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Understanding the attitude–behaviour gap in river conservation: Perspectives from urban riverside communities in Sabah

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Abstract

River pollution remains a significant environmental challenge in Malaysia despite the implementation of numerous environmental awareness and river conservation programs. This study aims to examine the factors contributing to the attitude–behaviour gap in river conservation among urban riverside communities in Sabah through the lens of the Theory of Planned Behaviour (TPB). A qualitative approach was employed using semi-structured interviews with four senior residents living along the Petagas River in Kg. Contoh, Putatan, Sabah. The interview data were analysed thematically using both deductive and inductive coding approaches. The findings revealed that although the participants generally supported environmental education and river conservation initiatives, their pro-environmental behaviour was constrained by several interrelated factors. Subjective norms shaped by the normalisation of river pollution practices within the community reduced the perceived importance of conservation behaviour. In addition, perceived behavioural control was limited by economic pressures, time constraints, inadequate waste management infrastructure, and limited institutional support. The participants also perceived river pollution as a broader structural issue originating beyond their communities, which weakened their sense of environmental responsibility. The study demonstrates that environmental awareness alone is insufficient to promote sustainable behavioural change without addressing the wider social, cultural, and institutional realities influencing environmental behaviour. This study contributes to the literature by extending the application of TPB within the context of river conservation among urban riverside communities in Sabah and highlights the importance of integrating environmental education with supportive governance, community participation, and infrastructural development to achieve sustainable river conservation.

Keywords: Environmental education, pro-environmental behaviour, river conservation, riverside communities, Sabah, Theory of Planned Behaviour

Introduction

Rivers serve multiple functions in society, including domestic use, agricultural activities, transportation, recreation, and the provision of riverine resources (Kaiser et al., 2020). Consequently, rivers have historically been important locations for human settlement and economic development. According to Widodo (2012), many early civilizations, such as those

in Mesopotamia, Egypt, and ancient China, flourished along riverbanks due to the strategic and economic importance of rivers. In Malaysia, many major urban centres were also established along rivers, reflecting their historical significance in supporting settlement expansion and economic activities (Chan, 2002). Despite their importance, rapid urbanisation, industrialisation, and population growth have contributed significantly to river pollution and ecological degradation. Urban rivers are particularly vulnerable to pollution due to anthropogenic activities such as industrial discharge, agricultural runoff, domestic waste disposal, and untreated wastewater (Chan, 2005). In recent decades, river pollution has become an increasingly critical environmental issue in Malaysia, threatening water quality, aquatic ecosystems, and public health.

In response to escalating river pollution and environmental degradation, the Malaysian government and various stakeholders have continued to invest substantial resources in river rehabilitation, environmental education, and community-based conservation initiatives. Beyond the long-established Love Our Rivers Campaign introduced by the Department of Irrigation and Drainage (DID) in 1993, several contemporary initiatives such as the River Ranger Programme, River Care Programme, Friends of River, River Adoption Programme, and the National River Care Fund (NRCF) have been implemented to strengthen environmental awareness, community participation, and local stewardship of river ecosystems (Global Environment Centre - GEC, 2024; National River Care Fund, 2024). More recently, collaborative awareness campaigns such as *Sungai, Nadi Kehidupan Kita*, implemented by the United Nations Development Programme (UNDP) Malaysia and local partners, have sought to foster environmental responsibility and encourage public action in protecting river and aquatic ecosystems (UNDP Malaysia, 2020). These initiatives are largely grounded in the traditional pro-environmental behaviour model, which assumes that increasing environmental knowledge and awareness can foster positive environmental attitudes and subsequently encourage environmentally responsible behaviour (Kollmuss & Agyeman, 2002; Yue et al., 2020).

Previous studies on environmental education and pro-environmental behaviour have mainly focused on the role of awareness campaigns, environmental knowledge, and public attitudes in encouraging environmental responsibility (Ahmad et al., 2021; Kollmuss & Agyeman, 2002; Nguyen et al., 2023; Ramkissoon, 2022; Yue et al., 2020). These studies have contributed significantly to understanding the importance of environmental awareness in shaping public perceptions toward sustainability. However, many continue to rely on the assumption that increased environmental knowledge will automatically translate into behavioural change. Empirical evidence has demonstrated that environmental awareness alone does not necessarily result in consistent pro-environmental behaviour (Kollmuss & Agyeman, 2002; Nguyen et al., 2023; Ramkissoon, 2022). Recent studies further suggest that environmental behaviour is strongly influenced by broader contextual and structural factors, including social norms, institutional support, economic conditions, cultural practices, and accessibility to environmental infrastructure (Cheung et al., 2023; Yusliza et al., 2020). Consequently, scholars have increasingly argued that environmental behaviour should be understood not merely as an outcome of individual knowledge, but as a socially and institutionally embedded practice shaped by everyday realities and community environments.

