Analysis of determining management areas for integrating landscape and seascape with an ecosystem approach

Mujio[1,2*], *Mia* Ermyanyla [2], *Teguh* Prawira[2], *Rindiani Agustina* Rahayu[1], *Diar* Siddiq[2], *Omo* Rusdiana[2,3], and *Zaharah Mohd* Yusoff[4]

[1]Urban and Regional Pakuan University, Bogor, Indonesia
[2]Center for Regional System Analysis, Planning and Development (CrestPent)-IPB University, Bogor, Indonesia
[3]Department of Silviculture, Faculty of Forestry, IPB University, Bogor, Indonesia
[4]College of Built Environment (CBE), UiTM Shah Alam, Selangor, Malaysia

Abstract. In recent decades, integrated management of land and coastal water (marine) spaces has received significant attention from the Indonesian government. However, its implementation in the field remains a challenge that must be addressed. The extensive areas of land ecosystems, coastal regions, and coastal waters have distinct characteristics and issues. These differences also extend to the social, economic, and cultural characteristics of their communities. An analysis of determining management areas for integrating landscape and seascape using an ecosystem approach is crucial as a recommendation for guiding area management. The research was conducted in Parigi Moutong Regency. The methodology applied was a multi-criteria analysis covering four dimensions: physical and disaster, economic, ecological/environmental, and social. Based on the analysis of 23 sub-districts in Parigi Moutong Regency, 7 sub-districts were identified as having strong land-sea integration and could be considered as areas/locations for landscape and seascape management integration.

1 Introduction

Over the last few decades, integrated management of land areas and coastal waters (sea) has received attention from the Indonesian Government. However, at the implementation level in the field it is still a challenge that must be solved, coupled with the decline in environmental quality as a consequence of increasing development both on land and coastal waters [1]. Land and sea are inherently connected through a variety of complex natural, socio-economic and institutional interactions [2]. To achieve sustainable development in land and coastal waters, there needs to be a paradigm shift in the development approach. The sectoral and administrative area-based development approach is collaborative, integrated and transformative [3].

* Corresponding author: mujio.pwk@unpak.ac.id

Ecologically, coastal boundaries are areas where land and sea meet towards land, including parts of land, both dry and submerged in water, which are still influenced by sea properties such as tides, sea breezes and saltwater seepage. Meanwhile, towards the sea, it includes parts of the sea that are still influenced by natural processes that occur on land such as sedimentation and freshwater flows, as well as those caused by human activities on land such as deforestation and pollution [4]. The boundaries of coastal areas to the mainland administratively is the sub-district and the coastal area towards the sea is approximately 12 miles from the coastline (Decree of the Minister of Maritime Affairs and Fisheries Number Kep.10/MEN/2022) [5]. Meanwhile, based on the Marine Resources Evaluation Program (MREP) project, the boundaries of the coastal area are all coastal villages.

A watershed is a land area that is a unit with a river and its tributaries that naturally accommodate, store and drain water from rainfall into lakes or the sea. The boundary on land is a topographic divider and the boundary at sea to water areas that are still affected by land activities (Law Number 7 of 2004 concerning Water Resources) [6]. This means that in terms of administrative area the watershed is the entire territory of a district. The development planning approach based on landscape and seascape integration in Parigi Moutong Regency is carried out using a scoring method for 4 (four) dimensions, namely the physical and disaster dimensions, the economic dimension, the environmental dimension and the social dimension.

2 Methods

2.1 Data collection

Data collection activities were carried out for approximately 5 days in Parigi Moutong Regency, from March 10th, 2024 to March 14th, 2024. Data collection activities began with FGDs at the Regional Planning and Development Agency of Central Sulawesi Province, which was carried out in the previous year. They continued with FGDs in Parigi Moutong Regency. FGD is carried out with all relevant OPDs and other stakeholders. The information to be obtained in the FGD is related to resources, stakeholders, activities, issues and programs carried out in coastal water areas as well as their hopes for integrated land and coastal water management in lowland and highland areas. Secondary data in each OPD confirmed the results of the FGD.

