

REVIEW OF THE MANGROVE CONSERVATION BEHAVIOUR FROM ENVIRONMENTAL PSYCHOLOGICAL PERSPECTIVES

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ABSTRACT

Despite the mangrove's ecosystem contributing to mitigating the effects of climate change, its significance is unknown, putting it at risk of extinction. This has contributed to a number of mangrove rehabilitation programs. However, ensuring the long-term efficiency of the conservation programs needs the involvement of the local community. Therefore, this paper aims to understand the local community mangrove conservation behaviour guided by the psychological factor that influences people's behaviour. This research is carried out by adopting qualitative techniques through Focus Group Discussion (FGD) which involved local communities from Kg. Tg. Keramat, Kuala Selangor. Results showed that the local community nearby the mangrove forest has a positive intention and attitude towards mangrove conservation based on the five themes assigned through the FGD. The five main themes are perception, intention, attitude, perceived behavioural control, and personal norm. Among the local community, perceived behavioural control has the most positive effects on mangrove conservation. However, because of the lack of conservation activities involving the local community, there were no community empowerment and enforcement from the top management upon receiving activity reports which significantly changed their intention towards mangrove conservation. From the result, it can be concluded that people that live nearby the mangrove forest will



have a positive attitude and intention towards conservation as it will affect their living and surrounding. However, these positive intentions need full support from the higher authority to ensure a long-term resilient program and sustainable management of mangrove conservation.

Keywords: *Environment conservation, Environmental behaviour, Conservation psychology*

INTRODUCTION

The value of our ecosystem has increased because of climate change. One of the main causes of the environment's destruction is urbanization. To evaluate the effectiveness of policies and solutions, it is necessary to recognize the genuine challenges that urbanization poses to environmental degradation (Kamarudin, et al., 2022). By their very nature, ecosystem restoration and conservation minimize vulnerability and are powerful allies in the battle against climate change. The coastal environment's ability to operate as a carbon sink gives the blue carbon ecosystem the greatest potential to mitigate climate change.

Mangrove is a vital component in the blue carbon ecosystem. According to Alongi (2020), it is the highest carbon sink for carbon sequestration in countries with extensive coastlines. Mangroves absorb carbon dioxide eight times more than any other ecosystem on earth and serve as the biggest carbon storage facility by consuming a large number of carbon dioxide and passing it to trees for further growth (Daniel et al., 2011). Rahman et.al (2021) confirmed further that by protecting and conserving mangrove biodiversity, they can maximize their capacity as a carbon sink by increasing carbon storage.

Malaysia has one of the largest tracts of mangroves country in Southeast Asia and the second-highest annual rate of deforestation in the region at 0.70% per year. The loss rate is significantly higher than the global average (Hamilton & Casey, 2016; Friess et.al., 2019). Malaysia has a total mangrove area of 629,038 acres, with Peninsular Malaysia accounting for 18%, Sarawak accounting for 22% and Sabah accounting for 60% (Figure 1.1). Malaysia itself lost 2.83% of its mangrove between 2000 and

2012 with agriculture accounting for 38.2% of the loss, 14.7% converted to aquaculture, and 12.8% to urban development (Ward & Friess, 2016). According to Forest Research Institute Malaysia (FRIM), (2020) research on mangrove mapping and monitoring in Malaysia, there has been a loss of mangrove area in Malaysia from 1990 to 2017 (Figure 1) resulting in a continued decline of mangrove area. Malaysia's mangrove area has degraded by 57.92% over the last ten years.