Although previous research has acknowledged the existence of an attitude–behaviour gap in environmental engagement, limited studies have specifically examined how urban riverside communities themselves perceive the effectiveness and limitations of environmental education programs in the context of river conservation. Existing studies tend to emphasise environmental awareness and behavioural intention while paying less attention to the lived experiences and structural barriers faced by riverside communities, particularly in developing and rapidly urbanising regions such as Sabah, Malaysia. Recent environmental behaviour studies have also highlighted the importance of contextualising pro-environmental behaviour

within local socio-cultural and institutional settings (Ramkissoon, 2022; Wang et al., 2024). Nevertheless, there remains limited qualitative research examining how subjective norms, environmental normalisation, institutional limitations, and inadequate waste management infrastructure influence river conservation behaviour among marginalised riverside communities. As such, this study addresses an important gap by exploring how these contextual realities shape community participation in river conservation efforts within Sabah's local context.

Furthermore, much of the existing literature on pro-environmental behaviour relies predominantly on quantitative approaches that measure environmental attitudes and behavioural intentions through surveys (Ahmad et al., 2021; Yusliza et al., 2020). While such studies are useful in identifying general behavioural patterns, they often provide limited understanding of how individuals experience environmental problems within their everyday social and institutional contexts (Ramkissoon, 2022). Consequently, there remains insufficient qualitative research exploring how riverside communities themselves interpret environmental education initiatives, negotiate structural constraints, and make sense of river pollution within their lived environments, particularly in the Malaysian and Sabah contexts (Cheung et al., 2023; Wang et al., 2024).

Therefore, this study seeks to address these gaps by examining the perspectives of urban riverside communities regarding environmental education and river conservation through the lens of the Theory of Planned Behaviour (TPB). Specifically, this study explores how attitudes, subjective norms, and perceived behavioural control influence pro-environmental behaviour among riverside residents living along the Petagas River in Sabah. By focusing on the lived experiences of the communities, this study contributes to the existing literature in three important ways. First, it extends the application of TPB within the context of river conservation among marginalised urban riverside communities in Malaysia. Second, it highlights the socio-cultural, economic, and institutional constraints that limit the effectiveness of environmental awareness programs. Third, the study provides localised insights into the complex relationship between environmental awareness and behavioural practices, particularly within Sabah's local context, where limited qualitative research has been conducted on riverside environmental behaviour.

Specifically, the study investigates how riverside residents perceive the importance of environmental education for river conservation, examines the influence of subjective norms on conservation-related behaviour, and explores the internal and external dimensions of perceived behavioural control that shape participation in river conservation activities. Through these objectives, the study aims to provide a deeper understanding of the factors contributing to the attitude–behaviour gap in river conservation among urban riverside communities in Sabah.

Literature review

Environmental problems have become increasingly complex due to rapid urbanisation, population growth, and unsustainable consumption patterns, prompting governments, environmental agencies, and non-governmental organisations to implement various initiatives aimed at promoting environmental sustainability and public environmental responsibility. Environmental education has been widely recognised as a key strategy for fostering environmental awareness and encouraging pro-environmental behaviour among individuals and communities (Ahmad et al., 2021; Yue et al., 2020). Many environmental education programmes are founded on the assumption that increasing environmental knowledge will lead to more positive environmental attitudes and subsequently encourage environmentally responsible behaviour (Kollmuss & Agyeman, 2002). This assumption reflects the traditional

pro-environmental behaviour model, which proposes a linear relationship between environmental knowledge, environmental attitudes, and pro-environmental actions.

However, increasing evidence suggests that environmental knowledge alone is insufficient to produce long-term behavioural change. Previous studies have demonstrated that individuals may possess high environmental awareness yet fail to engage consistently in environmentally responsible behaviour (Kollmuss & Agyeman, 2002; Nguyen et al., 2023; Ramkissoon, 2022). Recent environmental psychology research further highlights that pro-environmental behaviour is influenced not only by knowledge and attitudes, but also by broader contextual factors such as social norms, institutional support, economic limitations, infrastructure accessibility, and cultural practices (Cheung et al., 2023; Wang et al., 2024; Yusliza et al., 2020). Consequently, scholars increasingly argue that environmental behaviour should be understood as a socially and structurally embedded practice shaped by everyday lived experiences rather than merely an outcome of individual awareness.

Within river conservation settings, environmental education programmes often emphasise awareness creation and community participation through clean-up campaigns, recycling activities, and environmental advocacy initiatives. While these efforts are important, studies have shown that environmental campaigns frequently struggle to achieve sustained behavioural change, particularly within marginalised and urban communities facing structural and institutional constraints (Cheung et al., 2023; Nguyen et al., 2023; Ramkissoon, 2022). In many developing regions, environmental degradation persists despite repeated awareness campaigns due to inadequate waste management systems, weak institutional support, and the normalisation of environmentally harmful practices within local communities (Ramkissoon, 2022; Wang et al., 2024). These findings suggest that environmental behaviour cannot be fully understood without considering the broader socio-cultural and institutional contexts influencing community actions.

Furthermore, much of the existing literature on pro-environmental behaviour relies predominantly on quantitative approaches that measure environmental attitudes and behavioural intentions through surveys (Ahmad et al., 2021; Yusliza et al., 2020). While such studies are useful in identifying general behavioural patterns, they often provide limited understanding of how individuals experience environmental problems within their everyday social and institutional environments (Cheung et al., 2023; Ramkissoon, 2022). Consequently, there remains limited qualitative research examining how riverside communities themselves interpret environmental education programmes, negotiate structural limitations, and make sense of river pollution within their lived realities, particularly in the Malaysian and Sabah contexts. This highlights the need for qualitative approaches capable of capturing the complexities of environmental behaviour within specific local settings.

