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# Existing Conditions of Local Wisdom-Based Fisheries Management in Teluk Paman Timur Village, Kampar Kiri District, Kampar Regency, Riau

## *Kondisi Eksisting Pengelolaan Perikanan Berbasis Kearifan Lokal di Desa Teluk Paman Timur, Kecamatan Kampar Kiri, Kabupaten Kampar, Provinsi Riau*

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**Abstract**

Fisheries resource management based on local wisdom is passed down through generations, addressing significant challenges like over-exploitation. Teluk Paman Timur Village exemplifies this with its 'Lubuk Larangan' model, where specific river areas are designated for fishing prohibition, enforced by the community. This research examines the environmental conditions of water's physical-chemical parameters, the economic and social benefits of 'Lubuk Larangan,' and the current fisheries management status in the village. Using qualitative descriptive methods, data was gathered through observations, interviews, and water quality measurements. Results indicate that the 'lubuk larangan' system in Teluk Paman Timur is actively maintained. Management falls under the auspices of Ninik Mamak, POKMASWAS, and BPD, benefiting from community support. Economically, 'Lubuk Larangan' meets local consumption needs while providing additional income opportunities. Socially, it facilitates gatherings, cooperation, and activities during harvest seasons. Water conditions within 'Lubuk Larangan' are favorable, as evidenced by quality parameters like dissolved oxygen, temperature, pH, clarity, current speed, depth, and TDS, which comply with class 2 water quality standards vital for sustaining fishery resources and aquatic life. This governance model, therefore, enhances both ecological health and community resilience, ensuring sustainable fisheries management.

**Keywords:** Existing Conditions, Lubuk Larangan, Local Wisdom

**Abstrak**

Pengelolaan sumber daya perikanan berbasis kearifan lokal telah menjadi warisan turun-temurun yang efektif dalam mengatasi tantangan overeksploitasi. Desa Teluk Paman Timur telah mengimplementasikan sistem "lubuk larangan" sebagai upaya konservasi perikanan. Penelitian ini bertujuan untuk menganalisis kondisi lingkungan fisik-kimia perairan, manfaat ekonomi dan sosial sistem lubuk larangan, serta status pengelolaan perikanan di desa tersebut. Metode penelitian yang digunakan adalah deskriptif kualitatif dengan pengumpulan data melalui observasi, wawancara, dan pengukuran kualitas air. Hasil penelitian menunjukkan bahwa sistem lubuk larangan di Desa Teluk Paman Timur masih berjalan efektif dengan dukungan penuh dari masyarakat. Pengelolaan sistem ini melibatkan berbagai pihak, antara lain ninik mamak, kelompok masyarakat pengawas (POKMASWAS), dan badan permusyawaratan desa (BPD). Secara ekonomi, sistem lubuk larangan mampu memenuhi kebutuhan konsumsi lokal dan memberikan peluang pendapatan tambahan bagi masyarakat. Dari aspek sosial,

sistem ini memperkuat kohesi sosial masyarakat melalui kegiatan bersama dan gotong royong. Analisis kualitas air menunjukkan bahwa kondisi perairan dalam kawasan lubuk larangan memenuhi standar kualitas air kelas 2, yang menunjang keberlangsungan ekosistem perairan dan sumber daya ikan.

**Kata kunci:** Kondisi Eksisting, Lubuk Larangan, Kearifan lokal

# 1. Introduction

The management of fishery resources based on local wisdom is a policy and agreement that applies from generation to generation from a specific community included in the Indigenous community institution (local wisdom). The management of fishery resources is currently faced with several serious problems, including overexploitation, the operation of fishing gear that damages the environment (destructive fishing gear), and environmental degradation. In some areas, overfishing in the Kampar River has led to a decline in fish species diversity (Fithra & Siregar, 2010). The decline in fishery resources in the Kampar River occurs due to environmental degradation and the way to catch fish using environmentally unfriendly fishing gear such as strum, putas, and tuck.