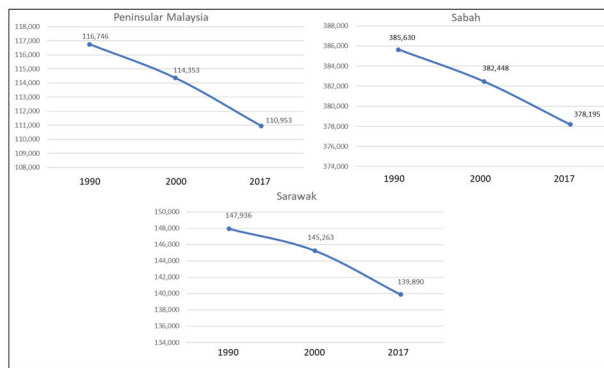


Figure 1. Mangroves Degradation in Malaysia (1990 – 2017)

Source: FRIM (2020)

Unfortunately, this natural ecosystem is declining due to human carelessness. Many of our activities disturbed the natural ecological balances that assist us in adapting to and mitigating climate change. The natural environment has been harmed in order to meet human needs, demonstrating that human impact is now greater than the rapid globalization, economic and population growth, and changing lifestyles (Intergovernmental Panel on Climate Change (IPCC), 2014). Simultaneously, if ecosystems are not effectively protected, climate change will accelerate. This global issue has raised awareness about the importance of sustainable development in preventing environmental degradation. As part of the efforts toward sustainability, policies and regulations, technical and regulatory solutions, international agreements, and economic tools have been implemented. However, if we failed to include a transformation of human behaviour, the issue of sustainable development and environmental degradation will not be resolved. This is to ensure that policy and intervention outcomes are positive.

Since the Rio Earth Summit in 1992, the role of individual consumption



patterns and production systems in achieving sustainable development has been mentioned. It is about understanding how people make and act on decisions, how they think, influence, and relate to one another, and how they form beliefs and attitudes. Human behaviour is at the root of the environmental problem. A change in behaviour patterns is required to find a solution to this problem (Maloney & Ward, 1973). In that regard, there is a need to better understand human behaviour. It is about understanding how they act in the face of environmental degradation.

The purpose of this paper is to understand local community mangrove conservation behaviour by using psychological factors that influence people's behaviour. The objective of this study is to identify the factors that influence local community mangrove conservation behaviour. These factors were guided by the psychological factors that influence people's behaviour. This is a qualitative study involving residents of Kg. Tg. Keramat and Kg Sungai Yu in Kuala Selangor. This village is less than 3 kilometres from the mangrove forest. It is also close to Taman Alam Mangrove Forest Reservation and Banjar Laut Forest Reserve. The mangrove forest nearby this village is large and important to monitor and conserve due to its location.

LITERATURE REVIEW

Community-Based- Approach

Many efforts have been made, and they are committed to ensuring the efficient management of the mangrove ecosystem through policies and conservation programs, as mangrove forests are a national conservation priority in several countries, including Malaysia.

Mangrove conservation faces challenges because of good policies and interventions. As the mangrove forest is administered by multiple government agencies, unclear policy contexts and overlapping policies create conflict and even contradiction in the prescriptive and enforcement realms (Ward & Friess, 2016; Goh, 2016). According to their research, one of the solutions is to have strong community-based management. Community engagement is a process that involves community members and people in

making requests or helping in the decision-making process. This process of community engagement also aids in reflecting on and making better decisions for the community's future. Local government or community-based organizations facilitate specific processes that are impending actions or necessary steps.

This is one of the approaches taken by the community to address the environmental challenge (Vanclay & Franks, 2015). Successful policies and programs are determined by how the local community reacts and acts in response to them. According to Pyrovetsi & Daoutopoulos (1997) and Sah & Heinen (2001), while more significant policy decisions have influenced the conservation of wetland resources, sustainable use is primarily dependent on local communities such as farmers, fishermen, and others. However, communities cannot be effective managers because they are imposed by powerful stakeholders, and management necessitates legal enforcement. In this regard, while we already have good policies and regulations in place for mangrove conservation, the local community plays an important role in determining the success of the interventions. Even though Malaysia has a successful rehabilitation project, the monitoring process is required to ensure the project's long-term success. This effort requires frequent visits and monitoring from the local community.

