



# Analysis of Land Availability For The Pasangkayu District Transmigration Program

Gunawan\*; Ahmad Munir; Andang Surya Soma

Universitas Hasanuddin, Makassar, Indonesia

## INFO ARTICLE

\* Corresponding author; :  
[engineer09@gmail.com](mailto:engineer09@gmail.com)

### Keywords:

development impact;  
land suitability;  
transmigration.

## ABSTRACT

Transmigration is one of the government's efforts to achieve a balance in population distribution, expand job opportunities, increase production, and boost income. The development of the Transmigration Area Technical Plan for Settlement Units Tanjung Cina is intended to optimize natural resources and the strategic potential of other regions. This research was conducted to assess the suitability of the transmigration settlement land in Technical Plan for Settlement Units Tanjung Cina in Bambakoro Village, Pasangkayu Regency. To meet the data needs of this research, data collection was carried out on the objects to be studied to obtain an overview of data or information about the research area. The data consists of primary and secondary data obtained from survey methods. The research results indicate the physical factors influencing the land suitability for transmigration land in Technical Plan for Settlement Units Tanjung Cina in Bambakoro Village. The suitability of transmigration settlement land in Technical Plan for Settlement Units Tanjung Cina in Bambakoro Village, Pasangkayu Regency, shows favorable results. Furthermore, the development of Transmigration RTSP Tanjung Cina has a significant impact on the welfare of the people and the progress of the region.



## INTRODUCTION

The development of the Transmigration Area Technical Plan for Settlement Units Tanjung Cina is intended to optimize natural resources and the strategic potential of other regions. To support this development, proposals for the development of influential areas in regional progress have been suggested. These areas include regional planning, housing and settlement development, community economic empowerment, and the improvement of institutional quality.

The implementation of the transmigration program, from a legal perspective with environmental considerations, has been incorporated into Article 2 of Law Number 15 of 1997 on Transmigration, which states that Environmental Insight is one of the 7 (seven) principles of transmigration implementation. Environmental aspects have been taken into account in the planning phase of transmigration, such as the use of forest areas with convertible forest status, land use recommendations in accordance with soil capabilities, slope limitations, and considerations of hydrological aspects. During the implementation phase, environmental considerations have been integrated into the technical execution, including securing routes along the left and right sides of rivers, land clearing without burning, manual and/or semi-mechanical land clearing, embankment construction, and soil and water conservation using organic materials.

Initially, the implementation of transmigration was not difficult in providing space and determining transmigration locations outside Java Island, as there was still ample available land. However, it is currently challenging to obtain adequate and suitable land for transmigration settlements. This difficulty arises not only due to the increasing demand for land with the development of the population and local economy but also because of the limited availability of land with suitable living qualifications.

Pasangkayu Regency is the northernmost regency in West Sulawesi Province and shares a direct border with Donggala Regency in Central Sulawesi Province, geographically located at coordinates 0° 40' 10" - 1° 50' 12" South Latitude and 119° 25' 26" - 119° 50' 20" East Longitude.

Pasangkayu Regency has 12 districts, one of which is the Lariang District where Upt. Tanjung Cina is situated. The area of Lariang District is 81.65 km with a population of ± 6,700 people, consisting of ± 3,577 males and ± 3,123 females scattered across 7 villages. Upt. Tanjung Cina is located in Bambakoro Village. UPT Tanjung Cina is located in the Tanjung Harapan Hamlet of Bambakoro Village, Lariang District, Pasangkayu Regency, West Sulawesi Province. According to the Transmigration Area Plan and Technical Plan for Settlement Units, it is part of the Development Area Unit (DAU) under the name Settlement Unit (SP 1 Tanjung Cina).

The overall topography of UPT. Tanjung Cina is on a slope of 0-3%, with a total area of 318 hectares. There are some flat to undulating areas, but their extent is very small, categorizing them as flat conditions. The planning for the preparation of Technical Plan for Settlement Units Tanjung began in the 2017 fiscal year through the Regional Budget II of West Sulawesi Province and was designated as a New Transmigration Area with Minister of Village PDT and Transmigration Decree Number 104 of 2017 dated November 3, 2017, with a planned area of 1000 hectares, accommodating 350 households, and focusing on the primary livelihood as fishermen and Paname Shrimp/Fish farming.

