

Will Indigenous Ecological Knowledge Vanish? Assessing Persistence of the *Celako kemali* in Farming Practices among the Serawainese in Bengkulu, Indonesia

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ABSTRACT

Indonesia is home to many indigenous peoples who can preserve the environment through their traditions amid the increasing of external values and lifestyles' penetration. The following presents the indigenous ecological knowledge of the Serawai people in the form of the *celako kemali*. Based on insights from the Indigenous research methods, this study aims first to assess the persistence of the *celako kemali* as a method for farming practices. Second, to identify transmission patterns of the *celako kemali* among generations in the Serawai community. This study found that there were 19 types of *celako kemali*. The current analysis demonstrates that, out of the 19 *celako kemali*, three types have been completely abandoned, five are still in use but with minor modifications, and eleven are still valid by established standards. The first generation acquires knowledge from their parents through the internalization process within the family. This first generation still preserves and maintains the 19 *celako kemali* daily farming activities. The second generation acquires knowledge through internalization within the family and horizontally by sharing experiences with other farmers, but horizontal channels are more dominant. This generation knows the 19 types of the *celako kemali*, although they dare to modify five types without losing the essence of their body of knowledge. The third generation acquires knowledge through vertical and oblique transmission, in which the oblique channel is predominant. This third generation learns a lot from village elders unrelated to the family, teachers, and mass media. However, this generation has abandoned completely three types of the *celako kemali*.

KEYWORDS

Indigenous ecological knowledge; indigenous research method; Indigenous People; *the celako kemali*; Serawai.

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1. INTRODUCTION

The contributions of indigenous ecological knowledge (IEK) to biodiversity conservation have recently received attention (Schroeder & González, 2019; Su et al., 2020). The IEK is the long-term understanding, beliefs, and practices human cultures about their natural environment, which is dynamic and evolving in response to social and environmental changes (Berkes et al., 2000). The IEK refers to the ability or skill of humans to use their natural resources, especially knowledge passed down from generation to generation (Okui et al., 2021). The definition of the IEK can be extensive, including knowledge and skills used in the conservation of endangered species (Uchida & Kamura, 2020), management of protected areas (Gómez-Baggethun et al., 2010), risk and disaster reduction (Lee et al., 2021; Wang et al., 2019), food security (Torres-Vitolas et al., 2019), and biodiversity conservation (Berkes & Folke, 2010). Traditional knowledge is local and contextual and can provide information for environmental strategy management in various ecosystems (Redvers et al., 2022). Researchers should view traditional knowledge as a communal, holistic, community-based, and interdependent form of knowledge between people and their environment (Redvers,

2018).

However, the loss of the IEK had been the central tendency in previous studies during the last few years. For example, Hanazaki et al. (2013) found that 57 per cent of 84 studies on traditional plant use showed a decrease or loss of knowledge. Aswani et al (2018) revealed a similar trend in 77 per cent of 92 studies on the IEK, and Tang and Gavin (2016) found that the decline in knowledge was by far the most commonly noted trend in 89 per cent of 152 studies. Likewise, Cardinale et al. (2012) and Groenfeldt also (2003) found that indigenous knowledge is changing in most parts of the world, resulting in socio-cultural and biodiversity erosion. The IEK loss is likely to hinder effective biodiversity conservation, particularly in community-based local conservation efforts, due to the relationship between cultural diversity and biodiversity (Aswani et al., 2018). It appears that the extinction of indigenous cultures and knowledge systems is just a matter of time (Cox, 2000).

There are various ways to maintain the persistence of IEK. For example, academics frame the IEK as a dynamic knowledge system that adjusts to new ecological and socioeconomic contexts rather than a static form (Gómez-Baggethun, 2021), allowing Indigenous Peoples to quickly adapt to external knowledge. Indigenous People often neglect the little outdated or less relevant expertise in everyday life to accommodate new types of knowledge (Hernández-Morcillo et al., 2014). It has also demonstrated that critical parts of indigenous knowledge and beliefs survive in civilizations with long-term acculturation processes. Many Indigenous People's religions hold particular worldviews, for example animism, which continues to affect their rituals and relationships with their environments (Cook & Offit, 2008).

Indigenous peoples have a rich tradition of nature conservation through the use, respect and protection of natural resources in a socio-religious and socio-cultural manner. They believe that invisible hands regulate the balance of nature in the form of spirits believed to live in certain areas that are considered sacred. In forest management practices, for example, traditional communities rely on local gods and knowledge to protect their forests (Ens et al., 2015). Sacred forests, for example, a piece of virgin forest that stores rich biodiversity, are protected by indigenous peoples based on their cultural and religious beliefs and taboos. Forest protection is guaranteed by using taboos and religious beliefs or by dedicating forests/species to forest guardian spirits (Onyekwelu, 2021). Thus, the fear of sanctions of the spirits becomes the motivation to preserve nature.

Protecting the sacred places relies on taboos and prohibitions, which, if violated, have consequences of sanctions and penalties. The locals can pass down taboos and prohibitions from generation to generation to maintain sacred forests in their pristine form. In many cases, traditional taboos and prohibitions in environmental management practices have played an important role in biodiversity conservation (Parthasarathy & Babu, 2019). However, the extent to which fear and respect for nature-guarding spirits can maintain protection is uncertain (Onyekwelu & Olusola, 2014).

Meanwhile, indigenous knowledge loss is associated with a lack of knowledge transmission. The loss of IEK transmission pathways is the first category of direct threats to knowledge (Tang & Gavin, 2016). There are three models of cultural transmission proposed by Cavalli-Sforza and Feldman (1981): vertical transmission, in which knowledge is passed down from parents to children; horizontal transmission, in which knowledge is passed down between peers; and oblique transmission, in which knowledge is passed down from the older generation to the younger generation without the family relationship, as well as through teachers and the mass media. Giddens (1979) uses a somewhat different word, "social reproduction," to refer to the transmission of knowledge and values in three ways: (1) in a network of direct interactions, as achieved

or presented by actors; (2) in the reproduction of members of the social system as humans with a limited period; (3) in the reproduction of institutions developed over a long period.

