Non-Timber Forest Product Accounting

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Non-timber Forest Product Accounting: Preliminary Estimates for community Forestry Business in South Sulawesi Indonesia

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Abstract. *The purpose of this study is to determine the potential and balance sheet utilization of non-timber forest products (NTFPs) in South Sulawesi community forest area. The study's location is in the community forest area neighborhood of Watang Bacukiki Village in the Bacukiki District of Pare Pare City, South Sulawesi. Data was collected through observation, interviews, and a questionnaire given to all group members (a 37-person census). In order to determine the final reserve amount, which will serve as an initial estimate for business development, the natural resource utilization balance is analyzed through a physical balance by calculating the amount of initial reserves in the research year, adding with planting, and then reducing by the amount of depletion or use. The results revealed that candlenut, coffee, cashew, cinnamon, cloves, and rhizomes are the NTFP categories that have the potential to be developed as sources of revenue for the community. Specifically, in the candlenut plant are the greatest final reserves to be discovered. In terms of ensuring the supply of raw materials for the survival of community forestry businesses, it is crucial to calculate the balance of forest resources.*

Keywords: *Initial reserves, final reserves, NTFPs, balance sheets, physical balances*

I. INTRODUCTION

Natural resources are one of the assets that need to be developed and optimized to support the development of an area and the sustainable use of natural resources. Utilization of these natural resources must pay attention to conservation, biodiversity [1] and efforts to preserve the function of the ecosystem [2]. One role of natural resources is as a source of raw materials in production activities [3] [4]. The uncontrolled use of natural resources will increase the pressure on the environment which will affect the needs of the community in the future. Optimizing natural resources plays an important role not only in social and economic aspects [5] [6] but also in the sustainability of natural resources [7]. NTFPs is quite diversified [8] and performs a number of tasks that support the sustainability of natural resource ecosystems, including ecological, social, and economic elements, particularly as a source of income for the community [9] [10] [11] [12]. According to [13] another benefit of non-timber forest products (NTFPs) over wood forest products is that they can be processed using simple to medium technology and modest to medium capital requirements, which also affects the rate and pattern of forest degradation [14]. The Forest Farmers Group, based in Watang Bacukiki Village, Pare Pare City, was one of the community groups that utilized NTFPs and gained a social forestry permit using the Community Forestry (HKm) design. Community forest is a state forest whose main use is to help empower the community in the utilization of the forest [15].

This location is among those with NTFP potential and has been used by the locals as a source of income. The lack of knowledge regarding the size of these forest product commodities' final reserves (stocks), however, is one of the barriers to their use. The stability and sustainability of the use of forest resources are supposed to be maintained. Calculating the balance of natural resources, which includes the physical balance calculation, is important to determine the quantity of reserves or potential natural resources in a given area.

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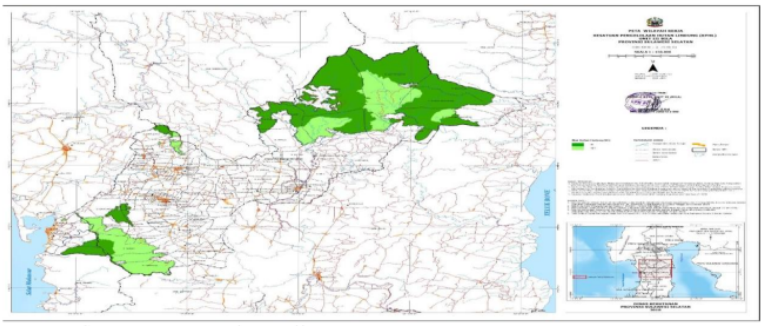
In terms of weight and volume, the physical balance can be used to represent changes in the quantity of natural resources, including the value of initial reserves, addition, depletion, and final reserves [16]. As a result, a balance sheet is required to offer information on the value of using natural resources and the environment, enabling more effective and wise use of both [17]. It is crucial for researchers to calculate the total value of forest product utilization in the form of a balance sheet so that it can be a reference in management and exploitation NTFPs both in this area and in several nearby areas. Changes that occur either by increasing (surplus) or decreasing (deficit) can be used as a basis for determining policies in its management [18].

II. METHODS

A. Study site

The research site is one of the prospective NTFP places that have so far been used by the community in the Protected Forest Management Unit (KPHL) administered area of Unit III Bila, which is administratively located in two administrative districts, Sidrap Regency and Pare Pare City. The KPHL Unit III area's boundaries are set at latitudes of 3° 30' 24.67" and 4° 7' 58.88" south and longitudes of 120° 17' 32.64" and 119° 38' 37.16" east, respectively. KTH Alam Jaya, a community organization with a Community Forestry (HKm) permit pattern, is one of the community organizations that was granted a Social Forestry permit in the Municipality of Pare Pare, South Sulawesi Province.

The majority of the population lives near forests and works as farmers on the 110 hectares of land that has been allowed access to management. This area is designated as a protected forest and may be used for the production of non-timber forest products and the provision of environmental services, provided that the protected purpose of the area is not altered. There are 37 respondents who are currently active in this group.



