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Integrating Indigenous Practices in to Environmental Monitoring

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ABSTRACT:

The integration of indigenous knowledge (IK) into environmental monitoring initiatives holds significant promise for fostering sustainable development and resource management. This study focuses on integrating Iban indigenous practices into environmental monitoring efforts in Sri Aman, Sarawak, emphasising the importance of incorporating local knowledge systems for effective environmental stewardship. The objective of this study is to assess the benefits of integrating Iban indigenous practices into contemporary environmental monitoring frameworks in Sri Aman, Sarawak. Results reveal a notable trend of diversification in livelihood activities among households, reflecting a holistic approach to enhancing livelihoods. Gender dynamics play a significant role in shaping livelihood strategies, with IK serving as a fundamental mechanism for mitigating livelihood vulnerabilities. Moreover, the pervasive utilisation of IK emerges as integral to sustaining livelihoods, particularly in agricultural practices. The integration of indigenous practices into environmental monitoring is identified as crucial for enhancing the efficacy of conservation and resource management initiatives and fostering more resilient and environmentally sustainable communities. The discussion highlights the intrinsic link between IK, livelihood sustainability, and environmental monitoring, emphasising the need to integrate IK into monitoring frameworks for holistic resource management. It also explores the importance of IK in non-farm livelihoods among the Iban communities, showcasing its influence on daily activities and choice of livelihood strategies beyond traditional agricultural practices. In conclusion, the integration of Iban indigenous practices into environmental monitoring represents a promising avenue for fostering sustainable development and environmental resilience in Sri Aman, Sarawak. Recognising and valuing indigenous knowledge systems enhances the effectiveness and inclusivity of environmental monitoring initiatives, contributing to the conservation and protection of natural resources for future generations.

1. Introduction

Indigenous communities worldwide hold valuable knowledge systems developed over generations, providing insights into sustainable resource management and environmental stewardship. Integrating indigenous knowledge (IK) into modern environmental monitoring initiatives is essential for advancing sustainable development and building resilience in fragile ecosystems. Discussing the situation in Sri Aman, Sarawak, where the indigenous Iban communities have a long history, highlighting the importance of preserving and integrating traditional ecological knowledge to improve environmental management. Exploring the complex connection between indigenous practices and environmental monitoring, the study aims to highlight the benefits of incorporating Iban indigenous knowledge into contemporary conservation approaches. This research highlights the importance of indigenous

knowledge in supporting sustainable livelihoods and ecosystem resilience by exploring the relationship between indigenous livelihood strategies, gender dynamics, and resource utilisation patterns. Investigating the environment is crucial for grasping the health of ecosystems and recognising possible threats to human and environmental welfare. Nevertheless, conventional monitoring methods frequently fail to consider indigenous viewpoints and customs, which offer valuable insights into ecosystem dynamics. This study explores the importance of incorporating indigenous practices into environmental monitoring initiatives. Indigenous communities have a profound bond with their surroundings, inheriting valuable wisdom across generations. This wisdom includes detailed insights into nearby ecosystems and recognising small shifts that signal environmental well-being or decline.

2. Materials and Method

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systems and modern environmental monitoring practices.

Literature Review

Indigenous environmental monitoring (IEM) represents the blending of traditional knowledge systems with modern environmental conservation initiatives. Indigenous communities worldwide have honed advanced methods for monitoring and sustainably managing their ancestral lands and natural resources. This review delves into the various aspects of IEM, providing insights into its importance, obstacles, and impact on environmental conservation.

Indigenous knowledge (IK) represents a rich source of traditional wisdom, skills, and worldviews that have evolved within social communities over generations. Especially for rural communities, indigenous knowledge acts as a valuable resource for important aspects of everyday life, such as environmental monitoring techniques. Researchers have been focusing more on the importance of indigenous knowledge (IK) for rural communities, aiming to understand its various aspects and impact on community well-being (Aikenhead & Ogawa, 2007; Alexander et al., 2021; Battiste & Youngblood, 2000). Exploring the incorporation of Iban indigenous practices in Sri Aman Sarawak into environmental monitoring efforts reveals the deep connections between traditional knowledge systems and modern conservation initiatives.

