



Journal of Educational Sciences

Journal homepage: <https://ejournal.unri.ac.id/index.php/JES>



P-ISSN
2581-1657

E-ISSN
2581-2203

Traditional Ecological Knowledge on Mangrove Ecosystem Utilization: Learning from *Orang Suku Laut* Kongky Strait, Lingga

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ARTICLE INFO

Article history:

Received: 18 June 2019

Revised: 10 Aug 2019

Accepted: 27 Aug 2019

Published online: 24 Sept 2019

Keywords:

Orang Suku Laut,
Strait Konky,
Traditional Ecological Knowledge,
Mangrove Ecosystem

ABSTRACT

Traditional Ecological Knowledge (TEK) has eroded globally, particularly which related to ecology. Even though TEK has been recognized as crucial for a sustainable development perspective. This study aims to explore TEK of *Orang Suku Laut* (OSL) Kongky Strait in Lingga about the utilization of mangrove ecosystem. Research area is Kongky Strait which is a part of Lingga Regency, Riau Archipelago Province. Data was collecting by using document study, field study, in-depth interviews, meetings and group interviews, participatory and non-participatory observation techniques. There are at least eight species of flora and 17 species of fauna that are known by OSL in Kongky Strait. Taxonomically, flora which has been utilized are classified in 6 families, while fauna consist of 15 families. The types of flora are generally utilized for firewood, building materials, fisheries infrastructure (fishing gear) and traditional medicine for health. While the whole fauna species used as food sources. Almost all mangrove flora parts are used such as trunk, branches, leaves, flowers, fruits, shoots, and roots. It can be concluded that *Orang Suku Laut* Kongky Strait have traditional ecological knowledge in the management of mangrove ecosystems in a sustainable manner.

1. Introduction

Traditional Ecological Knowledge (TEK) has eroded globally, particularly which related to ecology. In many parts of the world, rural and indigenous communities are facing changes in culture, economy and environment exceptionally (Safakish,

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2015; Cajete, 2018; Carter, 2019). Globally, the erosion of local and indigenous knowledge reached 77% which is mainly driven by globalization, modernization, and market integration (Aswani et al., 2018). If the loss of biodiversity caused us biologically impoverished, hence the loss of TEK causes us to experience socio-cultural poverty. Even though TEK has been recognized is crucial in the perspective of sustainable development (Magni, 2016; Bahta, 2017; Finn et al. 2017).

Indigenous peoples are actively involved as partners in the conservation of biodiversity (Kimmerer, 2002; Mekonen, 2017). They have a broad knowledge base about the behavior of complex ecological systems in their own territory. Management of natural resources in the form of traditional knowledge that is known as TEK. Understanding, beliefs, and practices of the local community develops longitudinally in relation to the natural environment dynamically along with the social and ecological change (Aswani et al., 2018). Relationships are built not only among men but also by natural or all residents of ecological community.

Existence of *Orang Suku Laut* (OSL) as one of the indigenous of archipelago are very challenging to be studied. Culturally, they were lived on top of a small traditional boats (canoes) and settled in the Coastal region with houses on stilts protruding into the sea (Chou, 2002, 2003; Khidir, 2010). The existence of mangrove ecosystems that characterize the coastal areas might be related to life of OSL. Empirically OSL is more common in mangrove forested coastal areas as a place for living. In addition to shelter from unfavorable climate change (Wengki, et al., 2019), it turns out they are also making a living out of the biological resources in mangrove ecosystems, especially if the season is not possible for them to earn a living on the high seas (Evawarni et al., 2005).

Ramli (2012) in his study of ecological intelligence in indigenous communities Bajo in Torosiaje village Gorontalo Province revealed that indigenous values, attitudes and behavior in the local community living arrangements form an ecological intelligence of Bajo Tribe. TEK existence in the tradition of the Bapongka tradition from bajo tribe of Sulawesi in conserving coastal resources have also been reported by John (2017). Evidently Bapongka has a philosophical values, educational, social, and environmental preservation. Diandara et al. (2018) also reported that the Duano tribe in Jambi have local knowledge of marine ecosystem preservation. This local value applies to coastal communities and quite effective in managing natural resources and ecosystem conservation efforts. Local knowledge has been guiding members of the tribe utilizes its resources wisely and not excessive. However, Cheng (2002) suggested that the local communities with the different of social, cultural assets and historical background have indigenous knowledge which is different in the present context.