One of the districts that applies much local wisdom in managing fishery resources is the Kampar Regency. Kampar Regency has two fisheries management models based on local wisdom: the Tax System and Lubuk Larangan, which are widely applied in the Kampar Kiri and Kampar Kanan Rivers. At least 44 prohibition points are implemented in the Kampar Regency (Prianto et al., 2016). Teluk Paman Timur is one of the implementations of the prohibition pit that still exists in Kampar Regency. The Paman Timur Lubuk Larangan is located on the Subayang River, precisely in the downstream part of the Subayang River in Kampar Kiri District, Kampar Regency, Riau Province. The Lubuk Larangan activity in this village is carried out by a fish Lubuk Larangan system commonly called "Mancokau Ikan" once a year using environmentally friendly fishing gear such as nets, nets, and fishing rods. This activity has been a Teluk Paman Timur Village tradition since ancient times.

On the other hand, along with the development of science and technology and cultural influences from outside, local cultural values held by the community have begun to fade. Of course, the fading of these cultural values will affect the implementation of applicable customary norms, including the lubuk larangan system in Teluk Paman Timur. According to Faiz & Kurniawaty (2020), the value of local wisdom not cultivated in daily life can gradually cause the values of local wisdom to fade. With these conditions, it is feared that the implementation of the Lubuk Larangan in Paman Timur Bay will disappear. Therefore, management efforts are necessary to ensure the 'Lubuk Larangan' sustainability in Teluk Paman Timur. Data and information must be gathered through research to formulate effective management strategies.

# 2. Material and Method

### *2.1. Time and Place*

This research was conducted from March to May 2024. Questionnaire data and water quality measurements were collected in Teluk Paman Timur, Kampar Kiri District, Kampar Regency, Riau Province.

### *2.2. Methods*

The method used in this study is a survey method, namely direct observation, interviews, and direct measurement of physicochemical quality in the waters of the Lubuk Larangan depths of Teluk Paman Timur. Furthermore, the data obtained are processed and presented in tables, and the discussion is descriptively discussed by referring to the literature related to this study.

### *2.3. Procedures*

The research procedure uses informant data and water quality data measurement. The determination of informants is carried out purposively, where informants are determined and considered able to explain the history, rules, and implementation of Lubuk Larangan (Tongco, 2007). Respondents and informants, as many as 20 people, were based on the fact that the respondents managed the Lubuk Larangan. Water quality parameters were analyzed in situ, and the subjects measured were the physical and chemical parameters of the waters. Water quality parameters were measured at 4 points of the river section upstream, middle, and downstream of the Teluk Paman Timur lubuk larangan and the upstream part of the Teluk Paman River, with three water quality measurements for 3 months. Physics and chemistry include parameters that are measured directly, namely dissolved oxygen (DO), temperature, degree of acidity (pH), brightness, current velocity, depth, and total dissolved solids.

### *2.4. Data Analysis*

The primary data was analyzed through interviews and questionnaires through informants, and the collection of socio-economic data of the community and social and institutional aspects was then analyzed descriptively. While the primary data for water quality measurement was analyzed in situ, the subject measured was the physicochemical parameters of the water. Water quality measurements were carried out at four river points in the upstream, middle, and downstream of the Lubuk Larangan Teluk Paman Timur and the upstream part of the Teluk Paman Timur, with three water quality measurements for 3 months.

# 3. Result and Discussion

### *3.1. Lubuk Larangan Regulation*

Teluk Paman Timur Village is a newly established village in Teluk Paman District, Kampar Kiri Subdistrict, Kampar Regency. It was founded in 2007 under the leadership of Mr. M. Razali SR as its first village head. Before its official establishment as a village, Teluk Paman Timur was part of the Lubuk Cimpur Teluk Paman Regency. Geographically, Teluk Paman Timur is located at 101˚07'05.7" BT and 00.05˚56'2" LU in the southern part of Kampar Regency. Teluk Paman Timur is endowed with abundant natural resources, particularly in the fisheries and agricultural sectors, covering an area of 25 km². Most of its territory consists of inland waters traversed by the Subayang River.

