



AN APPROACH OF ECOLINGUISTIC IN MINYAK KARO BASED ON ETHNOBOTANY

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Abstract

This study proved the interrelated concepts of Minyak Karo based on biological, ideological, and sociological dimensions in Padang Bulan and Pancur Batu reGENCY, North Sumatra. This study was in the form of descriptive qualitative study. The results proved that the ingredients to make Minyak Karo were cooking oil, green coconut oil, hundred spices, kaffir lime/kaffir lime leaves, panglai, kencur, shallots, garlic, pepper, nutmeg, nest wallet, ship leaves, jambar api, tawan gegeh, fresh ipuh, bulung patchouli, gagaten tiger, root areca nut, root riman, root bamboo, reeds, root pengkih, root palm, basil, tawan gegeh, turmeric and areca nut. The plant parts used in traditional medicine of Minyak Karo were leaf, root, rhizome, flower, stem, fruit, bark, seed, tuber, and latex in biological dimension. In ideological dimensions, Minyak Karo had the content of chant to invite the spirits of the ancestors. Based on sociological dimension, the purpose of the ritual of making Minyak Karo was to cure diseases that were believed to come from supernatural spirits or diseases sent by people through supernatural means and asked for protection from the spirits of the ancestors.

Keywords: Minyak Karo, Ecolinguistic, Ethnobotany

INTRODUCTION

Every language has a structure that influences how humans interact with one another, with other organisms, and with their surroundings. Language can influence how we think about the world, which in turn influences how we act; thus, language can inspire us to protect or destroy the ecosystems that support life. Suryadarma (2008) defined 'Ethnobotany emphasized how to reveal the cultural links of the community with plant resources in the environment directly or indirectly. Ethnobotany has an important role in describing the traditional knowledge about medicinal uses of plants and the sensitive dynamics of how the culture works.' An ecolinguistic study was to investigate the reciprocal change between ecosystems that are part of the human system (ecology of socio-cultural environment) with the language that people use to communicate in their environment (linguistics, both physical and man-made). Ecolinguistics or language ecology is an approach in linguistics research that study a language related to ecological and environmental problems pioneered by Einar Haugen. This is defined as local wisdom. According to (Malihah et al, 2019; Retnowati et

al, 2018; Radzi et al, 2016), “Local wisdom is a basic knowledge gained from living in balance with nature. It is comprised of direct experience and accumulative knowledge and information pass on from previous generation. This knowledge is vital to the appreciation of local people's culture. The wisdom from real experiences integrates the body, the spirit and the environment.

Tuxil et al (2001) state that any native plant can be considered a resource for human kind, it contributes to health and stability of the ecological community in which it occurs. In any flora, there are certain plants that are more intimately linked with human welfare. Plants which are used directly by local communities for food, forage, fiber, timber, medicine, ceremony, symbol, or income will be called ethnobotanical resources. Nasution et al (2020) proved that one of the well-known traditional treatments in North Sumatera is treatment using *Minyak Karo*. Treatment using *Minyak Karo* has been done from many generations as a medicine, such as aches, chills, cuts, itching due to allergies or insect bites. Karo people are found in North Sumatra Province, Indonesia, but the most people who lived are based on the Karo Regency. According to Barus research (2015), ethnic Karo believe that traditional Karo medicine can help them maintain or improve their health. Despite rapid advances in technology and modern medicine nowadays, the Karo ethnic group continued to use traditional treatments. The making of *Minyak Karo* is made with rituals with the aim that *Minyak Karo* is able to cure diseases that are believed to originate from supernatural spirits or diseases sent by people and request protection from ancestral spirits.

For the last few decades, ecolinguists believe that the classification of language diversity adds the maintenance to biodiversity. The reasons to conduct the study of ecolinguistic in *Minyak Karo* was when the society continued to maintain biodiversity for traditional medicine needs, they performed the conservation as a global agroecosystem. If a plant variety becomes extinct, then the entire body knowledge about its properties becomes irrelevant and the usefulness to humankind is severely reduced. Based on the fact, the respect of traditional medicine and linguistic to construct human-nature relationships should be found in an interdisciplinary approach. Other reasons were from (Maffi, 2005; McMillen et al, 2012), “The loss of linguistic and cultural knowledge, like the loss of biological diversity, can lead to an overall loss of resilience in terms of community sustainability, public health, and economic vitality, especially in light of global climate change.” According to the two theories, the empirical study of ecolinguistic and ethnobotany must be encouraged to understand how the local people perceive, understand, and classify plants as based on their own unique local cultural context and worldviews. Since species extinction leads to the loss of cultural knowledge, social network structure, and rural proximity to natural areas are insufficient to preserve a community's knowledge following species extinction, the authors conduct a study to determine the need for an outside force to effect meaningful conservation of both threatened flora species and cultural knowledge.

