Community forests’ management in the Saddang watershed

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Abstract. This study aims to identify and analyze the socio-economic characteristics of the community, which then are used to formulate a sustainable community forest management strategy. This article analyses the livelihood profile and the implementation of community forest management by using fishbone analysis and gap analysis. The results obtained in this study are members of farmer groups in general livelihood as a farmer which lack of education. The age of farmers are generally classified as productive age. The average number of dependents household is 3-6 people (72,58%), and the total average income of community forest management yield is around IDR 1,158,582 – IDR 1,411,748 per month. The highest revenue earned from honey commodity is IDR 600,000 – IDR 1,050,000 per month and from palm sugar commodity is IDR 900,000 – IDR 1,000,000 per month. The management strategy of community forest in Saddang watershed formulated in this research is the utilization of multi-purpose tree species by developing business unit managed by forest farmer groups based on creative economy and increasing the capacity of community farmer group members through mentoring and training.

1. Introduction
The physical aspect of watershed area is known as the mainland to store, receive, accommodate and drain rainwater to sea or to lake through river main. In this research, we investigate the human dimension of watershed area by investigating community forest in the watershed area. Forest land use system and human system are main indicators on observing any related community forest program and implementation [1]. Land use in the basin area especially in forest area must controlled as land-based activities are important factors affecting the quality and quantity of water resources within the watershed ecosystem. However, the pressure of local and regional livelihood system and needs has made the watershed management to become more complex

Saddang Watershed is one of the main watersheds that flows in the region South Sulawesi and West Sulawesi Provinces. Saddang watershed is the largest watershed second in South Sulawesi and is a priority watershed in Indonesia based Plan Strategic Environment Life and Forestry Year 2015-2019. Land area critical of Saddang watershed reached ± 195,877 ha [2]. The results of the study Socio-Ecology Prone to Disaster Based Saddang Watershed management find that event disaster that occurred as landslides and floods is effect from conversion region forest in the upper watershed becomes agriculture, and usage land that is not corresponding with power support it.

Efforts rehabilitation forests and land in the Saddang Watershed area has been done since year 2008 with vegetative method (reforestation / reforestation) in the program " National Movement of Rehabilitation Forest and Land " and civil engineering with the manufacture of soil conservation buildings [3]. Besides that, deep support effort rehabilitation forest and land, government implement the
program "Kebun Bibit Rakyat" to provide timber tree seedlings or multi-purpose tree species/MPTS with the aim of improving the welfare of the community and at the same time supporting the recovery of function and carrying capacity of the watershed.

People participation is the requirement in successful community empowerment program especially in forestry sector [4]. Development program forestry involve community with scheme forestry social start encouraged visible on the national program government amounting to 12.7 million ha forest area for social forestry [5,6]. Besides that, the document of national design of action on adaptation change climate (RAN-API) of 2014 mentions target of encouragement of community forest (HKm) and forest village (Hutan Desa) as effort rehabilitation of the national watershed reaching 500,000 ha for whole region the adjacent forest with priority watershed. Some experts also admit that community around Forest able do protection to land critical through efforts conservation [7].

Engagement community in management Forest through scheme community forest is integration participation community with pay attention aspect socio-economic community without rule out aspect environment. Organizing community forest in the region of watershed on Forest protected covering an area of ± 4,380 ha in the North Toraja district set based on Minister decree No. SK.628/Menhut-II/2010. Therefore, this paper analyze the performance management of community forest on Saddang watershed area in the Toraja Utara District. This article aims to identify and analyze the characteristics of social economy of community forest implementation, and formulate its strategy.

2. Methods

2.1. Methods protocol
This research was conducted in December 2017 - April 2018, observing the implementation community forest located in the village of Saddang watershed region, such as Bokin, Paniki, Basokan, Naggala, and Nanna Naggala Village on Toraja Utara District, South Sulawesi. We used observation, interviews, and document analysis.