In Teluk Paman Timur, the regulation governing the "Lubuk Larangan" system is stipulated in the Village Regulation (Perdes) No.5 of 2023. This regulation pertains to managing protected riverine areas to ensure the sustainability of fish populations and their ecosystems. Additionally, customary laws established by the local adat community serve the crucial purpose of preventing intra-community conflicts. Natural resources often become a source of contention among community members. With the establishment of clear and universally accepted regulations, it is anticipated that disputes can be minimized. The adat institution plays a pivotal role in managing and overseeing the implementation of these regulations, ensuring that all community members comprehend and comply with the established provisions. Teluk Paman Timur's community is firmly committed to following the prescribed fishing regulations. This sense of responsibility in preserving fish resources is driven by the community's awareness that the sustainability of natural resources is contingent upon compliance with these regulations.

### *3.2. Current Status of Fisheries Resources*

Teluk Paman Timur Lubuk Larangan is renowned as the most prolific source of capture fisheries in Kampar Regency. The community engages in open-access fishing activities in the Subayang River, except within the designated lubuk larangan areas where fishing is strictly prohibited. In Teluk Paman Timur, using explosives, poisons, electricity, and hazardous chemicals for fishing within Lubuk Larangan is strictly forbidden. Village fishermen utilize environmentally friendly fishing gear such as nets, scoops, and traps. These tools are selected for their minimal impact on fish habitats and their selectivity in capturing specific fish species without disrupting other aquatic organisms. Using such eco-friendly gear reflects the fishermen's awareness of preserving aquatic ecosystems for future generations. It also demonstrates the community's adaptation to sustainable practices in their fishing activities.

### *3.3. Existing Conditions of Fish Population*

Teluk Paman Timur exhibits a rich diversity of fish resources. Based on interviews with local fishermen, twelve distinct fish species were identified within the "Lubuk Larangan" conservation area. A detailed list of these species is presented in Table 1.

Table 1. Fish species diversity in Lubuk Larangan

| No | Family | Local Name | Latin Name |
|---|---|---|---|
| 1. | Suliridae | tapa | *Wallago leeri* |
| | | lais | *Kryptopterus bicirrhis* |
| | | sengarat | *Belodontichthys dinema* |
| 2. | Bagridae | baung | *Hemibagrus nemurus* |
| | | gesso | *Hemibagrus wyckii* |
| 3. | Pangasiidae | juaro | *Pangasius polyuaranodo* |
| 4. | Cyprinidae | semah | *Tor douronensis* |
| | | kapiek | *Barbonymus schwanenfeldii* |
| | | pantau | *Rasbora* sp |
| | | barau | *Hampala macrolepidota.* |
| | | motion | *Thynnichthys thynnoides* |
| 5. | Megalopidae | bulan-bulan | *Megalops cyprinoides* |

Fish resources can indicate changes in aquatic environments compared to plankton, benthos, and periphyton because fish can more quickly identify occurring changes. According to Prianto et al. (2023), there are at least 72 fish species in the 'Lubuk Larangan' of Teluk Paman Timur, with dominant species including *W.leeri, B.dinema,*

*H. nemurus*, and *K. bicirrhis*. However, the number of species found in this study is lower than that of Prianto et al. (2023). This is likely due to changes in river flow and river degradation.

The fish species in Teluk Paman Timur have relatively high diversity. This is due to the implementation of the 'lubuk larangan' system, which restricts fishing to once a year, and the relatively good environmental conditions. These conditions certainly contribute to the sustainability of fish resources in Teluk Paman Timur. This is in line with the statement of Sari (2016) that management systems based on the harvesting of fish in 'Lubuk Larangan' that limit the use of tools and restrict the types of fish that can be taken can support the sustainability of fish, natural resources, and their environment. Based on interviews with village officials, fishing is prohibited in the 'Lubuk Larangan' area until the specified time limit (1 year) has passed, allowing fish resources to grow and develop well.