In this study, the writer focuses on three semantic matrix by Haugen approach (1972) such as: (a) biological dimension was to reveal the types of plants and the utilization of *Minyak Karo* in ethnobotanical studies, (b) ideological dimension was to reveal the ideological background of Karo culture when making and using *Minyak Karo*, (c) sociological dimension was to reveal the ritual

process of *Minyak Karo*. The core question to the research addressed is: What are the biological, ideological, and sociological dimensions of *Minyak Karo* based on Haugen approach of ecolinguistic?

REVIEW OF LITERATURE

2.1 Ecolinguistic

The relation between language and the ecological system is evident because language is interconnected with the world as it creates, and is created by, the world (Muhlhausler, 2003). Fill and Muhlhausler (2001) emphasizes that linguistics and ecology are two things that influence each other. Language systems affect the behavior of users in managing the environment. Changes in the natural environment, social environment, and cultural environment of society affect the use of language at the level of lexicon to grammar. As proposed by Stibbe (2014), ecolinguistics have three areas, namely: structural linguistics, sociolinguistics, and critical linguistics

Some ideas of ecosystemic linguistics go back at least as far as Sapir (1912), who was the author of the first written essay explicitly associating 'language' with 'environment,' meaning by the latter the context where language is used. Sixty years later this pioneering proposal was taken up by Einar Haugen, under the name of 'ecology of language.' Haugen has been rightly considered the 'father of ecolinguistics'. The first definition of ecolinguistics was what Haugen (1972:325) called the "ecology of language," which he defined as: "the study of interactions between any given language and the natural environment. The central concept of ecology is the ecosystem. All handbooks of ecology define this as consisting of the inter-relationships between the population of organisms living in its territory or habitat. Haugen argued for the heuristic value of earlier biological, instrumental and structural metaphors in understanding the life, purpose, and form of languages.

Other definitions are from Hogan-Brun & O'Rourke (2018) who defined that ecolinguistic is defined as the study of the mutual interactions between languages and between a language and its environment. Ecolinguistics or the field of language ecology is primarily concerned with the two major research areas: first, environmental discourse analysis, often termed eco-critical discourse analysis or the language of ecology and environmentalism, and second, language ecology and the interactions between human, mind, and environment, often expressed through lexico-grammatical studies of how humans talk about and adapt linguistically to new and foreign environments, that is, the ecology of language. Nash (2013) points out that ecolinguistic fieldworkers explore interconnections and relationships between human agents and human communities, and between these and their natural environments.

Pupavac (2012) states that colinguistics joins environmental concerns with language identity rights and treats linguistic diversity as analogous to biodiversity, inspired by environmentalism and sustainable development. Just as environmentalism is concerned with loss of biodiversity, so ecolinguistics is concerned with loss of linguistic diversity. It is interesting to note that ecolinguistics, which was previously an umbrella term for various approaches to linguistic theory by Haugen (1972), turns out to have its theoretical framework,

namely dialectical linguistic theory or dialectical ecolinguistics. The novelty of ecolinguistic framework is found in the concept of social praxis as a language environment, which refers to ideological, sociological, and biological dimensions. One model for analyzing the lexicon meanings in ecolinguistic emphasis is a semantic matrix analysis model which presents 4 semantic constituents which can be observed as in Figure (1) below. The constituents are:

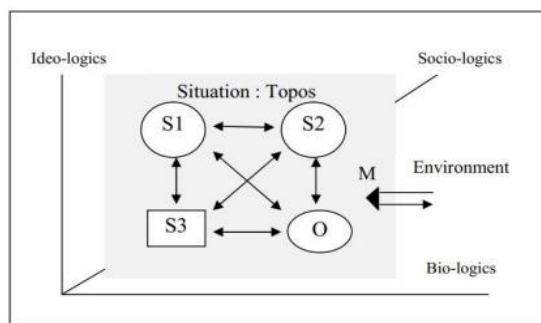


Figure 1. Dialogue Model

Khotimah et al (2021) define ideological dimension as the relationship of the individual with his mental, cognitive and psychological systems reflected in the ideology meanings in the society and behavior content. The sociological dimension is the dimension or measure of how a person organizes the activity of discourse, dialogue, and social discourse to realize the ideology. The biological dimension relates to the physical environment, such as the species of flora, fauna, rocks, micro-, and macro-organisms.

