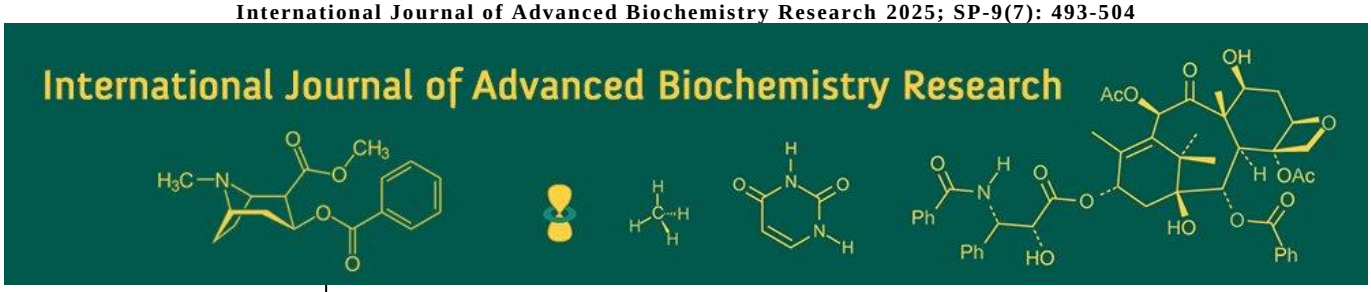

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Fisheries and social marketing: Can behavioural insights shape sustainable practices?

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Abstract
This review explores how social marketing and behavioural science contribute to advancing sustainable practices in fisheries and aquaculture. Through thematic analysis of existing literature, six major areas are examined: social marketing for environmental behaviour, behavioural nudges for compliance, fish consumption behaviour, community-based social marketing (CBSM), adoption of certifications and innovations, and behavioural responses to climate change and marine pollution. The review highlights that interventions based on behavioural theories—such as the Theory of Planned Behaviour and nudging—are more effective when integrated with regulatory frameworks, education, or participatory governance. Social marketing and CBSM approaches enable targeted, community-specific behaviour change, while the success of certification schemes depends on internalising sustainability rather than fulfilling formal criteria. Although behavioural strategies show promise, gaps remain in long-term impact evaluation and policy integration. The present review supports the potential of behaviorally-informed interventions to manage fisheries and ecosystems sustainably.

Keywords: Social marketing, behavioural change, fisheries sustainability, community-based approaches, aquaculture governance

Introduction
The global fisheries and aquaculture sector is at a critical crossroads. While it is pivotal in ensuring food security, nutrition, and livelihoods, it faces escalating sustainability challenges. Marine plastic pollution, overfishing, consumer detachment, and ineffective regulatory compliance have become prominent concerns (Eagle *et al*., 2016; Garcia-Vazquez *et al*., 2023) [17, 18]. Traditional top-down policy interventions and awareness campaigns have had limited impact in producing measurable behavioural changes in stakeholders ranging from fishers to consumers (Thompson, 2008) [39]. This has increased recognition of social marketing and behavioural science's role in fostering sustainable practices in fisheries and aquatic environments.

Social marketing, defined as applying commercial marketing principles to influence behaviours for social good, offers a promising avenue to encourage pro-environmental actions such as reduced plastic use, improved compliance, sustainable consumption, and community participation. However, its application in the fisheries sector remains underutilised and under-researched. For example, Eagle *et al*. (2016) [17] point out the low efficiency of wildlife tourism campaigns built only on raising awareness and recommend advanced ones based on the knowledge of human behaviour that can cause emotions and normative motivation. Likewise, Garcia-Vazquez *et al*. (2023) [18] evidence the positive effects of imagery-based nudges to augment pro-environmental intentions in consumers when imagery is congruent with the message of seafood contamination and individual responsibility to clean sea pollutants.

The need for behavioural change is further emphasised in aquaculture, where sustainability certifications are often adopted superficially without internalising responsible practices (Amundsen & Osmundsen, 2020). Their study underscores the importance of organisational learning and flexible certification schemes that go beyond box-ticking exercises to embed sustainability into daily operations. At the community level, Thompson (2008) [39] argues that Community-Based Social Marketing (CBSM) holds untapped potential for co-managed

fisheries, particularly due to its participatory nature and focus on removing psychological and structural barriers to behaviour change.

These studies reveal that while a growing body of literature acknowledges the relevance of behavioural tools and social marketing in fisheries, the field suffers from thematic fragmentation, limited cross-sectoral synthesis, and a lack of theoretical coherence. Furthermore, many interventions still emphasise information dissemination over action-oriented behavioural shifts. There is a clear need to transition from awareness to actionable, culturally tailored, empirically validated strategies that can influence the behaviour of consumers, fishers, aquaculture producers, and policy actors alike.

This review seeks to fill that gap by synthesising current literature on fisheries, behavioural insights, and social marketing. Drawing from empirical studies, experimental interventions, and conceptual frameworks, the review categorises existing research into thematic areas such as (1) Social Marketing for Plastic Pollution Mitigation, (2) Nudging and Environmental Communication, (3) Behavioural Change in Certified Aquaculture, and (4) CBSM in Community Fisheries.

2. Theoretical Background

Understanding behavioural change in the fisheries sector requires a grounding in social science theories that explain why individuals, communities, and institutions act in certain ways and how these behaviours can be influenced toward sustainability. There is a strong conceptual potential to apply social marketing, behavioural economics, communication theories, and participatory strategies in resolving unsustainable fisheries practices and aquaculture. This section will review the most common theoretical frameworks underlying behaviour-oriented interventions in the fisheries environment.

2.1 Theory of Planned Behaviour (TPB)

It aims to concentrate actionable knowledge and areas of research distances to implement future interventions and policies of sustainable fisheries establishment through behaviourally informed strategies. One of the most popular theories in determining an individual's decision regarding environmental and consumption behaviours is the Theory of Planned Behaviour (TPB). TPB has it that behavioural intentions influence actual behaviour and are shaped by the attitudes, subjective norms and perceived behavioural control (Ajzen, 1991) [2]. TPB has been used in fisheries to interpret fish consumption behaviour.

For instance, Verbeke and Vackier (2005) [42] demonstrated that consumers' intentions to eat fish were strongly influenced by their health beliefs, taste preferences, and social pressure. Similarly, Şen *et al*. (2022) [37] discovered that TPB components, specifically perceived control and normative beliefs, strongly predicted Turkish consumers' inclinations to purchase fish. Yi (2019) extended this model by demonstrating that consumers' intentions to purchase certified aquaculture products in South Korea were modulated by environmental awareness about TPB constructs. The TPB's applicability in creating social marketing strategies that focus on attitudes, social norms, and self-assurance in carrying out sustainable behaviours is supported by this research.

2.2 Nudge Theory and Behavioural Economics

Further, Garcia-Vazquez *et al*. (2023) [18] demonstrated that emotionally charged, imagery-based nudges were particularly effective in increasing consumer willingness to adopt pro-environmental behaviours, especially when linked to seafood safety and pollution risks. These findings highlight the potential for nudge-based strategies in fisheries policy, marketing, and outreach to enhance voluntary compliance and consumer responsibility.

