

Research Paper

The Utilization of Traditional Conservation of Sumatran Tiger as a Potential Development of Biology Teaching Materials

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Abstract: Indigenous communities have long had an unwritten norm system that regulates the protection of forests and biodiversity inside. The principle of traditional conservation on the island of Sumatra for the preservation of Sumatran tigers is to implement environmental management in the form of prohibitions or invitations in forest areas. On the other hand, this cultural concept is intertwined with learning. Students can discuss lesson concepts in a cultural perspective to support meaningful learning in biology lessons. Therefore, the purpose of this study is to find out the values of traditional conservation of the Sumatran tiger which can be used as a source of developing biology teaching materials based on cultural perspective. The method used in this research is a literature review and content analysis. Researchers searched works of literature from multiple data search engines, namely PubMed, Google Scholar, Mendeley, Semantic Scholar and the Publish or Perish. Data is processed and analyzed according to research needs. Based on the results of the study, obtained results regarding the identification of Sumatran tiger, threats, and forms of conservation in the natural habitat of the Sumatran tiger. Based on the Curriculum 2013, the relevance of this study is linked to the biology material on biodiversity in basic competencies 3.2 and 4.2 regarding distribution, threat analysis, and conservation efforts of biodiversity for the grade of 10th of high school. The material is also included in the learning outcomes of the Merdeka Curriculum phase E for class x regarding understanding and process skills analyzing interactions between ecosystem components and efforts to conserve biodiversity. These material resources can be developed into a module-based on local culture to be studied independently by students.

Keywords: Biodiversity; Conservation; Culture; Forest; Sumatran tiger

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INTRODUCTION

Indonesia has more than 200 ethnic groups spread among 13,400 islands. These ethnic groups have their own language and culture (Kemendikbud.go.id). Culture with the coming of the necessary transformative dimension that ensures the sustainability of development processes as United Nations' 2030 Agenda for Sustainable Development (Rahmawati et al., 2023). Education plays an important role in promoting sustainability. Therefore, the learning process requires accommodation of various cultural aspects such as cultural identity or community diversification to support cultural sustainability (Laine, 2016). Thus, quality education will increasingly be able to promote the development of human resources as well as cultural and environmental sustainability.

The quality education requires meaningful learning to support the quality of learning in it. The main goal of education at all levels is to involve students in meaningful learning that occurs when they are making meaning (Wong, 2015). Meaningful learning creates a learning environment that is interesting from around and relevant to an environment that is familiar by students (Polman et al., 2021). To be meaningful, the content learned is assimilated and linked between previously acquired knowledge and new

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information to be learned. The assimilated information from such relevant content can be attributed mainly to the richness of local culture closer to the students' real lives.

Teachers need to utilize learning resources that are relevant and familiar to students. Local culture, such as typical foods, visual art, and social and ritualistic practices, known to students from their home life, strongly influences cultural identity related to students' daily lives (Rahmawati et al., 2023). By incorporating cultural values into the curriculum, teachers can create a supportive learning environment for students to directly learn their cultural identity with meaningful understanding (Kumar et al., 2018). With the gradual decline of the country's culture and traditions due to globalization, educational agents began to have to pay attention to cultural aspects in school learning, especially biology learning.

Biology is closely related to students' social and cultural environment. Biology learning will become meaningful if presented with a cultural learning approach. Nowadays, teachers should pay attention to the needs and characteristics of students in their classrooms. This refers to the 2013 curriculum development guidelines that the Education Unit is expected to develop the curriculum in accordance with the education unit, regional potential/regional characteristics, local community socio-culture, and students. The importance of cultural aspects also supports meaningful learning in the implementation of the Merdeka Curriculum as a new curriculum as a form of evaluation of the previous curriculum, namely the 2013 curriculum (Indarta et al., 2022).

According to research conducted by Julca in 2000, the knowledge and experience learned from activities related to local communities such as habits, natural resources, images, and the use of objects will help develop meanings and concepts, thus contributing to effective learning (Vargas-Hernández & Vargas-González, 2022). However, culturally integrated biology learning has not been optimally developed. This causes students' ability to analyze community activities related to science is still low which has implications for low student learning outcomes (D. Fitriani, 2015). Therefore, as teachers who have professional competence must have the ability to identify various alternative methods and ways to develop the learning process in accordance with the characteristics and environment, including developing teaching materials to direct the teaching and learning process according to learning objectives (C. Fitriani et al., 2017).

Learning biology material that is linked to the local potential, is useful for making local wisdom known in the world of education that utilizes the environment or local areas as a source of learning (Safitri & Anas, 2023). One of the uses of the environment to learn biology is to examine the local potential that exists in the environment of students. The selection of teaching materials based on local potential is in accordance with biological characteristics, especially the relationship between nature and culture that converge in many ways that span values, beliefs and norms to practices, livelihoods, knowledge, and languages.