The term "community-based conservation" (CBC) refers to a variety of conservation programs that involve community members with a specific goal, such as community-based natural resource management, community-based social-ecological systems approaches, community-based conservation-protected area, incentive-based conservation and ecosystem management, and others (Gruber, 2010; Abdullah, K. et al., 2014). CBC is a conservation effort that involves community members as active stakeholders in protected area management (Abdullah, K. et al., 2014)

There are three basic theoretical frameworks in community-based conservation: ecological factors, institutional factors, and psychological factors (Baral & Stern 2011). This paper will focus on the psychological factor in understanding mangrove conservation behaviour among local communities.



Recent Research on Mangrove Conservation Among Local Community

Several factors were listed as a factor that influences coastal community behaviour towards mangrove conservation behaviour based on recent research related. Table 1 summarizes the local community and mangrove issues.

Table 1. Recent Research on Mangrove Conservation among Local Community

Author/Year	Topic	Result
Sarmin et al., 2017	Deforestation Awareness Among the Community Living Near Mangroves	Highly dependent on the mangrove for their livelihood. Payment for conservation, awareness towards mangrove protection
Abd Rahman et al., 2018	Mangrove Degradation issue and awareness	Lack of local community awareness due to lack of awareness efforts and public understanding.
Idrus et al., 2019	The livelihoods of local communities: Evidence of the success of mangrove conservation	Local communities are depending on mangrove area to get their daily needs
Setiastri et al., 2019	Local Community's perception and behaviour of mangrove preservation	The level of community perception towards mangrove preservation is good but the level of its community behaviour is bad
Roslinda et al., 2021	The involvement of Local Community in Mangrove Forest Conservation in West Kalimantan	The involvement of local community using the bottom-up approach. The level of involvement is still at the information and consultation stage.
Abib & Appadoo, 2021	Local people and Mangroves: Ecosystem perception and valuation on the The southwest coast of Mauritius	The local people were less willing to contribute to mangrove conservation activities in both terms of money and time.

Damastuti et al., 2022	Effectiveness of community-based mangrove management for biodiversity conservation: A case study from Central Java, Indonesia	The main contributing factors were a) the longer-term funding and maintenance, b) the greater acceptance of protective legislation, c) the higher levels of public support, d) the fact that more species of mangroves were used, e) the much larger spatial scale of mangrove restoration, and f) the presence of additional measures to reduce wave action in highly eroded areas.
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Based on the table above, knowledge and community awareness are considered the main factors driving conservation behaviours among the local community. Despite the ecological crisis and the importance of psychological roles plays in preventing further damage, lots of research has been conducted into the psychology of environmental conservation. However, the research only pays attention to community awareness which has been shown to have a significant relationship with mangrove conservation. There is a lack of study in determining another factor that influences the behaviour which is their perception.

Conservation Psychology

To ensure pro-conservation behaviour, applied psychology tools and techniques are essential. Involving the community in conservation efforts allows us to better understand them and develop better solutions. In this regard, attitudinal studies and local people's perceptions of conservation have been extensively researched in recent years. To encourage environmentally responsible behaviour, we must first identify and comprehend what causes such behaviour.

Conservation psychology is more than just an applied field concerned with determining the determinants of pro-environmental behaviour. It is about theory and research aimed at understanding the interdependence of human and natural well-being, understanding why people help or harm the environment, and making links between basic academic research and practical environmental issues (Clayton et al., 2012).



The promotion and awareness program for local communities was one of the most important components of the mangrove conservation program held. More effective conservation interventions are needed to change the behaviour of the local community living around the mangrove area (Ramli & Caihong, 2017). The local community is still unaware of the significance of mangroves and their global status (Friess et al., 2019). However, this type of program does not generate enough awareness, which has resulted in a mangrove conservation attitude due to a lack of understanding of their intention and condition (Abd Rahman & Asmawi, 2016).

