

Study of the potential expansion of new rice fields in Central Maluku District to support food security in Maluku Province

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Abstract.

Maluku province is one of the Islands in Indonesia. Seram island is one of the largest islands in the Maluku province lies the Central Maluku Regency. Central Maluku district is one of the priorities regions in the development of paddy fields in the province of Maluku. According to the BPS Maluku province in the year 2015 Government Maluku province was only able to meet the needs of 58% of the rice. Fulfillment needs rice is one of the Government's efforts in food self-sufficiency, it is because of the availability of food is one of the primary needs. Increased agricultural productivity through the extension of new rice fields became one alternative settlement in fulfillment of rice. The increase in rice production through the expansion of rice fields is still possible, because of the potential land is suitable for the expansion of rice fields was still quite spacious. The success of the process of the expansion of paddy fields depend on the expansion of the activities of the mechanism of the rice is done. The process of the expansion of rice fields is preceded by feasibility investigation location. Feasibility study of the site was conducted to find out the feasibility of potential land with the observations in the field which is then processed and spatial analysis in using ArcGIS software. Results of a survey investigating the Central Maluku district region with a total area of 594.29 achieved ha based on the suitability of the land for the potential expansion of new acres of rice paddies 587.35 ha from 2 (two) subdistricts include North Eastern Seram Subdistrict Kobi m2 170.87 ha and North Seram Subdistrict covering 416.82 ha.

Keywords: *The Expansion Of New Rice Fields, Agricultural Land Suitability Evaluation, Islands*

INTRODUCTION

Maluku province is a region of islands which consists of 559 Island, and from a number of the island, there are a few islands that belong to the big island. The Mainland province of Maluku is inseparable from the mountain and Lake clusters contained almost throughout the district/city, which numbered four (4) and 11 (eleven) of the Lake. As for the highest mountain Gunung Binaya altitude 3,055 MASL, located in Seram island Maluku Regency.

Central Maluku district is one of the priority regions in the development of paddy fields in the province of Maluku. Administratively, the Central Maluku has 17 (seventeen) subdistrict consists of 172 countries, and 6 (six) wards, with the flagship sector or commodity there is the same and there are different scattered in 17 districts. Geographically, Central Maluku district after expansion is located between $2^{\circ} 30' - 7^{\circ}$

30 ' LS and 250 ° – 132 ° 30 ' BT, and is the area of the Islands with a population of as many as 53 Island fruit, where inhabited by as many as 17 and never inhabited as much as 36 pieces.

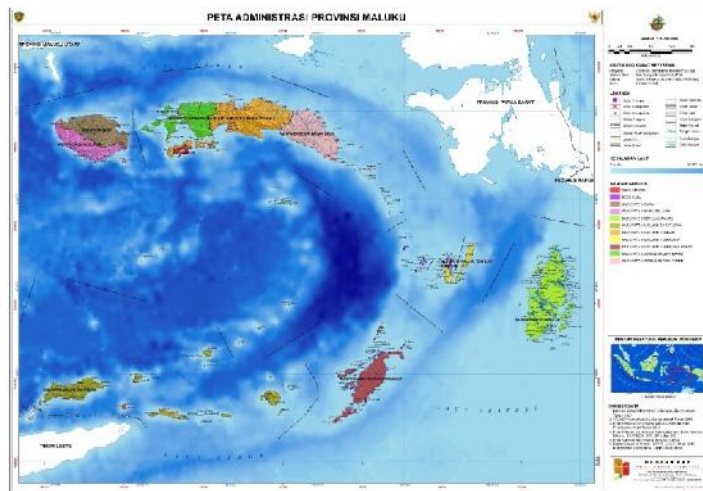


Figure 1. Administration Of Maluku Province map
 Source: *Thematic Map Of Indonesia*

The shape of the Central Maluku district area is grouped based on the fisiografi approach (macro-relief), Plains, beaches, hills and mountains with a varied slope. Recorded as much as 23 mountains, Plains, 2 lakes and rivers are in fruit 144 regions of Central Maluku Regency. According to the BPS Maluku province in the year 2015, Government Maluku province was only able to meet the needs of 58% of the rice. Fulfillment needs rice is one of the Government's efforts in food self-sufficiency, it is because of the availability of food is one of the primary needs.