The development of the Tanjung Cina Technical Plan for Settlement Units settlement was first initiated in the 2018 fiscal year using the National Budget Fund. It was constructed gradually and has been inhabited by a number of transmigrants from Java and Sumatra. The phased construction process (Multi Years) was also influenced by the 2019-2021 pandemic. Consequently, its development has continued up to the present.

The Tanjung Cina Technical Plan for Settlement Units in Pasangkayu is the first transmigration settlement unit located in the coastal area of Pasangkayu Regency. The main livelihood activities for transmigrant communities will be fisheries farming and fishing. This, of course, requires adequate land support specifically designated for this purpose. The author chose the title "Land Suitability Analysis to Support Coastal Fisher Transmigration Program in Tanjung Cina, Bambakoro Village, Pasangkayu Regency" to address this.



## THEORETICAL REVIEW

### Regional Planning Direction Theory

Regional planning is a development planning process aimed at bringing about positive changes towards progress for a community, government, and its environment in a specific region. It utilizes or harnesses various assets and resources, with an orientation that is comprehensive, complete, and in accordance with established standards and needs (Riyadi., & Bratakusumah 2004). Regional planning should be seen as a dynamic interaction that is consistent with the goal, considering social, ecological, and economic demands. Planning is also observed as an instrumental control and ethical regulatory code that (i) supports community economic growth, (ii) reduces disparities between regions, (iii) supports development and resource stability, and (iv) promotes sustainable environmental protection, including human safety (Baja 2012). A change in the current perspective and practice of planning, as expressed by Sandercock in Masik (2005), is where planning is not seen as working for the interest of a specific party determined by the planner but is a part of the entire heterogeneous community in general. Therefore, the forms of planning needed in this era emphasize processes of dialogue/communication, participation, collaboration, and consensus-building.

### Theory in Simulation Modeling

#### a. Analytical Hierarchy Process (AHP)

Analytical Hierarchy Process (AHP) is a decision support model created by Thomas L. Saaty. AHP is a multi-criteria approach method for decision making that produces parameter weights from a hierarchy of goals, criteria, sub-criteria and alternatives (Saaty 1980; Saaty 1999;). The decision support model will describe complex multi-factor or multi-criteria problems into a hierarchy. As pointed out by Saaty (1993), hierarchy is characterized as the depiction of complex problems in a multi-level structure where the main level is the goal, followed by the level of factors, criteria, sub-criteria, and so on until the last of an alternative. The pairwise comparison matrix shows pairwise comparisons between criteria consisting of  $n(n-1)/2$  pairwise comparisons for a number of  $n$  elements (Saaty 1999; Saaty 2003). Pairwise comparison of criteria in the AHP method produces a level of inconsistency that requires a logical consistency check (Ozturk and Batuk 2011).

#### b. Weighted Overlay Method (multi-Criteria Evaluation)

To meet a particular goal, often several criteria need to be evaluated. Such a procedure is called Multi-Criteria Evaluation (Voogd, 1983; Carver, 1991). The main problem in MCE (Multi-Criteria Evaluation) relates to how to combine information from several criteria to form a single evaluation index (Rahman & Saha, 2008). One of the overlay methods with weighting is using Spatial Multi Criteria Evaluation (SMCE). SMCE is an ideal tool for decision making using combined and weighted spatial criteria. The formula for SMCE is:

$$S = \sum_{i=0}^n W_i X_i \dots\dots\dots (1)$$

Where:

S = SMCE/Suitability;

$W_i$  = Factor weight to  $i$ ;

$X_i$  = Factor score to  $i$ .