The significance of integrating indigenous knowledge mainstream discussions, underscoring into its contribution to developing culturally appropriate for indigenous populations. solutions Utilising traditional ecological knowledge enhance can environmental monitoring initiatives, making conservation strategies more culturally relevant and successful. This approach can lead to increased involvement and responsibility community for environmental protection. Furthermore, incorporating Indigenous knowledge into environmental monitoring frameworks improves the effectiveness of data collection and interpretation, providing comprehensive insights into ecosystem dynamics and resilience (Alexander et al., 2021 & Chikaire et al., 2012). According to Campbell (2009), indigenous knowledge forms the basis for a range of practices, such as agriculture, environmental conservation, and traditional legal systems. Within the Iban community in Sri Aman, Sarawak, traditional practices based on animistic beliefs and cultural traditions significantly influence environmental monitoring methods. Traditional knowledge systems cover a wide range of areas, including plant identification, weather prediction, and natural resource

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management (Jawol et al., 2018; Lydon et al., 2020). By incorporating Iban IK into environmental monitoring initiatives, professionals can benefit from traditional knowledge that enhances scientific approaches with indigenous viewpoints and understandings.

The strong connection between indigenous knowledge and nature has empowered local cultures to flourish despite the challenges of change. Indigenous efforts to address modern environmental challenges showcase the vibrant aspects of local cultures, providing important insights for sustainable resource management (Supiandi & Leliavia, 2020). Obstacles arise in sharing IK within the Iban community because ancestral wisdom is typically transmitted verbally and is vulnerable to disappearing (Budiman et al., 2018; Jarvie & Perumal, 1994).

Discussing the significant contributions of indigenous environmental monitoring to conservation and development. sustainable Exploring ecosystem dynamics, biodiversity conservation, and resiliencebuilding strategies in the context of climate change can provide valuable insights (Berkes et al., 2012; Natcher et al., 2007). Indigenous monitoring networks function as early warning systems for environmental degradation ecosystem disturbances, enabling and prompt interventions and adaptive responses (Walters & Marten, 2004). Furthermore, by documenting and passing down traditional knowledge through generations, IEM plays a crucial role in safeguarding cultural heritage and encouraging intergenerational learning among indigenous communities (Nicholas et al., 2016). Incorporating indigenous viewpoints into environmental governance structures promotes fairer and more inclusive decision-making processes based on justice, reciprocity, and respect for human rights (UNEP, 2010). Indigenous-led conservation initiatives, like communitybased resource management and indigenous protected areas, provide promising models for sustainable development that focus on local autonomy, biodiversity conservation, and cultural revitalization (Berkes & Turner, 2006; Watson et al., 2018).

As the field continues to evolve in response to changing environmental conditions and socio-political dynamics, several avenues for future research and action emerge. It is crucial to enhance collaborations among indigenous communities, researchers, and policymakers to promote participatory environmental monitoring and establish governance mechanisms that honour indigenous rights and knowledge systems (Bohensky & Maru, 2011; Tengo et al., 2017). Investing in capacity-building initiatives, knowledge exchange networks, and culturally appropriate technologies can strengthen indigenous monitoring efforts to address emerging environmental challenges more effectively (Armitage et al., 2011; Brosius et al., 2005). Researchers need to further explore how integrating indigenous knowledge impacts environmental monitoring methods in various cultural settings. As such this study aims to enhance our comprehension of how Indigenous knowledge impacts environmental monitoring practices within the Iban community in Sri Aman, Sarawak. This research delves into the complex relationships between traditional spirituality, knowledge systems, kinship, and environmental dynamics to highlight the connections between indigenous practices and modern conservation efforts. Environmental monitoring initiatives that work closely with local indigenous communities can use traditional knowledge to tackle environmental issues, respect cultural heritage, and promote sustainable development.