2.2 Data analysis

Data and information obtained from the results of field survey activities and FGDs were then analyzed to identify areas that have the potential to influence landscape and seascape integration using a scoring method for 4 (four dimensions), namely the physical and disaster dimension, the economic dimension, the environmental dimension and the social dimension. Table 1 shows dimensions, parameters and indicators as aspects in the analysis of land and sea linkages. The results of this analysis produce recommendations for areas/locations and activities for the Landscape and Seascape Solutions for Indonesia Project in Parigi Moutong Regency.

Table 1. Parameters, Indicators, and Scoring Criteria for Identification of Candidate Locations Pilot Area in Parigi Moutong Regency.

No	Dimensions and Parameters	Indicator	Score	Criteria
A	**Physical and Disaster Dimension**			
1	Proportion of Surface Height	Proportion of surface height > 500 meters	1	The proportion of surface height > 500 meters above sea level is less than 20%
			3	The proportion of surface height > 500 meters above sea level is more than 20% but less than 30%
			5	The proportion of surface height > 500 meters above sea level is more than 30%
2	Watershed Status	Watershed Status	1	Watershed status is maintained
			5	DAS status restored
3	Potential Disaster	Disaster Prone	1	-
			5	Passed by a fault line
		Dangers of Earthquakes, Landslides, Floods, Flash Floods, Forest and Land Fires, Droughts, Tsunamis, Extreme Weather, Extreme Waves and Abrasion	1	Low
			3	Middle
			5	High
B	**Economic Dimension**			
1	Potential for Food Crop Agriculture and Horticulture	Rice Field Area	1	0 – 500 ha
			2	501 – 1.000 ha
			3	1.001 – 2.500 ha
			4	2.501 – 5.000 ha
			5	> 5.001 ha
		Corn Rice Area	1	0 – 100 ha
			2	101 – 500 ha
			3	501 – 1.500 ha
			4	1.501 – 2.000 ha
			5	> 2.001 ha
		Number of Productive Durian Trees	1	0 – 1.000 trees
			2	1.001 – 3.000 trees
			3	3.001 – 8.000 trees
			4	8.001 – 10.000 trees
			5	> 10.001 trees
2	Plantation Potential	The plantation area for palm oil, coconut and cocoa commodities in Parigi Moutong Regency	1	500 – 2.000 ha
			2	2.001 – 4.200 ha
			3	4.201 – 8.000 ha
			4	8.001 – 10.000 ha
			5	> 10.000 ha
3	Fisheries Potential	2023 Catch Results	1	0 – 500 tons
			2	501 – 1.000 tons

No	Dimensions and Parameters	Indicator	Score	Criteria
			3	1.001 – 2.000 tons
			4	2.001 – 3.000 tons
			5	> 3.000 tons
		Area of Cultivated Fisheries	1	< 100 ha
			2	101 – 500 ha
			3	501 – 1.000 ha
			4	1.001 – 1.500 ha
			5	> 1.501 ha
4	Strategic Area	Existence of Strategic Areas	1	There are no strategic areas
			2	In the Determination Proposal Process
			3	Regency Strategic Area
			4	Provincial Strategic Area
			5	National Strategic Area
5	Ecotourism Potential	Potential of Highland and Coastal Ecotourism and Village Tourism	1	There is 1 (one) ecotourism potential in the Highlands or Coastal or Village Tourism
			3	There are 2 (two) ecotourism potentials in the Highlands and/or Coastal and/or Village Tourism
			5	There are 3 (three) ecotourism potentials in the Highlands and Coastal and Village Tourism
C	**Ecological/Environmental Dimension**			
1	Blue Carbon Potential	Mangrove Area	1	0 – 100 ha
			2	101 – 500 ha
			3	501 – 1.000 ha
			4	1.001 – 1.500 ha
			5	> 1.501 ha
2	Forest Area	Forest Area Status (Conservation Area, Wildlife Reserve)	1	Production Forest, Limited Production Forest
			3	Protected Forest or Nature Reserve Area /Nature Conservation Area
			5	Protected Forest and Nature Reserve Area /Nature Conservation Area
D	**Social Dimension**			
1	Poor society	Number of Poor Villages (units), Number of Villages (units), and Percentage (%)	1	< 80%
			3	80 – 90%
			5	100%
		Number of Poor People (people), Total Population (people), and Percentage (%)	1	0 – 7%
			3	7 – 10 %
			5	> 10%

3 Result

Parigi Moutong Regency has an area of 6.231,85 km^2, of which around 9.42% of the total area of Central Sulawesi Province covers most of the East Coast of Central Sulawesi and Tomini Bay. Administratively, Parigi Moutong Regency consists of 23 sub-districts with the district capital in Parigi. The number of villages/urban villages consists of 283 villages/ urban villages. More details can be seen in Figure 1.