Motivated by the relatively limited results of studies on traditional ecological knowledge of sea tribes people in Indonesia, this paper reported the results of research on the TEK of *Orang Suku Laut* in Konky Strait, Lingga regency in the utilization of mangrove ecosystem. The results of this study are expected to

contribute cutting-edge science of the values status of Traditional Ecological Knowledge *Orang Suku Laut* in the regency of Lingga.

2. Methodology

Research area is Konky Strait (N 0⁰.0'16" and E 104⁰.29'21"), Pena'ah Village which is a part of Lingga Residence, Riau Archipelago Province (Figure 1). Mangrove ecosystem that cover this area is about 50 ha. This area inhabited by 17 OSL households that are predominantly Moslem. Samples were taken purposively (the existence of OSL and Mangrove Ecosystems). This research concentrated on mangrove ecology system, way of life and Traditional Ecological Knowledge of OSL. Data was collecting by using document study, field study, in-depth interview, meeting and group interview, participatory and non-participatory observation techniques (Balsiri, 2014).



Figure 1. Research Area

3. Results and Discussion

Knowledge of the Flora and Fauna of Mangrove Ecosystem in the Strait Konky

The *Orang Suku Laut* in the Strait Konky know there are at least eight species of flora and 17 species of fauna in mangrove ecosystems (Table 1).

Table 1. The types of flora and fauna and its utilization in Mangrove Ecosystems The Strait Konky, Lingga District

Category	No	Traditional Name	Scientific Name	Family	utilization
FLORA	1	Bakau sesap	<i>Lumnitzera littorea</i>	Combretaceae	Firewood, house poles, traditional medicine
	2	Bakau Tumuh / Melukap	<i>Rhizophora mucronata</i>	Rhizophoraceae	Firewood, house poles, traditional

	3	Bakau Repat	<i>Sonneratia alba</i>	Sonneratiaceae	medicine Firewood, house poles, traditional medicine
	4	Bakau nyirih	<i>Xylocarpus granatum</i>	Meliaceae	Firewood, traditional medicine
	5	Bakau Nadai	<i>Bruguiera cylindrica</i>	Rhizophoraceae	Firewood, traditional medicine
	6	Bakau Akit	<i>Rhizophora apiculata</i>	Rhizophoraceae	Firewood, traditional medicine
	7	Bakau fires	<i>Avicennia alba</i>	Aviceniaceae	Firewood, traditional medicine
	8	Jerampong / Tread Kude	<i>Ipomoea pes-caprae</i>	Convolvulaceae	traditional medicine
FAUNA	1	Temiluk	<i>Bactronophorus thoracites</i>	Teredinidae	food
	2	Temakul Fish	<i>Periophthalmus</i> sp.	Oxudercidae	food
	3	Shellfish Lokan	<i>Geloina erosa</i>	Cyrenidae	food
	4	Sembilang Fish	<i>Plotosus canius</i>	Plotosidae	food
	5	Ungar Fish	<i>Lutjanus argentimaculatus</i>	Lutjanidae	food
	6	Libam Fish	<i>Siganus canaliculatus</i>	Siganidae	food
	7	Belanak Fish	<i>Mugil cephalus</i>	Mugilidae	food
	8	Kerapu Fish	<i>Epinephelus coioides</i>	Serranidae	food
	9	Shrimp	<i>Panaeus indicus</i>	Penaeidae	food
	10	Bangkang Crabs	<i>Scylla serrata</i>	Portunidae	food
	11	Kupang	<i>Mytilus edulis</i>	Mytilidae	food
	12	Berong Snail	<i>Telescopium telescopium</i>	Potamididae	food
	13	Teririp	<i>Saccostrea cucullata</i>	Ostreidae	food
	14	Umang-umang	<i>Coenobita cavives</i>	Coenobitidae	food
	15	The Stone Crab	<i>Thalamita sima</i>	Portunidae	food
	16	Gonggong Snail	<i>Strombus canarium</i>	Strombidae	food
	17	Rinjung Crab	<i>Portunus pelagicus</i>	Portunidae	food

Taxonomically, flora which are utilized are classified in 6 families, while the fauna consist of 15 families. The types of flora are generally utilized for firewood, building materials, fisheries infrastructure (fishing gear) and traditional medicine for health. While the whole fauna species used as food sources. Almost all mangrove flora parts are utilized, such as trunk, branches, leaves, flowers, fruits, shoots, and roots (Table 2). As for fauna is almost entirely intact utilized as a food ingredient.

