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Socio-Economic Vulnerability of Household Surrounding the Limboto Lake

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Abstract: For generations, people surrounding the Limboto Lake have depended their livelihood from farming and fisheries activities. Environmental changes of the lake cause social and economic vulnerability that comes from Limboto Lake critical condition. This research objective to study the social economic vulnerability of households surrounding the Limboto Lake, of Gorontalo district. This study uses mixed methods of quantitative and qualitative research methods. The research sites at the five villages surrounding the Limboto Lake of Gorontalo District. The sample total sizes consist of 228 farmers and fishermen household. Data were collected using a questionnaire and then analyzed quantitatively and qualitatively.

The results of research explain that the level of social and economic vulnerability of households varied in five research sites. Based on economic pressures the vulnerability shows medium rate (50.44%), the living conditions have vulnerability with high rate (54.82%), the social conflicts have low vulnerability (50.88%), and the knowledge impact on change of season have low vulnerability rate (51.86%).

Socio economic vulnerability of the farmers and fishermen households are quite diverse, economic conditions, housing, social conflict, and the impact and knowledge of the seasons will affect or bring major changes in household livelihood. So the empowerment of the program is required surrounding the lake right on target, using the resources of the lake with consideration of environmental sustainability.

Key words: household, Vulnerability, Socio-economic

Introduction:

Limboto Lake is situated in Gorontalo province which is a natural resource that everyone can access and utilize openly. The existence of the Limboto Lake for Gorontalo people have an important role in many livelihood aspects and have the multi-functions both as a buffer of livelihood for the community and then the system buffer microbial life in water/fresh water fish and other living creatures as well as adapting and balancing the environment and the elements of native ecosystems of environmental Gorontalo Province. These benefits are not fully enjoyed caused of two main issues, namely, depreciating and silting of the lake area.

The size of Limboto Lake including its resources continue to diminish. According to the present study, this lake can be categorized as a lake that is critical, the process of sedimentation and population pressure on land tenure surrounding the lake for farming and settlement caused the breadth and depth of the lake declines. Limboto Lake area in 1934 reaches $\pm 70 \text{ km}^2$ and the depth its 14 m. Currently, extent of approximately 30 km^2 and the depth of 2.5 - 4m (Balihristi, 2009).

The reliance on activity as farmers and fishermen that limited skills cause them vulnerable to shocks cause capacity or ability to survive is very dependent on local natural stability factor. In this point that the residents are powerless by the will of nature and could not take the fight. Cannon in Henry (2008) agree with the idea that man can not control most types of disasters, but McEntire (2004) argues that society would be able to resolve, though not completely eliminate disaster vulnerability. While Moser (1996) said that the vulnerability as the state of one's individual, household, or community in a changing environment that threaten the welfare of those people. Environmental changes that can threaten the welfare can be either ecological, socio political, sudden crisis, long trend or seasonal changes.

Social vulnerability describes the condition level of social fragility in the face of hazards (Triutomo, *et al.*, 2007). This phenomenon is a condition that is not in line with expectations or not in accordance with the values, norms and social standards that apply (Soetomo, 2010). Social vulnerability is a condition of individuals, households or the general public suffered, so the impact on their inability to resist of pressure to life hazards.

In case a disaster, that socially vulnerable, then it will certainly have an impact very loser (Triutomo, *et al.*, 2007). Land carved up and ownership in the banks of Limboto Lake for agricultural and house building activities will have an impact on social conflict. Neither the water body carved up the lake for fishing will lead to social conflict and undermining materially and socially, especially within family relationships. According to Baiquni (2007) that the

conflicts commonly arise when the annexation and violation beyond the control, in these situations of conflict will going in getting the limited resources.

Vulnerability of the economy is not as flaws, but as an openness vulnerability and powerlessness (Chambers, 1995). The people economics vulnerability that these vulnerabilities threatening the economics of the population both as individuals and as households. Flood disaster inundate the land surrounding the Limboto Lake will be a threat because the land has an economic value and a valuable asset to the households that use Limboto Lake as natural resources.

The conditions of lake that deteriorated area and siltation resulting in reduced local populations of fish, wet and dry land are often hit by floods that inundated paddy fields, fields and settlements because the lake is not able to accommodate the overflow of water from the rivers that lead to the Limboto Lake. There is no more land is the farmers processed that are likely to cause residents to lose their livelihoods and declining revenues. This can lead to socio-economic vulnerability of people that influence their welfare. Therefore, it would put more constraint into the household activity of the community surrounding the lake, at the end, the lake households have to be able to manage their current income and resources by looking at many alternative livelihood strategies in order to fulfill their household needs. So, a research on the socio-economic vulnerability of household surrounding the Limboto Lake needs to be done.