Indonesia is home to many indigenous peoples who can preserve the environment through their traditions. Indigenous people often apply a shifting cultivation system (Njau et al., 2019; Noordwijk et al., 2008; Nopembereni et al., 2019), including the Serawai people. The people apply this system through the practices of *celako kemali* in their farming system. The *celako kemali* is indigenous ecological knowledge and values passed down to the generations through taboos and prohibitions in their farming practices. In other words, the *celako kemali* is a set of taboos and prohibitions in shifting cultivation systems, accompanied by consequences for those who break them (Danim, 1994). The repercussions of this category vary depending on the substance violated and the sort of sanctions. The *kemali besar* provides penalties for taboo violators, including death for the violator or a family member. The *kemali kecil*, on the other hand, involves sanctions such as prolonged illness for the violators or a member of his family (Danim, 1994). In addition, the *celako kemali* is always associated with forest, hill, animal, and river components. In forest use, for example, the Serawai people have the concept of forest categorization according to its designation in their agricultural practices. The locals divide the forest into: *qhimbo* (forest), *qhimbo tuo* (old forest), grove forest, *geleboan* (young forest), *repuo* (secondary forest), and *hutan seragam* (homogenous forest). The types of forest play a significant role in determining where they will clear land and cultivate crops.

Two questions arise from the *celako kemali* phenomenon. First, to what extent does the Serawai people use the *celako kemali* as a guide in sustainable agricultural practices? Second, how do the Serawainese transmit the values of the *celako kemali* from generation to generation? This study aims first to explore the persistence of the *celako kemali* as a method for managing the environment in the farming practices of the Serawai tribe in Bengkulu Province. Second, to identify transmission patterns of the *celako kemali* values in the Serawainese. This study uses Indigenous research methodologies to examine whether the locals still adhere to the *celako kemali* as a guide in the agricultural practices or whether it has been affected by erosion or has even disappeared.

2. METHODS

2.1 Research design

The present study employed the Indigenous research method. However, it is essential to highlight that traditional research procedures are paradigmatic research strategies (Kovach, 2010, 2020; Snow et al., 2016), emphasizing knowledge components and general local values. The research goal must be respectful of Indigenous Peoples, and the study has to be based on traditional methods (Koster et al., 2012; Kovach, 2019, 2020). The goal of the indigenous research paradigm is not to replace the previous and current research paradigm but to conduct research that produces actual results while not misrepresenting Indigenous People (Koster et al., 2012; Kovach, 2019, 2020).

The research procedure should be based on Indigenous Peoples' belief systems when utilizing a paradigmatic approach to indigenous methodology. The connectivity between methodologies and paradigms and how they link with Indigenous Peoples' worldviews determines indigenous research practices, not the method itself (Alcantara et al., 2017). This unique Indigenous paradigmatic approach is a theoretical framework for constructing knowledge and values and promoting assumptions about what constitutes indigenous knowledge and research methodology, such as how the locals

transmit indigenous knowledge through oral and story transmission (Castleden et al., 2017).

The study of Indigenous Peoples' knowledge primarily aims to determine the unique manner in which Indigenous Peoples acquire information through oral traditions. As a result, indigenous research employs several methodologies to collect data regarding indigenous cultural practices, including storytelling, yarning, narrative speaking and re-telling (Drawson et al., 2017; Kovach, 2010, 2019, 2020; Toombs et al., 2019). For example, Kovach (2010, 2019, 2020) argues that the conversational method aligns with the Indigenous worldview, emphasizing oral as a mode of imparting information and relational values to sustain collectivist customs. This story is a relational method with protocol and indigenous knowledge certified as a research guide.

The Indigenous research methodology emphasized personal preparation, self-situation, and a decolonization viewpoint that helps the community (Kovach, 2019b, 2020). Indigenous research methodology aims to sustain research processes' credibility, validity, sophistication, and robustness within and between communities (Saini, 2013). The author must first understand the Indigenous Peoples' social milieu to do this research. The researcher does not belong to the Serawai culturally. This condition presents complications because this form of research necessitates the researcher's involvement in their daily lives. Fortunately, an academically qualified local citizen facilitated the author to serve as a research assistant. He is the sole resident with a bachelor's degree from a state university. The author offered him as a liaison to the local and a research assistant during the study.

2.2 Research Participants

The research applied purposive sampling to ensure that it represented each segment of society because they are well-established and master the issue according to their distinct societal positions. The author did not use a formal selection method or eligibility conditions to participate in the study while selecting research informants. At first, the author chose key informants with the expectation that they would open up the networks of other informants. During fieldwork, the researcher discovered additional informants who deserved to be included as key informants, particularly from the youth and women's groups. The author did a mini and grand tour for about three months in the preliminary study to acquire an overview of the Serawainese who live in Tanah Hitam Village. Traditional village leaders, informal and formal village leaders, women's groups, village youth groups, first and second-generation shifting cultivators, and village government officials made up the research participant groups.

2.3 Data Collection and Analysis

The researcher collected data in three stages to ensure the authenticity and trustworthiness of the information gained. The author conducted individual interviews with 31 interviewees to acquire cultural themes and sub-themes connected to socio-cultural environmental management techniques. The author requested that the research informants participate directly in this work to feel a sense of ownership over the research process. In this initial step, the researcher performed mini and grand tours (Spradley, 1980) to all parts of the village, in addition to in-depth interviews, to see the daily activities of local people, tell stories, and exchange experiences with them. Storytelling and in-depth interviews become the leading options in gathering primary data and information in this first stage. The researcher applied domain analysis techniques (Spradley, 1980) to analyze the interviews and observation results. The method creates a general and comprehensive picture of the research object or social situation, resulting in various domains or categories. Following the domain analysis, the

study employed taxonomic analysis (Spradley, 1980) to determine the internal structure of the parts or classes. The findings in the first stage served as the foundation for the data gathered in the second stage. The author created data displays in various formats, including graphics, tables, and flowcharts, to make research participants easier to grasp and analyze data and information.

