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Evaluation of Land Suitability for Shrimp Ponds in Alue Naga Village, Syiah Kuala Sub-District

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Abstract: Alue Naga Village is located in the coastal area of the Syiah Kuala sub-district, which has the potential for shrimp pond cultivation. A mistake in choosing a pond location will cause problems, one of which is environmental. The purpose of this study was to determine the suitability of land for shrimp pond cultivation in Alue Naga village. The samples tested directly in this study measured the level of salinity and soil pH at predetermined pond points and were marked using the Avenza Maps application based on a simple random sampling technique. This research uses overlay and scoring method analysis. The parameters used and analyzed were: land use, soil texture, soil type, soil pH, land slope, distance from the river, distance from the coastline, and salinity. The results of the spatial analysis show three classifications of land classes for shrimp pond cultivation, namely: 1) The class is very suitable for pond cultivation (S1), with an area of 85.15 ha and a percentage of 59.72%. 2) Class suitable for pond cultivation (S2), with an area of 56.91 ha and a percentage of 39.91% 3) Conditionally suitable class for pond cultivation (S3), with an area of 0.52 ha and a percentage of 0.36% There are no ponds in unsuitable areas. The dominant factor affecting the development of ponds in Alue Naga village is land use, most of which is already in the area where they should be, and the salt content is in accordance with the criteria.

Keywords: *Alue Naga; Coast; Cultivation; Pond*

Introduction

Indonesia is an archipelagic country consisting of large and small islands with a very long coastline, one of the longest in the world. Indonesia was blessed by God with a wider ocean than the mainland, with two-thirds of Indonesia's territory being marine waters consisting of coastal seas, high seas, bays, and straits. Indonesia's marine potential also

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includes freshwater potential in the form of open water, fishponds, and mixed aquaculture (Lestari, 2016, p. 134).

Coastal areas become associated with food, aquaculture, tourism, mining, industry, housing, ports, and other economic service activities (Xu et al., 2009; Ambarwulan, 2010). On the other hand, groundwater in coastal areas is very dynamic and is influenced by the distance from the sea, the depth of groundwater, the porosity of rocks, and human activity in them. Seasons will influence the dynamics, so the probability of occurrence in the rainy season of seawater intrusion is greater than in the rainy season (Afriyani et al., 2023, p. 250). The high demand for land for many uses in coastal areas requires optimal planning for land use. This issue reflects the wide range of coastal areas that can support a variety of land uses. Coastal areas are multifunctional because they have high biodiversity and are part of land with high economic growth (Widiatmaka et al., 2016, p. 194).

The dynamic reality of coastal areas requires specific area management to accommodate all human interests and ensure environmental sustainability. The management of coastal areas must be able to accommodate various stakeholder interests while at the same time taking into account the potential and environmental capabilities of coastal areas as ecosystems that must be sustainable without reducing the rights of humans and other communities to live in them (Muliani Am et al., 2021, p. 36).

Indonesia's coastal and marine areas have large fishery resources and have great potential to be developed. As population growth and development increase, so does the community's need to consume fishery resources. Communities will find it difficult to obtain them if they only rely on dwindling fishing resources. There are still many potential fishery resources other than capture fisheries that have not been utilized properly in Indonesia. One of the fishery resource utilization activities that can be carried out and optimized is pond cultivation (Syaugy et al., 2017, p. 44).

Ponds are a type of habitat that is used as a place for brackish water activities and are located in coastal areas. Continuous pond cultivation activities cause environmental degradation, which is characterized by a decrease in water quality. Environmental constraints faced in cultivation activities include zoning or spatial planning for cultivation development, which does not pay attention to the carrying capacity of the environment due to improper management, causing environmental problems with all aspects of their complications over a long period of time (Ristiyani, 2012, p. 13).

Pond cultivation in Indonesia began hundreds of years ago. This cultivation is in the form of pond plots, which are still similar to the simple ponds of the past: single rectangular plots with an area of 0.5-2 hectares. (Lestari, 2016, p. 134)

Cultivation businesses managed by the community need to pay attention to environmental conditions. Both the aquatic environment and the condition of the land area Optimal aquatic environmental conditions are those that comply with the requirements for cultivated biota to grow and develop properly. In addition, the proper location of the land is very important for the successful management of aquaculture. Pond management requires careful planning. If not, it will lead to the abandonment of pond land, either due to crop failure or sub-optimal management errors. If the location of the pond is not determined carefully, it will result in very large waste, especially when coupled with the level of pond management that is not good. This situation affects the level of production (Mustofa & Rochmanto, 2021, p. 138).

Studies to determine the suitability of pond cultivation land can be based on land characteristics such as topography, soil, hydrology, vegetation, and climate, and if managed excessively, it will affect the ability to use the land. The ability of the land to accept loads due to pond cultivation activities is dynamic, can decrease due to the accumulation of waste from cultivation activities, and can be increased through proper management. Uncontrolled exploitation of pond land and exceeding its natural carrying capacity results in environmental damage, which leads to a decrease in productivity. Land

suitability evaluation is a strategic land use planning step in predicting land performance, namely the advantages and constraints obtained from land use and the environmental degradation that will occur due to land use (Suhaimi, 2014, p. 1).

