



The Conservation and Development Model Design of Camphor (*Dryobalanops Aromatica*) Biodiversity in Sibagindar Champor Forest Pakpak Bharat District North Sumatra

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Abstract. Camphor trees (*Dryobalanops aromatica*) are one of the typical trees with a high prospect in Nusantara, especially in North Sumatra. Camphor was in high demand in the 2nd century so the price was almost equal to gold, Europe and the Middle East showed a high interest in this commodity. The camphor tree produces camphor which attracts the interest of most people. This tree grows in the forests of northern Sumatra. The International Union for the Conservation of Nature (IUCN) states that camphor has entered a very critical period and is even threatened with extinction. Therefore, it is important to maintain and protect the existence of camphor trees by involving wider communities to grow this tree. This paper discusses the conservation and development of camphor trees in the Sibagindar camphor forest as a form of conservation of camphor biodiversity and sustainable regional economic development. This study uses a descriptive qualitative method. The first process was identifying the problems and potentials of the camphor tree and the local area. Data were analyzed to design a conservation and development model of camphor.

Keywords: Conservation model · Camphor tree · Development · Subagindar Camphor Forest

1 Introduction

The camphor tree (*Dryobalanops camphora*) is one of the typical trees of the archipelago that has a high allure, is highly sought after, and even its price is almost equivalent to gold and has once been the prima donna of European and Middle Eastern peoples. The commodity is camphor derived from camphor trees that grow a lot in the forests of northern Sumatra. The existence of camphor (camphor) in this area is most likely the later background for the naming of one of the important trading cities on the West Coast of Sumatra, namely Barus. This place has even been reported by Claudius Ptolemaeus in the 2nd century AD in his book *Geographyke Hyphegeiss* which refers to Barus as Barousai [1].

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Claude Guillot (Editor) in his book *Lobu Tua Sejarah Awal Barus* [2], explained that Barus and Lobu Tua are the place of Barus as the Zero Point of Islamic Civilization in Nusantara XXVII from old sites that were once inhabited between the 9th to early 12th centuries add also contain Barus as a center for producing camphor and frankincense which became a trading commodity with nations from the Middle East, China and India [3].

The highest quality camphor (*Dryobalanops camphora*) is known to come from a city on the west coast of Sumatra, namely Barus. Lime from Barus is considered to have a stronger and fragrant aroma compared to camphor species from China, India or the Middle East. Therefore, camphor from Barus is more popular and is generally sold in sap form by traders in the past [1], also mentioned that the existence of camphor and frankincense as one of the trading commodities is quite influential on the existence and development of port cities on the island of Sumatra. In Barus, for example, the camphor and frankincense trade is one of the indicators of the progress and retreat of ports in the region. Foreign written sources also often inform about the camphor and frankincense trades that are mostly taken from the forests of Sumatra. Based on information obtained from local communities, community leaders and academics, lime products known as camphor come from forest trees in the area around Central Tapanuli, Dairi, Pakpak Bharat and the surrounding Aceh Singkil area.

Nationally, the population of camphor trees has decreased due to deforestation, forest fires, and the conversion of forests to oil palm plantations (*Elaeis guineensis*) [2]. This species is now being considered a rare plant in Indonesia, particularly in Central Tapanuli and Aceh Singkil Regency and is categorized as Critically Endangered by the International Union for Conservation of Nature [2, 4]. According to the International Union for the Conservation of Nature and Natural Resources (IUCN), the existence of camphor trees is currently a Redlist that is included in the Critically Endangered or critical conservation status. This status is the highest-level status of shock before the extinct status [5].

The factors causing the threat of this camphor trees are its slow growth (tens or even hundreds of years to be harvested) the high demand for camphor, causing camphor to also become more difficult to obtain, as well as the demand for camphor wood and the insistence of community movements in planting oil palm plantations which are considered a commodity that promises more profits. Until now, there has been no conservation program specifically carried out both at the local level and at the national level to protect and save this camphor trees as an endemic plant of North Sumatra, the heritage of the nation's wealth that was once part of the historical record of the archipelago.

Departing from this reason, this paper is meaningful as a brief review of the golden age of camphor trees and their current condition, it is hoped that through this paper it will be able to arouse and motivate the community and local governments in particular to play a role in preserving them. This paper aims to raise an idea in finding solutions regarding the existence of natural camphor trees in the form of conservation of biological natural resources of camphor trees and economic empowerment of communities located around the forest in general and specifically in the Sibagindar Pakpak Bharat camphor forest, North Sumatra.

2 Methods

2.1 Research Location

This research was conducted in the Camphor Forest of Sibagindar Village, Pagindar District, Pakpak Bharat Regency, North Sumatra, which is in the coordination: 2030'45.8"N, 98008'57.6"E (Fig. 1).