While TPB has been widely applied in environmental psychology research, many previous studies have primarily employed quantitative survey approaches to measure environmental attitudes, behavioural intentions, and self-reported behaviours (Ahmad et al., 2021; Yusliza et al., 2020). Although these approaches are valuable for identifying general behavioural trends, they often provide limited understanding of how individuals interpret environmental problems within their everyday social and institutional realities. Therefore, this study adopts a qualitative approach to explore how riverside residents experience, negotiate, and make sense of river conservation behaviour within the context of their lived environments. By using qualitative interviews, the study provides deeper insight into the socio-cultural, structural, and contextual factors shaping pro-environmental behaviour, thereby complementing existing TPB research that has predominantly focused on quantitative behavioural measurement.

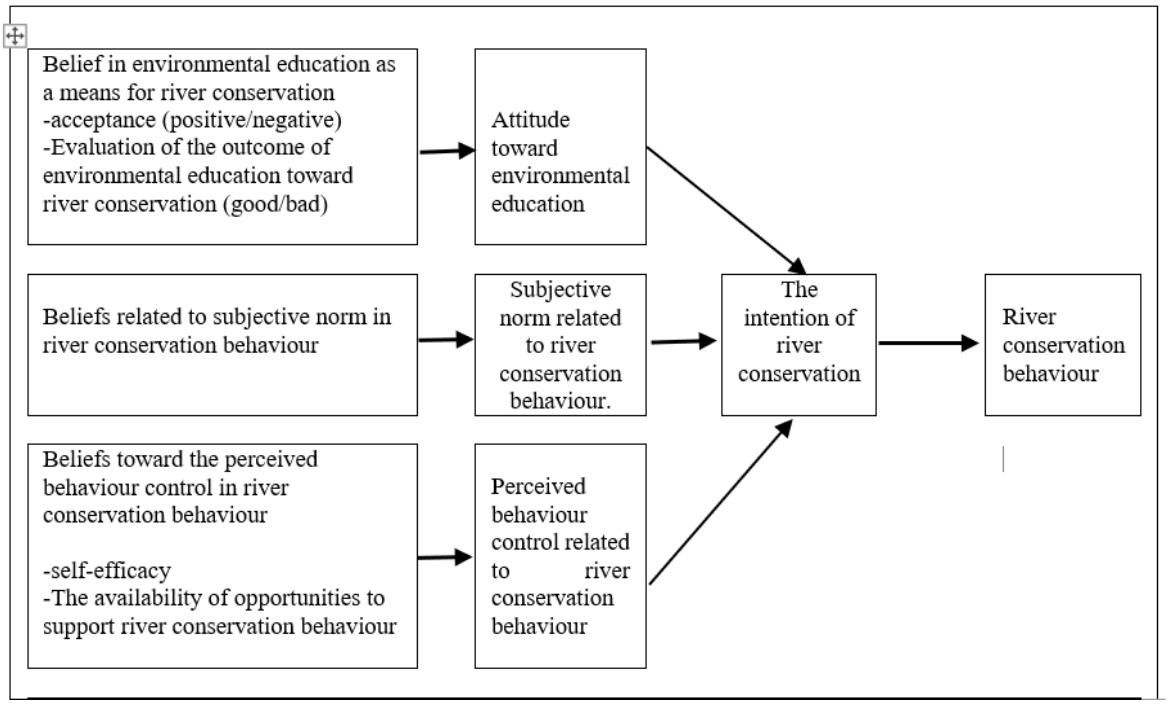
Given these limitations, the Theory of Planned Behaviour (TPB) provides a useful framework for understanding the complexity of pro-environmental behaviour. According to Ajzen (1991), behaviour is primarily influenced by behavioural intentions, which are shaped by three interrelated components: attitudes, subjective norms, and perceived behavioural control. Unlike earlier environmental behaviour models that focused mainly on knowledge and awareness, TPB acknowledges that behavioural decisions are also influenced by social pressures and perceptions of control over one's actions. The theory has been widely applied in environmental psychology studies to explain recycling behaviour, energy conservation, waste management practices, environmental participation, and sustainable consumption behaviour (Armitage & Conner, 2001; Ramkissoon, 2022; Wang et al., 2024; Yue et al., 2020).

The first component of TPB, attitude, refers to an individual's positive or negative evaluation of a particular behaviour (Ajzen, 1991). Behavioural beliefs influence attitudes by shaping perceptions regarding the expected outcomes of behaviour (Armitage & Conner, 1999). In environmental contexts, individuals are more likely to engage in pro-environmental behaviour when they perceive environmental actions as beneficial, meaningful, and socially valuable. However, positive attitudes alone may not necessarily translate into actual behaviour, particularly when individuals face competing priorities or structural constraints.

The second component, subjective norms, refers to perceived social pressures influencing whether individuals feel encouraged or discouraged from performing certain behaviours (Ajzen, 1991). Subjective norms are shaped through observations of how family members, peers, and communities respond to particular behaviours. Previous studies have shown that social norms significantly influence environmental practices such as recycling, energy conservation, environmental participation, and waste disposal behaviour (Cheung et al., 2023; Schultz et al., 2007; Wang et al., 2024). In river conservation contexts, environmental behaviour may become normalised through repeated exposure to polluted surroundings and common waste disposal practices within communities. Consequently, individuals may perceive environmentally harmful practices as socially acceptable, thereby weakening motivation toward conservation efforts.