The sustainability of the pond business is greatly affected by the evaluation of land suitability and regional spatial planning, which in the future will support community aquaculture businesses in areas that have the potential to be developed and utilized properly (Kurniawan & Hartanti, 2015, p. 57).

Land suitability evaluation is the process of assessing land performance when land is used for a particular purpose. The main objective of land evaluation is to select the optimal land use for each defined land unit and conserve environmental resources for future use. Detailed objectives can vary widely according to the purpose and scale of the evaluation site (L. Li et al., 2011, p. 587).

Geomorphological factors can be used to evaluate the appropriateness of a land use. Morphogenesis, morphochronology, morphoarrangement, and morphology and morphometry are the primary components of geomorphology. Over time, human activity and geomorphic processes can cause the earth's surface to evolve and alter. Both the physical terrain and the forms of land use undergo changes (Y Irawan et al., 2022, p. 259).

Land suitability evaluation emphasizes the diversity of land characteristics because it will determine the type of commodity that is suitable for cultivation in a particular area. The evaluation of land suitability also determines the level of land productivity. The suitability of land for a particular use is usually evaluated based on its characteristics or quality. The general land suitability criteria used in Indonesia are general in nature because they are compiled based on the compilation of land use data and are not site-specific (Syahri et al., 2020, p. 97).

Land suitability is an important key to aquaculture activities, which affects the success and sustainability of a shrimp pond. In general, the suitability criteria for pond cultivation can vary from one place to another (Rahmadhani et al, 2016). Stated that water quality is one of the keys to the success of the aquaculture business, apart from the land suitability factor. Water quality parameters for cultivated commodities need to be carried out to determine the level of suitability for the cultivated commodities (Ikbal & Agussalim, t.t., p. 70). The land suitability factor is very important in determining the success of activities cultivating vaname shrimp because you can determine the criteria for land use if it meets the criteria for land suitability (Rusdi et al, 2024., p.75).

The suitability of pond land is the most important thing in shrimp pond cultivation to maintain production levels and ensure the development of a better pond cultivation business. According to Mustafa et al. (2008) and Rossiter (1996) in Rudiastuti (2011), it is very important to evaluate land suitability because land has varying physical, social, economic, and geographical characteristics or is created differently. Land suitability evaluation can predict land variability in terms of expected benefits from land use as well as constraints to productive land use and expected environmental degradation due to land use (Setiaji et al., 2018, p. 129).

There are several studies that state that pond business failure causes a decrease in environmental quality. The quality of sea water as the main raw material for pond business has experienced considerable degradation as a result of human activities on land. In the terrestrial environment, the clearing of mangrove land for ponds actually results in a decrease in the carrying capacity of pond management. Damaged coastal ecosystems will not be able to support the pond business and have the potential to cause failure. On the other hand, choosing an inaccurate pond location will cause big problems. The big problem faced by farmers due to wrongly determining the location of pond cultivation is the increase in construction costs, cultivation operations, and the emergence of environmental problems (Poernomo A. 1992). (Syaugy et al., 2017, p. 44)

One of the important aspects that must be considered in the context of the development of pond cultivation in an ecological manner is spatial planning, which must be based on proper planning and be comprehensive and integrated with other sectors (Pirzan, 2012, p. 940).

An analysis of land suitability for pond cultivation needs to be carried out so that it becomes the basis for consideration in making decisions about land use that is suitable for its suitability. Based on the facts above, the authors are interested in conducting research with the title Evaluation of Land Suitability for Shrimp Ponds Around Alue Naga Village, Syiah Kuala District.

Alue Naga Village is in the Syiah Kuala sub-district, Banda Aceh City. This village has an area of approximately 329.19 hectares covering 80.58 hectares of residential areas, 89.63 hectares of rivers/canals, 155.98 hectares of ponds/beaches/swamps. Alue Naga village is divided into four hamlets, namely Buenot, Musafir, Kutaran and Po Diamat hamlets. Geographically, Alue Naga Village to the north is bordered by Krueng Cut Village, to the south by Tibang Village, to the east by Rukoh Village, to the west by the Sea (Handayani et al., 2022, p. 570).

To ensure that environmental conditions support sustainable shrimp farming activities, it is necessary to study land suitability based on conditions that affect shrimp life, safety, and continuity of cultivation. The suitability of shrimp pond land is studied based on water quality factors such as salinity and pH (Caniago & Johan, 2020., p. 2).