2.1.1 Biological Dimension

Maffi and Woodley (2012) In international debates on biodiversity conservation, it is becoming clear that the link between biological and cultural diversity is an inextricable one, and that it is necessary to think of preserving the world's biocultural diversity as an integrated goal. Holzl (2018) state that ecolinguistics as “the study of the impact of language on the life-sustaining relationships among humans, other organisms and the physical environment and is normatively orientated towards preserving relationships which sustain life. In another sense, the ecological aspect instead refers to the maintenance of languages and ensuing the preservation of linguistic diversity.

Ecolinguists draw on geography’s distinctions between cosmopolitan societies and societies based around local ecosystem or ‘cultures of habitat’ (Dasman, 1964; Nabhan, 1997). Ecolinguistics criticises globalization, global communications and the evolving global culture for eroding cultures and ecosystems speak the same language and have the same beliefs are felt to be parts of an ‘us’; those who speak other languages and have different customs and beliefs are seen as ‘others’ (Skutnabb-Kangas et al, 2003). In this study, ecolinguistic proposes a quasi-biological model of adaptation to the environment, in which different cultures represent different adaptations. Thus, preserving cultures becomes vital to ensuring that humanity has as many survival solutions as possible. The writer wants to reveal the use of *Minyak Karo* in medical purposes based on Cotton (1996) who assumes that the use of plants in traditional medicine has received considerable attention in ethnobotany and the closely related field of

ethnopharmacology. Traditional medicinal botanical knowledge of *Minyak Karo* can support Indonesian policy to widen the herbal knowledge of local communities which in turn adversely affects the health and welfare needs of the local community who to a large degree depend on folk medicine as a key alternative health service centres rather than on professional healthcare (Toledo, 2013).

2.1.2 Ideological Dimension

In the bioecology, language shapes the contemporary living world. As organism–environment systems, we learn by coordinating our bodies while also using instruments, artefacts and using the results to construct social values. In short, this ecological discourse opposes the natural to the cultural (Cowley, 2013). Ecolinguistics are attracted to holism, a philosophy which emphasises natural processes and organic relations and questions human uniqueness and its transcendence of nature (Chawla, 2001; Finke, 2001; Halliday, 2001). Lindo & Bundsgaard (2000) explained that the ideological background is related to the system of belief, paradigm, mental, or cognitive condition on individual or collective. This ideological background differs from one society to the other society or one place to the other place. The ideology is constructed in a society that controls the collective understanding about something. As stated by Stibbe (2014), this ideological background is manifested in myth, norm, law, values and regulation or rule in a society. In this study, the writer tries to reveal the values and beliefs of spiritual and ancestral tradition in *Minyak Karo* to enrich linguistic diversity and biodiversity for human physical and cultural maintenance. These ideas influence language rights advocacy (Crystal, 2000).

2.1.3 Sociological Dimension

According to Fill & Muhlhausler (2001:57), “There is a relation between language and society. It concerns in language used by people to express identity, from one to another to find the protection and increase various kind of power. It is observed to find the correlation of social structure and linguistic structure. Regarding to the symbolic system of local community, Porter & O’Donnell (2014) noted that language is a perfect. The value of linguistic is attached with the relation of language construction to the societal and cultural norms. In this study, the writer tries to reveal of why the local perceptions of Karonese and their attitudes in making *Minyak Karo* draw attention of tourism attention in promoting cultural identity and historical meaning. The writer examines the role of *Minyak Karo* to support livelihood and socio-cultural systems and providing ecosystem services.

2.2 Ethnobotany

Languages and cultures have coevolved with the biotic and abiotic environments in which they developed (Berlin, 1992). As Cotton (1996) summarizes, within ethnobotany itself, utilitarian, cognitive and ecological perspectives have been used to understand the place of plants in human society. The utilitarian approach looks at how people use plants. Cognitive ethnobotany was influenced by cognitive anthropology. It focuses on peoples’ beliefs, symbolizations and perceptions of plants, and how these perceptions and beliefs affect their use and management of plants. Folk taxonomy and the place of plants in myths, art and rituals is one of its central interests. (Cotton, 1996:62) stresses

the ecological approach about how the management and exploitation of plants can influence—or be influenced by—the characteristics and dynamics of the local environment.