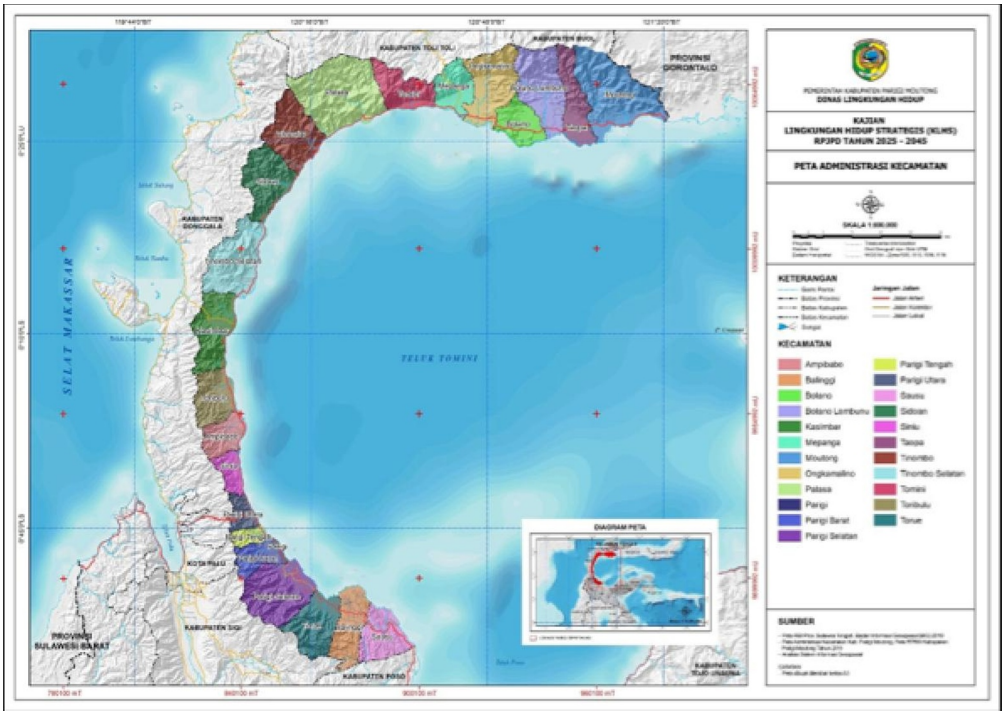

Fig. 1. Map of the Administrative Area of Parigi Moutong Regency.

3.1 Physical and disaster dimensions

There are 3 (three) parameters to see the integration of land and sea for the physical and disaster dimension, namely the topographic proportion of the area between highland and lowland (< 500 meters and > 500 meters), watershed status and potential for disasters and hazards. Based on the data obtained, the percentage of topographic areas between the highland and lowland in Parigi Moutong Regency is on average balanced. Only Parigi District has an area < 500 meters [7].

Meanwhile, based on watershed status, there are several watersheds whose status has been restored and several watersheds whose status has been maintained. Several watersheds whose status has been restored include Sausu, Baligi, South Parigi, Kasimbar, Tinombo, South Tinombo, Tomini, Maepanga, Palasa, Moutong, Bolano Lambunu, Taopa, Bolano and Ongka Malino subdistricts [7].

Parigi Moutong Regency is one of the regencies in Central Sulawesi Province which has quite high disaster potential. 3 (three) faults stretch across the Parigi Moutong area, namely (1) Sausu Fault in Sausu, Torue and Baligi Districts; (2) Tokararu Fault in Sausu District, Baligi, and (3) Tomini Fault, in Tomoni, Maepanga, Bolano Lambunu, Bolano and Ongka Malino Districts [8].