The aim of this research is to determine the level of suitability of shrimp pond land in Alue Naga village. Several studies such as those from Saputra et al (2023), Caniago et al (2020) and Amanda (2013) have investigated the evaluation of land suitability, especially shrimp ponds. However, a similar study has not been carried out in Alue Naga village, which is a potential area for developing shrimp pond cultivation and there is a lack of use of modern technology such as GIS to evaluate the suitability of shrimp pond land in Alue Naga village. The general benefit of research is that it is hoped that the results of this research can provide information for researchers, the government, and the community about the suitability of shrimp pond land.

Research Method

This research was conducted in Alue Naga Village, Syiah Kuala District. In this study, the method used was a field survey to obtain soil pH measurement values and salinity levels in the pond samples studied. According to Sugiyono (2018), the survey method is a quantitative research method used to obtain data that occurred in the past or present regarding beliefs, opinions, characteristics, and behavior-related variables and to test several hypotheses about social and psychological variables from samples taken from certain populations. Data collection techniques include observations (interviews or questionnaires) that are not in-depth, and research results tend to be generated. Pond sampling using the simple random sampling method According to Kerlinger (2006: 188), simple random sampling is a method of withdrawing from a population in a certain way so that each member of the population has the same opportunity to be selected or drawn.

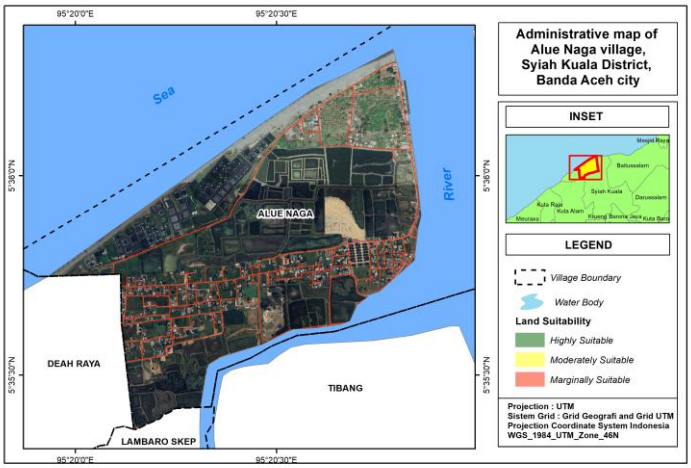

Figure 1. Administrative Map of Alue Naga Village, Syiah Kuala District, Banda Aceh City

This research requires software in the form of a GIS data processing application for the GIS analysis process. The definition of GIS is spatial data processing in the form of numerical and attribute data processing (Muhsoni, 2013, p. 9). The tools used for field surveys include a refractometer and a manual soil tester. The data from the field survey are the measurement values of soil pH and pond salinity, which are the parameters for land suitability for shrimp ponds. Soil pH values were measured at six observation points using a manual soil tester. As for the measurement of salinity, it is carried out using a refractometer at the same point as measuring pH. Every time pH and salinity data are taken at each point, a mark is made using the Avenza Maps application to find out the coordinates of that location. Processing of pH and salinity data in ponds that have been marked to obtain a map of the distribution of pH and salinity values in the shrimp ponds that have been studied Therefore, data on pH and salinity values were interpolated at the pond location.

Mapping management includes distance maps from rivers, soil texture maps, soil type maps, slope maps, land use maps, distance maps from the coastline, pH value distribution maps, and salinity value distribution maps. The methods used to produce pond land suitability maps are the overlay method and the scoring method. Overlay is the process of merging data from several different layers. Overlay is simply referred to as a visual operation that requires more than one layer to be physically combined. Overlay is considered very good for spatial studies, such as land suitability evaluation studies for pond cultivation activities. (Afriyani et al., t.t., p. 60).

The parameters for land suitability analysis for shrimp ponds are arranged in a matrix. The suitability matrix contains criteria for determining land suitability for shrimp ponds. Each parameter, both from spatial and non-spatial data, has a different contribution to the suitability of pond land. The scoring system refers to Kapetsky & Nath (1997), namely giving a score of 4 for criteria that are very suitable (S1), a score of 3 for criteria that are suitable (S2), a score of 2 for criteria that are conditionally suitable (S3), and a score of 1 for criteria that are not suitable (N). (Syaugy et al., 2017, p. 46)

The spatial analysis technique used is to use the raster data calculation operation step with the tools-raster calculator on the spatial analyst tool in the GIS data processing software. Mathematically, the process of determining land suitability for shrimp ponds uses the following calculation: {([land use] x 20) + ([soil texture] x 13) + ([soil type] x 13) + ([soil slope] x 12) + ([distance from shoreline] x 12) + ([distance from river] x 10) + ([pH] x 10) + ([salinity] x 10)} x 1%..... (1). This process adds up each category for each

required parameter, and multiplication is carried out for each of the parameters that have been determined. (Syaugy et al., 2017, p. 47)

The scoring method determines the value of land according to its use, benefit, or function that can be carried out. So land value is related to land quality. Land value is a qualitative value that is not measured directly but is determined by estimation or interpretation. Therefore, the value of land is always related to certain uses, so land that is of good value for, for example, agriculture does not automatically have good value for other uses, such as settlements or industrial areas. Conformity assessment can be absolute or relative. It can also be made based on the current condition of the land (actual suitability) or based on the condition of the land after a large-scale improvement (potential suitability), which changes the characteristics of the land gradually or according to will (very significant) and is quite permanent, and the results of the changes can last as long as more than 10 years. (Rizqiyah, 2015, p. 3).