The study employed a group approach to collect data in the second stage using sharing-talking circles, focused group discussion, and storytelling (Drawson et al., 2017; Kovach, 2019b, 2020; Toombs, 2019). The author separated the participants into groups, each with 10 to 15 persons. Each group reflected a different social group within the Serawainese. Village elders, religious leaders, opinion leaders, and village formal and informal leaders made up the first group. The second category addresses the needs of local women and youth groups. Finally, there is a group of cultivators from different generations. The purpose of selecting informants from different ages was to compare the differences in their adherence to farming customs.

The queries presented to the forum of the sharing-talking circle contrasted one subdomain with another. The researcher used a deep listening strategy and set up a piece of recording equipment that could record both audio and video. The second stage of data collecting was to reach an agreement or group consensus on the individual perspectives on indigenous ecological values generated in the first stage. The author utilized componential analysis techniques (Spradley, 1980) to hunt for specific qualities in each internal structure by contrasting between elements or sub-elements, domains, or sub-domains.

The author and informants arranged plenary meetings engaging groups in an arena of sharing-talking circles or focus group discussions in the third stage. The author presented the discussion results of the second stage to the debate participants to develop a group consensus on Indigenous ecological values. The planetary discussion reduced the sub-elements or sub-domains irrelevant to the research issue and searched for the relationship between the domains and the research themes. The author used a cultural theme analysis approach (Spradley, 1980) to assess the outcomes of this most recent data collection. After completing the final sharing-talking and group discussion, the researcher developed conclusions and verified the findings with the research participants.

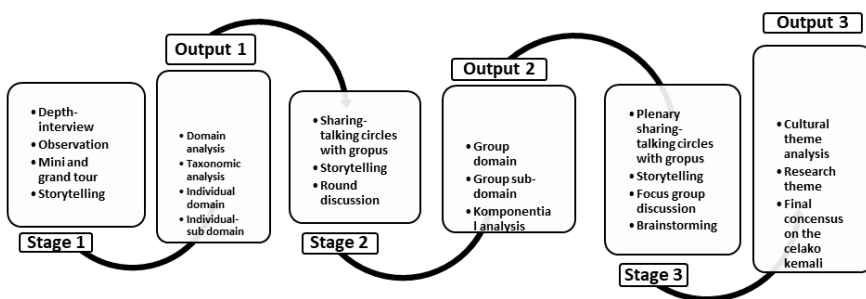


Figure 1. Collecting and data analysis process

Using narrative accounts and a sketch, the author sought to examine the purpose of the *celako kemali* that was on the minds of the locals. The researcher asked the research participants to create an easy-to-understand sketch drawing of indigenous proverbs. What are your thoughts about the *celako kemali*? What's the story behind the term? How many different kinds of *celako kemali* can you name and remember? Is it still being followed, or has it vanished? Can you determine the significant reason if it's still

followed or if it's gone missing? After brainstorming with the research participants, the forum agreed the research theme was to comprehend and assess the ecological values of *the celako kemali* in environmental management. Figure 1 below depicts the process of gathering and processing research data.

2.4 Research Site

The author conducted fieldwork in Tanah Hitam village. The village is located administratively in Padang Jaya district, North Bengkulu Regency, Bengkulu province, Indonesia. The community covers 5,262 hectares, with approximately two-thirds of the land allocated to agriculture and settlement and more than a third of the land-protected forest. The village has an undulating topography with a 35-40 degree slope for agriculture purposes. Residential and rain-fed rice farms occupy flatlands. Tanah Hitam hamlet is bordered on the left by the Lais River and on the right by the Padang River. The Serawai established the village as shifting cultivators in the 1970s. According to local legend, three families were the first to develop a farming area in this hamlet. The locals credited the families as the first generation to build the Tanah Hitam village settlement.



Figure 2. Research site

The public stigmatizes the Serawai people as shifting cultivators who previously resided around the forest. On the island of Sumatra, they expanded to numerous regencies and even provinces. As a result, the general public branded the Serawai as forest encroachers responsible for deforestation in Bengkulu Province and other regions on Sumatra Island.

From 2003 to 2005, the author collaborated with the Serawai on a research effort to build a model for developing forest conflict based on local knowledge. At the time, the author observed that the Serawai Indigenous People had created a shifting agriculture system for hundreds of years that featured ecological values directed toward the sustainability of their ecosystem. At that time, the author had identified 33 types of the *celako kemali*. The 33 types consist of 14 types with sociological dimensions and 19 categories with ecological orientation. The Serawai usually establish a community consisting of numerous huts in the middle of the forests at their settlement. The locals commonly live amid the forest with restricted road access. It took several hours to walk to their village. In 2020 or almost 15 years since the first fieldwork, the author assessed the persistence of 19 types of the *celako kemali* among the Serawai.

3. RESULTS

The following research results will discuss several topics, including forest categorization according to the perspective of the Serawai people, the celako kemali as a guide in the farming practices, and the pattern of transmission of the celako kemali values between generations among the Serawainese

3.1 Forest categorization

The celako kemali is associated with environmental components such as forests, hills, animals, and rivers. In the context of forest management, for example, the locals have a forest categorization model adapted to their agricultural practices. In addition, the locals divided forests into: *qhimbo* (jungle), *qhimbo tuo* (old forests), *hutan belukar* (grove or shrub forests), *geleboan* (young forests), *repuo* (secondary forests), and *hutan seragam* (homogenous forests). This categorization was a form of forest grouping based on customary consensus passed down from generation to generation. Each type of forest had a different treatment according to its designation. Based on interviews and group discussions with research participants, the research identified six forest types based on their functions and uses as illustrated in Table 1.