Research Methods

This research used mixed methods between quantitative and qualitative research methods. According to Creswell (2010), a mixing research is the research approach, which combines qualitative research and quantitative research. The research sites are rural villages surrounding the Limboto Lake. It is administratively surrounding Limboto Lake. Locating area research with multistage area sampling techniques, by considering the characteristics of surrounding the Limboto Lake topography that is hilly and flat.

The research sites were purposively selected among villages surrounding the Limboto Lake that located in the district of Gorontalo as samples, are Iluta Village (Batudaa Sub-district), Kayu Bulan Village (Limboto Sub-district), Lupoyo Village (Telaga Biru Sub-district), Limehe Timur Village (Tabongo Sub-district), and Tabumela Village (Tilango Sub-district).

The population in this study is the household farmers and fishermen in the surrounding the Limboto Lake which study site used. While the samples were households whose head of family work as farmer or firsherman. The size of the sample was 15% of 1529 families = $229.35 \approx 230$ families. Two respondents can not be interviewed, so the total respondents who can be

interviewed as many as 228 respondents. The sample size was proportionally determined for each village. The member of the samples was chosen using systematic random sampling.

The collection of data were observation, structured interviews, in-depth interview, and documentation of data. Quantitative data analysis with descriptive statistics used to describes of the data that has been collected through distribution of items to specify categories: the score were 1 is *low*, 2 is *medium*, and 3 is *high*. Then, each score are summed up based on the answers and and created interval classification, for three categories as follows:

$$\text{Classification interval} = \frac{\text{max. value} - \text{min. value}}{\text{Sum of classification}}$$

Qualitative analysis is used to interpret that the data obtained in accordance with the research purpose in addition to solve the problem with mutual checks and rechecks.

Research Result

The results at five sites revealed that the households are productive age, with the highest number belong to the group age of 30-44 years old are 109 people (47.81%), 45-59 years old are 81 peoples (35.53%), 15-29 years old amounted to 8.77%, or 20 people, while the least are 60 years old and more amounted to 7.89 percent, or about 18 people, has 2 to 4 children. The number average of households are 5 (five) people.

Education is a main indicator of development and quality of human resources. It can be concluded from the research results that the majority of respondents' education level is low, as shown in Table 1.

Table 1. Percentage of Respondents Based on Education

Village	Education Level				
	Not graduated from Elementary School	Elementary School	Junior High School	Senior High School	University/ College
Kayu Bulan	25.00	52.78	13.89	8.33	0.00
Lupoyo	31.03	62.07	3.45	3.45	0.00
Tabumela	24.49	63.27	10.20	2.04	0.00
Iluta	25.00	45.83	12.50	14.58	2.08
Limehe Timur	42.42	51.52	4.55	1.52	0.00
Average	30.70	54.39	8.77	5.70	0.44

Source: Analysis of primary data, 2014

Respondents' income is the information that will be used to describe the level of people welfare. Respondents' income from primary and secondary job, is presented in Table 2.

Table 2. Percentage of Respondents Based on Levels of Income

Village	Income (Rupiah)				
	< 1,000,000	1,000,000 to 2,000,000	> 2,000,000 to 3,000,000	> 3,000,000 to 4,000,000	> 4,000,000
Kayu Bulan	30.6	27.8	16.7	22.2	2.8
Lupoyo	65.5	10.3	6.9	6.9	10.3
Tabumela	34.7	44.9	10.2	4.1	6.1
Iluta	31.3	14.6	18.8	10.4	25.0
Limehe Timur	43.9	30.3	18.2	6.1	1.5
Totals	39.91	27.19	14.91	9.21	8.77

Source: Analysis of primary data, 2014

Vulnerability Socio-economic Household

Socio-economic vulnerability used in this study are the economic conditions, residence, social conflict, and through structured interviews obtained knowledge of season.

a. Economics Pressure

Economics pressure faced by the farmers and fishermen household are due to harvest failure and the high production cost. In addition to that, dependency on farming activities and fishing activities (*mohala*) would cause economic vulnerability due to instability and irregularity of income to fulfill their family needs. The level of economic vulnerability varies in five research sites, with Kayu Bulan as village with the highest vulnerability and Iluta village with the lowest vulnerability, as shown in Figure 1.