Table 1. Land suitability parameter matrix for shrimp ponds

Parameter	Weight (%)	S1 (Very suitable)	Score	S2 (in accordance)	Score	S3 (According to conditional)	Score	N (Not suitable)	Score
Land use	20	Ponds, ricefield, forest, beach	4	Garden, forest, swamp/mangrove	3	Protected forest, mining area	2	Settlement &building	1
Soil texture	13	Smooth	4	Smooth and rough	3	Rough	2	Sand	1
Type of soil	13	Alluvial	4	Entisol	3	Inceptisol	2	Ultisol	1
Land slope (%)	12	0-3	4	3-6	3	6-9	2	>9	1
Distance from the coastline (m)	12	300-500	4	500-4000	3	100-300	2	<100 and >4000	1
Distance from the river	10	50-500	4	500-1000	3	1000-1500	2	<50 and >1500	1
pH	10	6,5-8,5	4	5,5-6,5&8,5-9,5	3	4,0-5,5&9,5-10,5	2	<4,0& >10,5	1
Salinity(o/oo)	10	15-25	4	25-30	3	5-15;30-35	2	<5 & >35	1
Total	100	4		3		2		1	

Source: Modification of Yustiningsih (1997), Pantjara (2008), Hardjowigeno and Widiatmaka (2007); and personnel discussion with experts

Result and Discussions

All Alue Naga villages are in the Syiah Kuala sub-district; the astronomical location of Alue Naga village is at 5°59'9" north latitude and 95°34'8" east longitude. This research was conducted in the eastern part of Alue Naga village, precisely in the hamlets of Kutaran

and Po Diamat, where the natural surroundings of these two hamlets are swamps and ponds. Alue Naga Village consists of four hamlets, namely: Buenot Hamlet, Musafir Hamlet, Kutaran Hamlet, and Po Diamat Hamlet. Alue Naga Village has an area of approximately 329.19 ha, and the pond area has an area of 155.98 ha.

According to the research results, the characteristics of each land unit are not in harmony with each other between the characteristics of the land that is suitable for the plantation area and the characteristics of agriculture, which must have distinctive characteristics that are different from the characteristics of the good land for the land area. Each land characteristic has properties that are able to show how much potential the land has in accordance with the designation of a particular area.

Alue Naga Village has pond cultivation areas located in two hamlets, namely Kutaran hamlet and Po observed hamlet. Alue Naga Village is in the coastal area of the Syiah Kuala District, which has quite high fishery potential, and one of the species cultivated is shrimp. It was observed that Dusun Kutaran and Dusun Po were basically dominated by shrimp pond cultivation activities, more precisely the type of vannamei shrimp. The shrimp ponds located in Kutaran Hamlet are located close to the coastline of Syiah Kuala, where it is feared there will be a phenomenon of seawater intrusion.

Vaname shrimp (Litopenaeus vannamei) is a type of shrimp that has high economic value and is an alternative type of shrimp that can be cultivated in Indonesia, besides tiger shrimp (Panaeus monodon) and white shrimp (Panaeus merguensis). Other advantages of vannamei shrimp (Litopenaeus vannamei) compared to other shrimp are that it is relatively more resistant to disease, has a fast growth rate, high productivity, relatively short rearing time, and high survival rate during the rearing period. In addition, the production of vannamei shrimp is greater than the production of other types of shrimp. (Luthfi et al., t.t., p. 2).

Land use must be understtod to analyze the suitability of the land to be used as pond land, because not all land can be converted into pond land. Although this may be done at a very large cost. Environmental quality is closely related to determining the location of ponds, which will directly affect the production process (Syaugy et al., 2012: 50). The most suitable area to be used as pond land is an area close to rivers and seas; this will make it easier to obtain water, which is a living medium for shrimp in ponds. (Afrianto and Liviawati, 1991). In Alue Naga Village, more precisely in Kutaran Hamlet and Po Hamlet, it was observed that the places where shrimp ponds were cultivated were overgrown with shrubs and trees. The vegetation that grows around this pond area is mangrove, and there are several other types of trees.