Table 1. Forest Categorization Based on Their Functions

No	Forest Categorization	Description
1.	<i>Qhimbo</i> or jungle	The locals never use <i>qhimbo</i> as fields for agricultural purposes. Most locals believe that <i>qhimbo</i> is a place for wild or wild animals and spirits to reside. Therefore, <i>qhimbo</i> is always characterized by the growth of old and dense trees so that sunlight does not penetrate. People still do not dare to enter the forest area for fear of getting lost and falling prey to wild animals and spirits.
2.	<i>Qhimbo Tuo</i> or old forests	Trees that are more than 20 years old characterize <i>qhimbo tuo</i> . The locals can take advantage of this area's forest by-products such as resin, fruits, and rattan. Local people can clear the forests as long as permission from the customary head or village head, and it is not a forbidden forest or sacred forest.
3.	<i>Hutan Belukar</i> (grove or shrub forest)	<i>Hutan belukar</i> is a forest area overgrown by 5 to 15-year-old trees. This forest is usually overgrown by various productive plants such as <i>rambutan</i> , <i>durian</i> , and others, although not too many. The locals use this forest area for agricultural purposes.
4.	<i>Geleboan</i>	Since first clearing the forest, the locals did not use this land for cultivation in the first year due to weather, health or other reasons. Local people only leave large trees while various small trees are allowed to grow wild to resemble secondary forests. This forest belongs to the person who first opened it. Other people can use this forest area if they get permission from the forest owner who first cleared it.
5.	<i>Repua</i> (secondary forests)	<i>Repua</i> is a forest that has been abandoned for one to four years and has undergone forest succession (secondary forests). Usually, someone already owns this forest by marking certain trees, traditionally known as land boundary trees. Thus, other people are not entitled to manage the land without the permission of the first forest clearer.
6.	<i>Hutan homogen</i> (Homogeneous Forest)	This forest consists of productive trees such as durian, rubber, candlenut, etc. The locals usually use it for family needs.

[Source: Fieldwork, 2020]

The Serawai people generally recognized ownership of *repua*, *geleboan*, and *belukar*. Likewise, they could get the right of *qhimbo tuo* with the approval of the customary leader. The locals could clear *qhimbo* as long as they got permission from the traditional leader, except for protected or prohibited forests. The importance of traditional knowledge related to forest categorization was due to the characteristics of the Serawai people as shifting cultivators who are highly dependent on forest areas. For hundreds of years, the worldview of forest categorization among the Serawai people had been well preserved. The categorization was more symbolic that there are forest areas that should not be disturbed due to magical-spiritual considerations. For the Serawai people, *qhimbo* and *qhimbo tuo* were two forest areas that had their roles in maintaining the balance of nature.

3.2 The *celako kemali*

Indigenous ecological values were always related to forests, hills, animals, and rivers among the Serawai people. These natural elements are expressed symbolically in several indigenous proverbs spoken in the ancient Serawai language. The people had fascinating indigenous norms and sanctions regarding shifting cultivation systems. The locals paid particular attention to the values and standards they must uphold in their farming practices. The locals referred to the *celako kemali*, an indigenous reference in determining the land to be cultivated and how to work on it.

The senior villager then described a variety of ideas concerning the *celako kemali*. According to the locals, the *celako kemali* is a set of taboos and prohibitions in shifting cultivation systems, accompanied by consequences for those who break them. There are two types of sanctions: *kemali besar* (severe sanction) and *kemali kecil* (light sanction). The repercussions of this category vary depending on the substance violated and the sort of sanctions. The *kemali besar* provides penalties for taboo violators, including death for the violator or a family member. The *kemali kecil*, on the other hand, involves sanctions such as prolonged illness for the violators or a member of his family.

The *celako kemali* theme passed down through proverbs refers to natural elements like rivers, hills, forests, and animals. It often had various connotations when translated into languages, especially if the examples do not accompany the translation. Because they used the ancient locals' speech, the metaphorical sentences had implicit meanings and were relatively untranslatable. All participants did not fully comprehend the *celako kemali*, particularly the youth and third generations. They were aware, however, that local cultivators continued to follow similar norms in their shifting agricultural practices. A young man from the third generation expressed his response to the lack of understanding of the *celako kemali*.

"I know only a few of the proverbs of the celako kemali. My father also did not give me a complete understanding of the celako kemali. But I saw that my father was implementing some of the principles of the celako kemali in a limited number."

Other young people also complained that their stock of knowledge about *celako kemali* is very limited. "I do not get enough knowledge about it from my parents. I only know some of the *celako kemali* proverbs but don't know their meanings," said a participant in the discussion. After witnessing such a situation, the author advised the participants to listen to the traditional leader's or first generation's explanations of the *celako kemali* principles. The researcher had the formal and informal village leaders explain the terms in the form of a sketch to help other participants understand them. Finally, the participants identified 19 different types of the *celako kemali* norms in farming practices, as follows:

- Three types had been fully abandoned.
- Five types were still in use with minor modifications.
- Eleven types were valid according to accepted norms.

The discussion also revealed that, for various reasons, the second and third generations began to leave some of the values and norms of the *celako kemali*. They assumed that even if they leave some taboos, it would not cause negative consequences for the violation. Substantially, the *celako kemali* norms were still adhered to, but procedurally they carried out various adaptations that allow them to avoid punishment. The adjustment was still based on the village elders' advice to guide the transformation.

"I was taught by my parents that taboos and prohibitions were used when carrying out farming activities. I was ordered to pay attention to this because I thought it was true. Understandably, the current generation doesn't know about this celako kemali because sometimes they are no longer interested in cultivating. But I personally still ask my children to obey this ancestral heritage because it must have a good for the next generations. I also often remind my friends who are cultivating to pay attention to this celako kemali. If anything happens to them, I also have to take responsibility as the elder", a village elder added."

The following is a description of the *celako kemali* discovered in the discussion of research participants, along with their persistence and resistance.