3. Results

The study results highlighted a noticeable trend of diversification in income-generating activities within households, encompassing both agricultural and nonagricultural endeavours, indicating a holistic approach to enhancing livelihoods. Furthermore, gender dynamics played a role in determining the division of tasks within the community. Traditionally, men were the main breadwinners in the family, while women focused on non-agricultural tasks like crafting and managing small businesses. This emphasises the distinct gender roles within the community. Moreover, utilising indigenous knowledge (IK) has been recognised as a crucial approach to mitigating livelihood risks, especially in agricultural endeavours. Indigenous techniques for agriculture, hunting, fishing, and craftsmanship are vital for sustaining communities. Highlighting the importance of incorporating indigenous practices into environmental monitoring for long-term development. Integrating indigenous knowledge into monitoring frameworks can improve the effectiveness of conservation and resource management efforts, leading to stronger and more environmentally sustainable communities. Bv integrating traditional practices into environmental monitoring, the study reveals a deeper understanding of ecosystems. Indigenous knowledge offers valuable insights that complement scientific data, providing detailed perspectives on ecological patterns, biodiversity, and resource management. The study emphasises the importance of incorporating indigenous knowledge systems into environmental monitoring frameworks. Collaborating enhances the effectiveness and cultural importance of monitoring projects, leading to greater sustainability of resource management and conservation efforts.

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4. Discussion

Indigenous knowledge (IK) is specific to a particular culture and society, as highlighted by Anderson (2008) and Antweiler (2016). Values such as self-governance, social association, environmental stewardship, and adherence to network and land-related agreements have been incorporated into expressions, melodies, verses, stately rituals, and ceremonies to be passed down from subsequent ages (Ulluwishewa, 2008). In Iban communities, IK refers to their experiential, traditional, and informal knowledge that is crucial for both farm and non-farm livelihoods. People typically inherit and pass down this information through generations to address current challenges in their lives. The Iban community plays a crucial role in preserving the traditional knowledge system and relies on the natural resources in their environment, including forests, land, and rivers, for various cultural practices. In the Iban community, Indigenous knowledge is closely linked to their diverse roles in farming and non-farming activities like farming, labour, fishing, gathering, and hunting. Income generated from agricultural activities like wet rice cultivation, small-scale poultry farming, and aquaculture primarily sustains rural households in Sri Aman Sarawak. Highlighting the importance of incorporating indigenous practices into environmental monitoring efforts, supporting sustainable resource management, and strengthening ecosystem resilience, this extensive collection of IK is invaluable. In Iban society, there are two primary types of knowledge namely explicit and tacit. People document and record traditional knowledge for easy dissemination and communication. Tacit knowledge involves acquiring practical knowledge through personal experience, perception, and intuition. As indigenous knowledge erodes, there is an increasing need to transfer, store, and preserve tacit knowledge into explicit knowledge within the Iban community. Participants mentioned that they continue to use indigenous knowledge in their livelihood approaches to adapt to environmental changes and vulnerabilities. Residents point out that despite the decrease in natural resources like forests, animals, and fish, Iban communities are becoming more innovative in finding alternative ways to support their livelihoods. This implies that individuals seek alternatives by leveraging their indigenous knowledge to broaden their sources of income. For instance, they started growing wild vegetables like ferns and bamboo shoots. As not all of them go to the river to catch fish, the Iban in Sri Aman, Sarawak breed fish for their own consumption in fiberglass or cement tanks.

Exploring the significance of indigenous knowledge in livelihood strategies are important. According to the