2.3 Community-Based Social Marketing (CBSM)

Community-Based Social Marketing (CBSM), introduced by McKenzie-Mohr (2000) [27], focuses on identifying and removing barriers to sustainable behaviours through direct community engagement. Unlike broader mass communication, CBSM tailors interventions to specific community contexts and relies on tools like commitment, prompts, and social norms. Thompson (2008) [39] advocated for the application of CBSM in co-managed fisheries, arguing that its participatory and barrier-focused structure aligns well with the values and capacities of local fishing communi One of the ideas of behavioural economics by Thaler and Sunstein (2008) is the nudge theory that the behaviour can be meaningfully changed through slight modification of choice environment without limiting freedom of choice. As an example of a powerful nudge, framing the message, altering the defaults, or pointing out social norms can encourage sustainable fisheries practices. Mackay *et al*. (2018) [25] examined the viable role of nudges in supplementing regulatory adherence to recreational fishing with an alteration in behaviour through an ideology of frames and norm-based communication. According to Bisack and Clay (2021) [8], economic and normative incentives were important in increasing adherence to marine mammal protection policies among commercial fishers.

2.4 Social Network Theory and Participatory Research

Behavioural change does not occur in a vacuum but spreads through social communication networks. Social network theory, particularly when combined with the diffusion of innovations (Rogers, 2014) [33], helps explain how behavioural ideas and innovations propagate through communities. Mertens *et al*. (2012) [28] showed that fish consumption behaviour in the Brazilian Amazon was influenced by peer communication and participation in research projects, particularly when facilitated by trusted social partners. Their findings support the argument that interpersonal dialogue, opinion leadership, and gendered communication pathways play essential roles in the diffusion of sustainable practices. Participatory research—where communities co-create knowledge and interventions—further amplifies this effect by enhancing ownership, trust, and local relevance (Cornwall & Jewkes, 1995) [16]. These insights support the inclusion of participatory design in social marketing interventions for fisheries.

2.5 Diffusion of Innovation and Behaviour Adoption

Diffusion of Innovation (DOI) theory explains how new ideas and behaviours spread within a social system over time, influenced by perceived benefit, compatibility, complexity, and observability (Rogers, 2014) [33]. It complements social marketing by clarifying how individuals or communities move from awareness to adopting and

reinforcing new behaviours. DOI theory has been used in fisheries and aquaculture to examine the spread of sustainable aquaculture practices (Blythe *et al*., 2017) [9], certification adoption (Amundsen & Osmundsen, 2020) [3], and eco-friendly innovation. Wilson *et al*. (2021) also conducted a study to prove the efficiency of CBSM in minimising the temptation of marine wildlife due to the negligent discarding of fishing equipment in Oman. These applications support the applicability of CBSM in improving compliance and stewardship towards stakeholders directly relying on aquatic resources. The combination of DOI with the CBSM and network theory also aids in explaining such phenomena as why some innovations (e.g., beyond fish consumption advisories or Good Aquaculture Practices) can succeed in one place but fail in other communities.

3. Materials and Methods

A narrative literature review was carried out to identify and synthesise peer-reviewed research articles that dealt with this study on applying social marketing and behavioural insights in sustainable practices or behaviours in the fisheries and aquaculture sectors. The review examined the role of behavioural science frameworks, such as nudging, participatory inputs, and consumer-based strategies that have been utilised to alter decision-making and seek responsible environmental custody. To guarantee scientific rigor and transparency, the review adhered to a methodical, repeatable procedure that was directed by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework. The literature search was conducted from April to June 2025 on the academic database and websites: Publish or Perish (connected to Google Scholar), Google Scholar, ResearchGate, and open-access repositories. Only those articles published in peer-reviewed journals with an impact factor of more than 1 were regarded as eligible to ensure good quality and credibility of the studies selected. The limit was set on the English-language articles published between 2000 and 2025 to allow for the receipt of historical findings and the latest updates. A combination of Boolean operators and thematic keywords was used in the search process, including "social marketing" AND fisheries, "behaviour change" AND sustainable fishing, "fish consumption behaviour," and "nudging" AND marine conservation. Articles were also selected on the following criteria: the article was published in peer-reviewed journals, behavioural or marketing issues in the fisheries or aquaculture setting, and adherence to the review's objectives. The following were used to exclude publications: non-English, books or words, conference materials, chapters of books, grey or non-grey publications and those irrelevant studies in the context of behaviour. The search initially yielded a total of 546 records. 200 papers were chosen for full-text evaluation after duplicates were eliminated and titles and abstracts were screened for relevancy. Following a detailed evaluation of scope, content, and methodological quality, 160 articles were excluded, resulting in a final dataset of 40 peer-reviewed articles that were thematically analysed for this review. The article identification, screening, and selection process is summarised using a PRISMA-style flow diagram in Figure 1

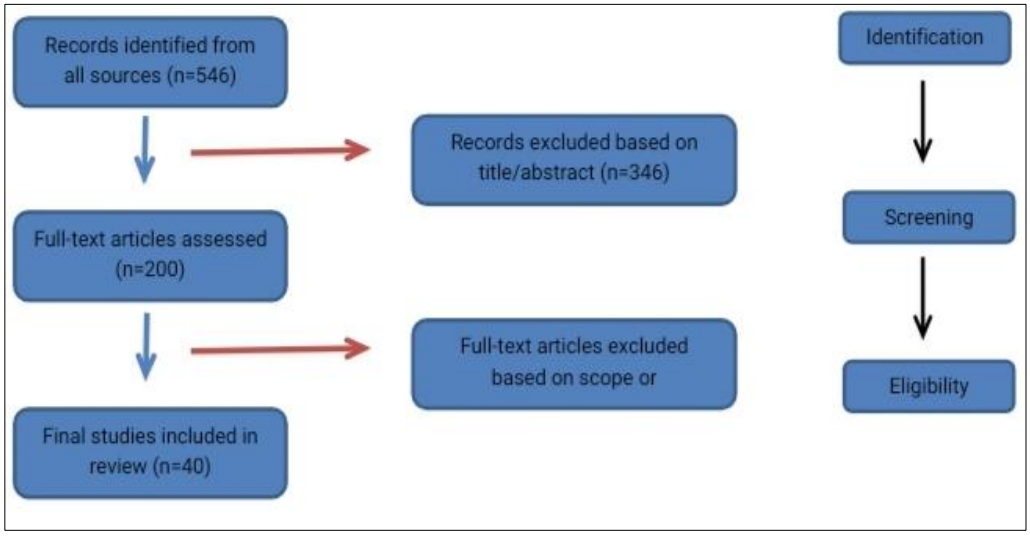

Fig 1: Flow diagram for the article review selection process

4. Thematic Literature Review

Based on a thematic analysis of the selected literature, six core areas of focus emerged concerning applying social marketing and behavioural insights to shape sustainable practices in fisheries and broader environmental contexts. These themes highlight various approaches, their efficacy, and the underlying mechanisms influencing human behaviour.

4.1 Social Marketing for Environmental and Fisheries Behaviour

As an instrument of strategic change, social marketing promotes socially desirable behaviour by adapting commercial marketing principles, which have taken centre stage in the push towards environmental and fisheries change. Unlike conventional awareness campaigns, social marketing emphasises understanding audience-specific barriers, motivators, and behaviours to design targeted, theory-based interventions (Eagle *et al*., 2016; Robison *et al*., 2024) [17, 32]. In fisheries, this approach has moved beyond generic outreach to promote specific pro-environmental actions by segmenting audiences based on psychographics such as beliefs, values, and attitudes.

Eagle *et al*. (2016) [17] demonstrated how marine turtles, as flagship species, were used to emotionally connect with audiences in campaigns addressing marine plastic pollution.

Their findings emphasised the importance of multi-method, theory-driven interventions focusing on behavioural enablers rather than merely delivering information. Robison *et al*. (2024) [32] further noted that the strength of social marketing lies in its evidence-based design, which tailors communication strategies to influence well-defined behavioural outcomes.