Source: KPHL Unit III Bila

Figure 1. Map location of Protected Forest Management Bila Forest Management Unit

B. Data Collection Techniques

Primary data and secondary data were both used in the data collection for this investigation. A list of NTFP resources, the number of trees or land owned by farmers, the quantity gathered so far, the amount still to be harvested, production, prices, labor needs, and equipment necessary to create NTFP products make up primary data. Initial observations and interviews conducted utilizing an interview guide were used to gather primary data. Using a census method, respondents were selected from a pool of 33 Forest Farmer Group members who were actively involved in the organization. The secondary data is information about the overall condition of the research area that has been gleaned from literature reviews, the outcomes of related studies, and other information that is both directly and indirectly connected to studies on the overall condition of the area.

C. Data Analysis

Descriptive analysis is carried out in compiling a list of NTFP natural resources for community business development and for calculating the utilization balance is carried out through balance analysis. The physical balance is the main consideration in the computation of the balance, which is based on the number of owned

trees and converted to kg. The physical balance is used to determine the initial reserve of NTFP resources that are readily available, the addition of NTFP resources (planting or enrichment) to be harvested in the future, the amount of depreciation (depletion) of NTFP resources that have been used, and determine the final reserve (stock). The formula is as follows for final reserve:

Final Reserve's = Initial Reserve + Addition – Depletion

Where:

1. The quantity of prospective NTFPs converted to final reserves (kg)
2. The number of trees and plants is the starting reserve.
3. The quantity of plants that are currently developing as stock and are anticipated to be harvested in the future is known as addition.
4. Depletion is the amount of resources used in a year, or depreciation.

III. RESULTS

A. Non-timber Forest Products

Cashew, candlenut, mahogany, and cloves are among the plant species that the majority of people and members of forest farmer group have long grown. Even formerly uncultivated plant species, such as pepper and coffee, are now beginning to be produced and in demand by the general population. There are currently 2 Social Forestry Business Group or KUPS in existence, KUPS of Pepper and the KUPS of Cashew. The community develops additional NTFP goods or commodities on each piece of land they oversee. With an average farmland size of 3 ha, the total amount of land managed is 110 ha. Three NTFP commodities/products, including coffee, cashews, and candlenuts, are the most popular of the eight types used by farmer groups. The sorts of NTFPs that are frequently employed as a source of local commerce in community forestry areas in this region are described below.

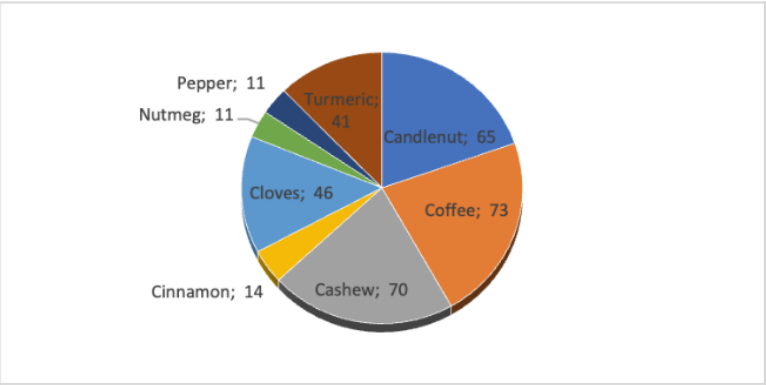


Figure 2. Percentage of types of NTFPs that people are interested in

According to Figure 2, the most common types are coffee (73%), cashews (70%) and candlenuts (65%). The two varieties of coffee that are grown are arabica (*Coffea arabica*) and robusta (*Coffea robusta*), both of which are sold as whole beans and ground coffee. Sorting coffee cherries, removing fruit skins,

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fermenting beans, drying, removing horns, and ultimately sorting beans for packing are the first steps in the processing of coffee beans. According to [19], the post-harvest procedure is essentially the same, with the exception of the fermenting and stripping procedures. While ground coffee is sold to local residents and cafe establishments, coffee beans are sold to collectors.

Public demand for cashew nuts, often known as cashews (*Anacardium occidentale*), is also very high. the majority of which is processed into cashew nuts before being sold, with a selling price of IDR 11.000/kg (0,70 US$), in the form of seeds or logs (Figure 3). Cashew nuts for processed foods, cashew nut shells for animal feed, seed shells for adhesives, varnish, and particle board are just a few of the many uses for cashew seed processing's potential added value [20].

Figure 3. Cashew

Candlenut (*Aleurites mollucana*), in addition to coffee and cashew nuts, is one of the goods that communities in this community forest region utilize the most. In line with Baharuddin et al [8] assertion from 2021, this plant is one of the NTFP goods that is extensively maintained by the community due to its high economic worth, particularly for those who live close to the forest. Round candlenuts (logs) and peeled candlenuts, which are the products of candlenut cultivation, are sold to collectors and end users. The post-harvest preparation of candlenuts, which are peeled hazelnuts, begins with the removal of the fruit's skin, followed by drying and storing the logs, sorting, drying, breaking open the shell, and packaging.