respondents, even their children and relatives who have moved away still maintain their traditional knowledge by purchasing fish or meat from the market, preparing their own smoked fish, salting fish, and preserving meat or fish for personal use or to sell to acquaintances in urban areas. Women who are involved in handicraft making mentioned that despite having a limited supply of donax canniformis and palm leaves, they are able to create mats and baskets using colorful plastic strips. On their farms, some of the participants grow their own donax canniformis and palm leaves. Next, in Sri Aman Sarawak, the majority of fishermen now construct their boats using fibreglass material, a shift from the traditional use of ironwood for boat construction. Considering the high cost and scarcity of ironwood, fibreglass emerges as the most viable substitute. As per the interviewees, the tradition of passing down boatbuilding skills through generations in the family has now shifted towards using fibreglass. This conversation emphasises the strong connection between Indigenous practices, livelihood sustainability, and environmental monitoring, emphasising the importance of incorporating Indigenous knowledge into monitoring systems for comprehensive and efficient resource management. When incorporating indigenous practices into environmental monitoring, it is crucial to recognise the significance of indigenous knowledge (IK) in the nonfarm livelihoods of the Iban communities in Sri Aman, Sarawak. This information has a profound impact on how they go about their daily routines and influences the way they choose to make a living, going beyond the usual farming methods. The participants viewed indigenous knowledge as crucial to non-agricultural livelihoods. It was clear that IK had a significant impact on the community's daily activities and influenced their choice of livelihood strategies, from farming to non-farming. Findings from the detailed interview revealed that various types of Indigenous knowledge were present within the Iban communities in Sri Aman, and these were actively utilised in the daily practices of rural households. For instance, IK was frequently utilised in creating handicrafts like necklaces, sashes, woven textiles, women's headdresses, short-sleeved vests, loincloths, and men's headdresses. Iban men and women typically wear this craft during special events, ceremonies, dances, and rituals. Converting tacit knowledge about creating handicrafts into explicit knowledge involves personal discussions and documenting in printed materials. Traditionally, the people of Sri Aman passed down the art of crafting through both structured and casual methods. Some women participate in handicraft courses organised by community development department to learn how to create specific handicrafts in a formal setting. Usually, people learn through informal methods, like observing

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and emulating older individuals. Women typically practiced this activity. Some Iban artisans depend on natural materials like rattan, bamboo, leaves to create handicrafts like plant baskets, mats, or hats. When creating the handicrafts, it was important for them to follow certain restrictions and understand the taboos associated with their craft. The weavers normally begin with simple patterns before progressing to more intricate ones, like the leopard pattern. Skipping any of the steps is crucial, as it could lead to serious health risks or even death for women. Thus, understanding IK is crucial for assisting women in creating handicrafts correctly and avoiding negative outcomes, despite its decreasing significance in light of modernization. IK plays a vital role in the lives of the Iban people, particularly in activities like fishing and hunting, due to their strong belief in superstitions, taboos, and specific limitations. For instance, individuals need to be cautious and observant of the behaviour of birds and animals, as their actions are considered signals, markers, or predictors of upcoming occurrences. As noted in a study by Jawol et al. (2018), there are various bird species that are considered indicators of future events. Nevertheless, the research indicates that this knowledge has become implicit and less prominent over time, as younger adults are no longer able to identify these birds. Some older members and middle-aged individuals still utilised this IK for their fishing and hunting endeavours, which had dwindled in popularity among them. Furthermore, individuals who engage in hunting shared their traditional knowledge about hunting. They suggest that hunting can involve traps, dogs, shotguns, or just a shotgun. For instance, when they go hunting with a shotgun, they begin by tracking the wild boar's footprints. Tracking down the wild boar typically begins at 6:00 a.m. and continues until 6:00 p.m., depending on the success of the hunt. Typically, they track wild boars until 11:00 a.m. Hunters have been notified that the wild boar family rests in the den of the felled or dead tree. Dead or fallen trees offer shelter for wild boars, serving as a nest for the boar family. When the hunters successfully locate a wild boar in its den and are fortunate, they may come across the entire wild boar family, typically comprising six to seven members. While on the hunt for wild boar, it is believed to be bad luck to catch small animals like turtles or monkeys, as it may prevent them from successfully catching a boar. Typically, when hunting, individuals do not hunt alone but rather in groups of two to three. It was discovered that hunting is considered a form of implicit knowledge, and individuals with hunting skills tend to be more engaged in these pursuits. Hunters develop their hunting skills through experience and intuition, according to research findings. IK worked in Sri Aman Sarawak, where farming was the second most crucial activity. The