Also, combined strategies are more effective. An evaluation of the Rare Pride social marketing campaign aimed at conservation of parrots (Salazar *et al*., 2019) [34] demonstrated that changes were greatest when law enforcement and school-based environmental education and social marketing were used together. Such gaps must be addressed by evaluating the impact of such interventions effectively and on a long-term scale, to validate and scale these interventions in fisheries sustainability.

4.2 Nudging and Behavioural Economics in Compliance

Rooted in behavioural economics, nudging offers a non-coercive method to influence individual decision-making by subtly modifying the choice architecture—the context in which choices are presented—without restricting options or significantly altering incentives (Thaler & Sunstein, 2008; Hansen, 2016) [19]. For example, default settings, message framing, and visual cues have improved behaviours such as energy use, waste management, and sustainable consumption (Benartzi *et al*., 2017) [7]. The nudges have additional advantages over the traditional deterrence-based measures: unlike the latter, where the effectiveness of measures relies on the punishment threat and obligatory compliance, nudges exploit the cognitive biases, heuristics, or social norms to foster voluntary compliance by using a more compelling rationale (Mackay *et al*., 2018) [25].

Various studies have proven the usefulness of nudging in enhancing pro-environmental behaviour. Mackay *et al*. (2018) [25] suggested nudging among fisherfolk, including referring to undersized catches as baby fish to bring about emotional salience attraction and display of norm-based messages on the gear or ruminating on the signage boards to enforce compliance with regulations. Bisack and Clay (2021) [8] found that the behavioural impact of a greater presence of observers in commercial fisheries acted as a regulator since a greater quantity of observers represented an improvement in compliance with marine mammal protection regulations due to increased perceptions of regulatory detection.

While nudging presents a promising, low-cost supplement to enforcement regimes, its success is contingent on context-specific design, empirical validation, and ethical clarity. Nudges must be rigorously tested to avoid unintended effects and preserve individual autonomy—one of their key distinctions from mandates or monetary incentives. On the same note, (Nelson *et al*., 2019) [30] demonstrated in a coastal tourism scenario that opt-out default donation requests were highly successful in encouraging voluntary conservation payments, and should not be limited by a complex, multi-actor system environment Their results show that social marketing has an impressive contribution, yet it is more effective when the same is anchored in institutional and regulatory systems as a whole. The biggest challenge has been the small efforts to use strict evaluation techniques that could point back to the direct correlation between the results of behaviour change and social marketing activities. As the environmental field is turning more and more to methodologies based on behaviour change, the use of nudging within fisheries compliance offerings forms a potentially scalable intervention that will be evidence-informed, on the frontier of sustainable resource management.

4.3 Fish Consumption Behaviour and Psychological Drivers

Understanding the behavioural drivers of fish consumption is critical for promoting public health and sustainable fisheries. A large body of research has applied the Theory of Planned Behaviour (TPB) to explain consumer intentions and choices, emphasising the influence of attitudes, subjective norms, and perceived behavioural control Verbeke & Vackier, 2005 [42]; Şen *et al*., 2022 [37]. Favourable attitudes toward taste and health, social pressure to consume fish, and confidence in one's ability to access and prepare fish consistently predict higher consumption intentions and frequencies.

Early exposure and habit formation also play a key role. Childhood fish consumption strongly predicts adult behaviour, mediated by sensory experiences and attitudes (Thorsdottir *et al*., 2012) [40]. Health involvement further contributes, though its influence may be moderated by taste preferences and convenience factors (Verbeke & Vackier, 2005) [42]. Socio-demographic factors such as gender, age, income, and education show variable effects, with women and older individuals generally consuming more fish (Burger, 2002; Burger *et al*., 2014) [12, 13].

Risk perception is another factor of essential importance, which is frequently forgotten. Research conducted in the polluted areas showed that more consumers (recreational or cultural fishers in particular) still consume fish despite the health warning because of the lack of trust in the informing entity or cultural affiliation (Burger, 2002; Burger *et al*., 2014) [12, 13]. According to Shaw *et al*. (2023) [38], awareness among Asian women in Milwaukee only sometimes results in a behaviour change. This explains why culturally specific messaging and trust accretion should be applied to implement actionable measures that promote safer drinking.

This makes the research findings critical on the complexity of the fish consumption behaviour dependent on a combination of psychological constructs, socio-cultural impact and effective communication. The changes in consumption patterns towards health-conscious and sustainable patterns can be favorably changed through behavioural interventions, especially, those which are based on the TPB and connected to culturally conscious social marketing.

4.4 Community-Based Social Marketing and Participation

Community-Based Social Marketing (CBSM) integrates behavioural psychology with localised engagement strategies to promote sustainable practices, making it particularly relevant for fisheries as a common-pool resource (McKenzie-Mohr, 2000 [27]; Thompson, 2008) [39]. For example, Andriamalala *et al*. (2013) [5] implemented a CBSM intervention in Madagascar to reduce destructive fishing, targeting local leaders and tailoring strategies to community-identified barriers. The campaign improved attitudes and moderated reductions in illegal practices, particularly when combined with effective enforcement—similarly, Willson *et al*. (2021). In contrast to the traditional

education-based strategies, CBSM focuses on behavioural barrier infiltration, maximisation of benefits and creation of people's ownership by directly involving the community.

Research has revealed how feasible CBSM in fisheries has proven to be when it has built a foundation and expanded on general governance under participatory design—applied CBSM around Masirah Island, Oman, using prompts, infrastructure (e.g., skip bins), and norm-based messaging to encourage proper disposal of derelict fishing gear. Although the initial adoption rate was modest, the intervention showed the possibility of long-term involvement and connection to regulatory bodies. Interviewing, focus groups and consultation with community stakeholders enhance the local relevance of interventions concerning both behaviour and culture. Although underutilised in fisheries relative to other sectors, CBSM offers a scalable, cost-effective pathway for promoting sustainable behaviours, particularly when embedded within co-managed systems and supported by long-term community involvement.

4.5 Certification on Innovation and Sustainability Adoption

Sustainability certification schemes in aquaculture are widely promoted as tools to operationalise responsible production, improve market access, and ensure environmental compliance. However, their effectiveness depends not merely on formal adherence but on producers' internalisation of sustainable practices (Amundsen & Osmundsen, 2020) [3]. While certifications such as Good Aquaculture Practices (GAP) have incentivised improvements in documentation, waste management, and environmental awareness, studies reveal a persistent "checklist mentality" where compliance is superficial and disconnected from day-to-day behaviour (Amundsen & Osmundsen, 2020) [3]. The important components of CBSM success are social networks and interpersonal communication. Mertens *et al.* (2012) [28] revealed that peer pressure, especially that of females and trusted partners, played a major role in adopting health-related fish consumption behaviours among communities in the Amazon. Such results support the importance of local opinion leaders and participatory research in behaviour transition campaigns.

Furthermore, qualitative studies are crucial to CBSM as they reveal values, motivation, and impediments common to the community but are not necessarily noticed by quantitative research (Barclay *et al.*, 2017) [6]. The behavioural and structural constraints influence the adoption of innovations in sustainability. Most farmers regard GAP positively, acknowledging improved water quality and decreased chemical use. So on, the chief three barriers to large-scale adoption include the high expenses of agricultural input, inaccessible high-quality broodstock, and the absence of technical awareness (Booncharoen & Anal, 2021) [10]. This is more acute among the smallholders and constrained operators.