Of the nine dangers that threaten Parigi Moutong Regency, two dangers threaten almost all sub-districts quite high on average, namely the threat of tsunamis and the danger of forest and land fires. The sub-districts that have a fairly high earthquake hazard are Tourue, Balinggi, Maepanga, Palasa, Bolano Lambunu, Taopa, Bolano and Ongka Malino sub-districts. The sub-districts that have a fairly high risk of flash floods are Sausu, Tourue, Balinggi, Moutong, Bolano Lambunu, and Taopa sub-districts. Meanwhile, the danger of extreme waves and abrasion is almost high in all sub-districts, except for Sausu, Tourue, Balinggi, Bolano Lambunu, Bolano and Ongka Malino sub-districts with medium status while the others are low [8].

3.2 Economic dimension

Based on the economic dimension, there are 4 (four) parameters to see land and sea integration in Parigi Moutong Regency, namely agricultural potential for food crops and horticulture, plantation potential, fisheries potential and national strategic areas. The leading agricultural commodities of Parigi Moutong Regency based on the Regional Long Term Development Plan 2025-2045 Preliminary Draft are Rice, Corn and Durian. There are 5 (five) sub-districts which have a rice plantation area of more than 5.000 ha, namely Torue District with an area of 7.730.0 ha, Balinggi with an area of 10.803,7 ha, South Parigi with an area of 9.558,5 ha, Maepanga with an area of 8.350,3 ha, and Ongka Malino with an area of 6.158,0 ha. Meanwhile, corn commodity areas of more than 1.000 ha are in Bolano Lambunu District with an area of 1.192,8 ha, and Bolano with an area of 2.921,1 ha. Meanwhile, other sub-districts are under 500 ha [9].

Durian is a leading horticultural commodity in Parigi Moutong Regency. In 2023, the district will be declared one of the districts in Indonesia as a durian producer. Several sub-districts are known as durian centers, including Sausu, Torue, West Parigi, Ampibabo and South Tinombo sub-districts. Meanwhile, the leading plantation commodities in Parigi Moutong Regency are Coconut, Palm Oil and Cocoa. Palm Oil has the smallest area of approximately only 466 ha spread across several sub-districts of Sausu, Torue, Kasimbar, Toribulu, Tinombo and Bolano Lambunu. Meanwhile, cocoa and coconut are almost spread throughout all sub-districts with an area of 29.940 ha for coconut commodities and 66.894 ha for cocoa.

Based on fisheries commodity parameters, there are 2 (two) fisheries activities in Parigi Moutong, namely capture fisheries and aquaculture. Based on data from the Fisheries and Maritime Service of Parigi Moutong Regency, in 2023 capture fisheries production reached 29.305 tons. Meanwhile, the potential for coastal aquaculture in Parigi Moutong is almost spread across all sub-districts, only West Parigi sub-district does not have coastal aquaculture activities. Even though the length of the beach in Parigi Moutong district is quite long, approximately 473 km, mariculture activities have not developed since some people still find it easy to catch fish using fish catchers. There is a village in Ongka Malino District that is developing seaweed cultivation activities with a land area of less than 530 ha [10].

Another important parameter to see the integration of land and sea development is the status of strategic areas. In Parigi Moutong there are 3 (three) sub-districts which are included in the national strategic area, namely the National Priority Rural Area which is located in Torue, Balinggi and South Parigi sub-districts.