The gravity of environmental issues necessitates a shift in human behaviour as a whole. The specific challenge for psychology is to investigate how individuals' cognitive, emotional, and behavioural processes result in non-sustainable as well as sustainable behaviour.

A shift in behavioural patterns is necessary to find a solution to an environmental issue (Maloney & Ward, 1973). In that regard, there is a need to understand human behaviour. It is about understanding how they act in the face of environmental degradation. In this study, the local communities are heavily reliant on mangrove ecosystems, particularly for livelihood and as a first line of defense against sea level rise and more intense and frequent weather events caused by climate change. When it comes to the scientific study of the mind, brain, and behaviour, psychological research is required. Its goal is to better understand human behaviour and promote human well-being (Clayton & Myers, 2015).

The ability to successfully integrate community psychological factors into mangrove management is hampered by a problem involving social and psychological factors among local communities that rely on mangroves. The value of interdisciplinary collaboration between planning and environmental psychology is underappreciated in academia and policymaking (Shirotsuki et al., 2010). Conservation psychology adds an important dimension to understanding attitudes and how they affect conservation policies and practices (Fernandez-Llamazares et al., 2020).

In the scientific study of the interaction between people and nature, conservation psychology focuses on ways to promote conservation (Saunders, 2003). The study of the earth and what can be done to protect

it is not a specialty area within psychology but an emerging field for scientists, researchers, and practitioners from all disciplines. This network aims to understand why people harm or benefit the environment and how such behaviour might be altered. Any area of psychology that has clear knowledge of the environment and the impacts that people have on the natural world is referred to as "conservation psychology." By utilizing their skills in "greening" psychology, conservation psychologists work to create an environmentally sustainable society (Clayton & Myers, 2015). The science of conservation psychology is oriented toward environmental sustainability, which includes concerns like the conservation of resources, conservation of ecosystems, and quality of life issues for humans and other species.

Environment Psychology Theoretical Model

All fields of social science have produced models of how people make decisions. Human behaviour is conceptualized and defined in a variety of ways. The individual is mainly the locus of behaviour in most studies. Typically, individuals are questioned about their level of environmental concern. People, however, have another aspect that discourages them from acting sustainably when it comes to application. Understanding and awareness may not always translate into good or poor environmental behaviour. The concept of environmental awareness is oversimplified and cannot accurately depict the environmental trend. Some claim that not everyone aware of environmental issues is motivated to act and practice in an environmentally beneficial manner (Krajhanzl, 2010). According to psychological research, simply being aware of an issue is insufficient to motivate people to act (Howard, 2000). Environmental awareness can influence attitudes, but it does not always lead to sustainable behaviour. For example, people understand the environmental benefits of taking public transportation and walking a short distance. People, however, choose not to act on it because it is less flexible, inconvenient, and takes more time.

The Theory of Planned Behaviour (TPB), developed from the Theory of Reasoned Action (TRA) in 1980 by Martin Fishbein and Ajzen to predict human intention that led to such behaviour at a specific time and place (Fishbein & Ajzen, 1977; Ajzen & Madden, 1986; Ajzen, 1991), is one of the models of the theory that is most frequently used frameworks



in behavioural study. By including "perceived behavioural control" in the TRA component, TPB was first introduced. The attitudes and subjective norms that are connected to intention and correlated with behaviour are evaluated by TRA (Schifter & Ajzen, 1985).