Table 2. The Abandoned *Celako Kemali* in Farming Practices

No	The <i>celako kemali</i> ^a	Local Descriptions	Types of sanctions ^b
1.	<i>Selat setahun atau kijang ngulangi taio</i>	One could only cultivate land that had been abandoned for at least a year	This prohibition aims to restore soil fertility. If one violates this prohibition, he will receive the <i>kemali kecil</i> or prolonged illness for him or one of his family members. The local community has abandoned this norm due to limited agricultural land.
2.	<i>Sepenetaan akaq kayu or sepengorengan arang</i>	It is forbidden to cut trees on hillsides, while there are rice fields in valleys.	Those who violate this rule will be subject to the <i>kemali kecil</i> or illness for themselves or one of their family members. The locals have abandoned this norm because of limited access to agricultural land
3.	<i>Umo tekeno tana tigo atau bukit tiga gunung sembilan</i>	One is not allowed to clear the forest in a valley surrounded by three hills for agricultural activities	Those who break this rule will face the <i>kemali kecil</i> punishments and a lengthy disease for the violator and any family members. The locals have abandoned because of limited access to agricultural land. Local people believe that they will not get sanctions if they violate these norms, even though they have to work around this with ceremonies and offerings

Note: ^aLocal taboos and prohibitions; ^b*Kemali kecil* (light sanction) in the form of prolonged illness for violators or one of their family members; *Kemali besar* (severe sanction) in the form of death for violators or one of their family members.

[Source: Fieldwork, 2020]

Table 3. The Modified *Celako Kemali* in Farming Practices

No	The <i>celako kemali</i> ^a	Local Descriptions	Types of sanctions ^b
1.	<i>Manggang tetugu</i>	One is not allowed to clear forests bordering the haunted land	The locals have abandoned this rule because ritual ceremonies and offerings can circumvent it before clearing the land
2.	<i>Tana penyakitan atau tana angker</i>	It is unlawful to clear farmland in an area where ancestor spirits reside	Those who break this rule will face the <i>kemali kecil</i> punishments and a lengthy disease for the violator and any family members. The locals have abandoned it by performing ceremonies and offerings to avoid the <i>celako kemali</i>
3.	<i>Binti meretas tanjung</i>	One should not clear land in a river delta even if the ground is very fertile	Those who break this rule will face the <i>kemali kecil</i> punishments and a lengthy disease for the violator and any family members. The locals have abandoned it, and even local people consider this 4location profitable because of its fertility. According to them, to avoid sanctions, there are ways to work around them, performing ceremonies and offerings
4.	<i>Tanam tungku buisi</i>	One is not allowed to clear the forest for agricultural activities around a location that is considered a place for spirits to live	Those who break this rule shall face the <i>kemali besar</i> , or death, for themselves or their family members. The locals have abandoned it <i>because</i> , based on the experience of local people, it is possible to work around it through ceremonies and offerings to avoid the <i>celako kemali</i>
5.	<i>Bemban teralai</i>	One cannot clear a forest on a hillside while a river flows in the valley	Those who violate this rule will face <i>kemali kecil</i> and prolonged illness for violators and family members. People began to leave this norm with a few adjustments

Note: ^aLocal taboos and prohibitions; ^b*Kemali kecil* (light sanction) in the form of prolonged illness for violators or one of their family members; *Kemali besar* (severe sanction) in the form of death for violators or one of their family members.

[Source: Fieldwork, 2020]

Table 4. The *Celako Kemali* Used in Current Farming Practices

No	The <i>celako kemali</i> ^a	Local Descriptions	Types of sanctions ^b
1.	<i>Kijang melompat</i>	If one clears a plot of land somewhere in the first year (i.e., year t) and then opens another plot of land in the following year (i.e., year t+1), the land in year +1 should not be allowed to separate from the field of land in year t.	Violators of this prohibition will be subject to the <i>kemali kecil</i> or prolonged illness and the <i>kemali besar</i> or death. Local people followed this norm, following customary rules without any adjustment

No	<i>The celako kemali^a</i>	Local Descriptions	Types of sanctions ^b
2.	Tanah siboan	It is unlawful if one opens a plot of land for agricultural purposes in a place of worship of gods or ancestral graves	Violators of this norm will be subject to the <i>kemali kecil</i> or prolonged illness and the <i>kemali besar</i> or death for themselves or one of their family members. Considering the severe consequences, local people do not dare to violate these rules
3.	<i>Merabung bumi atau pematang kuburan</i>	A person is prohibited from clearing land for cultivation if the land is flanked by two rivers or tributaries	The locals consider this prohibition unavoidable and should not be violated. Violation of this norm will result in a <i>kemali besar</i> or death
4.	<i>Setabua gendang</i>	It is illegal to clear forests upstream of the river, whereas there are other farms downstream, not far away	Those who break this rule shall face the <i>kemali besar</i> , or death, for themselves or their family members. The locals still obey these customary rules because of their severe sanctions
5.	<i>Ulu tulang betangisan</i>	It is illegal to open land on a slope with two springs that flow in opposite directions	Those who break this rule will face the <i>kemali kecil</i> sanctions, such as extended illness, and the <i>kemali besar</i> sanctions, such as death for the violator or any of their family members. These customary rules are still being followed, apart from heavy sanctions, but also sociologically for the common good. Local people do not want to disturb clean water sources
6.	<i>Sepelansaran mayat</i>	If a person grows rice on half of the hillside in a particular year (i.e. year t), then the remaining half is prohibited from planting in the following year (i.e. year t+1)	Violating this <i>celako kemali</i> will result in the <i>kemali kecil</i> or illness and the <i>kemali besar</i> or death. This customary rule is still followed by local people even though they face limited agricultural land. The trick is to plant perennials along with food crops and coffee
7.	<i>Sepelintasan perau atau mengakipitka aiak</i>	It is unlawful to clear farmland on the left and right sides of the river. One can only clear agricultural land on one side of the river	Those who break this rule will face the <i>kemali kecil</i> sanctions, such as prolonged illness, and the <i>kemali besar</i> sanctions, such as death for the violator or any of their family members. These customary rules are still being followed, apart from heavy sanctions, but also sociologically for the common good. Local people do not want the flow of rivers as a source of their daily activities to be disrupted
8.	<i>Elang setepak atau ncapkkah tunggul rokok sampai ke sawah</i>	It is illegal to open plots of land in hilly places, whereas one can find rice fields in	Those who break this rule will face the <i>kemali kecil</i> punishments and a lengthy disease for the violator and any family members. The people