Table 2. Source and utility of mangrove flora and fauna

No.	Source	Utility	Plant / Animal Part
1.	Fuels	firewood	trunk
2.	Housing	polish	trunk
3.	Fishery	Cages and traps	trunk and branch
4.	Foods	Daily consumption / healthcare	whole
5.	Medicines	Healthcare	leaf, flower, seed, fruit, buds, roots

Utilization of mangrove wood for firewood and charcoal by indigenous peoples has also been reported by Miswadi et al. (2017), namely Native Liang River Bengkalis Island. Mangrove wood types which are generally used are *R. apiculata*, *X. granatum* and *L. racemosa* with small size. However, the *Orang Suku Laut* in Penaah Village are not utilize mangrove wood as charcoal. They use it for the purposes of building materials and traditional medicines for health. The results of this study are consistent with the idea Mekonen (2017) in conservation of biological resources, TEK commonly found in the form of knowledge about animal, plants, soil and landscape for sustainable resource utilization; traditional resource management system with a set of tools, techniques, and practices as appropriate; institutions or social organizations for coordination, cooperation, the rule-making and rules enforcement.

The *Orang Suku Laut* in the Strait of Konky are actually had TEK about medicines. Abdul (commonly called Pak Edi) who is also the Residential Chairman in Strait Konky said that mangroves sesap (*Lumnitzera littorea*) are often used to remedy bad breath disease (*Buam*). Part of the plant used is the flower (Figure 6) which were taken by being beaten with any branch of wood in the mangrove forest. There are certain rituals that must be done before taking mangrove sesap flowers, which read blessings on the Prophet:

Bismillahir rahmanir Rahim...
Allahumma shali'ala Sayidina Muhammad
Wa'ala alhihi Sayidina Muhammad

There is a unique thing in disease healing practices. It should be accompanied by the use of spell (ritual treatment). Pak Edi said that *Buam* disease is caused by external factors (oral) and internal factor (abdomen). Therefore, the treatment also consists of two stages. The first stage is intended to eliminate bad breath outside.



Figure 2. Mangrove Sesap (*Lumnitzera littorea*) trees and flowers for *Buam* Disease Drugs

The second stage to eliminate the causes of the inside. The steps to eliminate the causes of external factors, must be preceded by reading spell as follows:

Bismillahirrahmanirrahim...

Bismillah sakit makan paru

Sakit mulut makan tulang

Sakit mulut makan ujud

Sakit mulut makan pele

Turun bise naik tawa

Aku menawa sakit mulut

Sakit mulut nan bise

Bukan aku setajab guru

Setajab guru mengaja ku

Aku pakai berkat ALLAH

La Illa ha'Ilallah

Berkar baginda da Rasulullah

After reading the spell, nectar (honey) of sesap mangrove flowers directly inhaled. As for the cure for internal factor, it is used a glass of water which was read out spell before drinking. The spells are recited to a glass of water as follows:

Bismillah Guam

Bedenyut Guam

Bedenyis Guam

Guam makan paru

Guam makan tulang

Guam makan urat

Guam makan ujud

Guam makan pele

Turun bise naik tawa

Aku menawa sakit mulut

*Sakit mulut nan bise
Bukan aku setajab guru
Setajab guru mengaja ku
Aku pakai berkat ALLAH*

*La Illa ha'Ilallah
Berkat baginda da Rasulullah.*

In addition of sesap mangroves, *Orang Suku Laut* in Konky Strait also used to utilize Nadai mangrove (*Rhizophora mucronata*) for diarhe drug. They usually call it as stomachache medicine. Mangrove plant parts are used such as seeds, buds and new root tip (Figure 3).



Figure 3. Nadai mangrove (*Rhizophora mucronata*) for drug Diarhe by *Orang Suku Laut* Konky Strait, Pena'ah Village, Lingga Distict.