Local communities have been protected their lands and waters in reciprocity with nature, often guided by deep connections to place, culture and ways of knowing for a long time (Diver et al., 2019). The way they manage the forest often achieve greater conservation results and sustain more biodiversity than government protected areas. Indonesia is fairly large of various local wisdoms that strive to protect natural resource wealth. The report found that indigenous and local communities contribute in many significant ways to biodiversity. But nowadays that biodiversity is now disturbed due to forest imbalance. The climate change around the globe, aptly describes the loss of global biodiversity. Even though forests have an important role in biodiversity.

Based on Regulation of Government Number 28 of 1985, one of the functions of the forest is a place for environmental preservation, for that the forest wealth must be protected and maintained from human impacts that can damage the sustainability of living things in it. One of the forest areas with a large area is the island of Sumatra. The island of Sumatra is abundant for biodiversity, including the animals in its forests. Data from Department of Environment and Forestry of Bengkulu Province in 2020, the area of protected forest in Bengkulu province is 250,750 hectares wide and the area of nature reserves and nature conservation is 462,965 hectares wide (bengkulu.bps.go.id, 2021) (bengkulu.bps.go.id). The extent of the forest area in Bengkulu Province indicates the potential for biodiversity, one of which is as a place to live for animal species, namely the Sumatran tiger (*Panthera tigris sumatrae*). Forests in Sumatra are the natural habitat of these Critically Endangered.

The Sumatran tiger (*Panthera tigris sumatrae*) is endemic to the island of Sumatra in Indonesia that has been able to survive up until now, after previously two sub-species, namely the Bali tiger (*Panthera tigris sondaica*) and the Javan tiger (*Panthera tigris javanica*) had previously been declared extinct (Goodrich et al., 2022). Current studies indicate the Sumatran tiger population continues to decline and its existence is increasingly difficult to find. One of the few causes of this can occur due to human activities and actions that are not beneficial to the environment (Suryanda et al., 2017). Decreasing of Sumatran tiger population

are caused primarily by human activity that have excessively converted forest land into plantations or settlements.

The decline in tiger population due to the narrowing of forest area is supported by data that recorded in the period 1990-2010 (Margono et al., 2012), it was found that there was forest clearing with a large landscape on the island of Sumatra, namely with 70% conversion of forest area. Research by Nahib and Suwarno (2017), found that the rate of deforestation that occurred on the island of Sumatra was in the first place in Indonesia with a value of 0.78% higher than the island of Kalimantan. The main cause of the high rate of deforestation is agricultural expansion, especially the expansion of oil palm plantations and the expansion of industrial forest plantations for pulp and paper plantations (Margono et al., 2012).

Based on analysis of range contraction in the geographic range for 25 large carnivore in 2017. The Sumatran tiger is one of the large carnivores that experiences the greatest range contraction of 95% (Wolf & Ripple, 2017). This research is closely related to extinction risk individual populations and as a whole. Based on these findings, the massive degradation of the Sumatran tiger's natural habitat is a threat to the preservation of this animal. The forest of Sumatera is the only natural habitat where Sumatran tiger live. When a disruption to these key environmental conditions occurs, the species become homeless. This is called habitat loss. Based on data from the Ministry of Environment and Forestry in 2007, the estimated population of the Sumatran tiger is critically endangered at around 250 individuals left (Soehartono et al., 2007). Thus, tiger conservation is critically important for Indonesia.

The importance of Sumatran tiger conservation is quite extensive from the standpoints of ecology, socio-cultural, economic and for scientific purposes (Haidir et al., 2017). From the socio-cultural aspect, indigenous people believe that the bad relationship is caused by the attitude of the man himself. Therefore, the awareness of this community forms the knowledge that bring up to a tradition. The tradition of respecting the Sumatran tiger has taken root for the people who live on the island of Sumatra. This tradition has coexisted from generation to generation which explains the rules of how to maintain a harmonious relationship between humans and tigers in local communities in Sumatra. Both are located along the Bukit Barisan, from Lampung to Aceh, as well as along the east and west coasts of Sumatra.

The Elements of caring environment such as attitudes, beliefs, and values in preserving the environment can be used as material for environmental education that is able to foster an attitude of responsibility, character, and knowledge of available natural resources. This potential seems to be forgotten by many teachers, especially in Biology learning. Teachers tend to use the material in Biology textbooks that have been marketed so that the material used does not focus on the development of material by teachers related to the local potential of each region (Ardan et al., 2015). In fact, learning biology is closely related to all forms of life in the world that are familiar. It is important for teachers teach students to make connections between what they learn in the classroom and what they see in everyday life.