No	<i>The celako kemali^a</i>	Local Descriptions	Types of sanctions ^b
		valley areas	still apply this rule; apart from the sanctions, they also consider the benefits of others, especially those who own paddy fields
9.	<i>Tikam luang atau nengakah ulu tulong buntu</i>	It is illegal to clear farmland upstream of a river or close to a spring	Those who break this rule will face the <i>kemali kecil</i> penalties and a prolonged disease for the violator and any family members. The people still apply this rule; apart from the sanctions, they also consider the benefit of the people who depend on the river to meet their daily needs
10.	<i>Segelibak bangkai atau sebalia badan</i>	Suppose a person establishes a farm on half of the hill in a particular year (i.e., year t). In that case, he is unlawful from developing agricultural land in the other half of the hill the following year (i.e., year t + 1).	Those who break this rule shall face the <i>kemali besar</i> , or death, for themselves or their family members. The people still apply this rule; apart from heavy sanctions, it also prevents deforestation in all hills, which results in floods and landslides. They are not willing to take such a risk
11.	<i>Macan merunggu</i>	It is illegal to open a farming region enclosed by dense trees frequently used as tiger nests or thought to be a place for spirits to live	Those who break this rule shall face the <i>kemali besar</i> , or death, for themselves or their family members. The local people try to follow these rules because they are related to spirits that live in forest areas. Even if you want to clear the surrounding forest area, it requires special handling or permission from the customary leader

Note: ^aLocal taboos and prohibitions; ^b*Kemali kecil* (light sanction) in the form of prolonged illness for violators or one of their family members; *Kemali besar* (severe sanction) in the form of death for violators or one of their family members.

[Source: Fieldwork, 2020]

3.3 The transmission of the *celako kemali*

The Serawai carried out the transmission of the *celako kemali* through various channels. For families from the first generation, for example, the internalization of the *celako kemali* values was carried out through the family. Parents taught their children the norms of farming practices. However, there was a tendency for differences in the mastery of indigenous knowledge. The first generation had much more mastered and understood traditional heritage, preserving it in daily activities.

"I still remember the messages from my parents who ordered me to protect this traditional heritage. I do the same thing for my children who are now continuing my profession as a farmer."

The second generation acquired traditional knowledge through internalization within the family. This knowledge become a stock of knowledge that was enriched through horizontal channels. However, for this second generation, knowledge enrichment was obtained through community interaction, especially with other

cultivators. The second generation learned from the experience of fellow cultivators to make modifications and adjustments to the *celako kemali*. Thus, the second generation used the model of transmitting knowledge through vertical and horizontal channels, and horizontal media is more dominant.

"The acquisition of celako kemali knowledge was initially obtained from parents. This knowledge became my stock of knowledge in farming practices. But in its development, I learned a lot from other cultivators who gave enlightenment. I imitated them to make modifications without losing the essence of celako kemali. Honestly, I'm also afraid of being punished for these modifications."

Previous studies have shown that horizontal transmission is children's most common channel of knowledge transfer (Gallois et al., 2018). The research findings showed a similar case: the *celako kemali* transmission between the second generation was more likely to be a horizontal and vertical channel, whereas the horizontal channel tended to be more dominant through external internalization within the community.

The transmission of traditional knowledge in the third generation tended to be more dominant through the oblique channel. They obtained a basic understanding of *celako kemali* from their parents. Still, they strengthened it through interaction with other parties, such as village elders and teachers, and even through social media penetrating youth groups. The younger generation also gained knowledge of *celako kemali* from peer groups such as playgroups and other cultivators. Lifestyle and external norms had coloured the thinking patterns of young people. Their agricultural practices tended to have undergone modifications, and they even dared to leave some norms of *celako kemali* for specific reasons.

"I was often reminded by my parents and village elders to be more careful with celako kemali. They said it might not be affected by me, but who knows it might be affected by one of my family. I left the norm for the return of the one that has the smallest possibility of the risk of the violation."

The level of mastery of the *celako kemali* was indeed more dominated by the first generation. But there was an interesting thing, and the author found a cultivator from the third generation who showed extraordinary mastery. He told me that all the knowledge he got was from his grandfather than from his father.

"I live with my grandfather outside this village. During that time I helped grandfather in the fields. From farming practices, I knew very well figurative languages that were difficult to translate. But my grandfather was very fluent in them. When I moved to this village, I became my father's successor to cultivate the fields. Until now I still stick to the celako kemali for farming".

This study found that the youth obtained the *celako kemali* values from the horizontal and oblique channels. They gained knowledge from other cultivators who coincidentally adjoined the field. In general, this third generation was a group of new cultivators who open areas based on knowledge obtained from their neighbours who have previously cleared agricultural land. The pattern of conveying knowledge from the first to the second generation was dominantly using a vertical channel. However, from the second to the third generation, vertical transmission was combined with the horizontal channel, where horizontal transmission was more dominant. Among cultivators in the third generation, the mastery of knowledge of the *celako kemali* was a product of a combination of horizontal and oblique transmissions, where oblique transmission was more dominant.

The transmission pattern of the *celako kemali* norms showed the locals' loyalty to their ancestral heritage for hundreds of years. The first generation gained the *celako kemali's* knowledge from their parents' inheritance, who first opened agricultural land and villages in the village. This first generation built the foundation for maintaining the norms of cultivation in the form of *celako kemali*. A village elder said:

"I came to this village in a problematic situation. This village is just a wilderness. My wife and I started cultivating the land only to fulfil subsistence needs. However, I always remember the message of my parents, wherever they are, they must adhere to the principle of practising the heritage of their ancestors. I believe this celako kemali is a legacy from my ancestors that I still maintain".