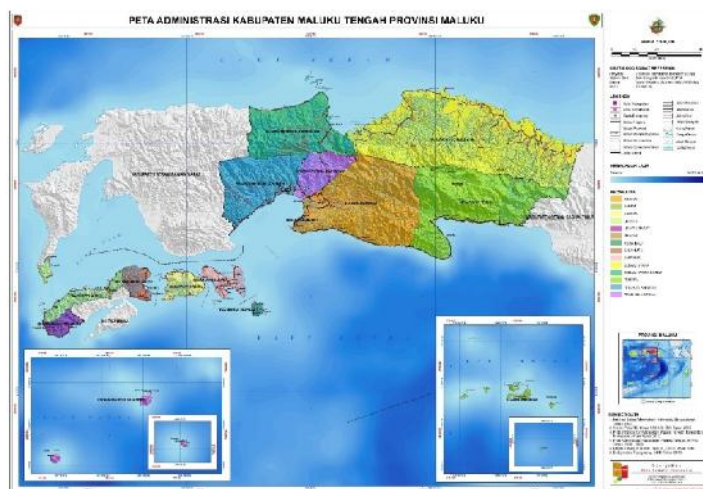


Figure 2. Administration of the Central Maluku District
 Source: *Thematic Map Of Indonesia*

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RESEARCH METHODS

Feasibility study of the site was conducted to find out the feasibility of potential land with the observations in the field which is then processed and spatial analysis in using ArcGIS software. Activities survey investigate CPCL (SI-CPCL) expansion of paddy fields using some method that collaborates be integrated activities either in descriptive, analytic or survey. A holistic approach is used in order to obtain optimum results. Stages of work in the activities of SI-CPCL includes preparations consisting of data acquisition and mobilization, survey the field include a spatial location of land measurement and measurement and identification of characteristics of land and water resources. Socio-economic surveys were done to obtain information the willingness of farmers in the rice field expansion program. Preparation phase carried out the preparation of the list of prospective locations. The list of prospective locations for expansion of paddy fields in the survey and investigation. The location of the candidate list was signed by the head of Department of agriculture Provinces or appointed by the KPA.



Figure 3. Flowchart diagram of the survey investigation new rice field

Field survey includes measurement of the activity of land are the spatial candidate. Prospective land that had already been planned then measured in terrestrial by directly surrounding it. Characteristics of prospective land observed in field intensity observation ground 1 (one) observation represent 25 ha. Ground observations made through the soil profile or drilling as deep as 1.2 meters or more shallow when there are

rock solid for mineral soils, whereas in peat up to a depth of 1.5 metres if the thickness of the peat is less than 1 meter or substratum (mineral lands) if the thickness of the peat is more or equal to 1 meter. Evaluation methods of land use refer to the Technical Evaluation of land for agricultural commodities (BBSDLP, 2012) with modifications to suit local conditions. All the data obtained are then analyzed to produce classroom suitability of land for the extension of new rice fields. Land suitability class refers to the framework of FAO (1976) as follows:

- Class S1: **Highly suitable** : The land does not have a limiting factor or real meaning against the use of sustainable, or limiting factor are minor and will not affect the productivity of the land.
- Class S2: **Moderately suitable** : The land has a limiting factor, and this will be a limiting factor to productivity, requiring additional input (input). The delimitter can usually be overcome by farmers themselves.
- Class S3: **Marginally suitable** : The limiting factor will be very effected on productivity, requiring additional input more than land that belongs to the S2. To overcome the limiting factor on S3 requires high capital, so the need for assistance or intervention (intervention) the Government or private parties.
- Class N: **Not suitable** : The land has a limiting factor that is very heavy and/or difficult to overcome.