Learning biology is learning to find out and understand the systematics that exist in nature. Learning biology is not only about mastering concepts, facts or principles, but also involves a process of finding knowledge (Ramdiah et al., 2020). The process of finding this knowledge can be done by developing a curriculum based on the advantages of each area. By strategically embedding local potential of any area into those topics in biology curriculum may allow student to finding more information. Students can study biology material that is close to their lives. This can develop a habit of mind as well as knowledge of students.

The biology topics that orient the curriculum to local potential will be adjust according to the local potential of the area around the school (Rizqi Imtihana & Djukri, 2020). While the government has determined to manage the Sumatran tiger conservation area, for the indigenous people, they also take the responsibility for its existence. They have their own attitude and habits based on traditional ways. Education is a strategic sector for promoting sustainability, including natural and cultural sustainability. Therefore, this study aims to describe local potential in the Sumatran area, namely the traditional conservation of the Sumatran tiger as a source of biology learning in accordance with the Basic Competencies in the 2013 Curriculum and The Merdeka Curriculum.

METHOD

This study consists of two stages. Phase 1 is descriptive exploratory research using the literature review method (Suhartono, 2017). Research with literature review is carried out by taking data in the library, reading, recording and processing research materials to be analyzed according to research needs. According to Creswell (2018), this literature study plays a role in finding and summarizing studies on a topic in three systematic stages, namely capture (find or collect), evaluate (evaluate), and summarize (summarize) the literature. Literature searches are carried out using an online search engine, namely

PubMed, Google Scholar, Mendeley, Semantic Scholar and the Publish or Perish application to collect scientific journals, report, articles, or magazines (both national and international). In addition, the literature review also compiles several proceedings, books, government regulations or policies as well as news on online news portals.

The number of journals and report studied was 25 files with a period of publication between 1981 and 2023. The keywords used to search for literature sources on Google are "Local Culture", "Traditional Conservation", "Local Potential based Biology Learning", "Sumatran Tiger", "Community Perception and Knowledge of Sumatran Tigers", "Teaching Materials", "Learning Resources based Local Potential" and "Conservation". Phase II is a content analysis to discuss the findings that have been investigated in phase I to find out how to use the values of local potential of the Sumatran tiger as a potential development of biology teaching materials. The data obtained are poured into discussion sections so as to answer the problem in the research entitled "The Utilization of Sumatran tiger traditional conservation as a potential development of biology teaching materials". Indonesia is a giant archipelagic country with a very diverse distribution of ethnic groups (Arifin et al., 2015). There are 497 types of tribes in Indonesia and each tribe consisting of many customs that can be used as teaching material in biology subjects.

RESULT AND DISCUSSION

Etymology of the Sumatran Tiger (Panthera tigris sumatrae)

In the beginning of the tiger's real name was "*tigris*" or in English it was called *tiger*. The word "*Tiger*" apparently comes from the Greek word "*tigris*". The word *tigris* probably comes from Persian which means arrow (Thorley, 2017). The arrow symbolizes the incredible speed of the animal and the place where it first came from the Tigris River in Iraq. The word *tigris* was then absorbed into English into *tigress* which was first recorded in 1611. The tiger belongs to the cat family but is very large. This was stated by a scientist from Sweden, Carolus Linnaeus, who is known as the "father of modern taxonomy" (Mazak, 1981).

In the research of Carolus Linnaeus entitled *Systema Naturae* in the 18th century there is the naming of tigers. From these studies in simple scientific language, tiger or *panthera tigris* is also often thought to come from Greek which consists of two words "*Pan Theron*". "*Pan*" means all and "*Theron*" means beast or wild animal (Matt et al., 2014). The naming of the Pantheron was a popular etymology at the time. In parts of East Asia, the naming of tigers appears as "yellowish animal" and "whitish yellow". The name "harimau" itself was popularized in Malay and other languages such as "*rimuëng*" from Aceh Province and "*maung*" in Sunda Tribe.

In the Sumatran Islands, there are still many local communities who have inherited messages from their ancestors by applying customary law. The community is gathered at the village level. The community respects the Sumatran tiger as an mythical ancestor. They believed that ancestor transformed into a tiger to serve as the community's guardian. The community's perception of the existence of this tiger has become a part of life in the communities of Aceh, Kerinci, North Sumatra, West Sumatra, and Bengkulu. These beliefs, values, concerns and attitudes that have lived for hundreds of years explain how the harmonious relationship between humans and tigers exists in communities in Sumatra, both those along the Bukit Barisan, from Lampung to Aceh, as well as along the east and west coasts Sumatra.