Iban held the land in high regard, considering it the center of their primary economic endeavors. Some farmers continue to harvest paddy manually using a finger knife. The Iban crafted finger knife from a blend of wood, bamboo, and a small blade. Furthermore, the Iban community in Sri Aman also engages in labour exchange, on their farm. Additionally, when the rice harvest takes place, the Iban first place their rice in the basket before transferring it into the sacks. In addition, the Iban also performed agricultural ceremonies to offer blessings and safeguard their harvests. Experienced ritual practitioners must use specific metaphorical language to convey the message to God during the ritual, as this knowledge is in the form of tacit knowledge. Meanwhile, the community in Sri Aman continues to practice the traditional dance as a part of their cultural heritage. The Iban community conducts dance training to transfer knowledge to the younger generation. IK is commonly used in traditional medicine by the Iban community in Sri Aman, Sarawak. Respondents reported using traditional medicine for health treatment, including rhodomyrtus tomentosa and guava for diarrhoea or stomach pain, and blumea balsamifera for fever. The study discovered that this information is considered part of explicit knowledge, and the Iban community incorporates traditional medicine alongside modern medicine. According to the respondents, for certain diseases that are challenging to cure with modern medical techniques, they turn to rituals performed by the shamans to help bring back the soul and treat the illness. In the traditional belief system, people believe that illness occurs when a patient's soul becomes separated from the body. People often keep this knowledge secret and do not widely practice it. Most practitioners are older individuals who may be difficult to locate, especially if they are no longer able to perform certain rituals. One of the reasons for this practice's lack of popularity is the high number of Christians among the Iban in Sri Aman Sub-District. Furthermore, detailed IK aspects are also documented in Adat Iban 1993. In the Iban community, custom played a crucial role in fostering harmonious relationships among community members and promoting overall prosperity. It effectively served as a tool for managing discussions in a constructive and suitable manner. For example, the Iban community's practices relate to marriage, divorce, inheritance, and property division. Furthermore, within Iban society, there exist ritual prohibitions that members must adhere to. When a resident of the longhouse passes away outside the village, the community sacrifices a pig before bringing the deceased's body into the longhouse for the rites and burial preparations. The Iban community in Sri Aman. As mentioned, many households believed they could decrease their vulnerability by using indigenous knowledge. Given that agriculture was the primary

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economic activity of households in Sri Aman, they faced a range of hazards that could impact their productivity and livelihoods dependent on agriculture. Nevertheless, the local Iban community was well-informed about the potential dangers and successfully maintained these resources in a sustainable manner by drawing on their traditional wisdom. Rapid rural development has resulted in a depletion of natural resources, reducing households' reliance on them compared to the past. Nevertheless, the Sri Aman community discovered a different approach to substituting certain natural resources and safeguarding their IK knowledge. Several studies have reported consistent results regarding the integration of indigenous knowledge into the daily practices of the Iban community. Kendawang et al. (2005), Bolhassan et al. (2014), Riman (2015), Sanggin et al. (2016), and Jawol et al. (2018) all found similar patterns. People recognise that tacit knowledge can be converted into explicit knowledge. Specific individuals, like elders, retain certain expertise and experiences within indigenous knowledge that remain tacit. Overall, indigenous knowledge proved valuable for both agricultural and non-agricultural livelihood approaches. It strongly supported the idea that indigenous knowledge plays a role in shaping livelihood strategies in the face of environmental changes affecting their livelihoods.

5. Conclusion

Incorporating Indigenous practices within the Iban community into environmental monitoring is a vital component of comprehensive conservation initiatives. Utilising traditional knowledge and techniques passed down through generations can lead to improved and long-lasting environmental management. Respecting and preserving cultural heritage while also boosting the resilience of ecosystems. By working together and showing respect between Indigenous communities and modern environmental practitioners, it is possible to develop holistic approaches that support both the environment and society. Moving ahead, it is crucial to persist in appreciating and integrating Indigenous viewpoints, acknowledging their significant role in environmental preservation. The Iban communities in Sri Aman, Sarawak, focused a considerable amount of their time on agriculture and gathering resources. The natural resources in Sri Aman Sub-District are vital for sustaining the local community's way of life, encompassing agriculture, hunting, fishing, and handicrafts. This study emphasises the vital role of indigenous knowledge (IK) in shaping livelihood strategies and resilience within the Iban community in rural Sri Aman, Sarawak. Highlighting the significance of integrating indigenous practices into environmental monitoring for sustainable development.

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