Indigenous plant knowledge and use provides the foundations of the meaning of life, death and the supernatural. Plants occupy key positions in religious rituals and other socio-cultural beliefs in traditional societies, serving as gateways to the sacred world (Minnis, 2000). The world of the spirits is approached with various uses of plants, whether it is to approach benevolent or malevolent spirits or to worship the Supreme Being (Anderson, 2002). The centrality of plants in human culture is most evident in medicinal and spiritual quests. The knowledge of plants' healing power for both physical and psychological illnesses by herbalists is a key force that commands the attention and respect of community members (Schultes & Raffauf, 1992).

Cunningham (2001) summarizes existing schemes of local peoples' conceptions of place,

territorial access and resource use from a cognitive anthropological perspective. This explains how local people express their territorial attachments and symbolisms of access to, and control of, resources in a given territory. One way of affirming territorial attachment and resource ownership is, for example, through conducting rituals at designated spaces in the landscape (Nyamweru et al, 2008). Symbolic territorial and ethnogenetic myths often link a local group to a territory and the group invokes that symbol to affirm its rights to resources and its geopolitical identity (Schlee, 1992). These provide important context and authority for use and management of natural resources (Cunningham, 2001).

2.3 *Minyak Karo*

Indonesia is one of the essential oil producing countries. These parts include roots, seeds, fruit, flowers, leaves, bark, twigs, and rhizomes (Lutony & Rahmayati, 2002). The most of Karonese are found in Karo Regency, North Sumatra Province, Indonesia. The rest of Karonese are found in Medan City, Binjai, Deli Serdang, Langkat, and Simalungun Regency. The size of Karo regency is 2.97 % of the North Sumatra Province. Karonese population in North Sumatra in 2011 was about 913.000 people or 6.90 % of the total population of North Sumatra (North Sumatra Statistical Bureau, 2012; Karo Regency Statistical Bureau, 2012). The research results of Pandapotan et al, (2018) stated that the making of *Minyak Karo* is one form of local wisdom that is very well known in Karo culture. *Minyak Karo* consists of processed spices in the form of oil that is useful for cure various diseases, such as aches and pains, sprains, whiplash, colds, shifts in joints, stomach acid, headaches, allergies and so on. There are many variations in the composition of *Minyak Karo*. In the Village of Lingga, one of the Karonese resident, they use monkey oil and snake oil for ndikar (grappling) activities. The spices consist of coconut oil, monkey oil, python oil, tiger / cat oil, sesame oil, green coconut oil, rattan root (ketang), sugar palm (*enau*), areca root, iron-tree root, yellow bamboo root (hurgen) tuba root, coconut root, parched nek miting. Situmorang et al (2015) argue that in terms of illness treatment, they have a philosophy "*lit bisa lit tawar*" which means that all diseases can be treated or cured. Karonese people believe that the nature provides medicines to cure diseases as a part of their culture since many generations.

RESEARCH METHOD

Qualitative research approach was used to reveal the connection about the context and relationship plays in forming thoughts and behaviors of human (Roller & Lavrakas, 2015). The qualitative research was related to research data in the form of quality of ecological *Minyak Karo*. This research also used descriptive approach. This was related to the purpose achieved in this study, which was to identify the biological, ideological, and sociological dimensions of *Minyak Karo* based on Haugen approach by using ecolinguistic study. Fill (2001: 126) in Lindo & Bundsgaard (2000) stated that ecolinguistics was an umbrella against all approaches of language study in combination with the environment (ecology).

The data in this research were taken from sources of area that were selected in Padang Bulan and Pancur batu areas in North Sumatra, Indonesia. The data also were taken from documents that related to *Minyak Karo* materials. The data were collected using three techniques that include (i) observation, (ii) interview, and (iii) document. The observation technique used in this research was nonparticipant observation because the researcher only recorded what he observed without interacting directly with **the sample**. The interview conducted in this research was an unstructured, open-ended interview; the interviews were audio-taped and transcribed.