2.2 Research Procedures

Researchers use qualitative research methods to obtain research results. The approach used is a theoretical descriptive approach carried out in the form of literature research, observation, interactive discussions and limited interviews.

1. Literature research

Researchers collect library data, read and record and process research materials in order to find authentic sources and based on relevant research results.

2. Observation

Researchers made direct observations to the site to see the actual condition and presence of camphor trees. Observations were made to see the existing natural potential and unmanaged potential in the Sibagindar camphor forest.

3. Interactive Discussion

Researchers conducted a joint discussion with the community around the village around the Sibagindar camphor forest. Discussion of local community knowledge and information about the existence of existing potential, as well as suggestions related to development in areas around the forest.

4. Unstructured Limited Interviews

Researchers conducted limited interviews with village, sub-district and district government officials and community leaders and forestry practitioners. Then the data and

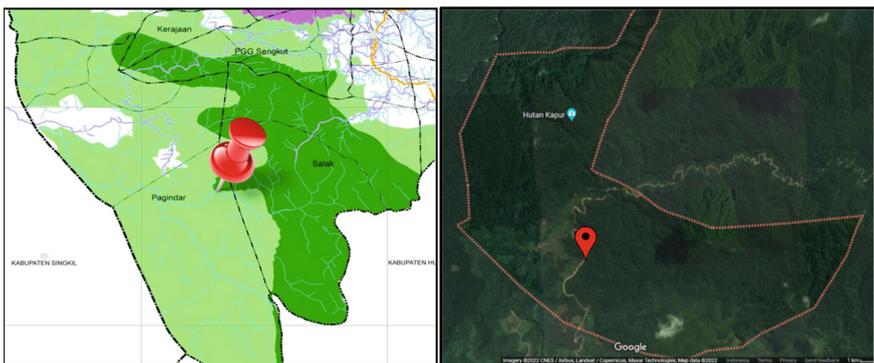


Fig. 1. Research location in Camphor Forest Sibagindar

information in the interview are used to find out the conditions and potential that can be done for conservation and development in the community through the biodiversity of camphor trees.

2.3 Data Analysis

The data collection process is carried out through literature studies of related studies, Observations, Interactive Discussions and Limited Interviews. After the entire data is collected, the data begins to enter the analysis stage. At this stage, the description of the previous data is analyzed through the classification of natural resource potentials. From the data of this study, it will become a constituent material based on natural resources and history. The last stage of this research is the process of interpreting the results of data analysis through the determination of a design model for conservation and development of camphor trees biodiversity.

3 Results and Discussion

3.1 Securing the Sibagindar Camphor Forest Area

Indonesia is a country that has very abundant biological resources. The richness of this biological resource can be seen from the many types of flora and fauna that inhabit this country. The need for the preservation of biological resources due to the emergence of threats that can damage biological sustainability in Indonesia. Including camphor trees, according to Prasetya (2013) [5] the results of observations by several plant experts suspect, concluded, or suspected that there has been a decrease in the population of camphor trees by at least 80% over the past 10 years or three generations. This can happen because the level of exploitation by the community of camphor trees is very excessive. The high exploitation of camphor trees was caused by the high price and demand for kamfer commodities in the world market at that time, illegal logging activities, forest fires, and the production of logs by several companies that have Forest Concession Rights. Dipterocarpaceae member growth factors are relatively sluggish and rare and unison fertilization events, make Dipterocarpaceae forests unique and vulnerable to the impact of uncontrolled exploitation activities. Moreover, there is a tendency for meranti to grow together to form a forest community, so in the eyes of loggers such conditions will be very efficient to be eradicated.

Based on the results of field observations that have been carried out in Barus Central Tapanuli as the origin of the camphor trade, it turns out that in this precise camphor trees almost no camphor vegetation is found in groups. Camphor trees only have a few trees and according to the owner, these trees have been managed for generations for generations.

In a forest exploration expedition carried out by local communities with academics, forestry practitioners and students, camphor trees have been found that are still thriving and developing well in this Sibagindar camphor forest, which is estimated to still number thousands of trunks in the forest, which is estimated to be 500 hectares. Through this study, the author presents the design of steps or actions for the camphor trees conservation model as follows.



Fig. 2. A bed of Camphor Sapling Seedlings Under stands



Fig. 3. Rescue of Seedlings by the Community

3.2 Camphor Tree Rescue and Conservation

The rescue and conservation of camphor trees is expected to be carried out not only to save existing trees, but the conservation paradigm can go in a broader direction, namely including research and domestication of trees into plants. This action can be done through: 1.) Vegetative and Generative propagation of plants (Insitu and Exitu), 2.) Plant propagation by tissue culture (laboratory), 3.) Distribution and planting in various locations both on community land and in forest areas (Figs. 2 and 3).