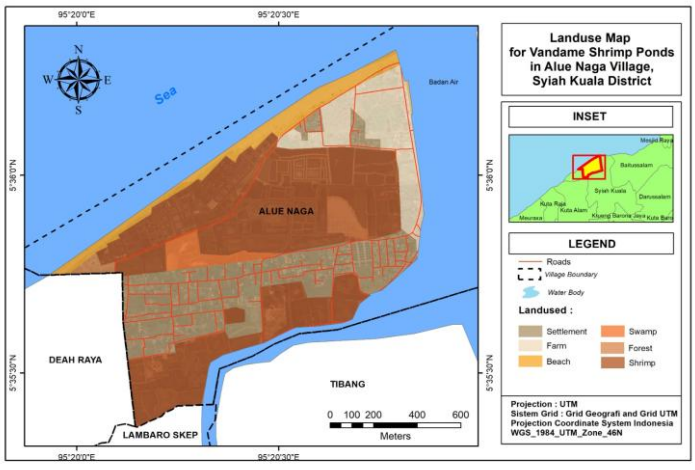

Figure 2. Land Use Map for Vandame Shrimp Ponds in Alue Naga Village, Syiah Kuala District

Soil quality that can be said to be suitable for pond cultivation activities includes the type, pH, and texture of the soil in the pond. The most suitable soil type for ponds is alluvial soil. At the research location, the type of soil found in the ponds is alluvial soil, where the soil texture of the ponds studied has a smooth texture, and there are two ponds that have a slightly sandy soil texture. Alluvial soil is a type of soil that is formed due to sediment. Sediment areas occur in rivers, lakes that are in the lowlands, or basins that allow sediment to occur. Soil pH levels found at several sampling points show that the average pond in Alue Naga village has a soil pH content between 5.4 and 6.5. The PH content of this soil was obtained from six pond sample points. After obtaining the results of soil pH levels in several ponds in Alue Naga village, it can be said that Alue Naga village has good potential to be used as pond cultivation land according to the criteria in Table 1. However, areas with soil pH levels below 5.5 are not suitable for the use of pond cultivation land.

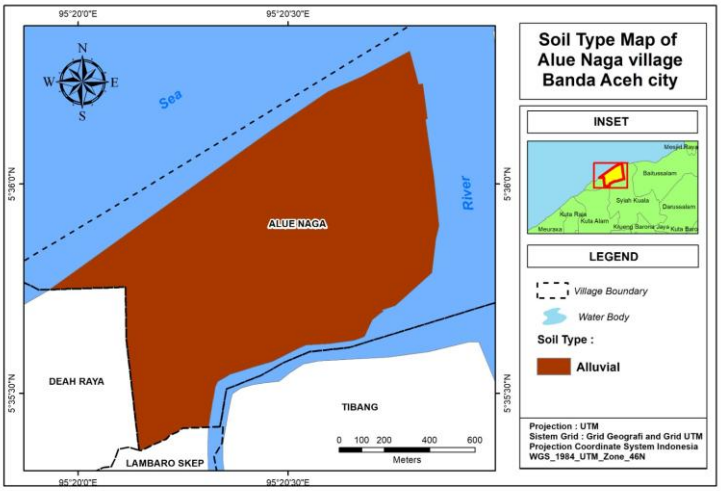

Figure 3. Soil Type of Alue Naga Village, Banda Aceh City

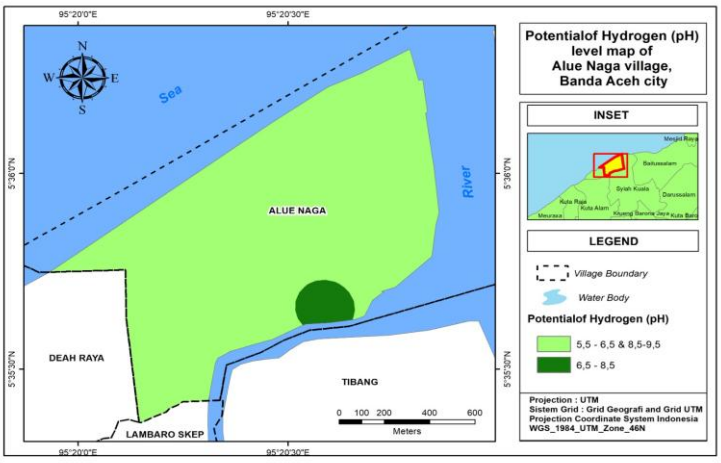

Figure 4. Potential Hydrogen (pH) Level Map of Alue Naga Village, Banda Aceh City

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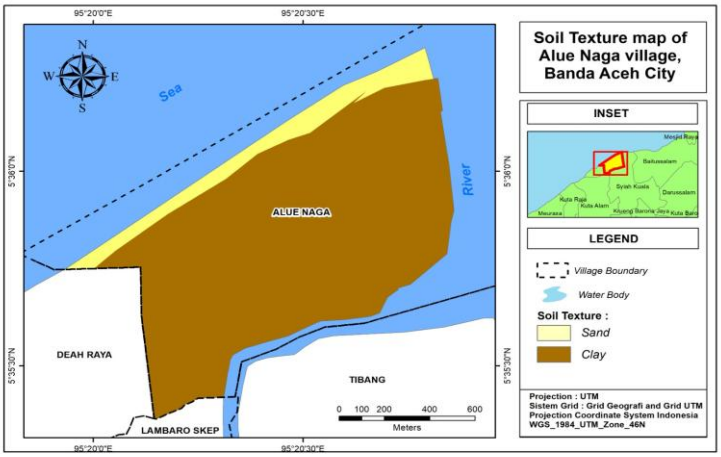