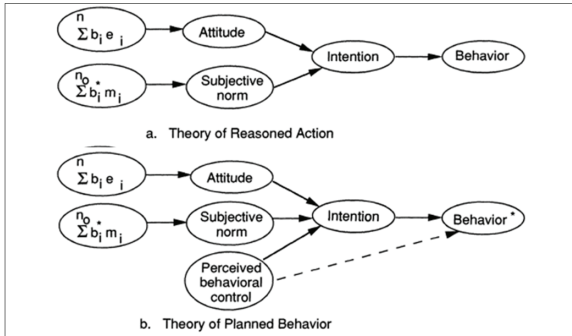


Figure 2. Basic Theory of Reasoned Action and Theory of Planned Behaviour

Source: Fishbein & Ajzen (1977)

Shepherd & O’keefe (1984) argue that not all good intentions will result in good actions since there are other predictors of behaviour control in each person's behaviour, which prevents behavioural intention from being the only factor influencing behaviour. Ajzen completes the TPB component by including perceived behavioural control in an effort to predict actual behaviour more accurately.

Target, action, context, and timeframe are the four components of TPB, and the principle of compatibility is included to help identify the behaviour of interest in each of these four areas (Ajzen, 1991). To determine how to design and measure each construct in the TPB, the behaviour that has been defined from the theory must match the behaviour in these four aspects (Ajzen, 2020). As shown in Figure 2, TPB uses four direct variables- attitude, subjective norm, perceived behavioural control, and intention to explain pro-environmental behaviour. People's behaviour was determined by ability and intention (behavioural control).

This variable is based on two assumptions: (1) people will evaluate the consequences of an action before deciding to take it, and (2) people will make decisions based on the information they receive and their early

evaluation. This assumption is founded on intent and capability (behavioural control). In general, when a person has a favourable attitude toward pro-environmental behaviour, is positively aligned with the relevant norms, and has a high level of behavioural control, the person can be expected to have a strong intention to engage in pro-environmental behaviour.

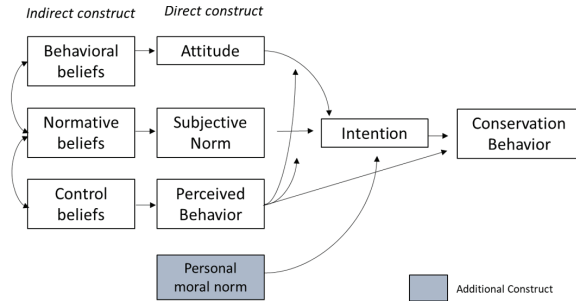


Figure 3. Adapted Theory of Planned Behaviour Diagram

Source: Author (2023)

Based on the theory, this study adapted four main factors: intention, attitude, subjective norm, and perceived behavioural control. Adding another factor, which is the personal norm, because there is a need to understand more about individual personal perception factors, such as perceived environmental responsibility, as suggested by Sugandini et al., (2017). Other factors that people believe can predict conservation behaviour include locus of control, individual feelings, social norms, intrinsic value, and personal knowledge (Akintunde, 2017; Cherian & Jacob, 2012; Clayton & Myers, 2015).

RESEARCH METHODOLOGY

This study is part of a larger study that looks into the relationship between mangrove conservation behaviour and environmental psychology in the local community. This study's methodology is a mixed methods approach that includes the collection of quantitative and qualitative data.

This paper focuses on the local community's behaviour towards mangrove conservation in their area guided by the environmental psychology

indicators. The research findings presented in this paper are based solely on qualitative data gathered from focus group discussions (FGDs) with local community volunteers. Focus Group Discussion (FGD) is one type of discussion that approaches the community in a more coordinated and structured manner. FGD is a qualitative research method and data collection technique in which participants or stakeholders are people with specialised knowledge or an interest in a specific topic (van Eeuwijk, 2018). People were involved in a focus group discussion (FGD) that was held with a small group of participants. The number of people involved in the discussion ranges from 5 to 12 in a group. FGD is also facilitated by a professional and external moderator who is involved in the assessment of the community approach.

FGDs, on the other hand, are more beneficial because they provide environments in which participants can influence and be affected in a more direct manner (Krueger & Casey, 2000). The FGDs group discussion was used to evaluate the effectiveness of the biodiversity monitoring system in improving natural resource management and strategies. Aside from that, we can learn about people's perceptions of how and why they respond to conservation issues in a particular way (Nyumba et al., 2018). Through interactions with various people, this technique seeks out participants' attitudes, perceptions, knowledge, experiences, and behaviours.