3.3 Nature and Cultural Preservation

Along with the awareness of the importance of the environment and sustainable development should begin to lead to the preservation of the environment, economic development

and social welfare of society. Similarly, the culture that exists in society. Culture is the work of a group of human beings that has been mutually agreed upon and has become a habit that has been passed down for generations, binding in society. Culture has been objectified in its shape and pattern, which is then internalized in every joint of life. The diversity and richness of culture make Indonesia a plural country.

To preserve nature and culture in the sibagindar camphor forest environment, it is carried out through: 1.) Organizing writing competitions, such as: Poetry, Short Stories, Science Fiction, Legends, Local Wisdom, Traditional Medicine, Traditional Food/Drink, Cultural Customs, Arts, history and local endemic trees and their benefits, 2.) Record the results of incoming writings and publish them, 3.) Development of cultural attractions and their publication.

3.4 Ecology Education-Tourism History

Based on the concept of developing and organizing tourism activities based on environmental utilization for protection and invoking the active participation of the community by presenting products charged with education and learning, positively impacting the environment, making a positive contribution to regional development and being applied to protected areas, open areas, fostered areas and cultural areas.

Ecology-Education-Tourism History activities can be carried out in the Sibagindar forest environment in the form of: 1.) Camping Ground, 2.) Tracking camphor forest tourism, waterfalls and routes, and 3.) Local culinary tours typical of Sibagindar.

3.5 Nature and Laboratory for Education and Research

Utilizing the Sibagindar forest environment as a natural laboratory for educational and research development. Various studies with various aspects of study: ecology, biology, geology, chemistry, physics and socioeconomics of the community, both at the primary and secondary education levels and even to higher education require the Nature Laboratory to explore it practically.

This activity can be carried out through activities: fieldwork practice, Internship and Preparation of Student Final Project, etc.

3.6 Economic Development of Local Communities

Local economic development is a process by which communities, local governments, and the private sector work together to create better economic conditions and create jobs, with the aim of building economic capacity at the local level that is sustainable as an effort to improve the living standards of the community. The local economic development of the communities around the Sibagindar Camphor Forest can be carried out through the process of local government, namely village officials, communities, and organizations in the community can participate in stimulating, encouraging, and inviting in the maintenance of community activities in order to create jobs.

The participation of the surrounding village community is needed to take part in developing the local economy of the local village through: 1.) Development of the

benefits of camphor products and their derivatives (including research and training), 2.) Development of other local endemic products and their derivatives, and 3.) Development of agricultural businesses, animal husbandry, handicrafts, medicines/potions, food and beverages typical of the region, etc.

4 Conclusion

Indonesia is a country that has very abundant biological resources and currently its existence is starting to decline and some are endangered. This can happen because the level of exploitation by the community of camphor trees is very excessive. Forest protection is an effort to prevent and limit the destruction of forests, forest areas and forest products, caused by human actions, livestock, fires, natural resources, pests and diseases, as well as maintain and maintain the rights of the state, communities and individuals to forests, forest areas, forest products, investments and tools related to forest management.

The steps that need to be done are 1.) protection and security of forests through: 1. Issuance of local government regulations through the West Pakpak Regent Regulation on the Determination of camphor Forest Friends in Sibangindar as a protected area, must not be converted, and as a source of plant propagation (mother tree). 2.) Rescue and Conservation of Camphor trees, Rescue and conservation of camphor trees is expected to be carried out not only to save existing trees, but the conservation paradigm can go in a broader direction, namely including research and domestication of trees into plants, through: 1. Vegetative and Generative propagation of trees (Insitu and Exitu), 2. Plant propagation by tissue culture (laboratory), 3. Distribution and planting in various locations both on community land and in forest areas. 3.) Preservation of Nature and Culture, Culture is the work of a group of humans that has been mutually agreed upon and becomes a habit that has been passed down for generations, binding in society. To preserve nature and culture in the community of the Sibagindar camphor forest environment, it is carried out through: 1. Organizing writing competitions, such as: Poetry, Short Stories, Science Fiction, Legends, Local Wisdom, Traditional Medicine, Traditional Food/Drink, Cultural Customs, Arts, history and local endemic trees and their benefits, 2. Record the results of incoming writings and publish them, 3. Development of cultural attractions and their publication. 4.) Eco-Edu-Histori Tourism, Ecoeduhistori Tourism Activities can be carried out in the Sibagindar forest environment in the form of: 1. Camping Ground, 2. Tracking camphor forest tours, waterfalls and routes, and 3. Local culinary tours typical of Sibagindar. 5.) Nature Laboratory for Education and Research, This activity can be carried out through activities: KKN, Internship and Preparation of Student Final Project, etc. 6.) Economic development of local communities, Participation of surrounding village communities is needed to take part in developing the local economy of local villages through: 1. Development of the benefits of lime products and their derivatives (including research and training), 2. Development of other local endemic products and their derivatives, and 3. Development of agricultural businesses, animal husbandry, handicrafts, medicines/potions, food and beverages typical of the region, etc.

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