Besides certification, aquaculture innovation can be diffused through socio-economic and institutional processes. In the Solomon Islands, adoption of tilapia farming was higher among older, wealthier individuals with diverse livelihoods, while deep conceptual knowledge about sustainability failed to diffuse through informal peer networks (Blythe *et al.*, 2017) [9]. This knowledge gap limits the adaptive capacity needed for sustained behavioural change. Sustainable intensification is also undermined at the system level. According to Joffre *et al.* (2018) [22], weak regulatory enforcement, lack of coordination between agencies, and access to affordable credit were perceived as the major barriers to Vietnamese shrimp farming. The overwhelming emphasis on productivity over the resilience of the ecosystem also hinders the process of sustainability.

4.6 Climate Change, Marine Pollution, and Behavioural Response

Climate change and marine pollution pose critical challenges to aquatic ecosystems and human livelihoods, particularly in vulnerable aquaculture communities. Since human behaviour is a principal driver of biodiversity loss and environmental degradation, behavioural interventions are essential to support mitigation and adaptive strategies (Ver ssimo *et al.*, 2024; Abu Samah *et al.*, 2021) [1]. Adaptation to climate change in aquaculture involves diverse responses across multiple levels. To address these problems, institutional change and behaviorally driven interventions are needed to address farmers' motivations, risk perceptions, and local environment. Innovation and certification should be an indispensable part of fish farming sustainability. They can only become effective when behavioural uptake, knowledge transfer, and systemic obstacles are removed with the help of integrated, context-based approaches. They comprise policy backing, financial access, up-gradation of the infrastructure, diversification of species, and even cooperation at the community level (Abu Samah *et al.*, 2021) [1]. Preparedness and resilience are improved through behavioural flexibility, including shifting to climate-resilient species, adoption of early warning systems or alternative livelihoods. Practices like mangrove planting and energy conservation reflect broader pro-environmental behaviours but often require sustained motivation and institutional support.

In parallel, marine plastic pollution has spurred the development of behaviorally informed strategies to reduce single-use plastics. Effective interventions combine information, motivation, and structural opportunity, often through nudges, policy reforms, and social marketing campaigns emphasising pollution's personal and ecological consequences (Verís imo *et al.*, 2024). At the production level, sustainable aquaculture practices—such as polyculture, periphyton use, and efficient feed management—help reduce ecological footprints by enhancing nutrient retention and minimising waste (Bosma & Verdegem, 2011) [11]. Market-based mechanisms also play a role; the growing demand for environmentally responsible seafood has incentivised firms to adopt sustainable marketing strategies that integrate behavioural, environmental, and economic performance goals (Risitano *et al.*, 2022) [31]. Addressing climate and pollution-related pressures requires an integrated behavioural response—from individual aquaculture practices to industry-wide shifts—supported by effective communication, incentives, and enabling policy environments. A summary of the reviewed literature, including authors, objectives, methods, key findings, and thematic classification, is provided in Table 1.

Table 1: Summary of Reviewed Literature on Social Marketing and Behavioural Interventions in Fisheries.

S. No	Author(s) & Year	Title	Objective/Focus	Methods	Key Findings	Assigned Theme
Theme 1: Social Marketing for Environmental & Fisheries Behaviour						
1	Assem *et al*. (2018)	The Role of Social Marketing in Promoting Environmental Behaviour: A Conceptual Framework	To propose a conceptual framework for the role of social marketing in promoting pro-environmental behaviour	Literature review and conceptual framework development	Social marketing is crucial for fostering pro-environmental behaviours by understanding audiences and designing effective interventions.	Social Marketing for Environmental Behaviour
2	Eagle *et al*. (2016) [17]	The role of social marketing, marine turtles and sustainable tourism in reducing plastic pollution	To explore how social marketing and behavioural strategies can address plastic pollution using marine turtles as a flagship species	Review + case-based discussion	Traditional awareness campaigns are insufficient; they suggest multi-method, theory-driven behavioural interventions using marine tourism platforms.	Behavioural Change via Wildlife Campaigns
3	French *et al*. (2018)	The Contribution of Social Marketing to Public Health	To critically assess the contribution of social marketing to public health.	Review and critical appraisal of social marketing interventions in public health.	Social marketing has made significant, though sometimes modest, contributions to public health interventions by focusing on behaviour change.	Social Marketing & Public Health
4	Jones *et al*. (2008)	The role of social marketing in reducing alcohol harm: A review	To review the literature on the application of social marketing in reducing alcohol-related harm	Literature review	Social marketing principles can effectively reduce alcohol-related harm by influencing attitudes and behaviours.	Social Marketing for Alcohol Harm Reduction
5	Truong (2014)	The application of social marketing to reduce problem gambling	To explore the potential of social marketing strategies in addressing and reducing problem gam ling	Literature review and conceptual discussion	Social marketing offers a robust framework for developing interventions to reduce problem gambling beyond mere awareness.	Social Marketing for Problem Gambling
6	Sima & Milos (2020)	Social Marketing and Responsible Consumption in Romania: The Case of Green Products	To investigate the effectiveness of social marketing in promoting responsible consumption, specifically regarding green products, among Romanian consumers.	Quantitative research using an online questionnaire (n=300) and statistical analysis. [5]	Social marketing positively influences responsible consumption and purchase intentions for green products in Romania.	Social Marketing for Green Consumption
7	Benalcazar & Rosales (2023)	Social Marketing to Promote Sustainable Lifestyles in University Students	To analyse the impact of social marketing on promoting sustainable lifestyles among university students in Ecuador.	Quantitative approach with a survey (n=385) and statistical analysis. [2]	Social marketing significantly influences sustainable lifestyle choices among university students. [3]	Social Marketing & Sustainable Lifestyles in Academia
8	Mofleh (2021)	Social Marketing in Higher Education: A Scoping Review	To conduct a scoping review of social marketing applications within higher education.	A scoping review of academic literature. [8]	Social marketing is increasingly used in higher education for various goals, including student recruitment, retention, and promoting pro-social behaviours. [9]	Social Marketing in Higher Education
9	Ma *et al*. (2022)	Social Marketing for Sustainable Development: A Systematic Review	To systematically review the application of social marketing in achieving Sustainable Development Goals (SDGs).	A systematic review of studies published between 2015 and 2021.	Social marketing effectively contributes to various SDGs, particularly health, education, and responsible consumption, by influencing pro-social behaviours.	Social Marketing for Sustainable Development Goals
10	Benko & Ruseva (2023)	Using Social Marketing to Engage Private Forest Landowners in Climate Change Mitigation	To explore how social marketing can be used to engage private forest landowners in climate change mitigation practices	Case study approach, qualitative interviews with experts and landowners	Social marketing engages landowners in climate-friendly forest management through tailored messaging and addressing barriers.	Social Marketing and Climate Change Mitigation
Theme 2: Behavioural Nudges and Compliance						
11	Mackay *et al*. (2018) [25]	When push comes to shove in recreational fishing compliance, think 'nudge.'	To explore the potential of behavioural "nudges" to improve compliance in recreational fisheries, complementing traditional deterrence.	A narrative literature review focusing on Australian recreational fisheries.	"Nudges" (framing, defaults, social norms) can improve voluntary compliance in recreational fisheries; rigorous testing is crucial to ensure effectiveness and avoid issues.	Nudging for Fishing Compliance
12	Bisack & Clay (2021) [8]	*Behavioural responses to competing*	To analyse how different incentives, disincentives,	Multinomial logit model + NEFOP	Compliance improved in 2010 due to the threat of closures	Behavioural Economics in