So, SMCE is the sum of the multiple scores and weights of each factor.

c. Algoritme Cellular Automata (CA)

Cellular Automaton (CA) is a dynamic land use modeling technique that utilizes spatial data (raster) in the form of cells (grid) as its smallest analytical unit (White and Shahumyan, 2011). Figure 2 illustrates the concept of CA, which is a movement/transition from an automaton (a single form of automata). An automaton A can be represented by the set of limited states  $S = \{S_1, S_2, S_3, \dots, S_n\}$ , and a set of transition rules T. The relationship between A, S, and T can be expressed as:

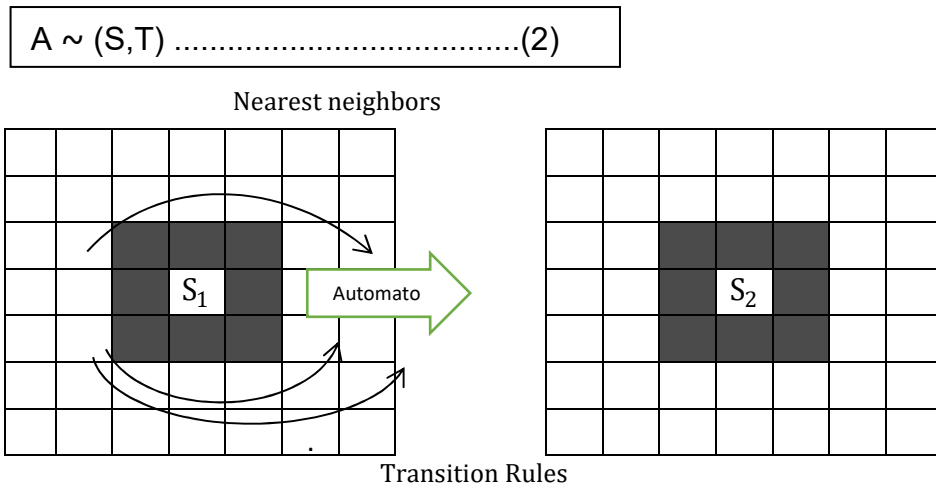


Figure 1. Cellular Automata Concept

The transition rules determine the state  $S_{t+1}$  at time  $t+1$  of an automaton, depending on the automaton state  $S_t$  and input  $I_t$  at time  $t$ , where  $S_t, S_{t+1} \in \{S\}$  (Benenson and Torrens, 2004).

d. Spatial Decision Making Systems

According to Eissa (2013), SDSS (Spatial Decision Support System) was introduced in the 1990s. Countinho-Rodrigues et al. (2011) stated that SDSS has a positive impact on decision-making performance. This is because SDSS involves large amounts of data and high complexity so that these decision support systems have gained popularity in the decision making process.

**Factors Influencing Changes in Land Use**

In general, changes in land use can be caused by various driving factors, especially those factors that are related to a specific type of land use. By understanding the driving factors of changes in a particular type of land use, it is possible to estimate and predict changes as a precautionary measure in the context of spatial dynamics. The requirements in the context of modeling the dynamics of land and urban development spatially can be modified as (Pratomoatmojo, 2020):

- a. Driving Factors (Accessibility)
  - Proximity to the main road network;
  - Proximity to secondary road networks;
  - Proximity to terminals;
  - Proximity to settlements;
  - Proximity to the Central Business District (CBD);



- Proximity to Growth Centers, and others.
- b. Inhibiting Factors (Spatial Planning)
  - Green Open Space Plans;
  - Conservation Plans;
  - Forest Development Plans, and others.
- c. Land Suitability and Capability
  - Capability Analysis;
  - Suitability Analysis, and others.

## METHODOLOGY

To meet the data needs in the research, it is necessary to collect data on the objects to be studied to obtain an overview of data or information about the research area. The data consists of primary and secondary data obtained from survey methods. The data collection methods used in this research include the matching technique, the Analytical Hierarchy Process (AHP), overlay method using Geographic Information System (GIS) analysis, and Cellular Automaton (CA) algorithm method.