Figure 5. Soil Texture Map of Alue Naga Village, Banda Aceh City

Land for pond cultivation requires flat land that can be inundated directly by water during high tide. An excessively high or low topography will have an impact on water management. While land that is too low is challenging to drain, land that is too high cannot be drained with adequate water. In addition, land that is too steep is also not good for making pond land because it will require a lot of money to make the land flat, and a lot of nutrients in the soil are wasted. Good land for ponds has a slope of about 0-3%. Shrimp ponds in Alue Naga Village have a slope of 0-3%. Therefore, the existing ponds in the Alue Naga Village area can be said to be suitable from the aspect of slope.

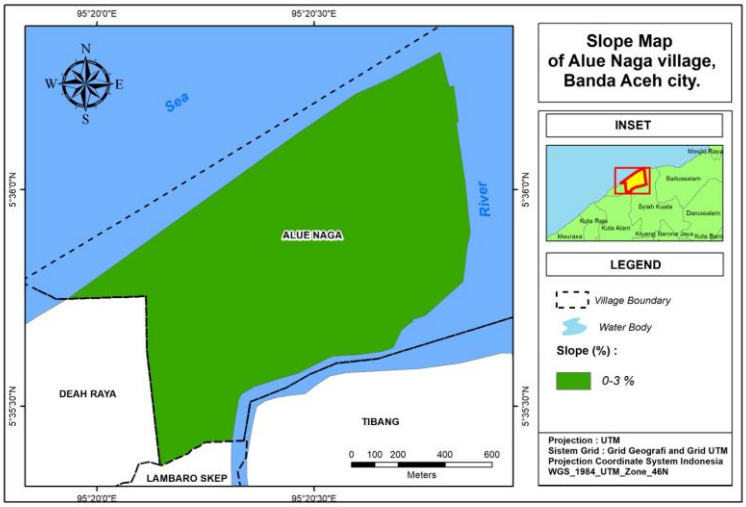

Figure 6. Slope Map of Alue Naga Village, Banda Aceh City

Shrimp pond farmers in Alue Naga Village use seawater from the Syiah Kuala beach as a source of water to fill their Vannamei shrimp ponds. This vaname shrimp pond is located around the Shia Kuala beach so that the sea water has sufficient salinity to be used as irrigation for the pond. Salinity describes the total concentration of ions present in both organic and inorganic waters. Seawater salinity is caused by seven main ions, namely sodium (Na+), potassium (K+), calcium (Ca2+), chloride (Cl-), sulfate (SO4 2), and bicarbonate (HCO3). Salinity affects the ability of osmotic and ionic regulation in shrimp. Osmotic regulation in crustaceans is an important mechanism for environmental adaptation (Kusuma et al., 2017, p. 260).

However, to determine the suitability of pond land, it is better to measure the salinity value in the ponds studied. The quality of the water used for ponds, should have appropriate criteria for the survival of shrimp in ponds. Shrimp have a fairly high tolerance for salinity. Shrimp can adapt to a salinity of 3–450 ppm. However, the appropriate salinity conditions for shrimp ponds are in the range of 15–300 ppm. When observing the salinity at six points, the salinity values at the study sites varied greatly, ranging from 22 to 430/00. The smallest salinity value is 220/00, which is at one point in Po Diamat Hamlet. And since the largest salinity value, namely 430/00, is found at one point in Kutaran Hamlet, it can be seen that this Kutaran Hamlet is indeed very close to the beach area. The range of salinity values is quite varied, so the study area has a different level of suitability based on the level of salinity.

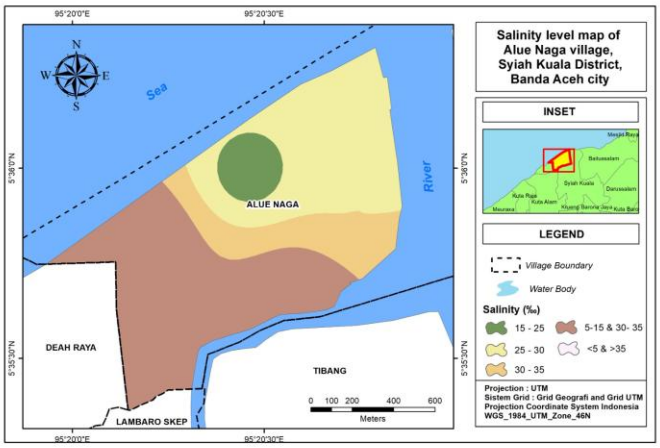

Figure 7. Salinity Level Map of Alue Naga Villagem Syiah Kuala District, Banda Aceh City