The third component, perceived behavioural control, refers to individuals' perceptions of their ability and opportunity to perform a behaviour successfully (Ajzen, 1991). This concept includes both internal factors, such as self-efficacy, and external factors, such as access to infrastructure, institutional support, time, and financial resources (Bandura, 1997; Cheung et al., 2023; Wang et al., 2024). Studies have shown that individuals are less likely to engage in pro-environmental behaviour when they perceive social, institutional, or infrastructural barriers that limit their ability to act, even when they possess positive environmental attitudes (Nguyen et al., 2023; Wang et al., 2024). Within urban riverside communities, inadequate waste disposal systems, limited government support, and economic pressures may reduce residents' perceived behavioural control and discourage participation in river conservation activities.

Overall, the TPB framework provides an important theoretical lens for understanding why positive environmental attitudes do not always lead to pro-environmental behaviour. By incorporating attitudes, subjective norms, and perceived behavioural control, TPB enables a more comprehensive understanding of the psychological, social, and structural factors influencing river conservation behaviour. Within this study, the framework is particularly useful for examining how riverside communities in Sabah interpret environmental education initiatives and how contextual realities shape their participation in river conservation efforts. Figure 1 shows the study framework.



Source: Adapted from Ajzen, 1991

Figure 1. The study framework

Methodology

This study formed part of a larger research project examining sustainable community partnerships in river management within urban riverside settlements in Sabah. The study employed a qualitative research approach using semi-structured interviews as the primary method of data collection. A qualitative design was considered appropriate because the study aimed to explore the lived experiences, perceptions, and contextual realities of riverside communities regarding environmental education and river conservation. This approach enabled an in-depth understanding of how social, cultural, institutional, and environmental factors influence pro-environmental behaviour within the local context (Creswell & Poth, 2018).

The study was conducted in Kg. Contoh, Putatan, Sabah, located along the Petagas River. The settlement is situated approximately two kilometres from Kota Kinabalu International Airport (KKIA) and about 10 kilometres from Kota Kinabalu city centre. The area was selected due to its dense riverside settlement pattern and its exposure to persistent river pollution issues, making it a relevant site for examining environmental behaviour and river conservation practices. The settlement also reflects the broader environmental challenges experienced by many urban riverside communities in rapidly developing areas of Sabah.

A total of four senior residents from the riverside community participated in this study. The participants are referred to using pseudonyms (R1, R2, R3, and R4) to maintain confidentiality and anonymity. Convenience sampling was employed to identify participants who were accessible and willing to participate in the study. The participants were selected based on their long-term residence in the community, familiarity with local environmental conditions, and extensive experience with river-related issues. Consistent with Patton's (2015) information-rich case approach, participants were chosen because they could provide in-depth insights into changes in river conditions, community practices, and environmental challenges experienced within the settlement over time.

Although the number of participants was relatively small, the study prioritised depth of insight rather than statistical generalisation, which is consistent with qualitative research principles (Patton, 2015). The interviews generated rich and detailed narratives relevant to the study objectives. Data collection continued until thematic redundancy was observed, whereby no substantially new themes emerged from subsequent interviews (Guest et al., 2006). Therefore, the sample size was considered sufficient for the exploratory nature of this study. Table 1 presents the demographic background of the participants.

Table 1. Demographic profile of participants

Respondent	Gender	Age	Occupation	Length of residence
R1	Male	61	Fisherman	30 years
R2	Female	54	Housewife	25 years
R3	Male	35	Small trader	20 years
R4	Female	46	Housewife	30 years

Semi-structured interviews were conducted to allow flexibility in exploring participants' experiences and perceptions regarding environmental education, river pollution, and conservation behaviour (Bryman, 2016). The interviews were conducted in a conversational manner to encourage participants to share their views openly and comfortably. Each interview lasted approximately 45 to 60 minutes and was conducted in the Malay language. With participants' consent, the interviews were audio-recorded and later transcribed verbatim for analysis.

Ethical considerations were observed throughout the research process. Prior to the interviews, participants were informed about the purpose of the study, the voluntary nature of participation, and their right to withdraw at any stage of the research. Verbal consent was obtained before conducting the interviews. Confidentiality and anonymity were ensured through the use of pseudonyms and the removal of personally identifiable information from the interview transcripts (Creswell & Poth, 2018).

The interview data were analysed using thematic analysis supported by NVivo 12 software. Thematic analysis was conducted following the six-phase framework proposed by Braun and Clarke (2006), which provides a systematic approach for identifying, analysing, and interpreting patterns within qualitative data. The analysis began with data familiarisation, whereby the interview transcripts were read and reviewed repeatedly to gain an overall understanding of participants' experiences and perspectives. Subsequently, initial codes were generated through a combination of deductive and inductive coding processes. Deductive coding was guided by the Theory of Planned Behaviour (TPB), focusing on the three core constructs of attitudes, subjective norms, and perceived behavioural control (Ajzen, 1991). At the same time, inductive coding was employed to allow new themes and contextual factors to emerge directly from participants' narratives without being restricted by the theoretical framework.