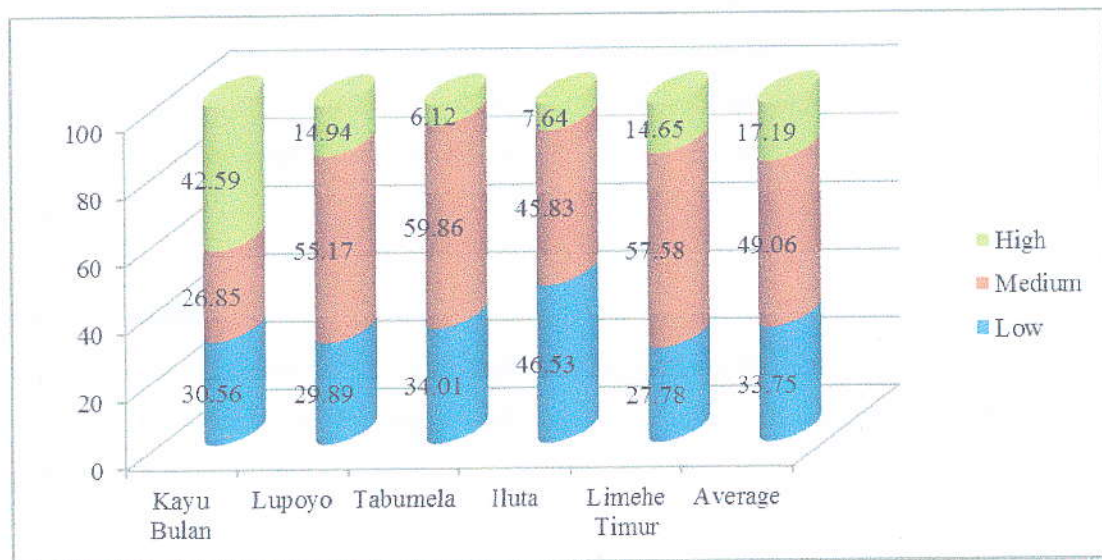


Figure 1. Economic Pressure Vulnerability

Households respondents in Kayu Bulan village generally rely on rice farming and fishermen as their source of livelihood. The yield from the rice farming is used to cover the debt for production cost such as fertilizer, seeds, and other working capital. Kayu Bulan village is the center of economic activities in Limboto sub-district, regardless, only few of these respondents (5.56 percent) that used this as an opportunity to set up additional livelihood, such as small shops.

Income from farming or fishing insufficient daily needs. There are not all farmers and fishermen have a second job to supplement their income. Such conditions experienced with Mr. Yusuf and Mr. Kude from interviews following:

The interview: "...I have no skills other than farming, and it has become the main job.

Alhamdulillah still less for everyday purposes.(The interview with Mr. Joseph-Januari Kude 2014)

..... Mohala is only my livelihood and cut no other job that can support the economic life of the family. (Interviews with Mr. Kude-January 2014)

On the other hand, the research reveals that Iluta village has low vulnerability level because the respondents, in addition to have income from main jobs, large proportion of the respondents (45.83%) have additional job as farmers as well as fishermen, small shops vendors, and *Bentor* (local carriage) driver. In this village as well, the households as floating fish net business. Therefore, it is possible to guarantee the fulfillment of household needs.

The ability of the economy is very limited, while the increasing needs led to the emergence imbalance between income and expenditure of households. The imbalance causes households vulnerable to price fluctuations in the market. Rising commodity prices of goods in the market on the one hand is not accompanied by an increase in revenue. This condition causes the burden getting heavier household expenditure, while revenue is not increased. Conditions were completely inadequate over time led to the emergence of deprivation difficult circumvented.

b. Residence Condition

During the flood season, the farming area near the lake are flooded as well as the residence area of the Limboto Lake. This research reveals that the residence area surrounding the Limboto Lake, presented in Figure 2.