We interviewed 62 respondents representing key members of community forest farmer groups on Saddang watershed area in the Bokin, Paniki, Basokan, Naggala, and Nanna Naggala in North Toraja, and stakeholder related in management Community forest. The respondent also represents each Social Forestry of Ministry officer (BPSKL), head of villages, and NGO’s. We observed their basic socio and economic background and activities. These our steps on deploying our methods

- In-depth interview and observation capturing respondents that asking the characteristics of social aspects covering economics level education, livelihood, age, dependents family, accessibility and income earned from management community forest, as well as problems in community forest management.
- Fishbone Analysis. This analysis is expected to better understand the problems in the management of community forestry implementation
- Gap analysis that happens in community forest management and formulating community forest management strategy.
- Content analysis by collecting and analyzing all related documents such as rules, community forestry managements, and government reports

2.2. Data analysis
Fishbone analysis is used to identify problems that hamper land management. Analysis of condition, situation and problem of land management is used to see the broader context and specific condition of land management optimally. This will describe the conditions in each aspect as well as the factors that influence the optimal land management.

Gap analysis used for observe condition moment this with ideal conditions or supposed to be on those aspects that are still be inhibitors or problem main in management land.
3. Result and discussion

3.1. Forest farmers’ education background
Interviews have been delivered in five villages on our location study object to investigate the level education background of the community. Generally, they have low formal education background. Level of an education community member of community forest farmer groups finished primary school as many as 51 people, finished junior high school as many as five people, graduated from high school as many as four people, bachelor degree as found as two people. The full capture of education level background of our respondent can be found in Figure 1.

Figure 1. Education level of peoples in the study area

The level of formal education has a role in shaping the mindset of the community in acting. People with low education find it difficult to accept new things, innovation, and knowledge [8]. The level of education is closely related to the perceptions and understanding of forest-related communities [9]. Low level of education is possible one of the factors of low understanding and perception of the community related to sustainable forest management in this case the management Community forest and forest farmer groups institutional itself so that the implementation does not run optimally.

This low level of education profile is caused by the poverty [10]. The lower level of community education, the lower their income because both of these things are interconnected [11]. Therefore, the condition of the community which is a member of the Community forest farmer group with a low level of education needs to gain additional knowledge and information through counseling, socialization of rules, training and assistance related to the management of community forest.

3.2. Livelihood context
In addition to the level of education, the results of the study also found that most respondents were farmers. The distribution of other livelihoods other than farming is presented in Table 1.

Table 1. Distribution of Other Livelihoods

| No | Another livelihood | Number of Respondents (People) | Percentage (%) |
|----|--------------------|--------------------------------|---------------|
| 1  | Yes                | 12                             | 19.35         |
| 2  | No                 | 50                             | 80.65         |
|    | Total              | 62                             | 100           |

Table 1 shows that 80.65% of Community forest farmer group members do not have other livelihoods. This indicates that they are very dependent on farming. Kadir et al [12] states that people who mostly work as farmers tend to rely heavily on existing land resources. Most of them work as farmers also due to
the low level of education of members of Community forest farmer groups so that they are difficult to compete and get adequate jobs.

### 3.3. Age of community forest farmer groups

In addition to the level of education, social aspects that affect the management of Community forest by the community i.e age. Based on the Central Bureau of Statistics, 2016 states that the productive age is in the age range of 15-64 years, while the unproductive age is under the age of 15 years and over 65 years. Based on this, the age of Community forest farmers obtained from the interviews is classified based on the productivity presented in Table 2.