Human philosophy or attitude towards tigers and other animals is also reflected in the Talang Tuwo Inscription (Wijaya, 2019). According to traditional leaders in Palembang, the King of the Sriwijaya Empire at that time mandated that this nature, which was symbolized through the Sriketra Park, was intended for all living things, not only humans, including tigers in Sumatra as well. Before humans existed, tigers were the top carnivore in the forest. The ancestors in Sumatra viewed tigers as "*wong tuo*" who must be respected. This attitude then brings up into a tradition or culture which essentially protects the environment and tigers in the jungle.

Various regions in Sumatra call tigers with the same meaning. Research conducted by Maisaroh on 2021, four local names are often spoken by people in the North Sumatra area, namely *Datuk*, *Panglima*, *Belang*, and *Raja Hutan*. People believe that if they are talking about or intentionally calling a tiger by a common name then the tiger will enter the settlement. Naming the Sumatran tiger with this local name is the reason people give those names. This statement relates to local wisdom that has beliefs about the presence of tigers. If viewed from local wisdom by the community, local names appear for Sumatran tigers, people still believe in the term *pamali* as a prohibition to call *harimau* because if they are called, Sumatran tigers will enter settlements (Maisaroh, 2021). This is in accordance with (Suhartini, 2009) who states that local wisdom is a form of environmental wisdom that exists in social life in a place or area, therefore local wisdom is not the same in different places and times and in different tribes.

If in the mountainous areas of South Sumatra, such as in *Pasemah* the tiger is called "*niniak*" and on the coast it is called "*puyang*". In Aceh, it is believed that there are black and white tigers, whose function

is to guard sacred tombs. Including the existence of a tiger (*rimueng*) guarding the tomb of a district chief named Teuku Cot Bada in Pidie Regency. In North Sumatra, the tiger is called "ompung" (grandfather), in West Sumatra it is called "datuk" (grandfather) or "inyiak" (grandmother), also in Kerinci "hangtuo" (parent) and in Bengkulu as "setuo or setue" (parent) (Sintas Indonesia, 2021).

Even community groups recognize the existence of tiger man or weretiger. Both in North Sumatra, West Sumatra, Kerinci, Bengkulu, and South Sumatra. This tiger man is known as *Sumai* in South Sumatra, precisely in Pasemah (Pagar Alam, Lahat and Muara Enim), while in Kerinci it is called *Cindaku*. In Bengkulu Province, the incarnate tiger or tiger incarnate is respected as an ancestor. In *Bukit Sarang Macan*, Ladang Palembang Village, Lebong Regency, Bengkulu, it is believed to be the place where reincarnated tigers or ancestral reincarnations meet in Lebong Regency (Hendry, 2017b). This hill is called *Tebo Sa'ang Imau* or *Bukit Sarang Macan* (The Sarang Macan Hill) by the local communities.

Sumatran Tiger (Panthera tigris sumatrae)

Sumatran tiger (*Panthera tigris sumatrae*) is an endemic animal on the island of Sumatra. The distribution area is at an altitude of 0-2,000 mdpl (O'Brien et al., 2003), but sometimes it can also be found at an altitude of more than 2,400 mdpl (Linkie et al., 2003). The source of tiger food is an important factor supporting the sustainability of its population. The availability of these prey animals also plays an important role in determining the home range of individual tigers.

The Sumatran tiger (*Panthera tigris sumatrae*) has the smallest body compared to all tiger sub-species living today. Adult males can reach a height of up to 60 cm tall and a length from head to tail of up to 250 cm long and a weight of up to 140 kg. The female tiger has an average length of 198 cm and a weight of up to 91 kg. The Sumatran Tiger's skin color is the darkest of all tiger subspecies, ranging from reddish yellow to dark orange. They also have the narrowest black stripes of any tiger subspecies (WCS Indonesia, 2021).

Sumatran tigers are carnivores. In their natural habitat, the Sumatran tiger preys on animals from the Cervidae and Suidae families such as the sambar deer (*Cervus unicolor*) and wild boar (*Sus scrofa*) as their main food. However, under certain conditions it can prey on other animals such as deer (*Muntiacus muntjac*), mouse deer (*Tragulus sp*), macaque (*Macaca nemestrina*), porcupine (*Hystrix brachyura*), and beyond (Ari & Aunurohim, 2012). A tiger needs about 6-7 kg more meat per a day. The amount of this need depends on whether the tiger is looking for food for herself or the tigress has to feed her cubs.