Following the coding process, related codes were grouped into potential themes and sub-themes based on conceptual similarities and recurring patterns across the dataset. These themes were then reviewed and refined through constant comparison of the interview transcripts to ensure internal consistency and clear distinctions between themes. The final stage involved defining and naming the themes, followed by the selection of representative quotations to illustrate participants' perspectives and support the interpretation of findings. NVivo 12 software facilitated data organisation, coding management, and theme development throughout the analytical process. To enhance the credibility and trustworthiness of the findings, the researcher maintained detailed analytical notes and continuously revisited the data

during theme refinement to ensure that interpretations remained grounded in participants' lived experiences (Lincoln & Guba, 1985).

Figure 2 illustrates the study site setting, while Figure 3 presents selected photographs of river pollution observed within the study area.

Figure 2. The site setting

Figure 3. Collection of river pollution photos from the site

Findings and discussion

a) Attitudes towards environmental education

According to the Theory of Planned Behaviour (TPB), attitudes refer to an individual's positive or negative evaluation of a particular behaviour or initiative (Ajzen, 1991). Within this study, attitudes toward environmental education reflect the extent to which riverside residents perceive environmental awareness programs as beneficial and meaningful for river conservation. Overall, the findings indicate that the participants demonstrated generally positive attitudes toward environmental education initiatives and acknowledged the importance of raising environmental awareness within the community.

The participants expressed support for environmental campaigns and recognised the growing environmental challenges affecting the riverside settlement:

"Yes, it is good, we are more responsible for the environment." (R1)

"…the environmental campaign, I agree… we are too busy with our daily lives and overlook our environmental problems..." (R2)

"…the settlement along the river is growing day by day… so the volume of waste is also increasing..." (R3)

"…I do not have any objection, we should support this kind of initiative, give cooperation, and get involved..." (R4)

These responses suggest that the participants possessed positive cognitive and affective evaluations toward environmental education programs. The findings support previous studies arguing that environmental education can increase environmental awareness and strengthen positive attitudes toward environmental sustainability (Yue et al., 2020; Ahmad et al., 2021). However, despite expressing support for environmental awareness initiatives, the participants simultaneously questioned the effectiveness of such programs in addressing the broader issue of river pollution.

Several participants perceived that riverside communities were unfairly blamed for river pollution despite believing that significant pollution sources originated upstream or from external areas outside their control:

"…if it is just about educating riverside communities, I think the problem of river pollution is still happening because the main sources are not from us..." (R1)

"Everyone points their finger at us, but they do not know that we are the victim… the discharge comes from somewhere, flowed through the river, and gathered at the estuary where we live…" (R2)

"Most rubbish is mineral water bottles… it does not make sense the riverside communities consume that much…" (R3)

These findings reveal an important limitation of awareness-centred environmental programs. Although the participants recognised the importance of environmental education, they perceived river pollution as a broader structural and systemic issue rather than solely an individual behavioural problem. This perception weakened their sense of responsibility and reduced confidence that awareness programs alone could produce meaningful environmental improvement.

The findings further demonstrate the existence of an attitude–behaviour gap, whereby positive environmental attitudes do not necessarily translate into active pro-environmental behaviour (Kollmuss & Agyeman, 2002; Nguyen et al., 2023). From the viewpoint of TPB, positive attitudes alone are insufficient to encourage behavioural change when individuals perceive environmental problems as being beyond their personal control. Similar findings have been reported in recent environmental behaviour studies, which suggest that individuals are less likely to engage in conservation efforts when environmental degradation is perceived as externally generated or institutionally neglected (Ramkissoon, 2022; Wang et al., 2024).

Furthermore, the participants' narratives reflect feelings of marginalisation and environmental victimisation. Rather than viewing themselves as contributors to pollution, they perceived themselves as communities disproportionately affected by waste flowing from upstream areas. This finding is significant because it highlights how environmental

responsibility is socially negotiated within local contexts. Environmental education programs that focus exclusively on behavioural awareness among riverside residents may therefore fail to address the broader institutional and infrastructural dimensions of river pollution.

Overall, the findings suggest that environmental education programs should move beyond awareness creation alone and adopt a more holistic and participatory approach to river conservation. River pollution should not be framed solely as a problem of community behaviour but also as an issue involving waste governance, institutional accountability, and broader urban environmental management systems. These findings reinforce recent arguments that sustainable environmental behaviour requires not only awareness but also supportive structural conditions and collective responsibility across multiple stakeholders (Cheung et al., 2023; Yusliza et al., 2020).

From the perspective of TPB, the findings demonstrate that positive attitudes towards environmental education do not necessarily lead to corresponding conservation behaviour. Although participants acknowledged the importance of environmental awareness programmes and expressed support for river conservation initiatives, many perceived river pollution as a problem originating beyond their communities and outside their sphere of influence. Consequently, positive attitudes were insufficient to generate strong behavioural intentions because participants questioned the effectiveness of their individual actions in addressing the broader environmental problem. Consistent with TPB, attitudes alone are often inadequate predictors of behaviour when individuals perceive environmental outcomes as being beyond their control (Ajzen, 1991). This finding provides further evidence of the attitude–behaviour gap frequently reported in environmental behaviour research (Kollmuss & Agyeman, 2002; Nguyen et al., 2023).

b) Subjective norms

According to the Theory of Planned Behaviour (TPB), subjective norms refer to perceived social pressures influencing whether individuals engage in particular behaviours (Ajzen, 1991). These norms are shaped through observations of how family members, peers, and communities respond to certain practices. Within river conservation settings, subjective norms influence how riverside residents perceive environmentally acceptable behaviour within their surrounding social environment.