In addition to the management system that supports the sustainability of fish resources, the good condition of the aquatic environment also contributes to the high diversity of fish species in Teluk Paman Timur. The community works together to protect fish resources and comply with the applicable fishing regulations. This can be seen from the good condition of the riparian vegetation around the 'Lubuk Larangan' and the annual floods that have not experienced significant changes.

### *3.4. Institutional Structure of Lubuk Larangan*

Local wisdom in Teluk Paman Timur is known as 'Lubuk Larangan.' This institution has a core structure consisting of a responsible party, management, and operators. The responsibility for 'Lubuk Larangan' is held by the Ninik Mamak (traditional leader) and the head of the Village Consultative Body (BPD) as the executive chair. Meanwhile, the management of 'lubuk larangan' is the task of the youth group. This youth group is divided into several divisions: fishing, diving, fish auction, fish collection, and catch distribution. The core structure can be seen in Figure 1.


Figure 1. Core Institutional of Lubuk Larangan

The existence of lubuk larangan in Teluk Paman Timur serves not only as a means of environmental conservation but also as a platform to strengthen social bonds among the community. This initiative aims to foster communication and cooperation among community members, thereby strengthening social ties. The awareness of the importance of environmental preservation enhances a sense of community and shared responsibility among the people.

### *3.5. Economic and Social Implications of Lubuk Larangan*

The existence of "lubuk larangan" has provided significant socio-economic benefits to the community of Teluk Paman Timur. Fifteen percent of the population are fishermen, including fish collectors and independent fishermen. Fishing is often a hereditary occupation in the community. The regulations prohibiting fishing in "Lubuk Larangan" have resulted in abundant harvests, meeting local consumption needs, and generating additional income through fish sales. Moreover, during the opening of "Lubuk Larangan," many community members engage in selling activities along the river. These economic benefits have contributed to the overall well-being of the community.

The existence of the lubuk larangan has provided social benefits, particularly during communal activities such as the opening of the lubuk larangan for harvesting in Teluk Paman Timur. The community cooperates, gathering together and working collaboratively on various preparations, ranging from cleaning the surrounding area of the Lubuk Larangan to preparing fishing equipment (Rahmawati et al., 2021). This spirit of cooperation reflects the community among the village residents, where each individual contributes to preserving and utilizing shared natural resources. These activities strengthen social bonds and ensure that the Lubuk Larangan is well-maintained and provides optimal benefits for all.

### *3.6. Habitat Conditions of Fishery Resources*

The river in Teluk Paman Timur is the Subayang River, characterized by its brownish water due to suspended particles. Based on Landsat image processing and interpretation, the Subayang River sub-watershed has an area of 64,592.8 hectares, a central river length of 61.5 km, a gradient of 0.6%, a stream density of 1.7 km/km$^2$, and a stream order of 6.1 (Suwondo et al., 2015).

This study measured water quality in Teluk Paman Timur, Kampar Kiri District, Kampar Regency. These measurements aimed to assess the condition and suitability of the river water as a habitat for aquatic life. Apriadi (2018) stated that water quality conditions influence the life of aquatic biota. The physical-chemical characteristics measured included dissolved oxygen, temperature, pH, turbidity, current velocity, depth, and total dissolved solids (TDS). The results of the physical-chemical characteristics measurements in the waters of Teluk Paman Timur from three sampling points can be seen in Table 2.