Study Area

Local communities living near mangrove forests, particularly coastal fishing communities, were chosen as respondents for this study. The research site is in

Kuala Selangor. Village in the west of the state of Selangor, Kg Tanjung Keramat, near the estuary of the Selangor River (figure 4). This area's mangrove is one of the most densely forested in Kuala Selangor. Kuala Selangor Nature Park is a well-known tourist destination in this area, with 95 hectares of mangrove swamp forest. It is the best place in Selangor to learn about the mangrove forest ecosystem and has been the site of many mangrove rehabilitation programs. However, mangrove coverage in the area has declined from 24.29 percent in 1989 to 15.57 percent today.



Figure 4. Research Area

Source: Rancangan Kawasan Khas Bandar Melawati 2025

There are ten volunteers which are chosen based on simple random sampling from the local community in Kg. Tg. Keramat. One small group of focus group discussions (FGDs) exploring local community perceptions on mangrove conservation practices. The respondent consists of fishermen and self-employees. This information was gathered from Balairaya Kg Tg. Keramat on August 13, 2022. The five themes served as a semi-structured for the FGDs (subjective norm, intention, attitude, perceived behavioural control, and personal norm). The themes were chosen based on a psychological aspect of the environment that was widely utilised to predict people's pro-environment behaviour. In Table 2 below, each theme's description is given.

Table 2. Five (5) Themes for the Semi-Structured FGDs

Main Theme	Description
Subjective Norm	Individual assessment of specific behaviour is influenced by other people's opinions.
Intention	Individual readiness to perform kind of behaviour
Attitude	Individuals' self-beliefs that have a strong reflection on actual behaviour
Perceived behavioural control	Individual own control is based on knowledge, skills, and abilities.



Personal Norm	A way of behaving and doing things that our feelings agree with. An individual values and beliefs about what the general population perceives or does
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Source: Cherry (2018), Ajzen, (1991), Ajzen, (2020) & Mohd Noor et.al., (2022)

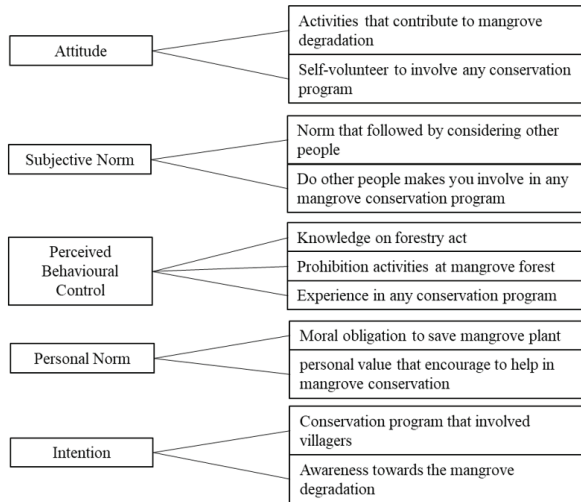


Figure 5. A Sample of the Procedure Used to Assign the Themes
(Author, 2023)

Based on the main theme, Figure 5 is the expectations that are necessary to be considered to avoid unnecessary questions and to make sure that the FGDs objective was achieved.

DISCUSSION

All of the participants in the focus groups have direct knowledge of mangrove management in their village. The following discussion will look at the main issue from each theme that led to the local community's current attitude toward mangrove conservation.

Subjective Norm

The villagers are generally aware of the government's approach to mangrove conservation. However, they have a negative attitude toward the mangroves

conservation management in their community. According to the villagers, the forest reserve is under the jurisdiction of the forestry department, and the villagers have no authority to intervene if any prohibited activities occur. Furthermore, no action was taken following the report. The top management's actions toward any conservation or local community issue must be improved in order to achieve great collaboration among both stakeholders. About, the majority of the neighborhood's residents share the same opinion on the need to protect mangroves there. The notion implies that everyone is unwilling to participate in any mangrove conservation efforts.