For shrimp to be raised in ponds, a lot of water is undoubtedly needed for the living medium. Ponds need to be situated near fresh and saltwater sources to make filling them easier than otherwise. Because of this, one of the most crucial factors in determining whether pond property is suitable is the pond's distance from the water supply. 50 to 500 meters from the riverbank is the ideal distance to construct a pond. It will be simpler to fill ponds with fresh water at this proximity. Although fresh water may still be obtained 500–1500 meters from the river, this requires technological support, which raises the cost of production. There are several variations of shrimp ponds at the study site: there are shrimp ponds located at intervals of 0–50 meters from the river; there are ponds located at intervals of 50–500 meters from the river; and there are also ponds located at intervals of 500–1000 meters from the river. Based on Table 1 regarding the land suitability parameters for shrimp ponds, not all areas in Alue Naga Village are suitable for shrimp pond cultivation. Because the distance that is very suitable for building shrimp ponds is an interval of 50–500 meters.

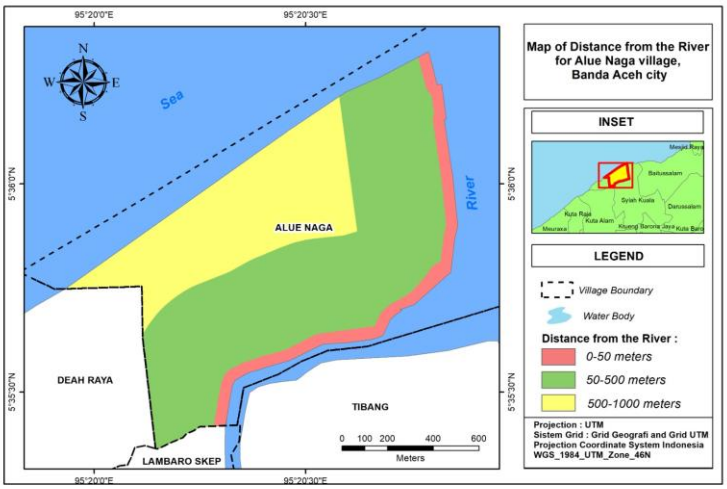

Figure 8. Map of Disantance from The River for Alue Naga Village, Banda Aceh City

Seawater is needed to regulate the level of salinity in the pond. If the pond's salinity is too low, seawater will be added. The distance from the beach to the pond needs to be considered so that it will be easier for the pond to get seawater. The distance of the pond location from the beach, which is still suitable, is 300–4000 meters. At this interval, the ponds are still within reach of the tides, so the pond managers can easily obtain salt water to increase the pond's salinity. Ponds that are too close to the coast will have a high level of salinity, and it is difficult to reduce it because they are inundated by sea water during high tide. The shrimp ponds in Alue Naga Village are located at a distance of between 300 and 4000 meters, so if you look at the distance from the beach, the ponds can be said to be suitable. However, if the distance between the pond and the beach is less than 300 meters, the area is not suitable for pond construction.

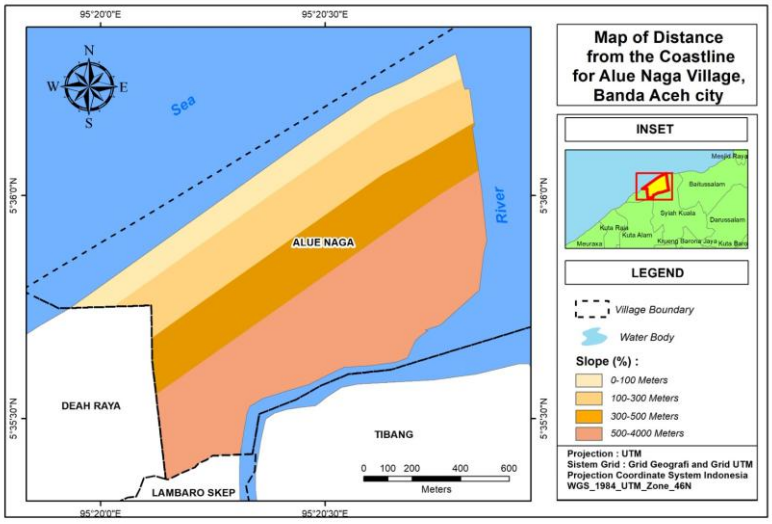

Figure 9. Map of Distance from The Coastline for Alue Naga Village, Banda Aceh City

The results of the analysis of land suitability class maps for ponds revealed three land suitability classes for shrimp ponds in Alue Naga Village. From the results obtained, nothing is included in the inappropriate class. From the overlay results, the highest score was 358, and the lowest score was 275.