- a. Matching Method: This method involves assessing land suitability by comparing variable parameters of land suitability between the regional conditions and predetermined criteria. Data on the condition of the region's parameters are obtained from field and secondary data, while guidelines for determining land suitability class criteria are established.
- b. Analytical Hierarchy Process (AHP): AHP, developed by Thomas L. Saaty, is a decision support model. AHP is a multi-criteria decision-making approach that generates parameter weights from the hierarchy of objectives, criteria, sub-criteria, and alternatives. This decision support model illustrates complex multi-factor or multi-criteria problems as a hierarchy.
- c. Overlay Method using GIS Analysis: This method involves handling data in land suitability evaluation digitally by combining multiple maps containing required information for a program with land characteristics. It utilizes Geographic Information System (GIS) analysis for overlaying maps.
- d. Cellular Automaton (CA): CA is a dynamic land use modeling technique that uses spatial data (raster) in the form of cells (grid) as its smallest analytical unit. CA reproduces processes with time-based characteristics of change based on status, rules, and input (White and Shahumyan, 2011).

Table 1. Residential Land Suitability Variables

Variable	Indicator	Land Suitability Class	Score
Land Slope (%)	0-3	S1 (Very Suitable)	5
	4-8	S2 (Suitable)	4
	9-15	S3 (Less Appropriate)	2
	>15	N (Not Appropriate)	1
Distance from Beach (m)	>200	S1 (Very Suitable)	5
	100-200	S2 (Suitable)	4
	5-200	S3 (Less Appropriate)	2





	0-5	N (Not Appropriate)	1
High (m/dpl)	>15	S1 (Very Suitable)	5
	5-15	S2 (Suitable)	4
	<5	S3 (Less Appropriate)	2

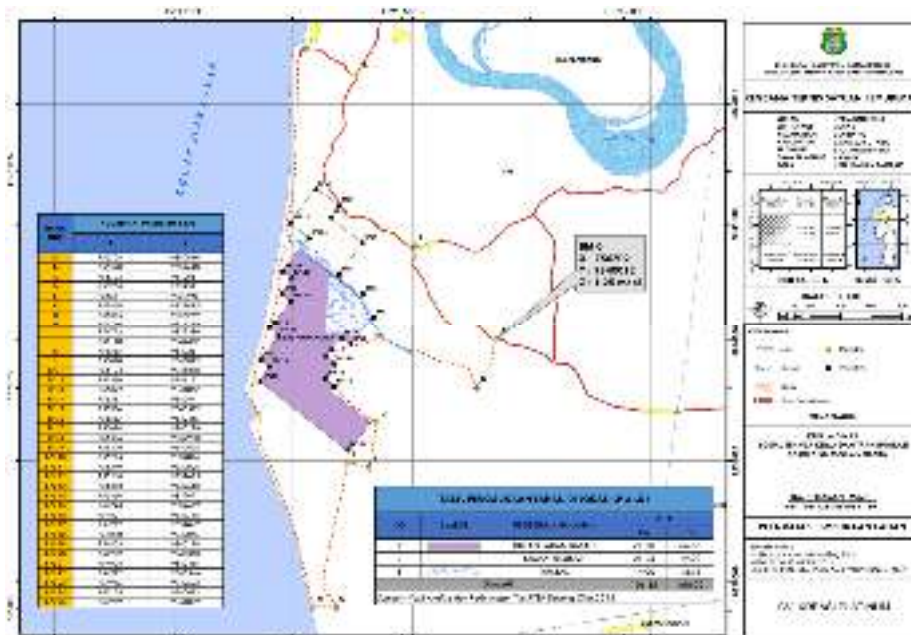
**RESULT AND DISCUSSION**

**General description of Bambakoro Village, Pasangkayu Regency**

Pasangkayu Regency is the northernmost regency in West Sulawesi Province and shares a direct border with Donggala Regency in Central Sulawesi Province. Geographically, it is situated at coordinates 0° 40' 10" - 1° 50' 12" South Latitude and 119° 25' 26" - 119° 50' 20" East Longitude. Pasangkayu Regency consists of 12 districts, one of which is the Lariang District, where Upt. Tanjung Cina is located. The area of Lariang District is 81.65 square kilometers with a population of approximately 6,700 people, comprising approximately 3,577 males and 3,123 females distributed across 7 villages. Upt. Tanjung Cina is situated in Bambakoro Village.