Table 2. Water Quality analysis results

| No | Parameter | Unit | Station | | | | Standard |
|---|---|---|---|---|---|---|---|
| | | | I | II | III | IV | |
| 1. | Dissolve Oxigen (DO) | mg/L | 5,6 | 5,1 | 5,2 | 4,2 | 4 mg/L |
| 2. | Temperature | ˚C | 32,6 | 33 | 33 | 33 | Natural |
| 3. | Degree of Acidity (pH) | - | 6,64 | 6,53 | 6,56 | 5,9 | 6-9 |
| 4. | Brightness | Cm | 33 | 35,5 | 28,25 | 28 | - |
| 5. | Current Speed | m/s | 0,10 | 0,14 | 0,15 | 1,15 | - |
| 6. | Depth | m | 1,25 | 1,9 | 2,6 | 2,6 | - |
| 7. | Total Dissolved Suspend | mg/L | 8,3 | 8,3 | 8,6 | 5 | 1000 mg/L |

Dissolved oxygen (DO) concentrations in the waters of Teluk Paman Timur lubuk larangan ranged from 4.2 to 5.6 mg/L (>4 mg/L). Based on the water quality standard class 2 in Government Regulation No. 22 of 2021, these values are considered suitable for supporting the life of aquatic organisms. This indicates the absence of organic pollution from plantation and domestic waste. DO concentrations are also influenced by weather conditions, depth, measurement time, and sunlight penetration into the water. Rahman (2016) stated that the intensity of solar radiation entering the water affects phytoplankton and algae, which play an important role in photosynthesis and oxygen production. Compared to the DO in the nearby Sungai Kampar Kiri, with an average DO value of 4.26 mg/L (Harahap et al., 2022), the DO levels in Sungai Subayang and Sungai Kampar Kiri can be considered reasonable and have a low level of pollution due to dissolved oxygen levels exceeding 5 mg/L.

The water temperature in the lubuk larangan of Teluk Paman Timur ranged between 32.6 and 33°C. Harlina (2020) stated that the optimal water temperature in tropical regions is usually between 25°C and 35°C, which is still suitable for aquatic organisms. Temperature also plays a significant role in controlling aquatic ecosystem conditions. Water temperature affects oxygen solubility, and oxygen solubility affects the life of organisms (Effendi, 2003). Temperature can be influenced by season, water depth, substrate composition, turbidity, and light penetration into the water. Thus, the water temperature in the lubuk larangan can be categorized as suitable and can support aquatic life.

The pH levels measured in the Lubuk Larangan area of Teluk Paman Timur ranged from 6.53 to 6.64. According to the water quality standards for Class 2 waters stipulated in Government Regulation No. 22 of 2021, these values are considered suitable for supporting aquatic life, mainly fish. Compared to the pH of the Kampar Kiri River, which was reported to be 6 (Harahap et al., 2022), the pH in Lubuk Larangan is slightly higher. The lower pH in the Kampar Kiri River is likely attributed to its higher turbidity levels and various anthropogenic activities that may contribute to pH reduction.

The water clarity in Lubuk Larangan ranged between 28 and 35.5 cm. This is higher than the Kampar Kiri River, where the clarity was reported to be between 22.5 and 30 cm (Harahap et al., 2022). Nuriya et al. (2010) suggested that an optimal clarity range for aquatic organisms is 30-40 cm. Water clarity is closely related to the process of photosynthesis in aquatic ecosystems. Clarity also reflects the amount of light that penetrates to a certain depth. It is a crucial parameter in assessing water quality as it influences the penetration of sunlight. Low clarity indicates the presence of suspended and dissolved particles in the water, obstructing sunlight (Harahap, 2000).

Current velocity measurements within the Lubuk Larangan area of Teluk Paman Timur ranged from 0.10 to 1.15 m/s, with the highest velocities recorded at points 3 and 4 and the lowest at point 1. Current velocity generally decreases from upstream to downstream, influenced by gravity, river width, and sediment load (Siahaan et al., 2011). The average current velocity indicated a low to moderate flow rate, consistent with Yusuf's (2012) classification of currents below 0.5 m/s as low to moderate. The reduced current velocity in Teluk Paman Timur is attributed to channel avulsion caused by sedimentation, which has hindered water flow and influenced current speeds. Consequently, fish within the Lubuk Larangan have exhibited increased movement from upstream to downstream.