The findings of this study revealed that prolonged exposure to river pollution and waste disposal practices contributed to the normalisation of environmentally harmful behaviour within the community. Several participants explained that waste disposal into the river had become socially accepted due to its continuous occurrence over generations.

> “The children here have seen this since they were young... indirectly educating them that this is normal, everyone throws garbage into the river, this is not a big deal, this is normal...” (R1)

> “If I am the only one who does not throw garbage into the river, but others do, there will be no effect either (it would not make any difference). There will still be much garbage; this is just how it is.” (R3)

The analysis indicates that environmental behaviour within the riverside community is strongly shaped by collective social practices and environmental normalisation. Repeated exposure to polluted surroundings gradually influenced residents’ perceptions regarding what constitutes acceptable environmental behaviour. As a result, improper waste disposal became socially tolerated and embedded within everyday community practices. This finding supports previous studies suggesting that subjective norms significantly influence pro-environmental

behaviour by shaping perceptions of social acceptability and behavioural expectations (Schultz et al., 2007; Wang et al., 2024).

The findings also indicate that the effectiveness of environmental education programs may be weakened when pro-environmental behaviour is not reinforced collectively within the social environment. Although some participants personally supported river conservation initiatives, they expressed feelings of futility when environmentally harmful practices continued to be performed by others within the community. This demonstrates how social conformity and collective behavioural patterns may discourage individual environmental action despite positive personal attitudes.

Furthermore, the study identified an important gap between environmental attitudes and actual behaviour due to differences between direct and indirect environmental experiences. According to Rajecki (1982), behaviours are more strongly influenced by direct personal experiences than by abstract environmental knowledge or indirect awareness campaigns. The participants explained that although river pollution had worsened over time, they had not experienced immediate or severe personal consequences affecting their daily lives.

"It has been like this for a long time, thankfully, there is no effect on daily life… It is just that the fish is less than before, but this is not a problem either…" (R1)

"The fish species are becoming extinct in the rivers… I am not sure whether it is due to pollution or the presence of crocodiles… Compared to the pollution, we are more worried about the crocodiles..." (R4)

These responses suggest that environmental degradation was perceived as relatively distant from residents' immediate survival concerns. While participants acknowledged environmental changes such as declining fish populations and worsening pollution, these issues were often overshadowed by more immediate risks and everyday realities, including economic pressures and concerns about safety. Consequently, river pollution became normalised as part of the community's ordinary living environment rather than being perceived as an urgent environmental crisis.

The findings provide strong support for the TPB proposition that subjective norms play a significant role in shaping behavioural intentions. Participants' narratives revealed that environmentally harmful practices had become socially normalised within the community through repeated observation and intergenerational transmission. As a result, individuals were less motivated to engage in conservation behaviour when such actions were not collectively reinforced by others. This suggests that social expectations and perceived community norms may override personal environmental attitudes, thereby weakening behavioural intentions toward river conservation. The findings further indicate that behavioural change is unlikely to be sustained unless pro-environmental practices become socially valued and collectively endorsed within the community.

Overall, the findings suggest that environmental education programs should move beyond awareness campaigns and incorporate strategies aimed at reshaping collective social norms regarding environmental responsibility. Educational initiatives should emphasise the long-term ecological and social consequences of river pollution while fostering stronger community ownership and collective environmental accountability. Within urban riverside settlements, behavioural change is unlikely to occur effectively unless pro-environmental behaviour becomes socially reinforced and collectively practiced within the community.

c) Perceived behavioural control

Perceived behavioural control refers to an individual's perception of their ability, opportunity, and capacity to perform a particular behaviour successfully (Ajzen, 1991). According to TPB, behavioural intentions are influenced not only by attitudes and subjective norms but also by whether individuals believe they possess sufficient resources, opportunities, and support to engage in a behaviour. Within river conservation settings, perceived behavioural control involves both internal factors, such as self-efficacy and motivation, and external factors, including infrastructure, institutional support, financial limitations, and access to environmental facilities.

The findings of this study revealed several internal constraints limiting participation in environmental conservation activities. Although participants generally expressed support for environmental education programs, many described difficulties balancing environmental participation with daily economic and family responsibilities.

"…nowadays people are getting busy with their own life… limited time to get involved in community activity." (R1)

"…weekdays, people are busy working, weekends they spend time with family… some people work part-time during the weekends as well." (R2)

"I am a housewife, I have to manage everything at home, and I also have an OKU (disabled) son, so my time is quite limited." (R4)

The responses illustrate that competing life priorities and time poverty reduced residents' capacity to engage actively in environmental programs. Although participants recognised the importance of river conservation, economic survival and household responsibilities remained more immediate concerns. Similar findings have been reported in environmental behaviour studies demonstrating that individuals are less likely to participate in environmental initiatives when faced with financial pressures, caregiving responsibilities, and limited personal resources (Nguyen et al., 2023; Ramkissoon, 2022; Yusliza et al., 2020).

