in Tanjung Uma Village as many as 3,229 parcels of land that have not been registered will be collected. the majority of the results of data

collection from P4T are used for settlements, there are several public facilities and social facilities such as village offices, school, mosque and others so on. Plots - land parcels as a result of P4T data collection were mostly used for as many as 3,169 residential areas with a total area 138,261 m<sup>2</sup>. A total of 33 fields are used for trading businesses such as shops and food stalls. But there are still 10 fields that are still in the form of land.

The application of Geographic Information System (GIS) in inventory mapping P4T to process the data collection is by using ArcMap software. The

application of GIS in the data collection of land parcels produces 4 maps namely Utilization, Authorization, Use and Ownership Maps of each

Role of maps the could makes it easy to provide information and data collection processes on interconnected land parcels.

Table 4: Structure of land utilization.

| No. | A Land Utilization Map Area Group (m2) | Residence    |                | For Economic / Trade Enterprises |              | Public Facilities |               | No Utilization |              |
|-----|--|--------------|----------------|----------------------------------|--------------|-------------------|---------------|----------------|--------------|
|     |  | ∑ Parcels    | ∑ Area (m2)    | ∑ Parcels                        | ∑ Area (m2)  | ∑ Parcels         | ∑ Area (m2)   | ∑ Parcels      | ∑ Area (m2)  |
| 1   | 1 - 100                                | 2,312        | 21,53          | 15                               | 693          | 6                 | 370           | 5              | 334          |
| 2   | 101 - 200                              | 650          | 3,018          | 12                               | 1,513        | 4                 | 769           | 3              | 262          |
| 3   | 201 - 300                              | 102          | 828            | 3                                | 784          | 2                 | 495           | 1              | 280          |
| 4   | 301 - 400                              | 43           | 1,448          | 1                                | 380          | 1                 | 375           | -              | -            |
| 5   | 401 - 1,000                            | 37           | 1,496          | 2                                | 1,318        | 1                 | 875           | 1              | 589          |
| 6   | > 1,000                                | 25           | 109,941        | -                                | -            | 3                 | 21,395        | -              | -            |
|     | <b>Total</b>                           | <b>3,169</b> | <b>138,261</b> | <b>33</b>                        | <b>4,688</b> | <b>17</b>         | <b>24,279</b> | <b>10</b>      | <b>1,465</b> |

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