UPT Tanjung Cina is located in the Tanjung Harapan Hamlet of Bambakoro Village, Lariang District, Pasangkayu Regency, West Sulawesi Province. Based on the Transmigration Area Plan and Technical Plan for Settlement Units (TPSU), it falls under the Development Area Unit (DAU) with the name Settlement Unit (SP 1 Tanjung Cina). The topography of UPT. Tanjung Cina is generally characterized by slopes of 0-3%, covering a total area of 318 hectares. There are several flat to undulating areas, although their extent is minimal, categorizing them as flat conditions.

Figure 2. Map of Tanjung Cina TPSU Transmigration Land Clearing Boundaries





### Analysis of Land Slope Variables

Land slope is the basis for making land suitability maps, information on land status and land use conditions will be included in spatial analysis to determine settlement suitability. Based on the results of the analysis, it is known that the research on the shape of the Malakoni transmigration settlement area is dominated by a slope of > 15%. Furthermore, the slope of the Malakoni Village land can be seen in the table. 2.

Table 2. Analysis Results for Land Slope Variables

Land Slope	Wide (Ha)	%	Land Suitability Class
0-3 %	118.4	45.05	S1 (Very Suitable)
4-8 %	99.6	27.63	S2 (Suitable)
9-15 %	55.2	16.37	S3 (Less Appropriate)
>15 %	44.8	10.95	N (Not Appropriate)
Amount	318	100	

Based on Table 2, it is known that the land slope in Bambakoro Village is dominated by the flat land slope class (0-3%) with an area of 118.4 Ha (45.05%), followed by the slightly flat land slope class (4-8%) with an area of 99.6 Ha (27.63%), then the land slope classes are gentle (9-15%) and steep (>15%) with areas respectively 55.2 Ha (16.37%) and 44.8 Ha (10.95%). Areas whose relief tends to be flat are very good for use as residential development locations. This is because in flat areas it is easier to build a house compared to steep areas.

### Variable Analysis of Distance from the Beach

In coastal areas at a certain distance, it is widely used by fishing communities considering the ease of accessibility to the sea for fishing. However, ecologically this area plays a role in supporting the function of the coast and also as a buffer in the event of sea water runoff and sea water intrusion. So it is better to designate coastal areas as protected areas. In the research area, the distance from the beach is dominated by a distance of >200 m with an area of 305.3 Ha. Furthermore, for a distance of 100-200 m it has an area of 12.6 Ha and the smallest is at a distance of 5-100 m with an area of 0.1 Ha.

Table 3. Analysis Results for Distance from Beach Variables

Distance from Beach	Wide (Ha)	%	Land Suitability Class
>200 m	305.3	99.11	S1 (Very Suitable)
100-200 m	12.6	0.88	S2 (Suitable)
5-100 m	0.1	0.01	S3 (Less Appropriate)
0-5 m	-	-	N (Not Appropriate)
Amount	318	100	



Referring to the suitability of land for settlements, the ideal distance for settlements is > 100 m from the beach. This distance is assumed to be a safe distance in the event of a flood disaster. The condition of the land in the research area which is > 200 m from the coast covers a very large area of land, namely 305.3 Ha (99.11%) and for a distance of 100-200 m an area of 12.6 Ha (0.88%). Meanwhile, the area 5-100 m away is only 0.1 Ha (0.01%). This means that most of the land in this research area is suitable for use as a residential area.

### Analysis of Altitude Variables

Based on the results of the analysis, it is known that the altitude in the research area is dominated by a height of > 15 m/asl with an area of 236.4 Ha (94.32%) while the smallest is an area of 81.6 Ha (5.68%). The results of this analysis can be seen in Table 4.

Table 4. Analysis Results for Altitude Variables

High	Wide (Ha)	%	Land Suitability Class
> 15 m/dpl	236.4	94.32	S1 (Very Suitable)
5 - 15 m/dpl	81.6	5.68	S2 (Suitable)
< 5 m/dpl	-	-	S3 (Less Appropriate)
Amount	318	100	

Based on The Urban, Rulal Regional Planning Field (1980) that urban cultivation activities can be developed at regional altitudes < 1,000 m/asl. Based on these height criteria, the Tanjung Cina area is very suitable for developing a transmigration settlement area.