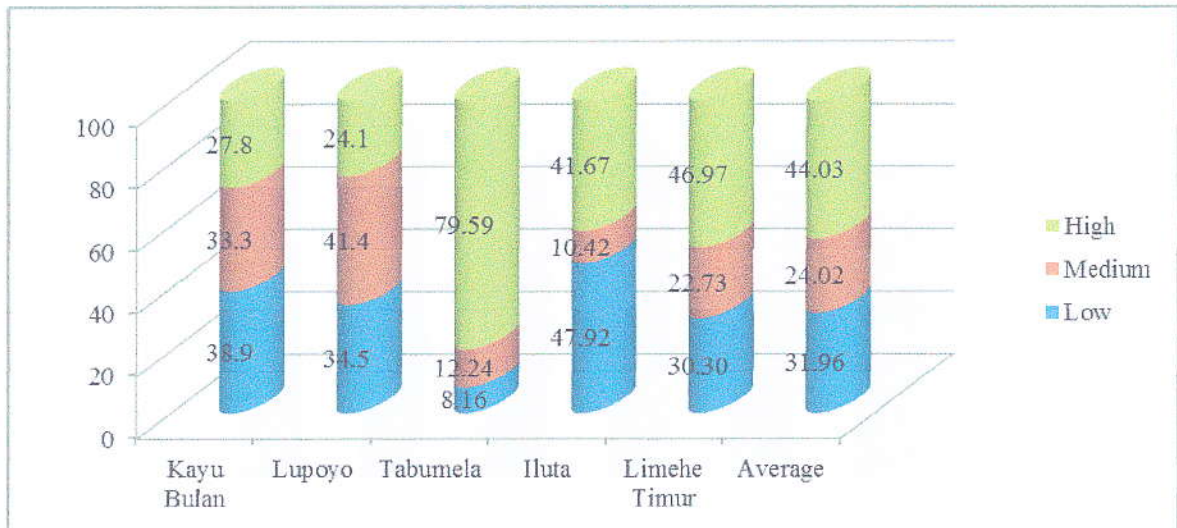


Figure 2. Residence Vulnerability Condition

Average level of vulnerability of living conditions in the village of Tabumela have high vulnerability, the lowest in the Village of Lupoyo and Kayu Bulan . Tabumela villages located downstream of Limboto Lake Tapodu flowing river which is the outlet of Limboto Lake, the village is often affected by floods when the lake overflowed Limboto. To be safe from flooding, home made stage and terraced houses.

c. Social Conflict

Social conflicts able to lead to vulnerability, disputes due to the annexation of land use or possession of fish to other people. According to Baiquni (2007) that, conflicts often arise when the encroachment and violation no longer be controlled. So in such a situation would occur in a conflict over resources are limited.

The results of research on the social conflicts household condition surrounding the Limboto Lake, as shown in Figure 3.

The average social conflict has low vulnerability. A few of them have a high vulnerability. Social conflict mainly from farmers and fishermen. The lowest Iluta village, that the social conflict of fishermen catching and fish farming net. No conflicts within farmers, because farmers in the Iluta with hilly topography as farmers cornfield instead of rice farmers, so there will be a conflict in the seizure of water to irrigate the fields.

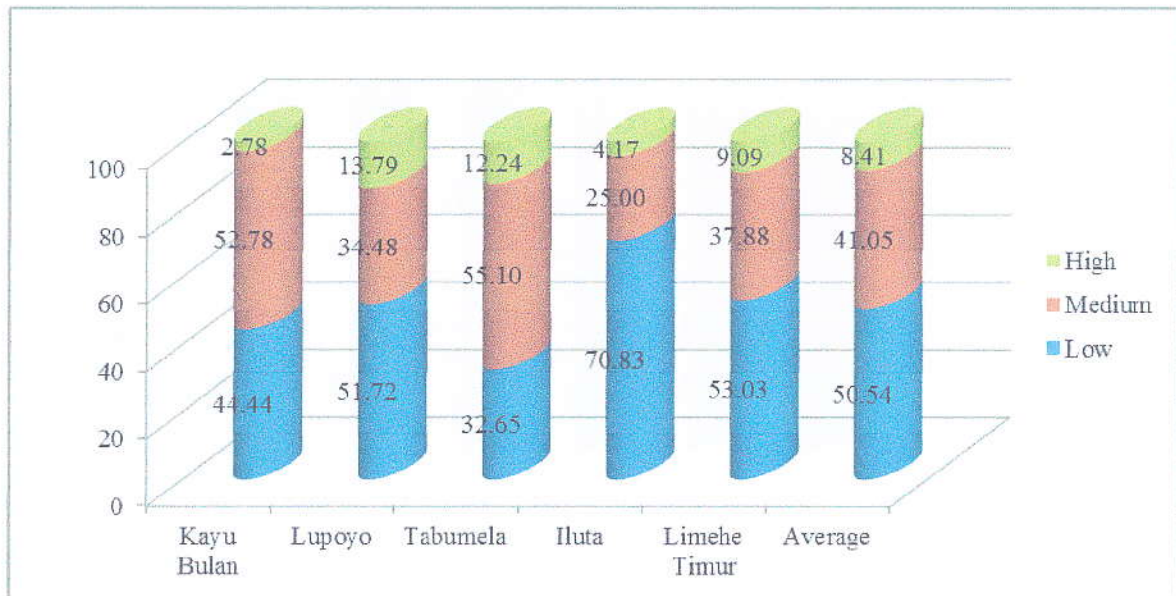


Figure 3. Social Conflict Vulnerability

The fishermen in five research sites surrounding the Limboto Lake is generally classified as a traditional fishing that simple fishing technology, so that the dependence on natural conditions is largest. For the traditional fishermen often put nets and create a boundary, it is often trigger social conflict if there is a shift boundary location. Besides the traditional fishing net into the area belongs to someone else, this can lead to conflict if taking fish nets or boat damage.

