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Infrastructure Role of Harvesting System In Community Forest

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Abstract. The community forest is one of the important assets of state revenue sources, seen as quite strategic in supporting wheels of development. Information about the obstacles and availability of regional infrastructure system used by a community in forest harvesting is not yet widely known, especially in Batu Putih, Maros. This study aims to identify the role of infrastructure in forest harvesting system. Data collection is done through direct observation and structured interviews. Primary data collected include specifications of available road infrastructure and those used by farmers in forest harvesting, available market infrastructure and utilized by farmers in marketing forest products, equipment infrastructure available and used by farmers in transporting forest harvesting, processing equipment infrastructure available forest products and used by farmers in processing forest products. While secondary data is obtained through a review of documentation of various sources, such as literature research, reports from relevant agencies or those related to research objectives. The results showed that the infrastructure used in community forests harvesting, including skid trails as skidding routes using both horses and human labor, village roads as lanes for transporting wood from the village roadside which can be reached by cars (Tpn) to the front of people's homes, and Provincial road as a transportation route from village roadside that can be reached by car (Tpn) to the village sawmill industry or to Makassar City. The most urgent infrastructure in community forest is a road because it can serve the mobility of population and forest commodities services from one place to another and can bridge the functional linkages between socio-economic activities of the village and the surrounding area.

1. Introduction

Community forest management is a form of human resource utilization and development by humans. The development of community forests is an alternative chosen to overcome socio-economic and environmental problems. The exploitation of community forests is one efforts to increase the carrying capacity of land for residents and contribute to watersheds management [1]. Community forest management as an effort to utilize natural resources and has been implemented for a long time on land that at first was used as a place to live permanently and in the end a desire arose to plant and maintain plants to make use of the results [2].

The results of preliminary study revealed wood plants that were developed in community forests in research locations, such as: Sengon (*Paraserianthes falcataria*), eucalyptus (*Melaleuca leucadendron*), sugar palm (*Arenga pinata*), Akasia (*Acacia sp.*), White Teak (*Gmelina arborea*), Candlenut (*Aleurites moluccana*), kapok randu (*Ceiba petandra*), Mahogany (*Swietenia macrophylla*), and bamboo (*Bambusa sp.*).



The exploitation of natural forest on the island of Sulawesi, the opening of its forest area (especially the road network) only aims to find and remove wood, after the exploitation of forest roads is abandoned, causing environmental damage, especially erosion and pollution of river water [3]. The development of regional infrastructure for exploiting the potential of timber and non-timber forest products has not been widely implemented [4] so that a lot of forest resources experience difficulties in their businesses, because of the unavailability of regional infrastructure, especially the road infrastructure for timber and non-timber forest products.

Community forest management until now, still uses human labor (manual) so that effectiveness is low and difficult to carry out large-scale management. Community forest management has not been touched by technological developments in forest engineering, even though the field has developed rapidly in developed countries for at least the past three decades [5]. Efforts to improve the quality of management and efficiency of utilization of community forest products are in desperate need of using tools that are by the objective conditions of the community forest and available road infrastructure to remove timber forest products from forest [5].

Information about the obstacles and availability of infrastructure used by population in community forests harvesting has not been widely known, especially in Batu Putih, Maros. Therefore research was conducted to identify the role of infrastructure (especially forest roads) on community forest harvesting systems.

2. Material and Method

This research was conducted for 3 months, in community forests Batu Putih, Maros (September to November 2018). Data collection is done through direct observation and structured interviews. Direct observation in the field with the aim of obtaining information about logging techniques, stem distribution techniques, sorting making techniques, skidding techniques and transportation techniques, and available regional infrastructure and those used by farmers in forest management. Structured interviews are conducted using a list of prepared questions.

Primary data collection is obtained by interviewing and field observation techniques, namely direct observation of timber harvesting activities and documenting stages of activities such as logging, trunk distribution, sorting, skidding, and transportation. The primary data collected include specifications of available road infrastructure and those used by farmers in forest harvesting. Available market infrastructure and utilized by farmers in marketing forest products, equipment infrastructure available and used by farmers in transporting the results of forest harvesting, infrastructure for processing forest products available and those used by farmers in processing forest products. Secondary data is obtained through review of documentation of various sources, such as reports on research results, reports from relevant agencies or those related to research objectives.

The data collected was then analyzed descriptively with an analytical framework based on primary data and secondary data. To facilitate the results of the analysis then tabulated by the results of the study.