Table 2. Land suitability level for shrimo ponds in Alue Naga village

	Suitability	Wide (Ha)	%
1	Very suitable (S1)	85.15	59.72%
2	In accordance (S2)	56.91	39.91%
3	According to conditional (S3)	0,52	0,36%
	Amount	**142.58**	**100.00**

The explanation regarding the suitability of shrimp ponds in Alue Naga Village can be described as follows, first from the results of the land suitability map analysis, most areas in Alue Naga Village have an average S1 land suitability level of 59.72%. It can be seen on the map that the distribution of areas in Alue Naga Village that have an S1 suitability level is in Kutaran Hamlet. From the results of the field survey, it is known that Dusun Kutaran meets the criteria in terms of land suitability parameters for shrimp ponds in all aspects. Geographical conditions in Dusun Kutaran are suitable for the construction of shrimp ponds because, when viewed from the perspective of land use, which is dominated by ponds, alluvial soil types, and the gentle slope of the land, Dusun Kutaran is very suitable land for the cultivation of the largest shrimp ponds. Land with a very suitable class classification can mean that the land does not have any inhibiting factors that affect the continuity of the shrimp pond business, so it is very suitable to be used as pond land.

Second, from the results of the map analysis, it is known that the land area in Alue Naga Village, which has a Masters degree in land suitability, is 39.91% of the area of Alue Naga Village studied. It can be seen on the suitability map for shrimp ponds that areas that have a suitability level of S2 are land adjacent to the coastline and partly adjacent to rivers. Areas that are less than 100 meters from the coastline and pond cultivation activities are said to be less suitable for pond construction in that area because the water in shrimp ponds will taste saltier than the provisions in the pond land suitability parameters. Land with an appropriate classification is suitable land for ponds because there are very few inhibiting factors that can interfere with shrimp pond activities.

Third, land with a land suitability level of S3 or according to conditions for the construction of pond cultivation has a land area of 0.36%. This conditional land classification is located at the end of Po Diamat Hamlet but only covers a small part of the area because this area is very close to the coastline, which causes a high level of salinity, which is more than 35 ppt. In this area, land use is dominated by community settlements. Land with a suitability level of S3 is land that is still possible to be used as shrimp pond cultivation but requires further processing because there are quite a number of obstacles when compared to land with a very suitable classification. The evaluation of land suitability in Alue Naga Village for shrimp pond cultivation is an analysis of the suitability level of Alue Naga Village land for shrimp pond cultivation. From the table of map analysis results above, it can be seen that the pond locations have been divided into three classes: very suitable, appropriate, and conditionally suitable.

This study focuses on Alue Naga Village, where a thorough evaluation of the feasibility of land for shrimp farming has never been done. Each geographical location has different characteristics such as soil type, soil pH, soil texture and water salinity. This research also combines various evaluation methods, ranging from GIS-based spatial analysis, field surveys, to direct measurements of water salinity and soil quality. This method approach can improve analysis and provide a more complete picture of land suitability in Alue Naga Village.

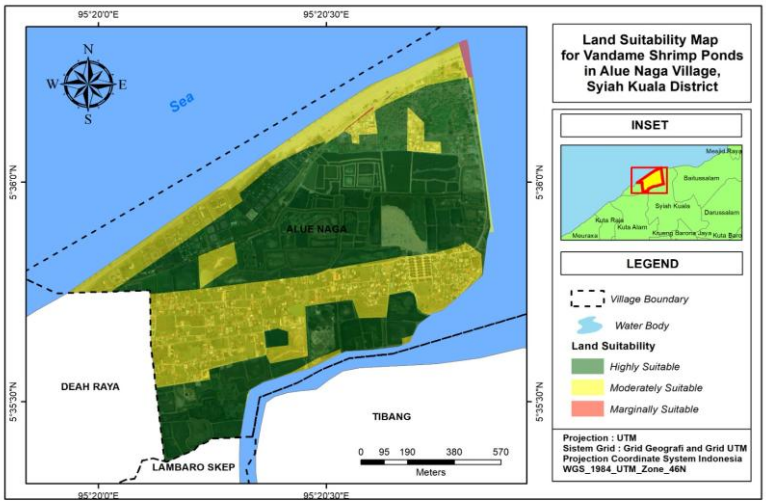

Figure 10. Land Suitability Map for Vandame Shrimp Ponds in Alue Naga Village, Syiah Kuala District

Conclusion

Alue Naga Village has quite large potential for building shrimp pond cultivation. This research aims to evaluate the suitability of land in Alue Naga Village as a location for shrimp farming, with a focus on vaname shrimp cultivation, which is growing rapidly in coastal areas. In the evaluation process, several main factors are considered, such as water quality (salinity), soil condition (texture, soil pH, and soil type), distance from the coastline, and land use. This research uses GIS technology for accurate land suitability mapping. This research produces a land suitability map in Alue Naga Village that separates land that is very suitable and meets the requirements. This can help farmers and local governments decide on optimal shrimp cultivation locations, thereby minimizing the risk of crop failure due to unsuitable locations. This research shows the effective use of GIS in comprehensively evaluating land suitability. This approach combines various scientific disciplines, including geography and environmental science to provide more accurate results in evaluating land suitability.

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