		incentives and disincentives: Compliance with marine mammal protection	and behavioural economics factors (like nudging, legitimacy, peer behaviour) affect compliance in the U.S. groundfish gillnet fleet	data + Focus group input	and observer presence; normative (social, ethical, legality) and economic factors are strong influencers	Regulatory Compliance
13	Houweling (n.d.)	Fighting Pollution with Nudges	To examine the effectiveness of nudging as a policy instrument to combat pollution, specifically litter and energy waste.	Case studies (plastic bag levy, energy efficiency label) and literature review.	Nudging can effectively reduce pollution, especially when integrated into broader policy frameworks.	Nudging for Pollution Reduction
14	Benartzi *et al.* (2017) [7]	Should Governments Invest More in Nudging?	Analyse the cost-effectiveness of government "nudge" interventions vs. traditional policy tools.	Calculated impact-to-cost ratios.	Nudge interventions often compare favourably to traditional incentives.	Cost-Effectiveness of Nudging in Public Policy
15	Hawkins *et al.* (1999) [20]	Restoration of temperate marine and coastal ecosystems: nudging nature	Summarise marine ecosystem impacts; discuss restoration potential for rocky shores, seagrass, and disused docks.	Review and discussion.	Restoration involves intervention, not forcing the original state; conservation/management is key.	Marine & Coastal Ecosystem Restoration
16	Nelson *et al.* (2019) [30]	Nudging tourists to donate for conservation: Experimental evidence on soliciting voluntary contributions for coastal management	Examine tourist donation behaviour for coastal conservation; optimise donation requests.	A natural field experiment with tourists tested various nudges.	Nudges (especially default opt-out) significantly increased tourist donations for conservation.	Behavioural Nudging for Conservation Donations
17	Mackay *et al.* (2020)	The influence of nudges on compliance behaviour in recreational fisheries: a laboratory experiment	To evaluate the influence of a descriptive social norm nudge on compliance in recreational fisheries, considering deterrence levels and risk preferences.	Economic laboratory experiment (n=120) with a common-pool resource game and varying deterrence/nudge conditions.	A descriptive social norm nudge increased compliance by 10% in low deterrence; effect weakened with high deterrence. Risk-averse participants showed highest compliance. Nudges can complement traditional deterrence.	Nudging & Compliance in Fisheries
18	Schwarz *et al.* (2020) [36]	Nudging statutory law to make space for customary processes and community-based fisheries management in the Solomon Islands	To examine how the Solomon Islands' Fisheries Management Act accommodates customary marine tenure and community-based fisheries management.	Analysis of legal development (2007-2015) and consultations within the Ministry of Fisheries and Marine Resources.	New legislation (Section 18) allows statutory law to support customary fisheries management, addressing enforcement gaps.	Integrating Customary and Statutory Fisheries Law
19	Garcia-Vazquez *et al.* (2023) [18]	Towards a plastic-less planet: Gender and individual responsibility predict the effect of imagery nudges.	To test whether imagery-based nudges influence consumer willingness to adopt “R-behaviors” (Reduce, Refuse, Recycle, etc.) for microplastic pollution.	Survey (n=671), image-based experimental nudges	Nudges about seafood/marine pollution are more effective than animal harm; gender and environmental responsibility are key predictors	Nudging & Consumer Psychology
Theme 3: Fish Consumption Behaviour						
20	Khan *et al.* (2018) [23]	*Fish consumption behaviour and fish farming attitude in Saudi Arabia*	To assess fish consumption behaviour and attitude toward home-based fish farming	Survey of 100 households; descriptive stats + Pearson correlation	High fish consumption preference, low engagement in fish farming; education affects consumption and willingness; lack of awareness and extension on aquaponics is a barrier	Consumer Behaviour & Awareness
21	Burger, J. (2002) [12]	Consumption Patterns and Why People Fish	Examine fishing behaviour, consumption patterns, and motivations; assess ethnic differences and advisory effectiveness in Newark Bay Complex.	Observational/Survey.	Varied consumption, recreation as the main motivation, and advisories are often ineffective as fishing is not primarily for food.	Risk Perception, Fishing Motivations, and Consumption Behaviour
22	Burger, J. *et al.* (2014)	Fish consumption behaviour and Rates in native and non-native	Determine fish consumption rates, species, and sources for health risk	Survey.	Consumption rates and preferences differ between native and non-native groups;	Fish Consumption Patterns and

		People in Saudi Arabia	assessment in Jeddah, Saudi Arabia.		local markets are the primary source.	Cultural Differences
23	Verbeke, W. & Vackier, I. (2005) [42]	Individual determinants of fish consumption: application of the theory of planned behaviour	Investigate individual factors influencing fish consumption in Belgium using the Theory of Planned Behaviour (TPB).	Cross-sectional data; TPB analysis.	Favourable attitudes, subjective norms, and perceived behavioural control positively influence consumption; taste/health are key drivers; demographics also play a role.	Determinants of Fish Consumption and the Theory of Planned Behaviour
24	Şen *et al*. (2022) [37]	An Analysis of Fish Consumption Behaviour of Turkish Consumers with the Theory of Planned Behaviour	To identify factors influencing fish consumption behaviours of individuals in Mersin, Turkey, using the Theory of Planned Behaviour.	Face-to-face interviews and statistical analysis.	Attitude, subjective norm, and perceived behavioural control positively influence fish consumption intention in Turkey.	Fish Consumption Behaviour (Turkey)
25	Shaw *et al*. (2023) [38]	A focus group study of fish consumption behaviours among Asian wom n in Milwaukee, Wisconsin	Understand cultural influences on fish consumption of Asian women (WCBA) for culturally appropriate health education.	Focus group study (Chinese, Hmong, Karen women).	Nutrition/availability drives consumption, low-risk awareness, and interest in trusted, family-focused health messages.	Cultural Influences on Fish Consumption & Health Communicatio n
26	Thorsdottir *et al*. (2012) [40]	A model of fish consumption among young consumers	Predict fish consumption in young adults based on attitudes, social pressure, skills, beliefs, health involvement, and childhood consumption.	Cross-sectional survey; Structural Equation Modelling.	Attitude, social pressure, and preparation skills correlated with consumption; beliefs/health involvement mediated by attitudes.	Factors Influencing Fish Consumption in Young Adults
27	Yi (2019)	Determinants of Consumers' Purchasing Behaviour for Certified Aquaculture Products in South Korea	To investigate consumers' decision-making process for purchasing certified aquaculture products using the Theory of Planned Behaviour (TPB) model and the moderating role of environmental awareness.	Web-based survey (n=960) and structural equation modelling (SEM).	Consumer purchase intention for certified products is driven by attitude, social norms, and perceived control; environmental awareness moderates these influences.	Certified Seafood Consumer Behaviour
Theme 4: Community-based and Participatory Approaches (CBSM)						
28	Thompson (2008) [39]	*Fostering sustainable behaviours in community-based co-managed fisheries*	To explore the role of Community-Based Social Marketing (CBSM) in CBCM fisheries	Theoretical analysis + cross-sectoral analogies	CBSM is underused but potentially powerful in co-managed fisheries due to shared emphasis on participation and empowerment	CBSM in Fisheries Co-Management
29	Wilson *et al*. (2021)	Addressing Marine Wildlife Entanglement in Derelict Fishing Nets Using Community-Based Social Marketing: Case Study and Lessons Learnt	Community-Based Social Marketing (CBSM) should be applied to reduce marine wildlife net entanglement around Masirah Island, Oman.	Applied CBSM methodology to select behaviours, identify barriers, develop strategies, and design a pilot study.	CBSM effectively reduces marine wildlife entanglement by promoting the responsible disposal of fishing gear.	Social Marketing for Marine Conservation
30	Andriamalala *et al*. (2013) [5]	Using social marketing to foster sustainable behaviour in traditional fishing communities of southwest Madagascar	Evaluate social marketing to reduce destructive fishing and improve law enforcement. [4]	Social marketing campaign, surveys, and observational data. [5]	Improved knowledge/attitudes; moderate increases in law enforcement and decreases in destructive fishing. [6]	Social Marketing for Sustainable Fisheries
31	Barclay, K. *et al*. (2017) [6]	The importance of qualitative social research for effective fisheries management	Show the value of qualitative social science in enhancing knowledge of human behaviour in fisheries management.	Qualitative social science (interviews, document review) across three case studies.	Qualitative methods offer deep insights into social/economic dynamics, crucial for effective fisheries management beyond quantitative data.	Qualitative Social Research in Fisheries Management
32	Mertens *et al*. (2012) [28]	Social communication network analysis of the role of participatory research in the adoption of new fish consumption behaviours	Role of social networks and participatory research in adopting new fish consumption behaviours (mercury reduction).	Social network analysis; community participatory research.	Participation and discussion partners influenced new behaviours; opinion leadership impacted women.	Social Networks & Participatory Approaches in Dietary Change