Intention

Individual awareness of the issue is linked to intent. Villagers are aware of the mangrove degradation problem in their area. There is, however, a scarcity of conservation programs that involve the local community. Any program that was held was a one-time event that only involved certain organisations such as the school program, and tree planting program with government organisations, especially at Kuala Selangor Nature Park. The villagers have less opportunity to participate, and there is no funding or expertise to establish their own conservation and monitoring program. Aside from that, the villagers must obtain approval for the mangrove rehabilitation program. This issue has an impact on villagers' attitudes toward the mangrove conservation program. Management of the community-based conservation approach must be well implemented.

Attitude

There is a prohibited activity in mangrove forests in their village in order to meet commodity demand such as logging. However, there has been no enforcement or action taken by top management on this issue. Even though there are only a few of them involved, logging activities continue to occur, resulting in a large area of mangrove degradation. The majority of participants are enthusiastic about mangrove conservation and are eager to participate in any conservation program. This is because the destruction of the mangroves has an impact on their way of life, particularly for fishermen. Another consideration is mangrove forests will protect the village from destructive wind and reduce the impact of storms.



Perceived Behavioural Control

The participants are all aware of the destruction of the mangroves in their region. They are still ignorant of the significance of mangrove forests, though. They did not highlight the problems with mangrove degradation and its effects because of a lack of program awareness in their village. They are, however, aware of any activities that cause mangrove degradation because it will have an impact on their living area and the fisherman. They don't have the ability and opportunity to solve the problems due to a lack of local community involvement in the conservation program, financial problems and no community empowerment.

Personal Norm

All of the participants agree that mangrove conservation is an important activity for them and that they will volunteer to participate in any conservation program. Furthermore, mangrove forests are important for protecting their village from storms and monsoons, as well as a barrier against rising sea levels and wave action.

CONCLUSION

As a result of the findings, we can conclude that people who live near a mangrove forest generally have a positive attitude and intention toward conservation. This is because they are concerned about the degradation of the mangroves which affects their life. However, the communities require the assistance of other stakeholders. The focus groups reveal that the local community requires enforcement and power from top management to assist them in monitoring. The problems are a lack of involvement, financial resources, and community empowerment.

Five of the factors mentioned in the theme adapted for this FGD have an impact on the local community's attitude towards mangrove conservation. The perceived behavioural control, on the other hand, has the greatest influence. Within the local community, awareness and knowledge transfer must be created. High levels of awareness and knowledge will foster a positive attitude and feelings towards pro-environmental behaviour (Roy, 2016; Sugandini et al., 2017; Ramli et al., 2018; Arundati et al., 2020).

This overview is a general psychological perspective on environmental behaviour and is limited by the theory of planned behaviour. However, it can be a guideline for further research in explaining specific environmental behaviours towards specific sustainable goals. This study's direction will aid in addressing the major issues related to factors that influence conservation behaviour, as well as providing a better understanding of local community intention and behaviour towards conservation. This study demonstrates the importance of community empowerment in encouraging the local community to save the environment. As a result, they can garner strong support from the local community for the long-term management of mangrove conservation. When communities are willing to be a part of the solution, they are willing to take on conservation responsibility. This study recommends further research to identify psychological factors from stakeholders such as Nature Park management, environmental NGOs, and the Forestry Department, which are related organisations that work with the local community on this effort.

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AUTHOR CONTRIBUTIONS

The authors have contributed to the review paper. The first author designed the study and analysed the data. The second author wrote the initial drafts of the paper. The third author contributed to the literature review and provided all the additional data needed for this paper. All authors finalized and contributed to the reviewed paper.



CONFLICT OF INTEREST

The authors declare there is no conflict of interest.

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