Sumatran tigers are solitary animals, this is because most of their lives are solitary, except during the mating season or are raising children (Djoko et al., 2009). Home range of Sumatran tiger is around 50-70 km², while for a male tiger it is around 110 km². Currently, the Sumatran Tiger is *Critically Endangered* or on the verge of extinction as released by *The International Union for Conservation of Nature's Red List of Threatened Species*. Conservation efforts continue to be prioritized, especially in protected areas. Empowerment of people living in and around the Sumatran tiger habitat continues to be improved so that they can take part in the conservation of the Sumatran tiger (Goodrich et al., 2022).

Traditional Conservation Principles of Sumatran Tigers

Armed with the belief that the Sumatran tiger is a mythical ancestor or reincarnation of an ancestor, no one on the island of Sumatra dares to capture or kill a tiger (Gea et al., 2019). Disrupting the tiger's life is the same as killing an ancestor. If they kill an ancestor, then the indigenous people believe the payoff will be more dangerous for themselves. The local community do not feel bothered by the existence of tigers. So based on the story as their local wisdom, the responsibility arises to utilize natural resources efficiently.

Local communities already know that the Sumatran tiger is an animal fully protected by law (Suryanda et al., 2017). The community understands that the existence of forests will affect the behavior of the Sumatran tiger, one of which is that if the home range of the Sumatran tiger is getting narrower, it will result in the tiger's natural food being reduced. This causes the Sumatran tiger has forced towards human societies where they occasionally prey on livestock (Adu et al., 2019). Therefore, the level of public perception of the existence of the Sumatran tiger is good. To this day, people still respect the Sumatran tiger that prowls in the forest. This respect for tigers has maintained a promise for generations to protect the environment.

Forest protection efforts in local law are one way to prevent forest destruction that can disturb the balance of nature, including the presence of Sumatran tigers in this region. Therefore, each indigenous community, especially in Bengkulu Province, has its own local legal apparatus, which functions as a tool of social control related to the life of their community by complying with local forest rules that include material and formal local legal rules (Yamani, 2011). Yamani in his research also explained that the system of forest protection in local law is based on local legal rules in the form of taboos and prohibitions and is carried out

through preventive measures in the form of rule formation, counseling and supervision, and repressive measures in the form of imposing customary sanctions.

The community understands the importance of the existence of forests for Sumatran tigers. One of these forest hill areas in Bengkulu, namely *Bukit Sarang Macan* (The Sarang Macan Hill) which is believed to be a place for Sumatran tigers to find prey. On this hill area, indigenous people also believe that destroying the forest environment will get traditional sanctions. So that the *Bukit Sarang Macan* is free from destructive activities. There is a belief that considers the Sumatran tiger as a mythical ancestor, as well as awareness of forest sustainability, so on July 6, 2001 and August 30, 2002, residents and the village government agreed to designate The *Bukit Sarang Macan* area as a forbidden forest or sacred groves. The community call it "*Hutan Larangan*". Furthermore, the agreement was stated in Village Regulation Number II concerning Village Protection Forests and Village Customary Forests dated September 30, 2003 (Hendry, 2017b).

The presence of the Sumatran tiger is also an indicator of the balance of the ecosystem. The Sumatran tiger as top carnivore plays a major role in maintaining the food chain. According to the traditional leader of Lebong Regency, Abdul Muis, the appearance of the Sumatran tiger in this settlement is a warning that environmental conditions are not good (Hardjo Putro, 2017). Therefore, from generation to generation, local communities have tried to carry out conservation based on local wisdom, namely by implementing environmental management in the form of prohibitions or invitations.

The existence of regulations for prohibited acts based on the material content of customary laws on indigenous communities in the Bengkulu area, shows that indigenous communities have long had an unwritten norm system that regulates the protection of forests and biodiversity inside (Yamani, 2011). Traditional conservation carried out for generations by indigenous peoples is an effort to preserve biological natural resources and respect for ancestors (Mahirta, 2015). This knowledge system of indigenous people forms rules for utilizing limited natural resources (Suhartini, 2009). Traditional forms of conservation that have been applied by the community in the *Bukit Sarang Macan* area for a long time to natural resources are listed in Table 1.