A total of 3-4 seeds, 3-4 pieces of firearms and one new fruit growing root tip ground, the extract is then filtered. The filtrate obtained drunk in the morning, afternoon, and evening. Before drinking, read shalawat:

*Bismillahirrahmanirrahim...
Allahumma shali'ala Sayidina Muhammad
Wa'ala alhihi sayidina Muhammmad
Bismillah Datuk Redang.....*

Traditional knowledge of sesap mangrove (*Lumnitzera littorea*) to cure diseases of Buam and Nadai mangroves (*Rhizophora mucronata*) for abdominal pain often experienced by OSL in this Konky Strait has not been reported in previous studies. From the narrative spell that was read in the ritual treatment of diseases of Buam and Diarhe, it is understandable that *Orang Suku Laut* Konky Strait's still practice rituals that had been used by their ancestors. Substantially the ritual

combines elements of religious (Islamic) and the belief in the supernatural power (supernatural). This finding reinforces the view Sony (2010) that local knowledge is not just about knowledge and understanding of the indigenous people, but also about the unseen. Literally, spell words are believed to be able to make something different. Spells in Malay culture are words which have special power, especially mythical power (Nugraha, 2019). The Bajo people have local wisdom such as tradition, rules, taboos, culture, which are still valid for generations (Citra, 2019).

Traditional Ecological Knowledge OSL in Mangrove Ecosystem Conservation

Mangrove ecosystem preservation in the Strait of Konky are very related with their behavior in the use of the mangrove ecosystem to meet the needs of daily living (Table 3).

Table 3. Traditional Ecological Knowledge of *Orang Suku Laut* in preserving mangrove ecosystems in Penaah Village, Lingga District.

No.	Aspect of Mangrove Management	Traditional Ecological Knowledge	Conservation Values
1.	Determining the type of resources used	Do not take advantage of the type of non-biological resources in the mangrove ecosystem	<ul style="list-style-type: none"> • Prevent damage to the reef and land in the mangrove ecosystem • Protect the habitat of fauna in the mangrove ecosystem
2.	Determination of the logging area of mangrove plants	<ul style="list-style-type: none"> • Prohibit logging in mangrove zones open • Activity logging should only be done in the middle of the mangrove zone 	<ul style="list-style-type: none"> • Prevent damage to mangrove formations in the open zone • Prevent erosion in coastal areas • Protect the habitat of fauna which are in the mangrove zone open
3.	The timing of use of biological resources	Utilization is done only during the northern summer (winds) that is between the months of November to January	<ul style="list-style-type: none"> • Ends meet, because this season the <i>Orang Suku Laut</i> can not find fish in the sea • Provide opportunities fauna that used to breed and deserve to be exploited
4.	The number utilized fauna	Utilizing fauna with a large amount just to meet the necessities of life in a single day	<ul style="list-style-type: none"> • Preserve a variety of fauna that used • Provide an opportunity for fauna that used to proliferate and perform spawning
5.	The utilization of mangrove ecosystem must obtain permission	Prohibiting logging of mangrove plants in large numbers	<ul style="list-style-type: none"> • Prevents damage to mangroves • Keeping the various fauna of mangrove habitat

			<ul style="list-style-type: none"> • Prevent abrasion of coastal areas
6.	Catching gear	Catch various species of fauna using traditional fishing gear	<ul style="list-style-type: none"> • Traditional fishing gear is used because it is environmentally friendly and does not damage the ecosystem • The use of fishing gear such as traps (pinto) aims to choose fish with a large size or a viable
7.	traditional rituals	<ul style="list-style-type: none"> • Giving semah to guard the mangrove ecosystem in Kojong Island Village Penaah before taking the biological resources in the mangrove ecosystem • Using lange leaf immersion water and rice water to wash his ship that does not bring results or misfortune in the dark (15 days) 	<ul style="list-style-type: none"> • Giving the safety of the mystical life-threatening • Avoid the misfortune that befell People Sea People for doing his job as a fisherman

Traditional Ecological Knowledge in the form of the use of a simple capture tool and resource utilization that are not excessive is also a habit Duano People Coastal Jambi (Oryza et al., 2018). Ramli (2012) in his study of ecological intelligence in indigenous communities Bajo in Torosiaje village Gorontalo Province asserted that traditional values, attitudes and behavior in the ecologically local community living arrangements form a society Bajo ecological intelligence. Score This applies to local coastal communities and quite effective in managing natural resources and ecosystem conservation efforts.