RESULT AND DISCUSSION

Analysis of the suitability land

At first the plan land use potential to be developed into paddy fields proposed by the Department of Agriculture of Central Maluku district covering an area of 500 ha, the targets in the northern Seram of Huahulu village Trans Kilolima 350 m²/ha, Seram Subdistrict The North East of the village of Waetonipa and Seti Marasaua covering an area of 100 ha (each covering an area of 50 ha village) and North Eastern Seram Subdistrict Kobi Kobi Village Conscious area of 50 ha. However, further developments, the district changed his proposal i.e. the redirect target from the villages of Waetonipa and Marasaua to the village of Sariputih and the village of Leawai. Based on the results of the investigation area in 2 (two) subdistricts retrieved extents of 594.29 ha, thus there is excess area of 94.29 ha which are contained in Table 1.

Table 1. Area measurement results SI-CPCL distribution subdistrict and village in Central Maluku District

No	Subdistrict	Village	Realization Of Measurement CPCL (Ha)
1	Seram Utara Timu Kobi		171,84
		Sari Putih	128,09
		Leawai	43,75
2	Seram Utara		422.45
		UPT Kilo V	422.45
Total			594,26

Source: Field survey, 2016

Results of a survey investigating the Central Maluku district region with a total area of 594.29 achieved ha based on the suitability of the land for the potential expansion of rice paddies covering 587.35 ha from 2 (two) subdistricts include North Eastern Seram Subdistrict Kobi 170.87 ha m² and North Seram Subdistrict covering

416.82 ha. Seram subdistrict of North East and North Seram Kobi is a subdistrict of land with the potential for the expansion of rice farming is big enough and good enough because it is customary owned land and resettlement with physical characteristics which are quite supportive of plus the community's socially very enthusiastic to participate the expansion of rice fields

North Seram Subdistrict

Survey of North Seram subdistrict investigation carried out in the village of Seram UPT Kilo V with extents reach 422.45 ha. Based on the results of the analysis of the eligibility of land for potential printing rice apparently retrieved extents of 416.48 ha.

Table 2. Area of Potential expansion of rice fields on the North Seram Subdistrict

No.	Village	Realization Of Measurement (ha)	The Potential Expansion Of Rice Fields (ha)
1	Huahulu	422,45	416,48
	Total	422,45	416,48