Table 1. Traditional forms of conservation at *Bukit Sarang Macan*

Forms of Conservation	Forms of Customary Fines
Limits on taking forest products without destroying trees	<i>Serawo punjung kambing</i> , rice and money fines
Creating barriers for forest burning in plantation areas	<i>Serawo punjung ayam</i> , rice, fine money
Prohibition of expanding the farm area to go into forbidden forest	<i>Serawo punjung kambing</i> , rice and money fines
Planting trees in the farm area	<i>Serawo punjung kambing</i> and rice

Sources: Yamani et al. (2014); Hendry, (2017)

To this day, the condition of The *Bukit Sarang Macan* area has not been used for the commercial interests of the community. The imposition of customary sanctions is carried out as a form of repressive forest protection. There are two types of sanctions in the local law of the indigenous community of the Bengkulu region, the first is customary sanctions, apologies to fellow citizens of customary law communities, and to supernatural forces that are disturbed due to violations or prohibitions in customary rules. The concrete form of customary sanctions is an apology in the form of *punjung*, goat or black chicken, black rice, and so on, which is paid in the customary institution session under the leadership of the head of the customary law community. Second, customary fines for planting replacement trees, applied to the prohibition on cutting trees without permits, clearing forests without permits, cutting trees in any location, cutting down rare trees with medicinal functions, and harvesting honey by cutting trees (Yamani, 2011).

Based on Table 1, for utilization, residents may only take forest fruit, medicinal plants, and honey without damaging the trees. If violated, the perpetrator is subject to a customary fine in the form of *serawo punjung kambing* (butchering a goat), two cans of rice, and a monetary fine equal to the price of wood that is cut or damaged. Owners of farms that are directly adjacent to the forbidden forest are prohibited from burning before setting up barriers or ditches. If violated, the perpetrator is subject to a customary fine in the form of *serawo punjung ayam* (butchering the chicken), two cans of rice, and a monetary fine equal to the price of the burned trees. The community is also prohibited from converting it into farmland in the *Bukit Sarang Macan* area. In addition, if people are gardening, they must plant trees to preserve forests to maintain their functions. If this is violated, it must comply with customary law, namely *serawo punjung kambing* (butchering a goat) and two cans of rice (Hardjo Putro, 2017).

The management of forest resources is one of the conservation efforts for the existence of the Sumatran tiger. Local communities, especially in *Bukit Sarang Macan*, have various ways of environmental management to prevent the decline in the quality of natural resources including the biodiversity of flora

and fauna in the forest. Local community together with The Natural Resources Conservation Agency (BKSDA) of Lampung and Bengkulu are also looking for and removing snares deliberately set by poachers in the roaming areas of the Sumatran tiger (Supardi, 2020). The management of the forest where the Sumatran tiger's natural habitat is, proves that the community is still trying to preserve this critically-stated animal. Traditional conservation by the community for the Sumatran tiger in the hill with an area of approximately 20 hectares wide is still maintained.

The value of local wisdom which is divided into several forms of traditional conservation of the preservation of natural resources in the forest is also found in Kaur Regency. The form of conservation is such as prohibition, *pamali*, or invitation. The values of local wisdom in the Kaur community are a form of oral message used by people in the hilly area as an ancestral heritage to protect the forest. This ancestral message (*pesan-pesan njadika jagad*) is contained in the *larangan jurai* (Hadiprashada et al., 2016). The *Larangan Jurai* is believed by the local community to be a message from ancestors who have been passed down from generation to generation to protect nature the content of the *larangan jurai* can be seen in Table 2.

Table 2. The Content of *Larangan Jurai*

<i>Larangan Jurai</i>	Meaning
<i>Ndang mangkak ulam</i>	Do not felling down young trees in the woods
<i>Jage tanah bebat gunung</i>	Land sloping land to be planted with useful trees with a sabuk system
<i>A tuan Jage "imbe larangan"</i>	Preservation and Management of The <i>Hutan Larangan</i> (forbidden forest)
<i>Kalu nak selamat, jangan sesekali me'usak hutan di pucuk. Makenye ku larang u'ang ni"</i>	Prohibition of land clearing in the <i>Ulu Tulung and Tulung</i> area (watersheds sacred to the community) to avoid flooding

Sources: Hadiprashada et al. (2016); J.E. S et al. (2021)

Forest management in the customs and habits owned by the community is carried out to prevent the loss of forest functions that threaten water sources and the preservation of flora and fauna in the forest (Hadiprashada et al., 2016). This statement is in accordance with the contents in Table 1 above, that the things that are implemented by the community in protecting and maintaining the customary forest in the Kaur area are intended so that the resources in it are not used arbitrarily. This gave bring up to local wisdom in the form of prohibitions that were obeyed by indigenous people, such as: (1) It is not allowed to felling down trees, (2). Not allowed to use forest products without the permission of *ninik mamak* (customary holder), (3) Not allowed to use forest products excessively, (4) Not allowed to sell forbidden forest products, (5) Not allowed to be arrogant while in the forest area, (6) Not allowed to hunt fauna in the forbidden forest, (7) May not do bad things in the forbidden forest, and (8) May not speak bad words in the forest (Undri, 2017).