The wisdom of *Orang Suku Laut* in Konky Strait, Pena'ah Village in managing Mangrove Ecosystem can also be seen from a number of aspects based on Law of the Republic of Indonesia Number 32 of 2009 on the Protection and Environmental Management (Figure 4).

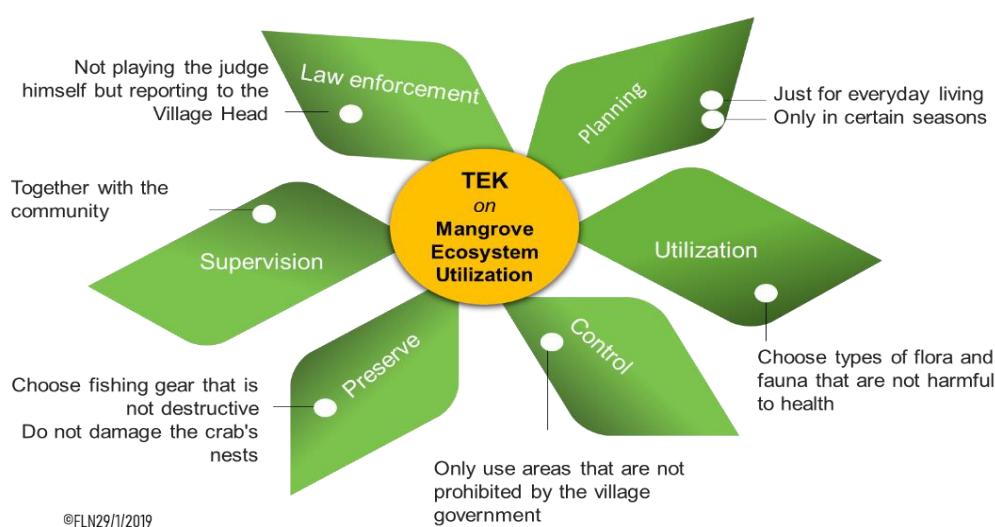


Figure 4. Traditional Ecological Knowledge of the *Orang Suku Laut* Konky Strait on Mangrove Ecosystem Utilization

The preservation of the mangrove ecosystem also performed by other tribe in several other areas in Indonesia, such as in Sungai Bakau Big Sea Mempawah Regency (Adiditia et al., 2018) and Village Nagalawan (Farid, 2016). Community in Sungai Bakau Besar Laut village has some form of action that reflects their local knowledge in preserving mangrove ecosystems, including the application of cut one and plant thousand, actualization of myth in surrounding the area as well as their application to local myth and ritual ceremonies of indigenous communities. Meanwhile, in the village of Nagalawan indigenous communities in conserving the mangrove ecosystem is based on mutual trust, cooperation, open to each other and mutual assistance.

4. Conclusion

The *Orang Suku Laut* of Konky Strait have traditional ecological knowledge in the management of mangrove ecosystems in a sustainable manner. The wealth of indigenous knowledge can add the ecological scientific knowledge in the preservation of mangrove ecosystems in coastal areas. The values of traditional ecological knowledge can be integrated into the curriculum of biology in secondary schools and universities. Chemical compounds of bakau sesap (*Lumnitzera littorea*) to treat Bad Breath disease is need further study.

Acknowledgment

This study can be held on the funding of DIPA LPPM Riau University 2018 through The Professor Research Scheme with Contract Number: 604 / UN.19.5.1.3 / PP / 2018 Date March 22, 2018. Special thanks was delivered to Mr. Abdul, Chairman of *The Orang Suku Laut* in the Strait of Konky as key

informants. The authors also thanks to Lensy Fluzianti and Jon that very much help and guide for research in the field.

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How to cite this article:

Firdaus, L.N., Rizki, M., Elmustian, Suarman, & Ridwan, M. (2019). Traditional Ecological Knowledge on Mangrove Ecosystem Utilization: Learning from Orang Suku Laut Kongky Strait, Lingga. *Journal of Educational Sciences*, 3(3), 328–339.