3. Results and discussion

3.1. Particle Infrastructure Available in Batu Putih

Regional infrastructure is an available infrastructure system that has the main function to serve the mobility of the population and services or forest commodities from one place to another and to bridge the functional linkages between socio-economic activities and the surrounding area. Based on observations and interviews of respondents in the field, it can be seen that regional infrastructure is utilized in the harvesting system of timber forest products, namely in the form of settlements and roads, either in the form of dirt roads which are roads that they make themselves, farm roads (*hardening*), village roads (*asphalt*), as well as provincial roads that transport timber that is ready to be marketed. The transportation equipment used is a truck in which one truck can contain approximately 100

candlenut pads (*Aleurites moluccana*) with a bearing size of 4 meters long, 20 cm wide, and 10 cm thick, then the wood is brought to the sawmill industry (*sawmill*) located in Sabila Village.

The average community forest farmer in Batu Putih makes their houses almost adjacent to their community forest location, this is intentional because they think that nearby houses and community forests can reduce costs in the process of managing community forest land and transporting timber, but most importantly they creation must be reached with road access to facilitate the marketing process.

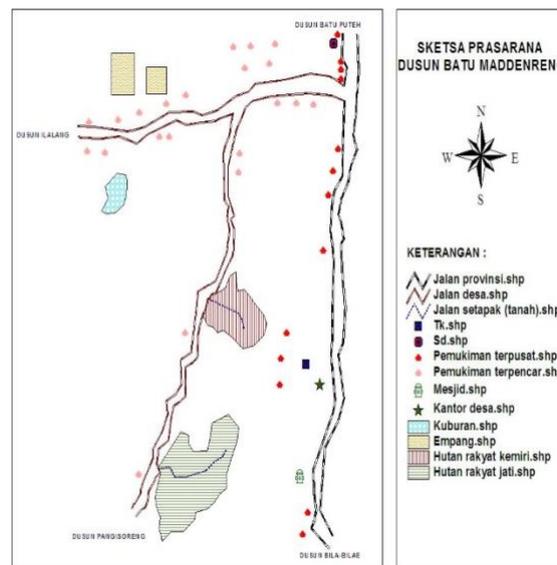


Figure 1. Infrastructure Map in Batu Putih

3.2. Infrastructure Role in Community Forests Harvesting

Road plays a very important role especially in skid trails in the process of logging [6]. As one of the wheels of transportation, skid trails are a trigger for the dynamics of sustainable forest development. In community forests in Batu Putih, the approach taken by entrepreneurs before logging is by inventorying trees to be felled and then making skid trails to be able to extract timber forest products to the village roadside (Tpn). The process for culms carried out by entrepreneurs in community forests is various, there are those who divide timber forest products according to market demand, but there are also those who divide the stems according to the road that will be passed during skidding, do not let divided wood cannot be removed because the road is narrow, so road infrastructure is very influential in the process for the stem. The road has a significant role in the skidding process in community forests in Batu Putih. The wood entrepreneurs employ labor to skew wood that has been divided into pads, both in the form of human power and horsepower. The extraction process from the felling location to the village roadside (Tpn) passes through the skid trail.

Table 1. Timber Forest Products that cannot be

No	Timber forest products	Causes so that they are not harvested
1.	Teak	Not yet have a dirt road because the topographic conditions are very steep and rocky.
2.	Candlenut	The distance between the logging location and the

roadside which can be traversed by timber transport vehicles exceeds 3 km

Roads (paths) are made by the community to make it easier for them to skid wood from the logging location to the village roadside that the car can reach (Tpn) [6]. The wood that is paraded is four meters in size for candlenut and one and a half meters for teak with road conditions in the form of footpaths with a width of approximately 1.5 meters so that the wood can only be skid using human power or horsepower.