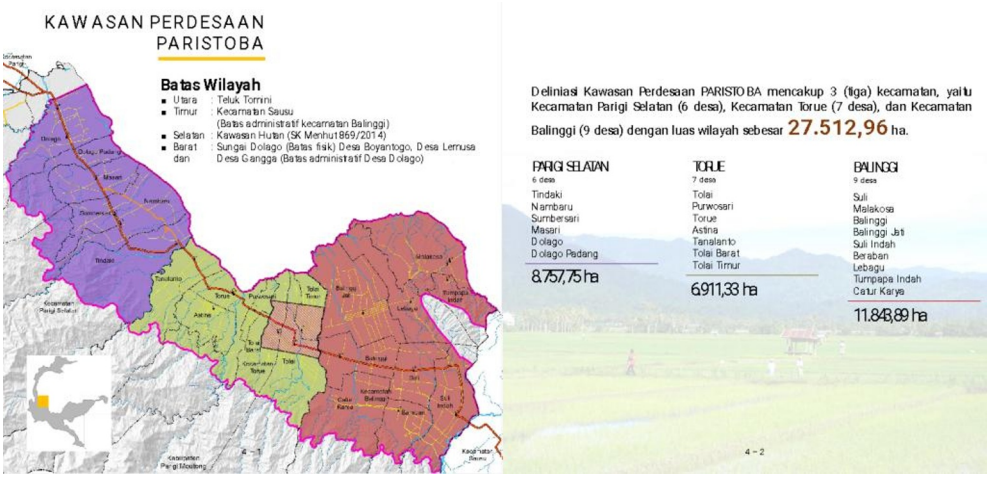

Fig. 2. Paristoba National Priority Rural Area Delineation, Parigi Moutong Regency (Detailed Plan for Paristoba Rural Area 2020-2040)

3.3 Ecological/environmental dimension

Based on the ecological/environmental dimension, there are 2 (two) parameters as indicators in determining land and sea integration areas, namely the presence of mangroves and the status of forest areas [11]. Based on data obtained from the Environmental Protection and Management Plan for Parigi Moutong Regency 2023-2043, the characteristic area of mangrove vegetation in Parigi Moutong Regency is 13.146,53 ha spread across several sub-districts, such as Sausu, Torue, Balinggi, South Parigi, Ampibabo, Kasimbar, Toribulu, South Tinombo, Maepanga, Moutong, Bolano Lambunu, Taopa, Bolano and Ongka Malino [7].

Meanwhile, based on data on forest area status, the status of forest areas in Parigi Moutong Regency is evenly distributed. Some of the existing statuses include production forest (HP), convertible production forest (HPK), plantation forest (HT), nature reserve area (KSA)/nature conservation area (KPA), limited production forest (HPT), and protected forest (HL). Complete details about the extent of mangrove areas and the status of forest areas in Parigi Moutong Regency can be seen in the following table.

Table 2. Basic Data on Ecological/Environmental Dimension in Determining Land and Sea Integration in Parigi Moutong Regency.

No	Sub-District	Characteristic Area of Mangrove Vegetation (ha)	Forest Area Status
1	Sausu	1.785,10	HP, HPK, HPT
2	Torue	713,45	HP, HPT
3	Balinggi	1.816,64	HL, HP, HPT
4	Parigi	None	-
5	Parigi Selatan	1.042,39	HL, HP, HPT
6	Parigi Barat	None	HPT, HL
7	Parigi Utara	None	HPT, HT, KSA/KPA
8	Parigi Tengah	None	HL, KSA/KPA
9	Ampibabo	438,31	HL, HP, HPT, HPK
10	Kasimbar	7,83	HL, HPT

No	Sub-District	Characteristic Area of Mangrove Vegetation (ha)	Forest Area Status
11	Toribulu	70,20	HL, HPT, HPK
12	Siniu	None	HPT, HT, KPK
13	Tinombo	None	HL, KSA/KPA,HP, HPT
14	Tinombo Selatan	664,67	HL, HP, HPT
15	Sidoan	None	HL, KSA/KPA,HP, HPT
16	Tomini	None	HL, HPT
17	Maepanga	259,23	HL, KSA/KPA
18	Palasa	None	HPT, KSA/KPA
19	Moutong	1.708,57	HL , HPT
20	Bolano Lambunu	865,88	HL, HPT, KSA/KPA
21	Taopa	2.565,96	HL , HPT
22	Bolano	1.487,32	HPT
23	Ongka Malino	1.429,55	HL, KSA/KPA/ HPT
	Total	13.146,53	

Source: Data Analysis, 2024

3.4 Social dimension

There are 2 (two) important parameters in looking at the relationship between land and sea from the social dimension, namely the number of poor villages and the number of poor people. From the data obtained, almost all sub-districts in Parigi Moutong Regency have poor villages. Meanwhile, the percentage of poor people in the sub-district is on average below 20%. The sub-district with the largest percentage of poor people is Sidoan District, namely 20% or there are 2.966 poor people out of 14.624 residents or around 20%. Meanwhile, the second is South Tinombo District with a poor population of 5.041 out of a population of 28.259 or around 18%.

Table 3. Basic Data on Social Dimension in Determining Land and Sea Integration in Parigi Moutong Regency.