Overall, the process of transmitting the values of the *celako kemali* started from the family through the internalization process. For the second and third generations, internalization of this knowledge become their stock of knowledge. They enriched it through horizontal and oblique channels. Figure 3 below illustrates the transmission characteristics of the *celako kemali* in the Serawai people.

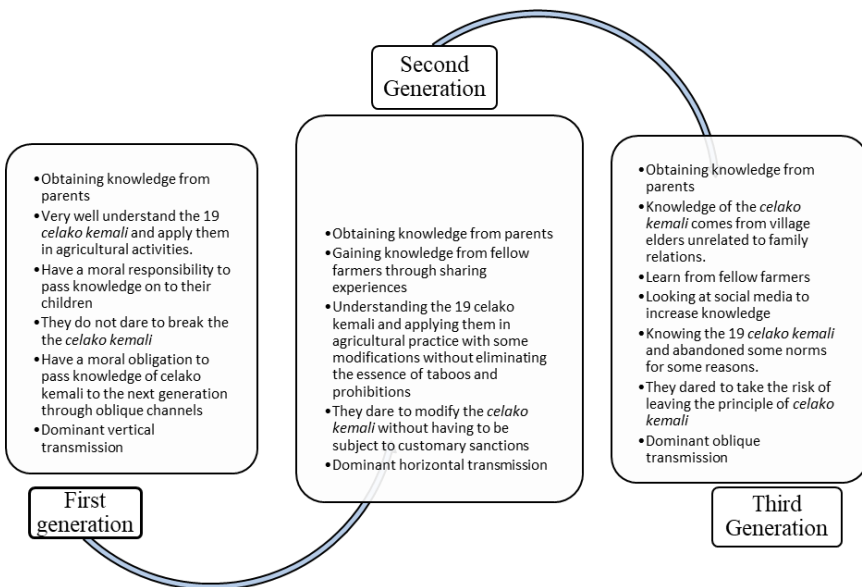


Figure 3. Transmission of celako kemali among generations

4. DISCUSSION

The *celako kemali* is essentially an embodiment of norms and rules of practice for natural resource management in the form of traditional taboos and prohibitions. This study revealed that the Serawainese have 19 conditions of the *celako kemali*, which generally contain components of rivers, forests, and hills. These taboos and prohibitions always connote the existence of spirits as figures who regulate the dynamics of nature. Therefore, it is not surprising that the Serawainese limit human intervention in places that are considered sacred and a place for spirits to reside. Among the 19 forms of the *celako kemali*, the locals still adhere to 11 types of the *celako kemali* due to fear of consequences for their violations. In addition, the Serawai have undergone various modifications for five kinds of the *celako kemali* without violating on substance. Nevertheless, the Serawainese have abandoned three types of the *celako kemali*, which are considered not subject to sanctions for their violations.

The Indigenous worldview emphasizes the harmonious relationship between a community and its environment since it shapes society's meaning, knowledge, and interactions (Schlüter et al., 2019). The Serawainese traditionally utilize forests, land, rivers, and hills as symbols of creating knowledge and values of their environmental management. Interaction with other systems in the environment is highly symbolic because individuals use symbols to analyze their environment and decide what to do based on their interpretation (Schlüter et al., 2019).

For the Serawai people, forests, for example, are seen not only as their own but also as belonging to other beings who rule the universe. The locals then believe that *qhimbo* (forest) and *qhimbo tuo* (virgin forest) should not be touched if they do not want to endanger their lives, such as natural disasters and disease outbreaks. The Serawai people's view of the forest implicitly contains two dimensions: relating to the relationship between humans and the environment, which is considered sacred as the foundation of ecological values. Second, it reflects social bonds that a person is not alone (Stocker et al., 2016). *Celako kemali* is a set of values and norms that illustrates the connection between humans and their environment. The locals cannot separate forests, rivers, and hills from the *celako kemali* principles.

Indigenous peoples have a rich tradition of nature conservation through the use, respect, and protection of natural resources in a socio-religious and socio-cultural manner. They believe that supernatural hands, living in certain areas that are considered sacred, regulate the balance of nature. In forest management practices, for example, traditional communities rely on gods and local knowledge to protect their forests (Ens et al., 2015). Sacred forests, for example, are protected by indigenous peoples based on their cultural and religious beliefs and taboos. Forest protection is guaranteed by using taboos and religious beliefs or by dedicating the forest/species to forest guardian spirits (Onyekwelu, 2021). For the Serawai people, the *celako kemali* values are a product of their worldviews on their environment. Of the 19 types of *celako kemali*, norms and sanctions are always related to environmental conservation and maintaining good relations with nature's ruling creatures. The research findings showed that the locals' loyalty to the *celako kemali* is primarily due to fear of the consequences of violating taboos and prohibitions. They modified the return to avoid punishment on the one hand and fulfilment of needs on the other. Even if three *celako kemali* were completely abandoned, it turned out that they did not contain elements of severe punishment.

The worldview elements of Indigenous People are an essential consideration for placing the position of an observer in conducting studies of Indigenous People. The Serawainese view biotic and abiotic environmental components as an integral part of their living system. The ecological values of the *celako kemali* are manifested in the form of norms and sanctions that adherents of the Serawai culture must follow. The locals always associate environmental management with material and spiritual aspects. The 19 types of *celako kemali* reflect the relationship between humans and others and between humans and the supernatural. For example, the Serawainese's attitude toward the environment is founded on a mental perspective passed down from generation to generation. How they treat trees, for example, is inextricably linked to their worldview of forests. The treatment has been established through customs and serves as a guide for their actions. The *celako kemali*, for example, was socially formed and is now considered a social truth. This social construction results from actor interaction legitimized by customary norms and punishments.

