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. Central Maluku district is one of the priorities region in the development of paddy fields in the province of Maluku. 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. Increased agricultural productivity through the extension of new rice fields became one alternative settlement in fulfilment of rice. The increase in rice production through the expansion of rice fields is still possible. The success of the process of the expansion of paddy fields depend on the expansion of the activities in the rice production. 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 dianalis in using ArcGIS software. Results of a survey investigating the Central Maluku with the total area of 594.29 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.

1. Introduction
Maluku province is a region of islands which consists of 559 Islands, 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.

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 ° 30 ' - 7 ° 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. The shape of the Central Maluku district area is grouped based on the physiography approach (macro-relief), Plains, beaches, hills and mountains with a varied slope. Recorded as much as 2 3 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 [1].
Increased agricultural productivity through the extension of new rice fields became one alternative settlement in fulfilment 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 business feasibility investigation location [2].

2. Materials and 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 prospective location and candidate farmers (prospective location and
candidate farmers) 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-prospective location and candidate farmers 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 [3]
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 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 meters 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) [4,5] 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 [6] 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 delimiter 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 [7].

3. Results and discussion

3.1. 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 Sariputh 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.
Figure 3. Flowchart Diagram of The Survey Investigation New Rice Field
Results of a survey investigating the Central Maluku district region with a total area of 594.29 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 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.

Table 1. Area measurement results Suvey Investigation-Prospective Location And Candidate Farmers Distribution Subdistrict and Village in Central Maluku district

| No | Subdistrict | Village   | Realization of Measurement Prospective Location and Candidate Farmers (Ha) |
|----|-------------|-----------|---------------------------------------------------------------------------|
| 1  | Seram Utara Timu Kobi | Sari Putih | 128.09                                                                     |
|    |              | Leawai    | 43.75                                                                      |
| 2  | Seram Utara  | UPT Kilo V | 422.45                                                                     |
|    |              |           | Total 594.26                                                               |

(Source : Survey Location, 2016)

3.2. 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 : Survey Location, 2016)

3.3. 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 Candidates Farmers 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 paddy 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 programmer in particular.
Figure 4. Map Overview Of Prospective Land Seram Timur Kobi Subdistrict, Central Maluku District

Figure 5. Map Overview Of Prospective Land North Seram Subdistrict, Central Maluku District


Table 3. Prospective Location in Central Maluku District

| No | Subdistrict       | Village | Measurment (ha) | Land Suitability (ha) | Physical Suitability/Feasibility Of Land | Hydrology | Social-Economy |
|----|-------------------|---------|-----------------|-----------------------|-----------------------------------------|-----------|----------------|
|    |                   |         |                 | S3nb  | S3ns | Yes | Yes | Yes |                   |
| 1  | Seram Utara       | Sari    | 128,09          | 101,8 | 3    | 26,26 | Yes | Yes | Yes |
| 2  | Seram Utara       | Leawai  | 43,75           | 43,75 |      |        | Yes | Yes | Yes |
|    | Timur Kobi        | Putih   | 422,45          | 332,7 | 89,75 |        | Yes | Yes | Yes |

(Source : Survey Location, 2016)

4. Conclusion

A survey investigation of Prospective Location and Candidate Farmers 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. 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.

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References

[1] BAPPPEDA Provinsi Maluku 2012 RPJMD Provinsi Maluku Tahun 2014-2019 Pemerintah Provinsi Maluku Ambon.
[2] Hayatuliman M 2017 Analisis Kesesuaian Lahan Untuk Tanaman Padi Sawah di Kabupaten Subang Bagian Tengah Institut Pertanian Bogor Bogor Provinsi Kalimantan Selatan Pangan 23(3): 232-243.
[3] FAO 2002 FAO Guidline for Crop Water Requirements and Irrigation Scheduling Module 4 Harare: FAO. [internet] [2016, 3 Mei]. Retrieved from: ftp://ftp.fao.org/docrep/fao/010/ai593e/ai593e00.pdf
[4] 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
[5] 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
[6] FAO 1976 A Framework for Land Evaluation. Soil Resources Management and Conservation Service Land and Water Development Division FAO Soil Bulletin 32 FAO-UNO Rome.
[7] 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/pdfdocs/framelc.pdf