RESULTS AND DISCUSSIONS

4.1 Results

4.1.1 Ecolinguistic of *Minyak Karo* based on Biological Dimension

Minyak Karo was a traditional medicinal herb in liquid form, green in color with extracts of more than 30 species of plants and the addition of coconut oil (*Cocos nucifera*). *Minyak Karo* or commonly called *Minyak Pemalun* was usually made from generation to generation by traditional. *Minyak Karo* had long been used by the community as massage oil. The general materials used to produce *Minyak Karo* were the same, namely: spices, roots and coconut oil because *Minyak Karo* was used by rubbing / massage. This oil was 100% natural and had a long shelf life even without chemicals, such as *cooking oil*, *green coconut oil*, *hundred spices*, *kaffir lime/kaffir lime leaves*, *panglai*, *kencur*, *shallots*, *garlic*, *pepper*, *nutmeg*, *nest wallet*, *ship leaves*, *jambar api*, *tawan gegeh*, *fresh ipuh*, *bulung patchouli*, *gagaten tiger*, *root areca nut*, *root rima*, *root bamboo*, *reeds*, *root pengkih*, *root palm*, *basil*, *tawan gegeh*, *turmeric* and *areca nut*. Plant parts used in traditional medicine of *Minyak Karo* were leaf, root, rhizome, flower, stem, fruit, bark, seed, tuber, and latex.

Karo people gathered medical plants from nearby forests, fields, home gardens or purchasing it from local vendors. The forests were spread over Mount Sinabung, Simpang Empat, Namanteran, Tiganderket, Payung, Laubaleng and Mardinding Districts, Berastagi, and Dolatrayat. The knowledge of traditional medicine among Karo people had been passed from generations to generations. These traditional medicines were widely known as “Karo medicines” which were easily found at traditional markets in Karo Regency and neighboring areas. The raw materials for the medicines such as leaves, stems, roots and dried fruits were also available at the traditional markets in Kabanjahe and other markets in

Berastagi and Tigapanah, North Sumatra, Indonesia.

The process of making Minyak Karo was as follows: nature raw materials used consisted of more than 30 types of *Minyak Karo* spices. Before being refined, the 30 spices were first washed from the sticky dirt, dried, and chopped into small pieces. *Minyak Karo* distillation was done using steaming technique (indirect distillation). The kettle used was made of stainless steel. Spices that had been chopped as much as 3 kg were put into a kettle filled with 3 liters of water and 3 liters of coconut oil. Then the boiler was tightly closed, the combustion process was carried out for 4 hours at a temperature of 100°C which produces hot water vapor and *Minyak Karo*. At that time, the water vapor would flow between the particles carrying the oil. This steam would collect in the boiler cover which was shaped like a goose-neck and flows into the cooling boiler (condenser) through a pipe, where it turned into a liquid. Under the cooling boiler was connected a small pipe that would drain the distilled oil which was accommodated into a holding container.

4.1.2 Ecolinguistic of *Minyak Karo* based on Ideological Dimension

The Karo ethnic was one of the ethnic groups that still adhered to the traditional Karo belief (Pemena) before the entry of religion into the land of Karo. The manifestation of this belief was that the Karo ethnic still performed rituals that were carried out with various objectives to be achieved, one of which was the ritual of making *Minyak Karo*. The ritual of making *Minyak Karo* was the same as other rituals which also have a procession and implementation and ritual supporting objects. The ritual process of making *Minyak Karo* in Padang Bulan and Pancur batu regions was that after all the equipment and materials had been prepared, each family member took their share. Ingredients such as *kaffir lime/kaffir lime leaves*, *ship-board leaves*, *jambar api*, *bulung patchouli*, *gagaten tiger* and *basil* were sliced using a *pepper knife*. Ingredients such as hundred spices, *panglai*, *shallots*, *garlic*, *pepper*, *nutmeg*, *turmeric* and *areca nut* were ground until smooth. Materials such as *tawan gegeh*, *root areca nut*, *bamboo root*, *riman root*, *pengkih root* and *alang-alang* were pounded until they broke. After all, the ingredients were put together in one container, *Minyak Karo* was ready to be cooked. *Belau cawir* and *Perak* were prepared and when *Minyak Karo* started to cook, incantations would be said to invite the spirits of the ancestors. The content of the chant were:

“Okam nini sierkuasa
Berekenndulah gegeh ras kesehaten
Ibas kami makeken minak enda
Ras pedauh kam kerina
Kuasa-kuasa jahat ras kerina pinakit
Silit ibas daging kula kami
Endam pemindon kami nini
Gelah sura-sura kami tersehi.
Bujur...”

The meaning of the chant was:

Oh powerful Nini
Give us strength and health

In using this massage oil
And keep us all away
From evil spirits and all diseases
What's in our bodies
This is our request
May our intentions come true
Amen...