No	Sub-District	Poor Society					
		Number of Poor Villages (unit)	Total Villages (unit)	Poor Villages (%)	Poor Population (people)	Total Population (people)	Poor Population (%)
1	Sausu	10	10	100	2.990	21.722	14
2	Torue	7	7	100	1.592	20.429	8
3	Balinggi	9	9	100	1.237	17.526	7
4	Parigi	11	11	100	2.099	31.456	7
5	Parigi Selatan	8	10	80	2.879	23.456	12
6	Parigi Barat	6	6	100	1.384	8.532	16
7	Parigi Utara	5	5	100	990	7.032	14

No	Sub-District	Poor Society					
		Number of Poor Villages (unit)	Total Villages (unit)	Poor Villages (%)	Poor Population (people)	Total Population (people)	Poor Population (%)
8	Parigi Tengah	6	6	100	1.593	9.358	17
9	Ampibabo	19	19	100	3.802	23.181	16
10	Kasimbar	18	18	100	3.781	23.677	16
11	Toribulu	9	9	100	2.874	17.733	16
12	Siniu	8	8	100	1.848	10.192	18
13	Tinombo	12	15	80	2.210	20.331	11
14	Tinombo Selatan	20	20	100	5.041	28.259	18
15	Sidoan	11	11	100	2.966	14.624	20
16	Tomini	12	14	86	3.289	19.025	17
17	Mepanga	17	18	94	4.621	30.157	15
18	Palasa	11	11	100	4.299	26.278	16
19	Moutong	17	20	85	2.829	21.541	13
20	Bolano Lambunu	14	14	100	3.585	21.059	17
21	Taopa	11	11	100	2.421	14.132	17
22	Bolano	13	13	100	1.806	16.271	11
23	Ongka Malino	17	17	100	3.389	20.924	16

Source: Data Analysis, 2024

4 Recommendations

4.1 Recommended pilot area/location

Considering the length of the coast of Parigi Moutong Regency is approximately 473 km and consists of 23 sub-districts stretching from the north to the south (as seen in Figure 1), it requires in-depth analysis as material for a recommendation for spatial management areas based on the integration of landscape and seascape, namely using an ecosystem approach. The aim of conducting this analysis is to facilitate the landscape and seascape based on regional management so that it can facilitate program planning, implementation and monitoring and evaluation. Apart from that, it is also to make it easier to intervene in achieving indicators.

The analysis of ecosystem-based management of landscape and seascape is carried out by using a multi-criteria analysis approach. There are four dimensions, namely the physical and disaster dimension consisting of three parameters and four indicators; the economic dimension consists of five parameters and eight indicators; the ecological/environmental dimension consists of two parameters and two indicators; and the social dimension consists of one parameter and two indicators. Based on the results of the analysis, 6 sub-districts in Parigi Moutong Regency have the highest scores, namely Sausu Sub-District (score 84), Torue Sub-District (score 83), Balinggi Sub-District (score 85), Moutong Sub-District (score 80), Bolano Lambunu Sub-District (score 80), Bolano Sub-District (score 83), and Ongka Malino Sub-District (score 80).

There are 7 sub-districts of 23 sub-districts in Parigi Moutong Regency that have a quite strong landscape and seascape integration and can be considered as priority locations in the context of managing land and sea integration in Parigi Moutong Regency. The seven sub-districts are spread over two regional groups, namely:

1. The southern region of Parigi Moutong Regency which consists of Sausu, Torue and Balinggi Sub-Districts.
   a. Physical and Disaster Dimension
      The three sub-districts in the southern region have a fairly proportional proportion of highland and lowland (coastal) areas, namely between 66% of the area has highland topography and 34% has lowland (coastal) topography. Having a watershed which status is still good and that is being maintained and some of its status restored.
      The three sub-districts are located on the Sausu and Tokarau faults, so the potential for disaster there is quite high. This will be the focus for this project, how to develop programs in disaster-prone locations.
      The distribution of disaster hazards is quite high in the three sub-districts, such as the dangers of flash floods, earthquakes, forest and land fires, tsunami, and extreme weather.
   b. Economic Dimension
      From the economic dimension, the three sub-districts in the southern region are very dependent on agricultural activities, there are around 20.837 ha of rice fields stretching across the three sub-districts and 63,3 ha of corn crops. The horticultural potential of durian commodities is also quite large, there are around 107.386 durian trees in the southern region. These three sub-districts also have quite potential plantation potential, there are 3 (three) main commodities, namely palm oil covering an area of 27 ha, coconut covering an area of 1.190 ha and cocoa covering an area of 18.053 ha.
      Other economic potential that can be developed in the three sub-districts in the southern region is the potential for capture fisheries and coastal cultivation. Fishing activities are spread across the three sub-districts. Meanwhile, the potential area for coastal cultivation is 1.474.5 ha.
      Two of the three sub-districts in the southern region are included in the national strategic area, namely the national priority rural area, namely the Paristoba rural area.
      The tourism potential in the three sub-districts is the potential for highland tourism in Balinggi Village (Lumpang Batu and Angsri Agrotourism and Catur Karya Village (Baturiti Waterfall) and beach tourism in Sausu District in Sausu Tambu Village (Tambu-Karosondaya Bay and Rasita Island), Sausu Village Peore (Tanjung Bendera Beach), Toure District in Purwosari Village (Purwosari Beach) West Tolai Village (Arjuna Beach) and in Balinggi District in Malakosa Village (Tumpapa Beach).
   c. Ecological/Environmental Dimension
      In the coastal areas, the three sub-districts in the southern region have blue carbon potential i.e. namely the potential mangrove area that is quite large, namely approximately 4.315,19 Ha. Meanwhile, in the highlands there are areas with the status of protected forest (HL), production forest (HP), limited production forest (HPT), and converted production forest (HPK).
   d. Social Dimension

From the social dimension, almost the majority of villages in the three sub-districts still have poor populations. Meanwhile, the average number of poor people is between 7% -14%. So the Landscape and Seascape Solutions For Indonesia Project program in Parigi Moutong Regency can reduce poverty rates in these three sub-districts.

2. The northern region of Parigi Moutong Regency which consists of Moutong, Bolano Lambunu, Bolano and Ongka Malino Sub-Districts.

   a. Physical and Disaster Dimension
   The four sub-districts in the northern region have a fairly proportional proportion of highland and lowland (coastal) areas, namely between 71.25% of areas with highland topography and 28.75% with lowland (coastal) topography. Most of the watershed status in the four sub-districts has had its status restored.
   Three of the four sub-districts are on the Tomini fault, namely Bolano Lamburu, Bolano and Ongko Malino sub-districts. This will be the focus for this project, how to develop programs in disaster-prone locations. The distribution of disaster hazards is quite high in the four sub-districts, such as the danger of floods and flash floods, the danger of tsunamis, and extreme weather.

   b. Economic Dimension
   Just like the southern region, the people in these four sub-districts are very dependent on agricultural activities, there are around 10.445,5 ha of rice fields stretching across these four sub-districts. The potential area for corn crops is also quite large, namely 4.286,4 ha. There is also quite a lot of horticultural potential for durian commodities in Bolanon and Bolano Lamburu Districts. These three sub-districts also have quite potential plantation potential with 3 (three) main commodities, namely oil palm covering an area of 119 ha, coconut covering an area of 5.379 ha, and cocoa covering an area of 7.517 ha.
   Other economic potential that can be developed in the three sub-districts in the southern region is the potential for capture fisheries and coastal cultivation. Fishing fishing activities are spread across the three sub-districts. Meanwhile, the potential area for coastal cultivation is 4.841,47 ha.

   The potency of tourism in the four sub-districts is quite complete, consisting offering a range of attractions. There are 3 tourism potentials, namely highland tourism, beach tourism, and village tourism. Highland tourism in Moutong District includes Moutong District in the village of Olonggata Village (waterfall), Boloung Village (waterfall), Lobu Village (Siduidui Waterfall), Bolano Lamburu District in Tirtanagaya Village (Lambunu Dam), and Ongka Malino District in Santigi Village (Uwe Vatu Nipa).
   Beach tourism is also well-represented in these districts. Moutong District offers Moutong Tengah Village (Lalayo Island and Pasir Island) and Salumpengut Village (Salumpengut Island)); in Bolano Lambununu District it is in Siendeng Village (Polu Subua); in Bolano District, these are West Bolano Village (Lake Bolano Sau), Bajo Village (Dagat Dede (Laut Kecil)); in Ongka Malino District is in Santigi Village (Ongka Island). Village tourism is specifically available in Moutong District in Moutong Tengah Village (Moutong traditional house) and Bolano Lamburu District in Gunung Sari Village (agrotourism).