Village roads are used for the entry of truck cars in the process of transporting wood from the location of the collection of wood to the front of the entrepreneur's house or the provincial road. Usually transportation equipment used in the form of truck cars if the wood is transported in large quantities. This road condition is in the form of hardening of mountain rocks with inadequate drainage so that in the event of rain the road becomes flooded and perforated. The width of the village road is 5 meters with a relatively steep slope so most wood entrepreneurs when the rainy season comes through alternative routes that can be reached far enough, namely passing through the village road in Pangisoreng to prevent/anticipate things that can be detrimental in the process transportation. m^3 with percentage of 2.851%, while the smallest volume of trees is $0.012 m^3$ with the percentage of 1.974%. Thus the percentage of waste stump averaged 2.242% of the total volume of trees that should be utilized. The occurrence of the waste stump is largely determined by the operator's ability and understanding of the maximum utilization of wood. The size of the waste is very dependent on: The loggers do not understand the making of the notch and the notch that can cause waste. Loggers do logging without considering the small size of the waste, but based on logging positions that facilitate logging activities. Lumberjacks pay more attention to meeting the targets of cutting, so do not pay attention to the height of the stump in logging.

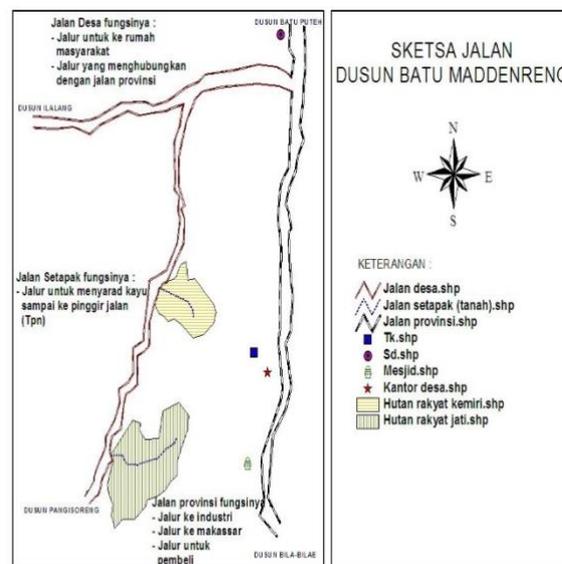


Figure 2. Roads Condition in Batu Putih

Provincial roads are used in the process of transporting timber from the home of a businessman to sawmill to wood market; the road condition is in the form of asphalt roads with a width of 6-12 meters. However, some timber entrepreneurs, especially teak (*Tectona grandis*), do not use this road because

they only sell the wood in front of their houses by waiting for buyers from outside the region who have ordered their wood, for example from Sinjai, Pangkep, Bone and Makassar City.

Table 2. The Role of Road Infrastructure in the Harvesting of Community Forests

1. No	Roads Infrastructure	Function in Harvesting	Equipment used
1.	Footpath	As a skidding line	Human power; Horsepower
2.	Village Road	As a lane for transporting wood from the edge of the village road that can be reached by car (Tpn) to the front of the house or the provincial road	Truck, when in bulk; Car Pick up, when in small quantities
3.	Provincial Road	As a transportation route from the village roadside that can be reached by car (Tpn) to the sawmill industry. Also as a route for buyers from outside the region, namely from Sinjai, Pangkep, and Makassar.	Truck

In another hand, the role of settlements in the logging process [7], with the proximity of residential areas, can be controlled intensively by timber harvesting, timber entrepreneurs and village officials. Every logging must be known or obtained permission from the local government or timber businessman. The role of settlements in the transportation process is the proximity of settlement, the cost of transporting from village roadside (Tpn) to entrepreneur's yard (Tpk) can be cheaper.

The number of settlements in Batu Putih is approximately 367 with a population of 1,659 people. Based on direct observations in the field, the community built a house by considering several provisions, namely, close to garden (community forest) and can be reached by road access. The role of settlements centered on the edge of the provincial road in the harvesting of community forests is to facilitate buying

and selling process where timber entrepreneurs, mostly conduct buying and selling transactions in front of their homes so that buyers are not difficult. The role of settlements scattered within Batu Putih for gardening in the harvesting of community forests in the proximity of their community forests to settlements, transportation costs will be smaller and the time needed in the process of transporting from village roads that can be reached by car (TPN) to the house they are getting faster.

4. Conclusion

Regional infrastructure used in harvesting community forests, such as skid trails for skidding lines using either horses or human labor, village roads for transporting timber from village roadside which can be reached by cars (Tpn) to the front of houses, and provincial roads for transportation from the village roadside that can be reached by car (Tpn) to sawmill industry or to Makassar City. The results of many candlenut and teak forests are not harvested because skid trail and village road infrastructure are not yet available. The most important infrastructure in community forests in Batu Putih is the road because it can serve the mobility of population and services forest commodities from one place to another and can bridge the functional linkages between the village socio-economic activities and the surrounding area.

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