Theme 5: Certification, standards and innovation in Aquaculture						
33	Amundsen & Osmundsen (2020) [3]	*Becoming certified, becoming sustainable?*	To evaluate whether certification in aquaculture leads to internalised sustainable behaviour in companies	Interviews and fieldwork with aquaculture firms	Certification schemes vary in behavioural impact; internalisation, not just compliance, matters; flexibility and ongoing learning are critical	Certification & Behavioural Change in Aquaculture
34	Joffre *et al*. (2018) [22]	Aquaculture innovation system analysis of transition to sustainable intensification in shrimp farming	To explore constraints in the transition to sustainable intensification in shrimp farming using an innovation systems framework, focusing on the Mekong Delta.	Systematic diagnosis using an aquaculture innovation systems framework.	Institutional constraints, limited regulatory enforcement, and a lack of coordination hinder sustainable shrimp farming.	Sustainable Shrimp Farming Innovation
35	Blythe *et al*. (2017) [9]	Social Dynamics Shaping the Diffusion of Sustainable Aquaculture Innovations in the Solomon Islands	To investigate factors influencing the spread of small-scale tilapia aquaculture in rural Solomon Islands without formal extension services.	Semi-structured interviews with 16 adopters and 12 non-adopters; thematic analysis based on diffusion of innovation theory.	Adoption favoured wealthier, older farmers; basic knowledge spreads, but deeper understanding and compatibility challenges limit broader adoption.	Aquaculture Diffusion Dynamics
36	Booncharoen & Anal (2021) [10]	Attitudes, Perceptions, and On-Farm Self-Reported Practices of Shrimp Farmers Towards Adoption of Good Aquaculture Practices (GAP) in Thailand	To evaluate perceptions and attitudes of Thai GAP-certified shrimp farmers towards GAP compliance.	Cross-sectional KAP study with face-to-face interviews (n=508) and Weighted Average Index (WAI) analysis.	Farmers support GAP benefits (environmental, quality) but face significant adoption barriers: high costs, lack of quality inputs, and insufficient detailed knowledge.	GAP Adoption in Shrimp Farming
Theme 6: Climate change, Marine Pollution and Ecosystem Restoration						
37	Balasubramanian *et al*. (2024)	Marine plastic pollution: Insights from the past, challenges of the present, and solutions for the future	To provide a comprehensive review of marine plastic pollution, covering its history, current challenges, and potential solutions	Literature review and synthesis	Comprehensive understanding and multi-faceted solutions are needed for marine plastic pollution[1].	Comprehensive Review of Marine Plastic Pollution
38	Bosma & Verdegem (2011) [11]	Sustainable aquaculture in ponds: Principles, practices and limits	Review sustainable pond aquaculture criteria, factors, and new technologies.	Review paper.	Sustainable aquaculture growth is needed; land/water limits, improved nutrient use, periphyton, and polyculture boost productivity.	Sustainable Aquaculture Practices
39	Veríssimo *et al*. (2024) [43]	Changing Human Behaviour to Conserve Biodiversity	Review methods for changing human behaviour to conserve biodiversity beyond just awareness.	Review paper.	Awareness campaigns are often insufficient; multi-method, theory-driven interventions are needed.	Behavioural Interventions for Biodiversity Conservation
40	Abu Samah *et al*. (2021) [1]	A Systematic Review on Adaptation Practices in Aquaculture towards Climate Change Impacts	To systematically review adaptation practices to climate change among aquaculture communities.	A systematic review (PRISMA-guided) of 20 studies from Scopus, Web of Science, and Google Scholar; thematic analysis.	Aquaculture communities use governmental, community, facility, temperature, and financial strategies for climate change adaptation.	Climate Change Adaptation in Aquaculture

5. Discussion

This review synthesised literature across six thematic areas to examine how social marketing and behavioural science tools influence sustainable practices in fisheries and aquaculture systems. The findings reveal a growing yet fragmented body of evidence supporting the integration of behavioural insights—such as nudging, community-based strategies, and social marketing—with fisheries governance, conservation, and consumption behaviour change. Despite promising developments, several gaps and challenges that limit these interventions' scalability and effectiveness remain.

5.1 Integrating Insights Across Themes

A consistent finding across themes is that behavioural change interventions are most effective when grounded in participatory, theory-driven, and context-sensitive designs. For instance, social and community-based social marketing (CBSM) approaches demonstrated stronger behavioural outcomes when interventions were tailored to audience psychographics and embedded within broader institutional frameworks (Eagle *et al*., 2016 [17]; Robison *et al*., 2024 [32]; Thompson, 2008) [39]. Similarly, when applied through choice architecture and message framing, nudging techniques offered low-cost, scalable alternatives to traditional enforcement, particularly in recreational and

small-scale fisheries where regulatory oversight is limited (Mackay *et al*., 2018 [25]; Bisack & Clay, 2021) [8].

Behavioural determinants such as attitudes, norms, habits, and perceived control emerged as key drivers in influencing fish consumption behaviour, validating the explanatory strength of the Theory of Planned Behavior (TPB) in both developed and developing country contexts (Verbeke & Vackier, 2005 [42]; Yi, 2019; Şen *et al*., 2022) [37]. Meanwhile, innovations like sustainability certification and Good Aquaculture Practices (GAP)—while essential for operationalising sustainability—revealed limited success when behavioural internalisation and local adaptation were weak or unsupported (Amundsen & Osmundsen, 2020; Booncharoen & Anal, 2021) [3, 10].

Across all themes, multi-level engagement emerged as a critical factor, from individual consumers and producers to regulatory institutions and markets. This suggests that behavioural change in fisheries is not solely a matter of personal choice but is shaped by structural, social, and informational environments, which must be addressed concurrently for lasting impact.

5.2 Gaps and Limitations in the Current Literature

While the reviewed studies provide a diverse array of behavioural strategies, several critical gaps were identified:

- **Limited real-world application and evaluation:** Many social marketing and nudging interventions are conceptual or pilot-based, with few rigorous impact assessments or longitudinal evaluations (Salazar *et al*., 2019 [34]; Mackay *et al*., 2018) [25]. The field lacks large-scale empirical studies demonstrating a measurable and sustained behavioural change in fisheries contexts.
- **Underrepresentation in capture fisheries and policy contexts:** Most behavioural interventions are concentrated in aquaculture, tourism, or consumer-facing areas. There is a noticeable gap in research on behavioural change strategies targeting capture fisheries, particularly in open-access resources and fragmented governance contexts.
- **Weak integration of qualitative insights:** While a few studies leveraged qualitative methods to understand behavioural barriers (Barclay *et al*., 2017 [6]; Mertens *et al*., 2012) [28], many rely heavily on quantitative survey data without exploring the deeper social and cultural meanings behind behaviours. This limits the ability to design interventions that are truly responsive to local contexts.
- **Behavioural fatigue and ethical concerns:** Especially with nudging, concerns remain about manipulation, autonomy, and the risk of diminishing returns if interventions are poorly designed or overly repetitive (Thaler & Sunstein, 2008; Benartzi *et al*., 2017) [7]. Ethical guidelines and safeguards are underexplored in the fisheries domain.