### Suitability of Transmigration Settlement Land

Land suitability is the degree of appropriateness of a piece of land for a specific land use purpose. The suitability of an area can vary depending on the desired or considered land utilization type. The assessment of land suitability involves sorting or determining land parcels that exhibit positive characteristics related to the success of production according to their designated use. This is done by interpreting the characteristics of land map units in relation to the requirements and constraints in the cultivation of these parcels. The suitability of land for residential areas is obtained from the analysis of land suitability variables for this region, including land slope, distance from the coast, and elevation. All variables are overlaid to produce the land suitability results for the transmigration settlement in Bambakoro Village. The determination of land suitability direction is done by summing the scores from the five evaluated variables for each land unit.

Table 5 Analysis Results for Land Suitability Variables

Conformity Level	Wide (Ha)	%
Very suitable (S1)	-	-
In accordance (S2)	118.4	45.05
Not Appropriate (S3)	144.4	35.54
Not Suitable (N)	55.2	19.41
Amount	318	100





## CONCLUSION

Based on the analysis conducted, several key conclusions emerge regarding the transmigration settlement of Coastal Tanjung Cina in Bambakoro Village. Firstly, the predominant characteristics of this settlement include a considerable distance from the coast (> 200 m), an elevation exceeding 15 m above sea level, and predominantly flat land with a slope ranging from 0 to 3%.

Moreover, the evaluation of land suitability in the area indicates that almost all of the land is deemed suitable for settlement. Specifically, suitable settlement areas (S2) encompass 118.4 hectares, constituting 45.05% of the total area, while less suitable areas cover 144.4 hectares (35.54%). Additionally, there are unsuitable areas (S3) totaling 55.2 hectares, representing 19.41% of the region.

Furthermore, the establishment of the New Transmigration Area of Tanjung Cina in Pasangkayu Regency has demonstrated a substantial positive impact on the community's welfare, particularly for those residing in the coastal area of Bambakoro grappling with coastal erosion. The revitalization efforts have successfully transformed them into local transmigration residents, influencing both the existing local population and transmigrants arriving from Sumatra and Java.

Finally, the strategic approach adopted in the development of the New Transmigration Area involves collaborative efforts between the Pasangkayu Regency Government, the West Sulawesi Provincial Government, and the Ministry of Villages, Development of Disadvantaged Regions, and Transmigration. This collaboration aims to ensure the sustainability of the Transmigration Fisher area by providing various forms of support. Residents are granted allowances for clothing and food, along with assistance in acquiring Paname Shrimp and Nile Tilapia seeds for a duration of 5 years. The ultimate goal is that, after this stipulated period, the residents of the New Transmigration Area of Tanjung Cina will achieve self-sufficiency.

## REFERENCES

- Akib, Haedar, and Risma Niswaty. 2015. "Dampak Kebijakan Pemekaran Wilayah Terhadap Pengembangan Kompetensi Lokal Sebagai Basis Kerjasama Antar-Daerah Di Provinsi Sulawesi Barat."
- Baja, Ir Sumbangan. 2012. *Perencanaan Tata Guna Lahan Dalam Pengembangan Wilayah*. Penerbit Andi.
- DB Prasetya, H Anisia, 2021 - Analisis Kesesuaian Lahan Kawasan Lahan Basah (Wetland) untuk Perencanaan Tata Guna Lahan Berkelanjutan di Kabupaten Tulang Bawang
- DC Mungok, H Herawati, KP Utomo, 2021 - Pengaruh Perubahan Penggunaan Lahan Terhadap Zona Potensi Banjir Pada Daerah Aliran Sungai Landak
- D Fitrianto, G Senoaji, SP Utama, 2019 - Analisis Kesesuaian Lahan Untuk Permukiman Transmigrasi Di Pulau Enggano Kabupaten Bengkulu Utara
- D Erri, HH Asymar , 2021 - Potensi Ekonomi Rencana Kawasan Transmigrasi Long Apari Kabupaten Mahakam Ulu Kalimantan Timur
- D Miswar, S Sudarmi, DK Diandra , 2021 - Study Of Land Use Changes With Spatial Approach Sukoharjo District, Pringsewu Regency
- Forester, John. 2017. "Argument, Power, and Passion in Planning Practice." In *Explorations in Planning Theory*, Routledge, 241-62.
- Healey, Patsy. 1998. "Collaborative Planning in a Stakeholder Society." *The Town Planning Review*: 1-21.
- Innes, Judith E. 1995. "Planning Theory's Emerging Paradigm: Communicative Action and Interactive Practice." *Journal of planning education and research* 14(3): 183-89.
- Masik, Agustomi. 2005. "Hubungan Modal Sosial Dan Perencanaan." *Journal of Regional and City Planning* 16(3): 1-23.
- Monalisa, L. A. et al. 2019. "The Implementation of Research Based Learning in Developing the Students Mathematical Generalization Thinking Skills in Solving a Paving Blocks Design Problem." *IOP Conference Series: Earth and Environmental Science* 243(1).