The *larangan jurai* contains various methods for thinking wisely and consistently about conservation principles in maintaining forest functions. The *larangan jurai* is a source of knowledge that is integrated with the understanding of the natives towards the surrounding nature and culture. Based on table 2 which has been shared above, there is a prohibition on felling young trees which are part of conservation. The prohibition aims to prevent people from arbitrarily felling down forests that threaten biodiversity. Trees not only provide oxygen but also create necessary shade and provide a habitat for wildlife including Sumatran tiger. In addition, there is poin of *larangan jurai* that is "*jage tanah bebat gunung*" which means that residents plant trees on sloping land in order to suppress soil erosion.

In table 2 of point 3 about the *Larangan Jurai* regarding forest management, there are many prohibitions on entering forest areas, one of which is the prohibition to disturb or enter the Sumatran tiger's roaming area. People are not allowed to hunt or take natural products in forested areas that have high tiger intensity (J.E.S et al., 2021). People in the Sumatra region, especially the tribe in Kaur believe that tigers have cultural significance because they have mystical powers. This type of tiger is known as *Puyang*. The appearance of *Puyang* is interpreted as a bad omen. There are two meanings to the appearance. First, a sign of a violation of social norms. Second, warning of forest destruction. As a result, the people there can be wise towards nature.

Indigenous peoples in the Bengkulu area keep myths that contain messages from their ancestor form of invitations and prohibitions as well as customary laws that are still enforced today. The existence of the application of local wisdom values can control the community not to damage nature where various animals live, especially animals that are protected by law (*Panthera tigris sumatrae*). The various forms of application of customary law show that community attitudes towards tiger conservation are more shaped by local wisdom amid the community. People tend to fear and avoid conflict with Sumatran tigers who

are believed to be ancestors. Tarrant et al. (1997) explained that people's attitudes towards the conservation and protection of wildlife species are formed indirectly from the knowledge they have gained over generations. This approach through culture could save the endangered Sumatran tiger population.

Relevance of Local Potential to Biology Content

Recovery of learning after post pandemic Covid-19 is carried out by the government by developing the *merdeka* curriculum well said independent curriculum (kurikulum.gtk.kemdikbud, 2022). In its application, teachers are freed or given the freedom to develop their own learning content. Teachers have the flexibility to choose various teaching tools so that learning can be adapted to the learning needs and interests of students (Rizaldi & Fatimah, 2022). The local potential that is uniquely owned by an area is one of the potentials which can be used as learning content for development in the learning process. The values of local wisdom in the traditional conservation of Sumatran tigers by local communities can be applied in the learning process. The integration of the local potential of the Sumatran tiger into learning will provide a meaningful learning process.

An explanation of the distribution of fauna in the western part of Indonesia, one of which is the Sumatran tiger, as well as the traditional conservation principles of indigenous peoples on forest management and the participatory steps of indigenous peoples in protecting the Sumatran tiger, can be used as biological content for the grade of 10th of high school on biodiversity. Based on the regulation on Core Competencies and Basic Competencies of Primary and Secondary Education number 37 of 2018, the local potential of Traditional Conservation of Sumatran tiger is included for the grade of 10th of high school on biodiversity material, in accordance with the basic competencies below (Table 3).

Table 3. Basic Competence Learning according to The Topics

Basic Competence (Knowledge)	Basic Competence (Psychomotor)
3.2 Analyzing various levels of biodiversity in Indonesia and their threats and conservation,	4.2 Presenting the results of observations of various levels of biodiversity in Indonesia and proposed conservation efforts.

Biodiversity is material that discusses about definitions of biodiversity, species, habitats, ecosystems, conservation, and the relationships between them. Biodiversity also research about endangered species and a clear case for one species or more to be saved from the threat of extinction. Biodiversity is intrinsically valuable and is important for human survival because its also supplies indirect services to humans which are often taken for granted. The biodiversity material is a very broad learning material. This is because Indonesia has very abundant biodiversity throughout its territory (Dewi et al., 2020). However, the quality and quantity of biodiversity in a region may decrease or may even disappear. Therefore, in the learning process students can identify, explain, and analyze the benefits of preserving and threatening Indonesian biodiversity in Indonesia carefully and responsibly to maintain sustainability.

The value of local wisdom from the traditional conservation of Sumatran tigers can be developed into learning in phase E of the Merdeka Curriculum. Material elements that can be integrated are biodiversity and ecosystems. At the end of phase E, learners have the ability to be responsive to global issues and play an active role in providing problem solving. Such efforts are directed towards sustainable development goals. The scope of material and learning outcomes can be seen in the Table 4.