#### Table 2. Age of community forests’ farmers in Saddang watershed region

| No | Age Range   | Number of Respondents | Percentage (%) |
|----|-------------|-----------------------|----------------|
| 1  | <15 Years   | -                     | -              |
| 2  | 15 - 64 Years | 59                    | 95,16          |
| 3  | ≥65 Years   | 3                     | 4,84           |
| **Total** |   | **62**               | **100**        |

Table 2 shows the age of farmers members of community forest farmer groups spread in five research villages with the highest percentage of 95.16% have age of productive age while the rest of 4.84% belong to unproductive age. It proves that most respondents are at productive age. The age level of farmers has a large role in land management as it relates to work productivity [13]. People who work as young farmers are generally very productive because of their physical ability and ability of think reach maximum condition compared to old farmers. In addition, young farmers have a high spirits and desire to make changes and more daring to take risks in the farming business that occupied.

### 3.4. Amount of family dependence

The number of family dependents is one of the factors that determines the increase of farmer's production and income and the ability to manage the farm in community forest area [14]. In addition, the number of family members provides an overview of the potential employment of farmers. The number of members of the family is also closely related to the amount of expenditure and income of farmers. The greater the number of dependents of the family, the higher the level of expenditure of a family. Thus, the farmer as the head of the family and the breadwinner will have a high motivation and enthusiasm in doing his work. The number of dependents of the community forest farmer group in the Saddang watershed area is presented in Table 3.

#### Table 3. Number of family in community forest farmer group members

| No | Number of family | Number of respondents (People) | Percentage (%) |
|----|------------------|--------------------------------|----------------|
| 1  | 1-2              | 10                             | 16,13          |
| 2  | 3-4              | 25                             | 40,32          |
| 3  | 5-6              | 20                             | 32,26          |
| 4  | 7-8              | 6                              | 9,68           |
| 5  | Nothing          | 1                              | 1,61           |
| **Total** |   | **62**               | **100**        |
The table above shows that most farmers have 3-6 family dependents. The large number of dependents of farm households will affect sustainable forest management. For the most part, many farmers who tended to cultivate forests by cultivating profitable crops are driven to meet the needs of the family [14]. Therefore, assistance and training should be done in the framework of sustainable management of community forest.

3.5. Accessibility
One of the factors that influence the management of Community forest is access to plots of working area of farmer group members. The distance of Community forest area from the settlement varies from village to village. The distance traveled from the settlement to the community forest area in Bokin sub-district is accompanied by hardening road conditions. Similarly, community forest location in the Village area and Nanggala and Basokan that hardening roads and dirt roads can only be reached by motorcycle and walk. The distance traveled Community forest from the center of the settlement is presented in Figure 2.

![Figure 2. Mileage from residential center to community forest area](image)

The picture above shows that the residential location in Nanna Naggala village to community forest area is the furthest distance of 4,391 km. However, it can also be seen in Figure 4, community forest area based on map issued by BPSKL Sulawesi Area Year 2017, indicating that community forest area managed by forest farmer group member of Naggala Village is not in village administration area. Local roads taken by farmers to the location as far as 4 km to community forest area.

3.6. Community forest farmer groups’ revenue
The types of commodities developed by the community in the five research villages in the Community forest area and their sources of income are coffee, bamboo, cacao, sugar palm, honey, cloves, ginger, and chili. The selection of this commodity is based on the potential of NTFPs contained in Community forest area i.e. sugar palm, honey, and bamboo and plantation crops developed intercropping such as cloves, ginger, chili, and coffee. The income derived from the management of Community forest based on commodity fish is presented in Table 4.
Table 4. Community forest Group Farm Income Based on Commodity