- Munir, Ahmad. 2014. "Fuzzy Multi Attribute Decision Making (FMADM) for Land Use Management." *Academic Research International* 5(2): 58.
- Nanlohy, Ansy, and Abraham Tuanakotta. 2020. "UPAYA PENDAMPINGAN PENATAAN RUANG DI DESA KOBIBABUPATEN MALUKU TENGAH DALAM SEBAGAI DAERAH PENGEMBANGAN PROGRAM TRANSMIGRASI." *JURNAL PENGABDIAN MASYARAKAT IRON* 3(1): 210-24.
- Riyadi., & Bratakusumah, D.S. 2004. *Perencanaan Pembangunan Daerah: Strategi Menggali Potensi Dalam Mewujudkan Otonomi Daerah*. Jakarta: Gramedia Pustaka Utam.
- S Saikim, H Yatim, HAM Katili, 2021 - Identifikasi dan Evaluasi Sifat Fisik Dan Kimia Tanah untuk Tanaman Vanili Di Kecamatan Tinangkung Utara Kabupaten Banggai Kepulauan.
- Tri Budiharto, 2021 - Arahan Rekomendasi Pola Ruang Ideal Untuk Pembangunan Dan Pengembangan Perumahan Dan Kawasan Permukiman Di Kabupaten Poso, Provinsi Sulawesi Tengah
- Unelicke. L. Patty, dkk. 2014. "No TitFaktor-Faktor Penyebab Terjadinya Transmigrasi Dari Negeri Allang Ke Desa Allang Asaude Kecamatan Waisala. Agribisnis Kepulauan." 2: 31.
- Wahyuningsih, Diah, Dian Eka Rahmawati, and David Efendi. 2020. "Resolusi Konflik Kepemilikan Aset Publik Antara Kabupaten Tasikmalaya Dan Kota Tasikmalaya Tahun 2019." *Journal Homepage* 6(1).
- W Widiatmaka, SP Mulya, 2012 - Analisis Kesesuaian Lahan Tingkat Satuan Pemukiman Menggunakan Automated Land Evaluation System (Ales): Studi Kasus Rantau Pandan Sp-1, Provinsi Jambi
- W Widiatmaka, 2013 - Kesesuaian Lahan Fisik Dan Ekonomi Untuk Padi Sawah: Studi Kasus Wilayah Perencanaan Kota Terpadu Mandiri Rawapitu, Provinsi Lampung
- W Widiatmaka, B Sutomo, U Hamzah, 2014 - Perancangan Tataguna Lahan Dan Tata Ruang Kawasan Perkotaan Berbasis Pertanian: Studi Kasus Kota Terpadu Mandiri Transmigrasi Mesuji Provinsi Lampung
- Yanto, Dwi. 2006. "Analisis Pengaruh Kualitas Jasa Pelayanan Terhadap Kepuasan Konsumen (Di Rumah Sakit Mitra Keluarga Husada Pedan-Klaten)."