In addition, the ideological of *Minyak Karo* reflected in Karonese mothers who had babies. Karonese mothers were more accustomed to oiling their babies and children with *Minyak Karo* than telon oil/baby oil because it was considered superior in properties. This oil could strengthen the baby's bones and muscles so that they would grow healthy, agile, strong and would walk quickly.

4.1.3 Ecolinguistic of *Minyak Karo* based on Sociological Dimension

People throughout the Karo believed in the presence of supreme powers, Gods and their cognates, who controlled all aspects of human life. Other occult powers exist; these were the powers of supernatural beings, those of the spirits. They also influenced human beings and affected their health, causing disease, infirmity, and death. They possessed individuals or influenced them from afar. When they were provoked, they did harm through the machination of a *faqir*, a holy man, or a magic-monger, using these spirits as *jinn*s subject to their command.

Karo tribe believed that the nature and the environment functioning was not only for human being to live but also for other God's creators including souls which were not eye-catched but believed only or mind-catched. The ritual of making *Minyak Karo* could only be carried out by people who had been selected to have the tools needed to perform the ritual, such as *silver knife* and *pepper blades*. They were assisted by their respective family members in preparing the materials needed to make *Minyak Karo*. The procession of the ritual was managed and scheduled by *si Baso*. Whilst the procession, first, *si Baso* moved Nini Karo to the former place, having dancing together with the followers, then shampooing their hair (erpangir), it was always done in the river or made pool.

The Karo ethnicity was one of the ethnic groups who still often perform rituals aimed at communicating with supernatural spirits and in carrying out these rituals there were conditions that must be met, for example in the ritual of making *Minyak Karo*. The Karo people believed that a disease could not only be caused by factors that could be accepted by the human mind, such as diseases in general, in addition to diseases that we could know the cause, it turned out that there were also diseases that did not know their origins and what causes them. It was a disease caused by supernatural beings or caused by people who deliberately sent disease through supernatural means. Thus, the sociological to make ritual of *Minyak Karo* by Karo ethnicity was to cure diseases that were believed to come from supernatural spirits or diseases sent by people through supernatural means and asked for protection from the spirits of the ancestors.

CONCLUSION

According to Haugen approach (1972) of ecolinguistic, this study proved the interrelated concepts of *Minyak Karo* based on biological, ideological, and sociological dimensions. In biological dimension, the ingredients to make *Minyak Karo* were *cooking oil, green coconut oil, hundred spices, kaffir lime/kaffir lime leaves, panglai, kencur, shallots, garlic, pepper, nutmeg, nest wallet, ship leaves, jambar api, tawan gegeh, fresh ipuh, bulung patchouli, gagaten tiger, root areca nut, root riman, root bamboo, reeds, root pengkih, root palm, basil, tawan gegeh, turmeric and areca nut*. The plant parts used in traditional medicine of *Minyak Karo* were leaf, root, rhizome, flower, stem, fruit, bark, seed, tuber, and latex. All of these plants had already proved to treat illness, such as fever, weakness, cold, abscesses, cough, stomachache, and many more. In ideological dimensions, *Minyak Karo* had the content of chant to invite the spirits of the ancestors. Furthermore, the ideological of *Minyak Karo* reflected in Karonese mothers who had babies. Karonese mothers were more accustomed to oiling their babies and children with *Minyak Karo* than telon oil/baby oil because it could strengthen the baby's bones and muscles. In sociological dimension, the purpose of the ritual of making *Minyak Karo* was to be able to cure diseases that were believed to come from supernatural spirits or diseases sent by people through supernatural means and asked for protection from the spirits of the ancestors. People who could perform the ritual of making *Minyak Karo* were one of the descendants chosen by their ancestors and the chosen person had already given instructions, such as by dreaming when someone was slept.

The writers suggested to explore *Minyak Karo* researches as a traditional medicine deeply and documented it in the form of print media so that this knowledge was not slowly eroded and lost from the community, this could be done by individuals or in collaboration with the government. This was the task of the relevant government agencies such as the local Health Office to provide easier training and licensing. They could serve communities by providing vital information on scientific plant identification and broad-scale ecolinguistic knowledge, and by forging creative linkages to other communities with similar needs and goals of preserving and perpetuating cultural knowledge of plants and environments. They could participate in developing school and college curricula, audiovisual productions, science and cultural camp activities, museum exhibits, and locally relevant plant guides.

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