Additionally, the town grows cloves extensively as one of its main crops. The primary consumers of dried clove flowers, the primary product of cloves, are collectors. Cloves are processed after harvest in a straightforward manner, beginning with picking, sorting, drying/drying, and packaging. The quality produced is heavily influenced by the post-harvest process; if it is not managed appropriately, the crop's yield and quality will suffer [21]. Forest resources like pepper and cinnamon have not been extensively used by the local population. Despite the fact that these two commodities have been produced for a very long period, including in South Sulawesi, 20% of the group members still farm them. While nutmeg has not yet been harvested, pepper is offered as round pepper.

B. Physical Balance

The initial and final stock of resources, as well as their modifications, are described in the proper physical units to create the physical balance. These modifications could take the shape of additions or removals. Planting

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and natural growth can result in more reserves, whereas exploration of or use of the sugar palm's natural resources can result in changes. The physical balance describes variations in initial reserves, addition or planting, depletion (use), and final reserves for each type of natural resource. Initial reserves, additions, depletion, and final reserves are all reflected in the physical balance. the amount of reserves at the beginning of the following year will be equal to the volume of reserves at the conclusion of the current year. Figure 2 displays the overall physical equilibrium of the several plant species or NTFPs that the community has been cultivating.

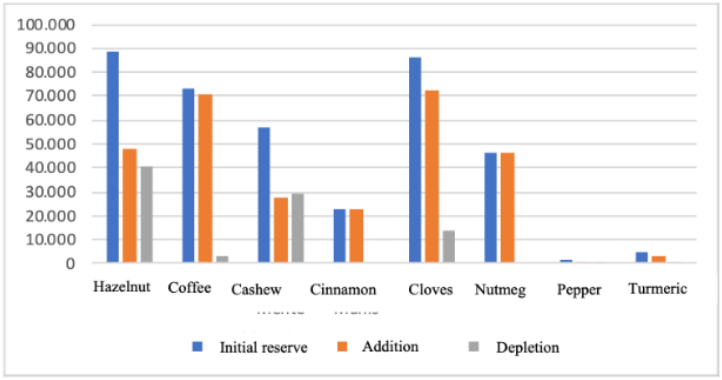

Figure 4. The total initial reserve, addition and depletion of NTFP products

The village grows candlenut, coffee, cashew, cinnamon, cloves, nutmeg, pepper, and turmeric, among other plants and products. Candlenut, with a potential output of 88,350 kg/year, coffee, and cloves, with a potential yield of 73,350 kg/year each, had the biggest original reserves; pepper, with a yield potential of 1335 kg/year, had the smallest starting reserves. Only a small number of people in the neighborhood have planted this particular variety of pepper; they grow it. The finished product is still shaped like a round pepper. The pepper production is first collected and then sold because there are currently only tiny amounts being produced. IDR 50,000/kg (3.19 US$/kg) is the cost of the raw pepper that is sold to collectors.

On each property, there are additional reserves in the form of plant enrichment. Clove and coffee plants, with potential yields of 72,500 kg and 70,500 kg, respectively, have the largest reserves. There are also further potential yields of 47,775 kg/year, 46,000 kg/year, and 27,425 kg/year for certain varieties of candlenut, nutmeg, and cashew nuts.

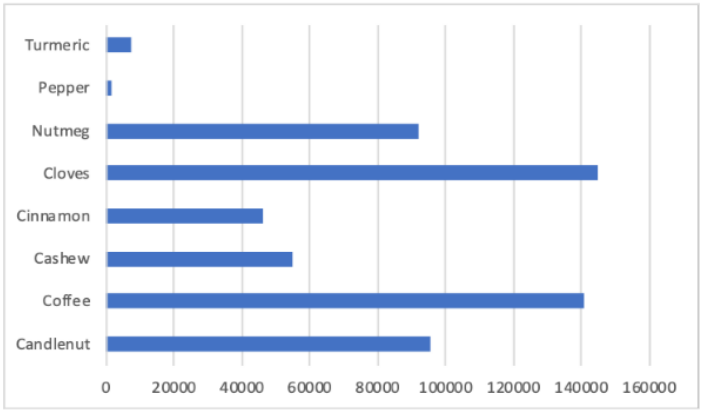

Figure 5. Final reserve's of NTFPS products

Through the development of community forestry businesses, the commodities of cloves and candlenut, which have final reserves of 145,000 kg (145 tons) each in the form of dried clove flowers and 95,550 kg (95.5 tons) in the form of candlenut peel, have the potential to increase the economic income of the community. Therefore, each farmer's potential annual contribution to government revenue for the clove commodity is IDR 470 million.

IV. CONCLUSION

The final reserves of natural resources differ in size for the following commodities: candlenut, coffee, cashew, cinnamon, cloves, nutmeg, pepper, and turmeric. The clove commodity has the largest final reserve with a total final reserve of 145,000 kg, and the pepper commodity has the smallest final reserve with a total final reserve of 1,350 kg.

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