Source: Field survey, 2016

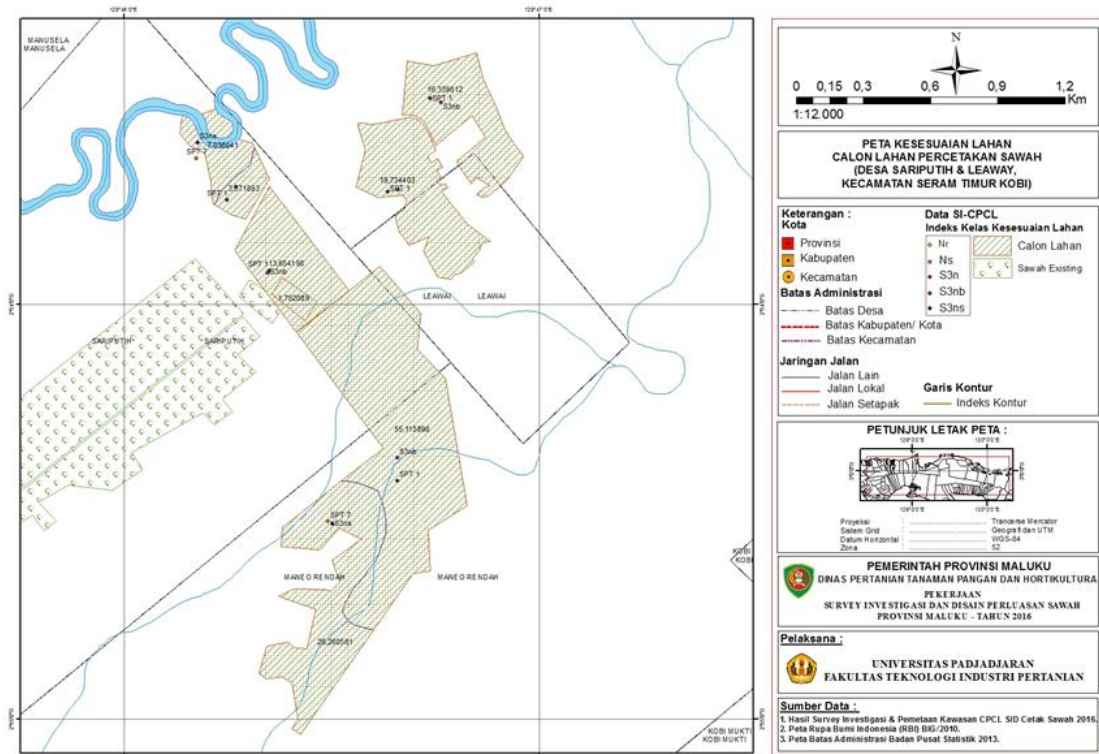


Figure 4. Map overview of prospective land Seram Timur Kobi Subdistrict of field printing, Central Maluku District

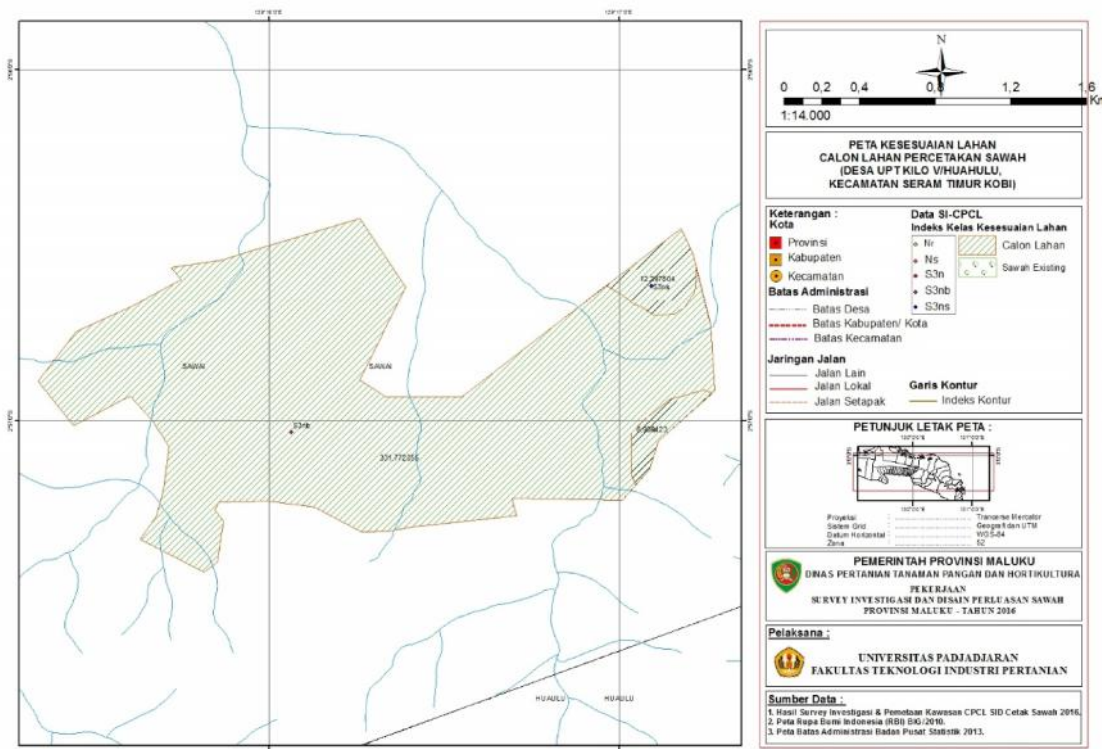


Figure 5. Map overview of prospective land North Seram Subdistrict of field printing, Central Maluku District