The Serawai have maintained the *celako kemali* in managing their environment and natural resources for hundreds of years. The continuity of the *celako kemali* occurs due to cultural reproduction, which transmits values and norms to ensure the continuity of

cultural experience. In other words, cultural reproduction is the process by which aspects of culture are passed on from person to person or from group to group. This finding also refutes the global trend, indicating that indigenous knowledge has been lost or eroded (Aswani et al., 2018; Cardinale et al., 2012; Groenfeldt, 2003).

Maintaining the *celako kemali* among the Serawainese cannot be separated from the transmission pattern among generations. Conveying knowledge can be carried out in three channels: vertical, horizontal, and oblique transmission channels. The transmission of traditional knowledge to the Serawainese differs based on the generation level. Submission of information in the first generation is more dominantly a vertical transmission pattern. Parents from an early age internalize the *celako kemali* with all the consequences, such as prolonged illness or death if they violate customary rules.

Vertical and horizontal channels colour transmission patterns of the *celako kemali* from the second generation to the third generation, where horizontal channels tend to be more dominant. The local cultivators learn a lot from each other to manage their fields through sharing experiences. Meanwhile, the transmission of knowledge also occurs among the younger generation, which generally consists of young cultivators. They obtain their knowledge from their parents and a combination of horizontal and oblique transmission. Beginner cultivators are more dynamic in seeking sources of knowledge from fellow cultivators who have already cleared the land. In addition, village elders provide guidance even though it is unrelated to family ties. The parent group is morally responsible for continuing the *celako kemali* values.

Methods of cultural reproduction vary depending on the agent's socialization based on location, awareness, and intensity to reproduce cultural norms and values. Regarding cultural reproduction, parents, neighbours, friends, and even traditional leaders transmit these cultural values of shifting cultivation to the next generation through social interaction. For example, the older generation introduces and even forces the younger generation to adopt traditional ways of thinking and acting in cultivation activities. Indirectly, this process reflects the enculturation model of the younger generation to duplicate the traditions and norms of the previous generation. Each successive generation's tendency to follow the previous generation's cultural norms is evidence of successful enculturation.

In one of his writings, Giddens (1979) states that social reproduction can occur in three ways, namely: (1) in a network of direct interactions, as achieved or presented by actors; (2) in the reproduction of members of the social system as humans with a limited period; (3) in the reproduction of institutions developed over a long period. The transmission of the value of the *celako kemali* is carried out through social interaction between cultivators as the main actors in a short time. The value reproduction of the *celako kemali* is also transmitted through social institutions in the form of shared values that followers of the Serawai culture must implement.

The study found several ways local people used to deal with the persistence of the *celako kemali*. Several cultivators from the third generation made adjustments to find a middle path with the aim of not violating customary rules on the one hand. Still, on the other hand, they were faced with the factor of limited land. This adjustment is mainly applied to lands that are considered sacred and where spirits live. On the instructions of village elders, the locals made adjustments in the form of offerings and ceremonies. According to local people, that is the best way to do it when facing limited access to land. The adjustment of local communities to customary rules may be caused by local religions and beliefs which contain animism and the worldview of the locals (Cook & Offit, 2008), which in turn affects adjustment patterns when they are faced with the limitations of the external environment. Or they tend not to pay attention to some

knowledge that is no longer relevant in their daily activities (Hernández-Morcillo et al., 2014).

This study also supports several previous studies that indigenous people still maintain their traditional knowledge in the management of environmental resources, including forests (Carson et al., 2018; Phungpracha et al., 2016; Rist et al., 2010; Schmidt et al., 2021; Wongvarn & Amnuay-ngerntra, 2018). These previous studies concluded that indigenous knowledge still has a significant role in managing natural resources and the environment. This conclusion is contrary to the conclusion of previous studies that indigenous knowledge has been degraded due to the penetration of social changes and external values (Aswani et al., 2018; Cardinale et al., 2012; Hanazaki et al., 2013; Tang & Gavin, 2016).

Studies on the Serawai community have shown that despite external social changes, local communities still rely on the *celako kemali* as a guide in natural resource and environmental management practices. The Loyalty of the Serawai community to the *celako kemali* is caused more by internalization within the family about the negative consequences of violating the *celako kemali*. If asked, is the fear of taboos and prohibitions or the spirits of forest guards the reason the Serawainese conserve their environment? This study proves that the fear of negative consequences for the violation of the *celako kemali* is the main reason for them not to over-exploit their environment.

5. CONCLUSION

This study illustrates that indigenous ecological knowledge is the result of extracts from the perspective of local communities in interacting with their environment. The values attached to the *celako kemali* manifest the unique attitudes, behaviours, thoughts, and approaches of the Serawai tribe in dealing with their environment. The Indigenous research method is considered relevant enough to reveal the philosophy of the Serawai people in building a balance between human interaction with nature. The *celako kemali* is the embodiment of the noble values of the Serawai people in the form of taboos and prohibitions.

This research also answers the discourse on the existence of indigenous knowledge amid the increasingly rapid penetration of external values. The Serawai people, especially the first generation, still maintain their traditional wisdom and values as an ancestral heritage for hundreds of years. The first generation reproduces the *celako kemali* values to the second generation using more vertical channels in the form of internalization within the family. Furthermore, the second generation places the results of the reproduction of these values as a stock of knowledge. They then enriched the understanding of the *celako kemali* through the horizontal and oblique channels, although the horizontal channel was more dominant.

Changes in the way of looking at the *celako kemali* occur in the third generation. In this generation, the knowledge gained through vertical channels becomes the initial basis for their understanding of the *celako kemali*. In its development, this generation uses oblique channels that provide knowledge from village elders with no family relationships, playmates, and even social media. Socio-cultural reproduction through oblique channels will be complicated to control, given the increasingly open access to information.

In general, this research also refutes previous studies indicating the erosion or loss of traditional knowledge in various parts of the world. Nevertheless, this study considers it essential to examine the younger generation's attachment pattern to the values of local wisdom. The reproduction of these values in this generation requires special handling following the dynamics of socio-cultural change.

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