5.3 Methodological Observations

Most studies reviewed utilised cross-sectional surveys, descriptive statistics, and self-reported behaviour, which are prone to biases and often fail to capture long-term or actual behavioural change. Experimental approaches, such as randomised controlled trials (RCTs) or natural experiments, remain rare in fisheries-related behavioural research. Moreover, while theoretical frameworks like TPB, social norms theory, and diffusion of innovation were employed, many interventions lacked a coherent behavioural theory base or failed to test hypotheses derived from them. This weakens the generalizability and scientific rigour of behaviour change interventions in the sector.

5.4 Practical and Policy Implications

Despite the gaps, the findings offer actionable insights for practitioners, policymakers, and development organisations:

- Targeted, theory-driven communication strategies—grounded in audience segmentation—can improve conservation behaviours and responsible consumption uptake. These strategies should move beyond awareness-raising to influence specific, measurable actions.
- CBSM and participatory approaches hold particular promise for co-managed or community-based fisheries, where peer influence, local leadership, and trust play a central role in shaping behaviour. These interventions are especially effective when linked to enforcement and institutional incentives (Thompson, 2008 [39].
- To avoid token compliance, market-based mechanisms, including eco-labels and sustainability certifications, must be coupled with support systems (e.g., training and financial access). Certification schemes should promote continuous learning and behavioural internalisation rather than just checklist fulfilment (Amundsen & Osmundsen, 2020; Joffre *et al*., 2018) [3, 22].
- Climate adaptation and pollution mitigation require cross-sector behavioural integration, where fisheries, conservation, health, and climate agendas are addressed together. Social marketing can help align these goals by shifting public norms, business practices, and policy priorities toward shared sustainability outcomes (Veríssimo *et al*., 2024 [43]; Abu Samah *et al*., 2021) [1].

6. Implications and Future Research Directions

6.1 Practical Implications

This review underscores the growing relevance of social marketing and behavioural science in advancing sustainability within fisheries and aquaculture systems. Interventions grounded in behavioural theory and audience segmentation (Eagle *et al*., 2016 [17]; Robison *et al*., 2024) [32] show greater effectiveness when combined with policy enforcement, education, and institutional support (Salazar *et al*., 2019) [34]. In compliance contexts, nudging techniques such as social norms, framing, and visual cues offer scalable alternatives to traditional enforcement, especially in resource-limited fisheries (Mackay *et al*., 2018 [25]; Bisack & Clay, 2021) [8]. Community-Based Social Marketing (CBSM) has proven effective in participatory fisheries governance, particularly where local engagement and context-specific strategies are prioritised (Andriamalala *et al*., 2013 [5]; Wilson *et al*., 2021). Such approaches are promising for co-managed or data-poor fisheries and should be scaled through partnerships with NGOs and extension services.

Certification schemes like GAP improve compliance and traceability in aquaculture but often lack behavioural depth. Uptake is hindered by high input costs, technical knowledge gaps, and superficial compliance (Amundsen & Os undsen, 2020; Booncharoen & Anal, 2021) [3, 10]. Supportive training and localised communication strategies are critical for shifting motivation from compliance to internalised

sustainability. Finally, behaviour interventions addressing marine pollution and climate adaptation—such as plastic reduction, mangrove planting, or sustainable pond management—require combined efforts involving nudges, labelling, and enabling infrastructure Veríssimo *et al*., 2024 [43].

6.2 Theoretical Implications

Despite frequent references to behavioural models like the Theory of Planned Behaviour (TPB), Social Norms Theory, and CBSM, many interventions lack a unified framework or empirical validation. While TPB has been effectively used to study fish consumption (Verbeke & Vackier, 2005 [42]; Yi, 2019; Şen *et al*., 2022) [37], fewer studies apply it within fisheries governance or aquaculture practice. Moreover, behavioural economics principles remain underutilised in fisheries policy. Future interventions should be grounded in tested models and employ mixed methods (e.g., RCTs, network analysis to improve theoretical rigour and practical relevance.

6.3 Future Research Directions

- Evaluate the long-term impact of social marketing: Empirical studies are needed to assess how these interventions sustain behaviour change over time.
- Test nudging in formal fisheries management: Research should explore the effectiveness and ethical use of nudges in commercial and regulatory settings.
- Understand behavioural drivers in aquaculture: Studies should examine how trust, social norms, and access to services affect the adoption of sustainability innovations in small-scale systems.
- Scale CBSM in inland fisheries: Participatory strategies should be tested in under-researched co-managed inland fisheries to foster stewardship.
- Integrate cross-sectoral behaviour models: Future studies could use co-benefit frameworks to explore joint strategies for fish consumption, health, and environmental goals.
- Leverage digital tools: Mobile apps and gamified nudging remain underexplored and could enhance stakeholder engagement and adaptive learning.

7. Conclusion

This review has synthesised emerging evidence on the role of social marketing and behavioural science in promoting sustainability within fisheries and aquaculture systems. The findings underscore that behavioural change is most effective when interventions are theory-driven, context-specific, and integrated with broader institutional or regulatory support across six thematic areas—from social marketing and nudging to fish consumption behaviour, community-based engagement, certification adoption, and climate adaptation. At the same time, models like the Theory of Planned Behaviour and Community-Based Social Marketing offer robust frameworks; their application remains uneven across sectors, particularly in capture fisheries and aquaculture governance. Notably, audience segmentation, norm-based messaging, participatory design, and framing strategies have measurable impacts in shifting consumption patterns, enhancing compliance, and fostering stewardship. However, significant gaps persist, including limited longitudinal evaluation, ethical concerns around nudging, and underutilisation of behavioural economics in formal fisheries policy. Moving forward, scaling behaviorally informed approaches will require a combination of empirical rigour, technological integration, and cross-sectoral collaboration. By embedding behavioural insights into policy, practice, and innovation systems, fisheries governance can better align with long-term sustainability goals.