Tabel 3. Feasibility of location in Central Maluku District

No	Subdistrict	Village	Measurment SI (ha)	Land Suitability (ha)		Feasibility Of Location		
				S3nb	S3ns	Physical Suitability/ Feasibility Of Land	Feasibility Of Hydrology	Feasibility Of Social
1	Seram Utara Timur Kobi	Sari Putih	128,09	101,83	26,26	Yes	Yes	Yes
		Leawai	43,75	43,75		Yes	Yes	Yes
2	Seram Utara		422,45	332,7	89,75	Yes	Yes	Yes

Source: Field survey, 2016

Socio-economic analysis of agricultural

The fulfillment of the basic necessities of farmers. Assuming the production of rice, then ownership of land with an area of CalonPetani ha 1.0 average, obtained results 4.0 ton – 4.5 ton/year (assuming 1 harvest time/year). Regional food procurement If estimated opening of the expansion of the wetland area of 3,647 ha (tentative) with production results pada 4 ton/ha obtained food as much willingness 14,588 tons/year assuming only one harvest time/year. This amount is enough means to meet the food needs of regional development are in place in particular the expansion of rice fields. Land use sleep unproductive land mostly belonging to Prospective farmers in Maluku province is recommended as the expansion of paddy fields have the condition as a land with grass vegetation and trees that are not productive. Therefore, the existence of a

plan the expansion of rice fields can make the land became productive which gives the benefit of economic, social and regional food security programmes in particular.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

A survey investigation of CPCL Expansion/Printing New rice fields in Central Maluku Regency of Maluku province has been completed, with the close area of 591.29 ha. From the land that measured over 591.29 ha, after analysis of the suitability of land for land acquired land that was worthy of the S3nb of 468.28 and S3ns of 116.01 ha for socio-economic development is beneficial for the fulfilment of basic necessities farmers, regional food procurement, and land use, which is not productive.

Recommendations

Central Maluku district included into the cluster of islands of agricultural development in the province of Maluku, thus the policy and direction of the development of any regions should be focused in the field of agriculture. After a review and evaluation of land with some limiting factor for growing rice plant terms that exist in Central Maluku Regency, Central Maluku District have the potential of land for expansion of new acres of rice paddies do 591.29 ha.

ACKNOWLEDGMENTS

The authors thank the Maluku Province Department of Agriculture has funded the research through a cooperation scheme of local government with the Faculty of the technology of the agriculture industry, as well as allowing to publish the results of this research.

REFERENCES

- Abidin, H.Z. (2007). *Penentuan Posisi Dengan GPS dan Aplikasinya*. P.T. Pradnya Paramita, Jakarta. Third edition. ISBN 978-979-408-377-2. 398 pp
- Aronoff, S. (1989). *Geographic Information System; A Management Perspective*, Ottawa. WDL, Publications
- Badan Pusat Statistik Provinsi Maluku. (2015). *Maluku Dalam Angka*. Ambon.
- Badan Pusat Statistik Kabupaten Maluku Tengah. (2016). *Maluku Tengah dalam Angka*. Badan Pusat Statistik Kabupaten Maluku Tengah, Masohi.
- Bafdal, N., K. Amaru dan E. Suryadi. (2011). *Buku Ajar Teknik Pengawetan Tanah dan Air*, Edisi 1. Jatinangor: Jurusan Teknik Manajemen Industri Pertanian.
- BAPPEDA Provinsi Maluku. (2012). *RPJMD Provinsi Maluku Tahun 2014-2019*. Pemerintah Provinsi Maluku Ambon.
- Balai Besar Litbang Sumberdaya Lahan Pertanian. (2015). *Kriteria Kesesuaian Lahan Tanaman Padi*. Bogor: Balai Besar Litbang Sumberdaya Lahan Pertanian. [internet] [2016, 2 March]. Retrieved from: <http://bbsdpl.litbang.pertanian.go.id/kriteria/padi.pdf>
- Balai Besar Penelitian dan Pengembangan Sumberdaya Lahan Pertanian. (2010). *Juknis Kesesuaian Lahan*. Bogor: Balai Besar Penelitian dan Pengembangan Sumberdaya Lahan Pertanian. [internet] [2016, 10 July]. Retrieved from: http://bbsdpl.litbang.pertanian.go.id/evaluasi_lahan.php
- Christian, C.S., C.A Stewart. (1968) *Methodology of Integrated Surveys*. In. *Aerial Surveys Integrated Studie*. Proc. UNESCO Conference on Principles and