| No | Subdistrict/Village | Commodity developed in Community forest area | Amount of Production Average | Unit | Selling Price (IDR per Bottle, kg, trunk, Liter) | Revenue from each commodity (IDR per Month) |
|----|---------------------|---------------------------------------------|-------------------------------|------|-----------------------------------------------|-------------------------------------------|
| 1  | Bokin               | Honey                                       | 7                            | Bottle/Month | 100,000-150,000 | 700,000-1,050,000 |
| 2  |                     | Chili                                       | 20                           | Kg/month    | 8,000 - 10,000 | 160,000 - 200,000 |
| 3  |                     | Arabica coffee                             | 30                           | Kg/year     | 17,000-18,000 | 42,500-45,000 |
| 4  |                     | Robusta coffee                             | 20                           | Kg/year     | 30,000-32,000 | 50,000 - 53,333 |
| 5  |                     | Parring Bamboo                             | 100                          | Trunk/year  | 20,000-25,000 | 166,666 - 208,333 |
| 6  |                     | Pattung Bamboo                             | 110                          | Trunk/year  | 40,000-45,000 | 366,666 - 412,500 |
|    | Total               |                                             |                              |             |                 | 1,485,832 – 1,969,166 |
| 7  | Paniki              | Cacao                                       | 70                           | Kg/year     | 20,000 - 22,000 | 116,666 - 128,333 |
| 8  |                     | Robusta coffee                             | 50                           | Kg/year     | 20,000-25,000 | 83,333 - 104,166 |
| 9  |                     | Parring Bamboo                             | 200                          | Trunk/year  | 20,000-25,000 | 333,333 - 416,666 |
| 10 |                     | Pattung Bamboo                             | 184                          | Trunk/year  | 40,000-50,000 | 613,333 - 766,666 |
| 11 |                     | Sugar palm                                 | 20                           | Liter per Month | 50,000 | 1,000,000 |
|    | Total               |                                             |                              |             |                 | 1,146,665 – 2,415,831 |
| 12 | Basokan             | Arabica coffee                             | 35                           | Kg/year     | 15,000 - 18,000 | 43,750 - 52,500 |
| 13 |                     | Robusta coffee                             | 25                           | Kg/year     | 20,000-25,000 | 41,666 - 52,083 |
| 14 |                     | Cacao                                       | 35                           | Kg/year     | 15,000 - 20,000 | 43,750 - 58,333 |
| 15 |                     | Clove                                       | Not yet harvested            |            |                 |                      |
| 16 |                     | Ginger                                     | 100                          | Kg/panen    | 7,500 - 8,000 | 93,750 - 100,000 |
| 17 |                     | Honey                                       | 5                            | Bottle/Month | 120,000 - 150,000 | 600,000 - 750,000 |
| 18 |                     | Chili                                       | 25                           | Kg/Month    | 15,000 - 18,000 | 375,000 - 450,000 |
|    | Total               |                                             |                              |             |                 | 1,197,916 – 1,462,916 |
| 19 | Nanggala            | Arabica coffee                             | 20                           | Kg/Year     | 15,000-20,000 | 25,000 - 33,333 |
| 20 |                     | Robusta coffee                             | 15                           | Kg/Year     | 20,000-22,000 | 25,000 - 27,500 |
| 21 |                     | Cacao                                       | 25                           | Kg/Year     | 15,000-20,000 | 31,250 - 41,666 |
| 22 |                     | Sugar palm                                 | 20                           | Liter per Month | 45,000 - 50,000 | 900,000-1,000,000 |
| 23 |                     | Bamboo                                     | Not yet harvested            |            |                 |                      |
|    | Total               |                                             |                              |             |                 | 981,250 – 1,108,499 |
| 24 | Nanna Naggala       | Arabica coffee                             | 40                           | Kg/Year     | 15,000 - 20,000 | 50,000 - 66,666 |
| 25 |                     | Cacao                                       | 30                           | Kg/Year     | 15,000-20,000 | 37,500 - 43,750 |
| 26 |                     | Sugar palm                                 | 20                           | Liter per Month | 45,000 - 50,000 | 900,000-1,000,000 |
| 27 |                     | Pattung Bamboo                             | 125                          | Trunk/year  | Not for sale |                      |
| 28 |                     | Pattung Bamboo                             | 110                          | Trunk/year  | Not for sale |                      |
|    | Total               |                                             |                              |             |                 | 981,250 – 1,108,499 |
|    | Average of Overall Revenue |                                         |                              |             |                 | 1,158,582 – 1,411,748 |

After analyzing the income earned on each commodity, the average income that community forest farmers can be earned is around IDR 1,158,582 – IDR 1,411,748 per month. The highest income earned from the commodity of honey is IDR 600,000 – IDR 1,050,000 per month and Sugar palm IDR 900,000 – IDR 1,000,000 per month. Revenue earned in utilizing community forest area is lower compared to UMP of South Sulawesi.