Depth measurements at four points within the Lubuk Larangan area ranged from 1.25 to 2.6 m, significantly shallower than the Kampar River, which has depths ranging from 4.53 to 8.15 m (Harahap et al., 2022). The shallow depth in Teluk Paman Timur indicates a sedimentation problem due to channel avulsion, resulting in reduced water flow towards the Lubuk Larangan and hindering the movement of sediment particles. This has led to lower current velocities in the upstream sections. Prianto et al. (2023) estimated the maximum depth of the Lubuk Larangan in Teluk Paman Timur to be approximately 7.7 m, with a total area of approximately 7.4 ha, of which 5.4% is designated as a fish sanctuary. While other water quality parameters remained suitable for aquatic life, the channel avulsion has significantly impacted current velocities within the river.

The TDS values obtained from the research site ranged from 5 to 8.6 mg/L. Elevated TDS levels can indicate increased toxicity to aquatic organisms (Amani & Prawiroredjo, 2016). According to the water quality standard, the maximum permissible TDS for drinking water is 1,000 mg/L. Based on the TDS measurement results, the waters of Teluk Paman Timur are still within the water quality standard and support aquatic life.

*3.7. Mechanism of Opening Lubuk Larangan*

Lubuk larangan-based local wisdom is a time-honored tradition deeply embedded in the community's daily lives. It aims to preserve and sustainably manage the environment (Rosdah & Yoserizal, 2017). Like other lubuk larangan management practices in Teluk Paman Timur, the community has established rules prohibiting fishing using any fishing gear until the harvest season. However, different activities are permitted if they do not harm the aquatic ecosystem and fish resources.

During the harvest season of Lubuk Larangan, there are several regulations that all community members must adhere to (Prianto et al., 2024). These regulations include. a) Individuals involved in the harvest are selected based on their expertise, such as the fish catching division, fish auction division, fish collection division, diving division, and profit-sharing division. b) Only nets and seines are permitted as fishing gear, each with a mesh size of 9 inches. According to Sari et al. (2016), the Lubuk Larangan fish harvesting system, which limits the use of fishing gear and the types of fish that can be taken, can support the sustainability of fish populations. c) Outsiders are prohibited from participating in fishing activities. d)The use of tuba (poison), electricity, and explosives for fishing is prohibited.

The establishment of the 'Lubuk Larangan' rule was based on a consensus reached through deliberation and mutual agreement with the customary institution and the community. Sanctions for violations are stipulated in the 2023 Village Regulation on 'Lubuk Larangan' and customary sanctions, which may include fines and the destruction of fishing gear used by the offender.

*3.8. The Benefits of The Lubuk Larangan System*

Implementing the lubuk larangan management system aims to preserve local wisdom for the community. All community members adhere to the restrictions and management regulations imposed on the aquatic area. A) Ensuring the sustainability of fishery resources. B) Providing time for fish to grow and reproduce, thus maintaining fish populations. C) Mitigating conflicts over excessive fishing. D) Protecting endangered and vulnerable fish species. E) Ensuring the fair and equitable distribution of fishery resources among communities. Supporting ecosystem balance. Fish and other organisms play a significant role in the food chain of river ecosystems.

# 4. Conclusions

Based on the research findings, Teluk Paman Timur, Kampar Kiri District's physicochemical characteristics support the life of fishery resource organisms. The values still meet the class 2 quality standard to support the fishery environment. Lubuk larangan has economic and social values that support the community's sustainability of lubuk larangan management. Socially, Lubuk Larangan is a gathering place for the villagers to socialize. At the same time, economically, it can increase the income of local people because, during the opening of Lubuk Larangan, people can sell around the river, and tourists can come to buy the fish caught during the fish harvest. Ninik Mamak and local people jointly manage this locally-based management system to conserve water resources. Lubuk larangan's existence helps conserve sustainable fishery resources in Teluk Paman Timur.

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