The study also identified culturally normalised environmental practices influencing behavioural control. Several participants acknowledged that direct wastewater disposal into the river had become a long-standing community practice, particularly among households located along the riverbanks.

"…it has been a practice for many decades, so this has become a way of life… inherited." (R3)

The findings indicate that environmental behaviour is not solely determined by environmental awareness but is also deeply embedded within historical practices and socio-economic realities. For some residents, installing proper wastewater systems was perceived as financially burdensome and unnecessary due to the absence of visible health consequences.

"We live in an urban area, where everything is expensive. Thankfully, so far, we have never faced any problems regarding wastewater disposal into the river…" (R2)

This reflects how perceived behavioural control is influenced by both economic limitations and perceived environmental risks. Residents may support environmental protection conceptually while simultaneously perceiving environmentally harmful practices as

practical necessities within their everyday living conditions. This reinforces previous studies suggesting that pro-environmental behaviour is often constrained by structural inequalities and limited access to environmental resources (Cheung et al., 2023; Ramkissoon, 2022).

In addition to internal constraints, the findings also revealed several external and institutional barriers affecting river conservation behaviour. Participants expressed dissatisfaction with local waste management systems and highlighted the lack of accessible waste disposal facilities within the settlement.

"There is a lack of effort from the authorities to solve this problem." (R1)

"There was an attempt to park a large garbage container here, but the garbage truck could not enter because the road here is too narrow." (R4)

"Another problem is the site for the garbage bins… the population is quite dense, it is difficult to find a suitable place…" (R3)

These findings indicate that inadequate infrastructure and limited institutional support weakened residents' perceived ability to practice environmentally responsible behaviour effectively. From the perspective of TPB, the absence of supportive environmental conditions reduced residents' confidence that individual conservation efforts would produce meaningful outcomes. Similar findings have been identified in recent sustainability studies highlighting the importance of institutional support and accessible environmental infrastructure in encouraging community participation in environmental conservation (Cheung et al., 2023; Wang et al., 2024).

The findings further suggest that environmental education initiatives alone are insufficient when communities lack the structural conditions necessary to support behavioural change. Environmental responsibility cannot be separated from broader issues of urban planning, waste governance, infrastructure accessibility, and institutional accountability. Within urban riverside communities, sustainable river conservation requires not only awareness programs but also long-term investment in waste management systems, accessible environmental facilities, and collaborative engagement between local authorities and communities.

Among the three TPB constructs, perceived behavioural control emerged as the most prominent factor influencing river conservation behaviour in this study. Participants consistently identified barriers such as financial constraints, time limitations, inadequate waste management infrastructure, and limited institutional support. These constraints reduced their perceived capacity to engage effectively in conservation activities despite holding generally positive attitudes towards environmental protection. According to TPB, individuals are less likely to develop strong behavioural intentions when they perceive insufficient resources or opportunities to perform a behaviour successfully (Ajzen, 1991). Therefore, the findings suggest that strengthening environmental infrastructure and institutional support may be essential for enhancing perceived behavioural control and encouraging more consistent pro-environmental behaviour among riverside residents.

Overall, the findings demonstrate that pro-environmental behaviour among riverside residents is shaped by a complex interaction between psychological, social, economic, and institutional factors. While residents generally expressed positive environmental attitudes, their conservation practices were constrained by social norms, economic pressures, infrastructural limitations, and the normalisation of pollution within their everyday environment. These findings reinforce the usefulness of TPB in explaining the gap between environmental awareness and actual environmental behaviour within marginalised urban communities.

Taken together, the findings demonstrate that the attitude–behaviour gap in river conservation can be understood through the interaction of all three TPB constructs. Although participants generally exhibited positive attitudes towards environmental education and conservation initiatives, these attitudes were weakened by socially normalised pollution practices and constrained by limited perceived behavioural control. Subjective norms shaped perceptions of acceptable environmental behaviour, while perceived behavioural control influenced participants' confidence and ability to engage in conservation activities. The findings therefore suggest that river conservation behaviour is not determined solely by environmental awareness but by the combined influence of psychological, social, and structural factors. This reinforces the explanatory value of TPB in understanding pro-environmental behaviour within urban riverside communities and highlights the importance of addressing all three TPB constructs when designing river conservation interventions.

Conclusion

This study examined the factors contributing to the attitude–behaviour gap in river conservation among urban riverside communities in Sabah through the lens of the Theory of Planned Behaviour (TPB). The findings revealed that although residents generally expressed positive attitudes towards environmental education and river conservation, these attitudes did not consistently translate into pro-environmental behaviour. Subjective norms shaped by the normalisation of pollution practices, together with limited perceived behavioural control arising from economic pressures, inadequate infrastructure, and weak institutional support, were found to be the primary barriers to participation in river conservation activities. The findings also indicate that many residents perceived river pollution as a broader structural problem rather than an issue that could be addressed through individual action alone.

The study highlights important practical implications for environmental management and river conservation programmes. The findings suggest that environmental awareness campaigns, while important, are insufficient on their own to promote sustainable behavioural change. Effective river conservation requires a more comprehensive approach that combines environmental education with community participation, improved waste management systems, accessible environmental facilities, and stronger institutional support. Efforts should also focus on fostering positive social norms and strengthening community ownership of conservation initiatives to encourage collective environmental responsibility.