8. References

1. Abu Samah A, Shaffril HAM, Fadzil MF, Ahmad N, Idris K. A systematic review on adaptation practices in aquaculture towards climate change impacts. Sustainability. 2021;13(20):11410.
2. Ajzen I. The theory of planned behavior. Organizational Behavior and Human Decision Processes. 1991;50(2):179-211.
3. Amundsen VS, Osmundsen TC. Becoming certified, becoming sustainable? Improvements from aquaculture certification schemes as experienced by those certified. Marine Policy. 2020;119:104097.
4. Anderson CM, Himes-Cornell A, Pita C, Arton A, Favret M, Averill D, *et al*. Social and economic outcomes of fisheries certification: Characterizing pathways of change in canned fish markets. Frontiers in Marine Science. 2021;8:791085.
5. Andriamalala G, Peabody S, Gardner CJ, Westerman K. Using social marketing to foster sustainable behaviour in traditional fishing communities of southwest Madagascar. Conservation Evidence. 2013;10:37.
6. Barclay K, Voyer M, Mazur N, Payne AM, Mauli S, Kinch J, Smith G. The importance of qualitative social research for effective fisheries management. Fisheries research. 2017;186:426-438.
7. Benartzi S, Beshears J, Milkman KL, Sunstein CR, Thaler RH, Shankar M, Galing S. Should governments invest more in nudging?. Psychological science. 2017;28(8):1041-1055.
8. Bisack KD, Clay PM. Behavioral responses to competing incentives and disincentives: Compliance with marine mammal protection. Marine Policy. 2021;132:104674.
9. Blythe J, Sulu R, Harohau D, Weeks R, Schwarz AM, Mills D, Phillips M. Social dynamics shaping the diffusion of sustainable aquaculture innovations in the Solomon Islands. Sustainability. 2017;9(1):126.
10. Booncharoen C, Anal AK. Attitudes, perceptions, and on-farm self-reported practices of shrimp farmers' towards adoption of good aquaculture practices (GAP) in Thailand. Sustainability. 2021;13(9):5194.
11. Bosma RH, Verdegem MC. Sustainable aquaculture in ponds: Principles, practices and limits. Livestock science. 2011;139(1-2):58-68.
12. Burger J. Consumption patterns and why people fish. Environmental research. 2002;90(2):125-135.
13. Burger J, Gochfeld M, Batang Z, Alikunhi N, Al-Jahdali R, Al-Jebreen D, Al-Suwailem A. Fish consumption behavior and rates in native and non-native people in Saudi Arabia. Environmental Research. 2014;133:141-148.
14. Can MF, Günlü A, Can HY. Fish consumption preferences and factors influencing it. Food Science and Technology. 2015;35:339-346.

15. Cheserek MJ, Obiero KO, Menach E, Ogello EO. Fish and fish products consumption behaviours and attitudes of farmers in western Kenya. 2022.
16. Cornwall A, Jewkes R. What is participatory research?. Social science & medicine. 1995;41(12):1667-1676.
17. Eagle L, Hamann M, Low DR. The role of social marketing, marine turtles and sustainable tourism in reducing plastic pollution. Marine pollution bulletin. 2016;107(1):324-332.
18. Garcia-Vazquez E, Garcia-Ael C, Ardura A, Rodriguez N, Dopico E. Towards a plastic-less planet. Gender and individual responsibility predict the effect of imagery nudges about marine (micro) plastic pollution on R-behavior intentions. Marine Pollution Bulletin. 2023;193:115157.
19. Hansen PG, Skov LR, Skov KL. Making healthy choices easier: regulation versus nudging. Annual review of public health. 2016;37(1):237-251.
20. Hawkins SJ, Allen JR, Bray S. Restoration of temperate marine and coastal ecosystems: nudging nature. Aquatic conservation: marine and freshwater ecosystems. 1999;9(1):23-46.
21. Houweling T. Fighting Pollution with Nudges. Student Undergraduate Research E-journal! 2019;5:1-5.
22. Joffre OM, Klerkx L, Khoa TN. Aquaculture innovation system analysis of transition to sustainable intensification in shrimp farming. Agronomy for Sustainable Development. 2018;38:1-11.
23. Khan AQ, Aldosari F, Hussain SM. Fish consumption behavior and fish farming attitude in Kingdom of Saudi Arabia (KSA). Journal of the Saudi Society of Agricultural Sciences. 2018;17(2):195-199.
24. Macaulay G, Bui S, Oppedal F, Dempster T. Challenges and benefits of applying fish behaviour to improve production and welfare in industrial aquaculture. Reviews in Aquaculture. 2021;13(2):934-948.
25. Mackay M, Jennings S, Van Putten EI, Sibly H, Yamazaki S. When push comes to shove in recreational fishing compliance, think 'nudge'. Marine Policy. 2018;95:256-266.
26. Mackay M, Yamazaki S, Jennings S, Sibly H, van Putten IE, Emery TJ. The influence of nudges on compliance behaviour in recreational fisheries: a laboratory experiment. ICES Journal of Marine Science. 2019;77(6):2319-2332.
27. McKenzie-Mohr D. New ways to promote proenvironmental behavior: Promoting sustainable behavior: An introduction to community-based social marketing. Journal of social issues. 2000;56(3):543-554.
28. Mertens F, Saint-Charles J, Mergler D. Social communication network analysis of the role of participatory research in the adoption of new fish consumption behaviors. Social science & medicine. 2012;75(4):643-650.
29. Nakano M, Sato H, Watanabe T, Takano K, Sagane Y. Mining online activity data to understand food consumption behavior: A case of Asian fish sauce among Japanese consumers. Food Science & Nutrition. 2018;6(4):791-799.
30. Nelson KM, Partelow S, Schlüter A. Nudging tourists to donate for conservation: Experimental evidence on soliciting voluntary contributions for coastal management. Journal of environmental management. 2019;237:30-43.
31. Risitano M, Romano R, Rusciano V, Civero G, Scarpato D. The impact of sustainability on marketing strategy and business performance: The case of Italian fisheries. Business Strategy and the Environment. 2022;31(4):1538-1551.
32. Robison V, Jones MS, Erickson B, Biedenweg K. Communication approaches and specialists that can improve fisheries management. Fisheries. 2024;49(7):319-326.
33. Rogers EM, Singhal A, Quinlan MM. Diffusion of innovations. In: An integrated approach to communication theory and research. 2014. p. 432-448.
34. Salazar G, Mills M, Veríssimo D. Qualitative impact evaluation of a social marketing campaign for conservation. Conservation Biology. 2019;33(3):634-644.
35. Sarrouf Willson M, Turley C, Daar LA, Al Masroori H, Al Muscati H, Al Aufi M, *et al*. Addressing marine wildlife entanglement in derelict fishing nets using community-based social marketing: Case study and lessons learnt. Social Marketing Quarterly. 2021;27(4):284-301.
36. Schwarz AM, Gordon J, Ramofafia C. Nudging statutory law to make space for customary processes and community-based fisheries management in Solomon Islands. Maritime Studies. 2020;19(4):475-487.
37. Şen İ, Rad F, Şen Ağilkaya G. Analyzing fish consumption behavior of Turkish consumers with theory of planned behavior. Thalassas: An International Journal of Marine Sciences. 2022;38(2):929-937.
38. Shaw S, He X, Haban A, Tomasallo C, Meiman J. A focus group study of fish consumption behaviors among Asian women in Milwaukee, Wisconsin. Preventive Medicine Reports. 2023;36:102528.
39. Thompson MH. Fostering sustainable behaviours in community-based co-managed fisheries. Marine Policy. 2008;32(3):413-420.
40. Thorsdottir F, Sveinsdottir K, Jonsson FH, Einarsdottir G, Thorsdottir I, Martinsdottir E. A model of fish consumption among young consumers. Journal of Consumer Marketing. 2012;29(1):4-12.
41. Tran T, Duong DV, Le TD, Loc HH, Chau LTN, Le LT, *et al*. Promoting sustainable shrimp farming: balancing environmental goals, awareness, and socio-cultural factors in the Mekong Delta aquaculture. Aquaculture International. 2025;33(1):119.
42. Verbeke W, Vackier I. Individual determinants of fish consumption: application of the theory of planned behaviour. Appetite. 2005;44(1):67-82.
43. Veríssimo D, Blake K, Flint HB, Doughty H, Espelosin D, Gregg EA, Thomas-Walters L. Changing human behavior to conserve biodiversity. Annual Review of Environment and Resources. 2024;49(1):419-448.
44. Yi S. Determinants of consumers' purchasing behavior for certified aquaculture products in South Korea. Sustainability. 2019;11(14):3840.
45. Zhang Z, Lin W, He D, Wu Q, Cai C, Chen H, *et al*. Aquaculture environment changes fish behavioral adaptability directly or indirectly through personality traits: a case study. Reviews in Fish Biology and Fisheries. 2023;33(4):1423-1441.