   c. Ecological/Environmental Dimension
   In coastal areas, the three sub-districts in the southern region have blue carbon potential, where the potential mangrove area is quite large, namely approximately 5.491,32 Ha. Meanwhile, in the highland areas there are areas with the status of

protected forest (HL), limited production forest (HPT), converted production forest (HPK), nature reserve area (KSA)/nature conservation area (KPA).

d. Social Dimension
From the social dimension, almost the majority of villages in the three sub-districts still have poor populations. Meanwhile, the average number of poor people is between 11% -17%. So the Landscape and Seascape Solutions For Indonesia Project program in Parigi Moutong Regency can reduce poverty rates in these three sub-districts.

4.2 Policy, plan and/or program recommendation

Based on the results of the analysis of potential and problems in Parigi Moutong Regency, especially in the two northern and southern focus areas, the following are several recommendations related to the Landscape and Seascape Solutions For Indonesia Project program in Parigi Moutong Regency.

a. Programs related to Physical and Disaster Dimension

The programs related to the Physical and Disaster Dimension are aimed at improving community resilience and environmental sustainability. Some of these programs namely, increasing community capacity in mitigating natural disasters, increasing agricultural and plantation productivity, implementing the environmentally friendly ponds, Increasing productivity and production of seaweed commodities, and implementing disaster education from an early age at kindergarten to high school levels to increase natural disaster literacy.

b. Programs related to Economic Dimension
   1. Increasing the added value of agricultural, fisheries and plantation commodities through downstream products (especially rice, corn, durian, cocoa and seaweed commodities).
   2. Forming fural area institutions, which could be BUMDES BERSAMA.
   3. Identifying development potential in the village.
   4. Identifying and developing a system for developing upstream and downstream linkage systems in existing sectors.
   5. Arranging village development stages based on development priorities.
   6. Studying on agricultural, plantation and fishery commodity supply chains.
   7. Training for BUMDES CEO.
   8. Training for prospective young farmers based on information and digital technology.

c. Programs related to Ecological/Environmental Dimension
   1. Training related to pond waste management for shrimp farmers.
   2. Dissemination of sustainable pond cultivation technology by encouraging the implementation of good aquaculture practices.
   3. Mangrove rehabilitation.
   4. Training of village facilitators to accelerate rehabilitation of mangrove ecosystems.
   5. Conducting survey, mapping and identification of key species in forest areas, mangrove ecosystem areas and river borders.
   6. Monitoring the quantity and quality of river water.
   7. Identifying the level of utilization of non-timber forest products by communities around the forest area.

d. Programs related to Social Dimension
    1. Increasing the added value of agricultural, fisheries and plantation commodities through product downstreaming.
    2. Implementing village spatial planning based on natural disaster mitigation.
    3. Compiling land use plan documents based on local wisdom.
    4. Conducting outreach and awareness of communities living along river borders and beaches regarding waste management.

5 Conclusion

To achieve sustainable development in land and coastal waters in Parigi Moutong Regency, a paradigm shift in the development approach is carried out i.e. the development planning approach based on landscape and seascape integration. There are 7 sub-districts of 23 sub-districts in Parigi Moutong Regency that have a quite strong landscape and seascape integration and can be considered as priority locations in the context of managing land and sea integration in Parigi Moutong Regency. The seven sub-districts are spread over two regional groups, namely the Southern Region of Parigi Moutong Regency which consists of Sausu, Torue, and Balinggi Sub-Districts; and The northern region of Parigi Moutong Regency which consists of Moutong, Bolano Lambunu, Bolano and Ongka Malino Sub-Districts. Policy, plan, and/or program, related to the landscape and seascape sustainable development in Parigi Moutong Regency of 4 (four) dimensions, namely the physical and disaster dimension, the economic dimension, th ecological/environmental dimension, and the social dimension, are recommended based on the results of this study.

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