Based on these findings, several recommendations can be proposed. First, environmental agencies and local authorities should enhance community-based river conservation programmes that actively involve residents in decision-making and conservation activities. Second, investments in waste management infrastructure and environmental facilities should be prioritised to reduce barriers to pro-environmental behaviour. Third, environmental education programmes should move beyond awareness creation and incorporate strategies that promote behavioural change, collective action, and long-term community engagement. Strengthening collaboration among local communities, government agencies, non-governmental organisations, and other stakeholders is also essential for achieving sustainable river conservation outcomes.

Although the study was conducted within a single urban riverside community, it provides valuable insights into the complex social, institutional, and environmental factors shaping conservation behaviour. Overall, the study demonstrates that sustainable river conservation cannot be achieved through environmental awareness alone but requires coordinated efforts that address the broader social and structural conditions influencing community behaviour.

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References

Ahmad, N. L., Maon, S. N., Yahaya, S. R., & Mohamad, Z. F. (2021). Environmental knowledge, attitude, and pro-environmental behaviour among Malaysian university students. *Sustainability, 13*(16), 8971.

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*(2), 179–211.

Armitage, C. J., & Conner, M. (1999). Distinguishing perceptions of control from self-efficacy: Predicting consumption of a low-fat diet using the theory of planned behavior. *Journal of Applied Social Psychology, 29*(1), 72–90.

Armitage, C. J., & Conner, M. (2001). Efficacy of the theory of planned behaviour: A meta-analytic review. *British Journal of Social Psychology, 40*(4), 471–499.

Bandura, A. (1997). *Self-Efficacy: The Exercise of Control*. W. H. Freeman.

Bryman, A. (2016). *Social Research Methods* (5th ed.). Oxford University Press.

Chan, N. W. (2002). *Managing Urban Rivers and Water Quality in Malaysia*. Universiti Sains Malaysia Press.

Chan, N. W. (2005). Sustainable management of rivers in Malaysia: Involving all stakeholders. *International Journal of River Basin Management, 3*(3), 147–162.

Cheung, L. T. O., Fok, L., & Fang, W. (2023). Understanding pro-environmental behaviour through social and institutional dimensions: A review of recent environmental psychology studies. *Environmental Research Communications, 5*(2), 025004.

Creswell, J. W., & Poth, C. N. (2018). *Qualitative Inquiry and Research Design: Choosing Among Five Approaches* (4th ed.). Sage Publications.

Global Environment Centre. (2024). River Care Programme (RCP).

Global Environment Centre. (2024). Introduction to GEC's River Care Programme (RCP).

Guest, G., Bunce, A., & Johnson, L. (2006). How many interviews are enough? An experiment with data saturation and variability. *Field Methods, 18*(1), 59–82.

Kaiser, F. G. (2020). GEB-50 general ecological behavior scale.

Kollmuss, A., & Agyeman, J. (2002). Mind the gap: Why do people act environmentally and what are the barriers to pro-environmental behavior? *Environmental Education Research, 8*(3), 239–260.

Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic Inquiry*. Sage Publications.

National River Care Fund. (2024). National River Care Fund (NRCF).

Nguyen, T. T., Lobo, A., & Greenland, S. (2023). The gap between environmental concern and pro-environmental behaviour: The moderating role of contextual constraints. *Journal of Environmental Management, 330*, 117165.

Patton, M. Q. (2015). *Qualitative Research & Evaluation Methods* (4th ed.). Sage Publications.

Rajecki, D. W. (1982). *Attitudes: Themes and Advances*. Sinauer Associates.

Ramkissoon, H. (2022). Pro-environmental behaviour: Critical perspectives and implications for sustainability. *Sustainability, 14*(3), 1437.

Schultz, P. W., Nolan, J. M., Cialdini, R. B., Goldstein, N. J., & Griskevicius, V. (2007). The constructive, destructive, and reconstructive power of social norms. *Psychological Science, 18*(5), 429–434.

United Nations Development Programme Malaysia. (2020, September 28). *Papa Pipi and UNDP Team Up to Raise Awareness About River and Ocean Conservation.*

https://www.undp.org/malaysia/news/papa-pipi-and-undp-team-raise-awareness-about-river-and-ocean-conservation

Wang, Y., Zhang, H., & Li, X. (2024). Social norms, institutional trust, and environmental participation in urban communities. *Environmental Sociology, 10*(1), 44–58.

Widodo, K., Damayanti, V. D., & Hadi, S. (2012). Landscape planning for Kelayan River to support revitalization in Banjarmasin City, South Kalimantan Province. *Lanskap Indonesia, 4*(1), 15–28.

Yue, B., Sheng, G., She, S., & Xu, J. (2020). Impact of environmental education on environmental awareness and pro-environmental behaviour. *International Journal of Environmental Research and Public Health, 17*(18), 6838.

Yusliza, M. Y., Amirudin, A., Rahadi, R. A., Nik Sarah Athirah, N. A., Ramayah, T., Muhammad, Z., Dal Mas, F., Massaro, M., Saputra, J., & Mokhlis, S. (2020). An investigation of pro-environmental behaviour and sustainable development in Malaysia. *Sustainability*, *12*(17), 7083.