Table 4. Flow of learning objective according to The Topics

Elements	Learning Outcomes	The Scope of Material	Flow of Learning Objective
Understanding Of Biology	At the end of phase E, students have the ability to create solutions to problems based on local, national or global issues related to understanding the diversity of living things and their roles, viruses and their roles, biological technology innovations, ecosystem components and interactions between components and environmental changes	Ecosystem	Students analyze local wisdom that can prevent ecosystem imbalances by considering ecosystem components and interactions between components.

Elements	Learning Outcomes	The Scope of Material	Flow of Learning Objective
Process Skills	<ol style="list-style-type: none"> 1. Observe 2. Questioning and predict 3. Plan and conduct an investigation. 4. Processing and analyze data and information. 5. Evaluate and Reflecting 6. Communicate results 	Benefits of biodiversity	Students identify the benefits of biodiversity by presenting data on the results of exposure to the benefits of certain species with various media
		Biodiversity conservation	Students analyze conservation technologies that can be applied in the preservation of biodiversity, especially overcoming the scarcity of biodiversity by presenting a conservation model chart from the results of the article review
		Campaign against biodiversity erosion	Students Create solutions to the biodiversity around them through campaigns with various media

The existence of the Sumatran tiger as an endemic fauna in the western part (Wallace's line) of Indonesia which has a critical status due to forest conversion and poaching can be used as an example of biodiversity and the threat of extinction of biodiversity as material according to Table 3 and 4 above. In addition, conservation efforts from the community customary law by managing forests to preserve the Sumatran tiger can be used as an example of material for preserving biodiversity conservation. This community participation is regulated in Law of The Republic of Indonesia Number 32 Year 2009 Concerning Protection and Management of Environment (PPLH), Chapter XI Article 70 paragraphs (1) to (3). Based on the law, the community has the same and widest possible rights and opportunities to play an active role in environmental protection and management. One of the objectives of this community participation is to increase awareness in environmental protection and management. Another goal is to develop and maintain local culture and wisdom in the context of preserving environmental functions.

This biology learning content can be developed into various forms of teaching materials. Biology learning will be successful if teachers are able to develop and use appropriate learning tools (Ramdiah et al., 2020). Teaching materials contain material descriptions of knowledge, experience, or theory on certain subjects according to the curriculum designed by the teacher to make it easier for students to understand the material (Kosasih, 2020). One form of developing teaching materials is a module. Furthermore, by Kosasih (2020), Modules are teaching materials designed with a series of learning experiences for students so that they can be studied independently.

The purpose of developing the module is to provide teaching tools that can guide teachers to carry out learning. In accordance with the application of the Merdeka curriculum (independent curriculum), in the practice the teacher has the freedom to choose, modify or arrange their own teaching modules according to the characteristics of students. The module must have criteria that are interesting, meaningful and challenging. In order to foster interest in learning and actively involve students in the learning process. A module based on local potential from the principle of Sumatran tiger conservation can be developed according to the needs and interests of students.

To be able to help direct the learning process that completes learning outcomes, the teaching module can be designed with components in it by two learning activities and evaluation. The first learning activity can be discussed about the importance of biodiversity, the level of biodiversity and the distribution of biodiversity in the division of regions in Indonesia, including the types of fauna, which can include the Sumatran tiger as an example of the distribution of endemic fauna in western Indonesia. The second activity may contain threats and risk of biodiversity and educational activities for students, including activities to explore information regarding the traditional conservation of the Sumatran tiger based on the beliefs of the indigenous people in Sumatra region.

The integration of traditional conservation values as teaching materials in the form of modules is a very big conservation step to foster the enthusiasm and responsibility of students to participate in maintaining and conserving biodiversity in Indonesia. In addition, students can also analyze local wisdom that can prevent ecosystem imbalances by considering components and interactions of ecosystem. This learning

experience with the development of teaching materials will have a positive impact on the next generation to cultivate a wise attitude for the future.

CONCLUSION

Based on the results of the literature review and content analysis that has been studied, it was found that there are traditional conservation principles for the conservation of Sumatran tigers (*Panthera tigris sumatrae*) in the form of invitations and prohibitions and customary laws that can be developed into teaching materials for biology learning. This conservation principle has great potential to be developed as local potential-based learning content by teachers such as modules. The results of the content analysis stated that this material can be given to 10th high school students in the 2013 curriculum regarding biodiversity, threats, and conservation. The material is also included in the learning outcomes of the Merdeka Curriculum phase E regarding understanding and process skills analyzing interactions between ecosystem components and efforts to conserve biodiversity. In addition to assisting teachers in using local potential-based teaching media, some of the advantages of integrating learning with traditional conservation of Sumatran tigers are promoting students in the development of their own cultural identity, sustainability, and cultural capital. This result can be used as basis for further study in integrating local potential of traditional conservation as learning resources in others relevant biological topic.

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