- Methods of Integrating Aerial Surveys of Natural Resources for Development, 21-25 September 1964, Toulouse, France.
- Djaenudin, D., Marwan, H. Subagjo, H., dan A. Hidayat. (2011) Petunjuk Teknis Evaluasi Lahan Untuk Komoditas Pertanian . Balai Besar Litbang sumberdaya Lahan Pertanian, Badan Litbang Pertanian, Bogor. 36p.
- Geospasial, B. I. (2015). Badan Informasi Geospasial. Retrieved from Bakosurtanal.
- ESRI, (2001), Getting Started with Arc-Gis, Redlands California.
- FAO. (2002). FAO Guidline for Crop Water Reuquirements and Irrigation Scheduling Module 4. Harare: FAO. [internet] [2016, 3 Mei]. Retrieved from: <ftp://ftp.fao.org/docrep/fao/010/ai593e/ai593e00.pdf>
- FAO. (1981). A Framework for Land Evaluation. Roma: FAO. [internet] [2016, 3 Mei 2016]. Retrieved from: <https://www.mpl.ird.fr/crea/taller-colombia/FAO/AGLL/pdffdocs/framele.pdf>
- FAO. (1976). *A Framework for Land Evaluation. Soil Resources Management and Conservation Service Land and Water Development Division*. FAO Soil Bulletin No.32. FAO-UNO, Rome.
- Fiantis, D. (2012). Morfologi dan Klasifikasi Tanah. Padang: Universitas Andalas. Retrieved from: faperta.ilearn.unand.ac.id (2017, 7 Januari).
- Hassan, Z.H. (2014) Kajian Rendemen dan Mutu Giling Beras di Kabupaten Kotabaru.
- Hayatuliman, Malulana. (2017). Analisis Kesesuaian Lahan Untuk Tanaman Padi Sawah di Kabupaten Subang Bagian Tengah. Institut Pertanian Bogor. Bogor Provinsi Kalimantan Selatan. PANGAN, Vol. 23 No. 3 September 2014 : 232-243.
- Kementerian Pertanian. (2016). Kinerja Satu Tahun Kementerian Pertanian. Jakarta: Kementerian Pertanian Republik Indonesia. [internet] [2016, 20 Desember]. Retrieved from <http://www.pertanian.go.id/assets/upload/doc/kinerja%20kementan%202015.pdf>
- Suganda, H., A. Rachman dan Sutono. (2013). Petunjuk Pengambilan Contoh Tanah. Bogor: Balai Penelitian Tanah. [internet] [2016, 7 Juni] Retrieved from: <http://balittanah.litbang.pertanian.go.id/ind/dokumentasi/lainnya/NOMOR%2002.pdf>
- Nurwadjedi. (2000) Klasifikasi Bentuk Lahan Semi Detil (Skala 1:50.000 / 1:25.000) Hasil Pengembangan Peta RePPPProT Skala 1:250.000, Globe Volume 2 No. 2, 72-83.