3.7. Problems in management community forest

To find out the root of the problems that hamper the management of Community forest in Saddang watershed, then the cause-effect analysis using fishbone analysis. The diagram is prepared based on primary data obtained from the field and analysis of secondary data in the form of report of study result, literature study, and rules of law and information obtained from the stakeholders such as the head of farmer group, subdistrict/village apparatus, BPSKL and community forest companion from WALDA (NGO). The results of the analysis using fishbone diagram approach related problems in the management of Community forest in Saddang Watershed is presented in Figure 3.
After analyzing the problems using fishbone diagrams, problems were obtained in every environmental, social, economic, and institutional aspect presented in Table 5.

Table 5. Major Issues on Community forest Management in Saddang Watershed

| No | Aspect       | Problems                                                                 |
|----|--------------|---------------------------------------------------------------------------|
| 1  | Social       | 1. Farmers lack of knowledge                                              |
|    |              | 2. Farmers lack of work productivity                                       |
|    | Economy      | 1. Farmers low income obtained from the community forest management       |
|    |              | 2. High level of family needs                                             |

Before formulating the management strategy of community forest, in this study conducted gap analysis. Gap analysis is principally used to provide a comparison between the current Community forest management with the ideal and expected management. This analysis is helpful in determining appropriate and factual strategies [15]. The analysis in this study is focused on minimizing the gaps that are inhibiting in the management of community forest. The results of gap analysis in the management of Community forest in the Saddang watershed are presented in Table 6.
Table 6. Gap Analysis in community forest Management

| Existing Condition | Expected Conditions | Gaps |
|--------------------|---------------------|------|
| Revenue earned by farmers form managing community forest is still low | Revenue earned by farmers form managing community forest is high | 1. Lack of supporting equipment for farmers |
|                     |                     | 2. Uneven distribution of work area |
|                     |                     | 3. Production results are not managed into finished goods that have high economic value |
|                     |                     | 4. Lack of training and capacity building assistance after granting a management license |

3.8. Strategy of community forest management

After analyzing the gaps that are then used to formulate the community forest management strategy in the Saddang watershed by considering the various problems that have been described in every aspect, analyzing the existing conditions in the field, and conducting the literature review, the strategies that need to be implemented in the management of Community forest in the Saddang Watershed are as follows:

a. Utilization of NTFPs in the form of honey, sugar palm, and bamboo, by developing business units managed by farmer groups based on creative economy. Creative economy means that all related sectors’ actors should support the need of local community forest entrepreneurship

b. Capacity building of community forest farmer group members through training and assistance such as organizational management training, NTFPs utilization training, forest protection related training, entrepreneurship training, and marketing training.

4. Conclusion

We successfully capture the broader socio-economic characteristics of farmer groups members in general as farmers in the research study. The level of education is low, the age of the farmers is generally classified as productive age, the average family dependent of 3-6 people (72.58%), and the total average income generated in the management of Community forest is IDR 1,158,582 – IDR 1,411,748 per month. The highest revenue earned from honey commodity is IDR 600,000 – IDR 1,050,000 per month and sugar palm IDR 900,000 – IDR 1,000,000 per month. Management strategy of community forest in Saddang watershed is formulated in this research, which show the utilization of NTFPs business. These small-scale business unit is managed by farmer groups based on creative economy. Furthermore, it is also recommend the consistent community based capacity building project to increase the capability of forest farmer group both as the individual farmer and as the member groups.

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