d. Impact and Knowledge of Season Change

Climate change impacts on natural resources and people's lives especially those who depend on these Limboto Lake Resources. From the results of research on the impact of climate change which includes wet and dry season farmers' difficulties in working on agricultural land, the fish catch, income level, and knowledge of the growing season and when can be *mohala*. The results of vulnerability impact and knowledge of the changing seasons can be seen in Figure 4.

From the results that the vulnerability average level is low. The highest Vulnerability in Subdistrict of Kayu bulan to 39.58%. It is possible to population of farmers did not use the calendar to determine when the start of the planting season. The timing of planting is based on their observations of the weather and the rain forecast then.

Household of Tabumela Village, Iluta and Limehe Timur have a level of vulnerability of low. Households in these three villages generally have knowledge of the seasons change so it can anticipate that do not suffer losses. Household of fishermen observe if high rainfall, the flooding and overflowing lakes occur more frequently.

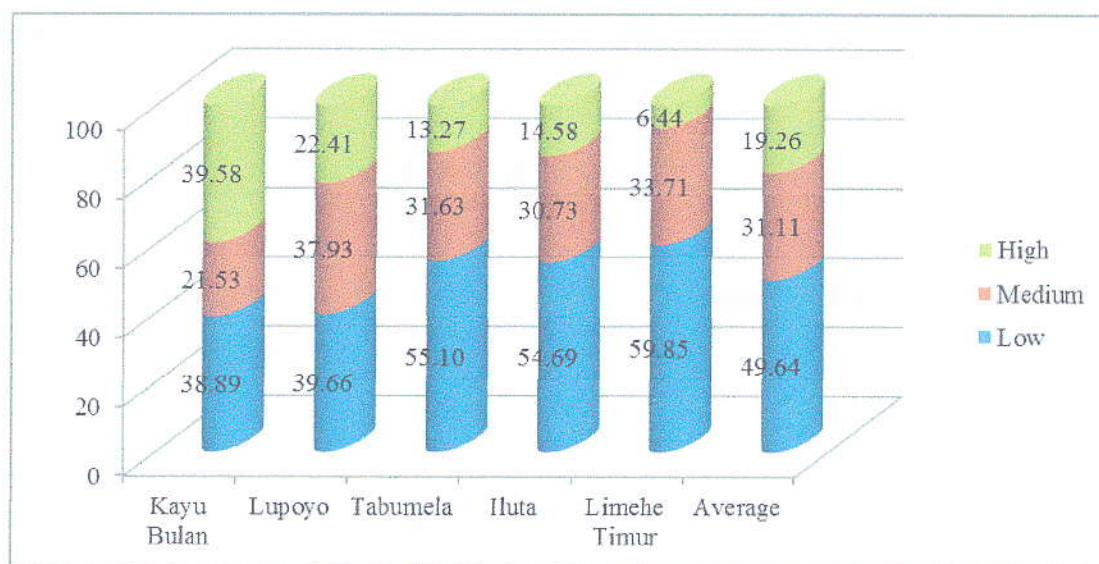


Figure 4. Impact and Knowledge Vulnerability to Seasonal Changes

Traditional fishermen count on their instincts and natural signs. If the rain level is high then they would not go to fish in the lake. For the floating net fishermen, if the rain level is high, they anticipate it by raising their net so the fish would not be loose. However, unpredicted things often happen, hence it influences the number of fish that they landed and the consequence on their reduced income, so it can lead to vulnerability.

Conclusion

1. Household's socio-economic vulnerability of farmers and fishermen are quite various. Dependency on farming activities and fishing activities (*mohala*) would cause economic vulnerability due to instability and irregularity of income to fulfill their family needs that the household has a vulnerability medium level, trending the to be low, their residence conditions that often flooded is highest; knowledge and the impact of the changing seasons tend to be low; generally the peoples has knowledge of the changing seasons so that they can anticipate that do not suffer losses; so there who did not use the calendar in the early season, so, if there was a flood, it will soak the plant. For fishermen fish catches will have an impact on earnings pressure and cause vulnerability for the household itself has a high vulnerability.
2. In order to minimize the socio-economic vulnerability of the population comes from the environment of the lake, the necessary empowerment of residents surrounding the lake right on target, using the resources of the lake with attention aspects of environmental sustainability.

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