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Review Article

Small-Scale Fisheries and Sustainability in India: A Thematic Analysis of Fisheries Instruments

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Small-scale fisheries (SSF) are crucial for India's coastal and inland ecosystems, food security, and rural livelihoods. This study analysed twenty six national and state-level fisheries instruments including laws, plans, and regulations, to evaluate their integration of sustainability principles in line with the FAO SSF Guidelines. Sustainability was operationalized across three pillars: ecological (e.g., conservation, fishing effort regulation), socio-economic (e.g., infrastructure, market access, welfare), and governance and enforcement (e.g., licensing, co-management, monitoring). Keyword frequency analysis and Kruskal-Wallis testing revealed a significant imbalance, with socio-economic considerations dominating (60.36%) while ecological (20.21%) and governance (19.42%) themes remained underrepresented ($p < 0.05$). Qualitative review highlighted that state-level Marine Fisheries Regulation Acts (MFRAs) emphasized top-down regulation with minimal community participation or welfare support, illustrating a design-delivery gap. Recent instruments, such as Pradhan Mantri Matsya Sampada Yojana (2020) and National Fisheries Policy (2020), showed rhetorical alignment with global sustainability frameworks, but operationalizing ecosystem-based management, co-management, and inclusive governance remains limited. The findings underscore the need for integrated, community-inclusive strategies to strengthen resilience, equity, and long-term sustainability in India's SSF sector. Bridging the gap between policy design and implementation is essential to safeguard livelihoods and maintain ecosystem health within India's blue economy.

(***Key words:*** *Fisheries instruments, Small-scale fisheries (SSF), Sustainability)*

Small-scale fisheries (SSF) are vital to global aquatic food systems and contribute over 40% of capture production and supporting nearly 60.2 million people or 90% of the fisheries workforce (FAO, Duke University & WorldFish, 2023). In India, SSF generate about 62% of total fish catch while underpinning food security, employment, and cultural identity in coastal and rural areas (Bapat, 1982). Family-based, labour-intensive, and grounded in traditional ecological knowledge, SSF are central to socio-economic resilience (FAO, 2013; Gibson and Sumaila, 2017). However, SSF remain structurally marginalized insecure tenure, limited financial access, institutional neglect, and exclusion from decision-making, compounded by industrial or large-scale fisheries, coastal development, and climate change, (Béné, 2006; FAO, 2005; Murciano *et al.,* 2021). Global frameworks now recognize SSF as critical not only to sustainable development but also for inclusive governance and ecosystem resilience. The FAO's voluntary guidelines for securing sustainable small-scale fisheries, henceforth SSF guidelines (FAO, 2015), anchored in the Code of Conduct for Responsible Fisheries (CCRF) (FAO, 1995), emphasize rights-based, participatory, and socio-ecological approaches that align with multiple SDGs especially SDG 14.b on securing access for small-scale fishers (Said *et al.,* 2019; UN-SDGs, 2015).

India's evolving fisheries policy landscape including the Pradhan Mantri Matsya Sampada Yojana (PMMSY) (Government of India, 2020a), National Fisheries Policy (Government of India, 2020b), National Policy on Marine Fisheries (Government of India, 2017), Marine Fisheries Regulation Acts (MFRAs), state-specific policies and others reflect increasing attention to sustainability. However, the operationalization of inclusive, SSF-sensitive frameworks remains limited

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and uneven. This study aimed to critically evaluate how well Indian fisheries policies integrate ecological, socio-economic, and governance dimensions relevant to the sustainability of SSF. To address this objective, a systematic evaluation of national and state-level fisheries instruments was conducted. Using thematic content analysis and a keyword frequency approach, the study assessed the relative emphasis placed on key sustainability themes and identified critical gaps in policy integration. The findings offer evidence-based recommendations to support more inclusive, responsive, and sustainable fisheries governance in India.

MATERIALS AND METHODS

Selection of policy instruments

A structured content analysis approach was employed to assess if and how sustainability principles for SSF are embedded within India's fisheries policy instruments. Twenty-six key national and regional policies, schemes, and legislative frameworks (Table 1) were objectively selected for the purpose and which reflected the thematic breadth and governance diversity of Indian fisheries, facilitating a holistic and comparative evaluation.

Identification of sustainability themes and/or keywords

Sustainability was operationalized through three analytical dimensions: (i) ecological sustainability, (ii) socio-economic sustainability, and (iii) governance and enforcement, aligned with the FAO SSF guidelines and the FAO Code of Conduct for Responsible Fisheries (FAO, 1995; FAO, 2015). In this study, sustainability indicators were defined operationally as the presence and normalized frequency of policy provisions and keywords corresponding to each dimension within fisheries policy instruments. Ecological sustainability was defined as policy measures addressing conservation of fish stocks and ecosystems, including regulation of fishing effort and capacity, habitat and species protection, ecosystem and precautionary-based management approaches, and control of bycatch, destructive fishing, pollution, and IUU fishing. Socio-economic sustainability referred to policy provisions supporting livelihoods, welfare, and economic resilience of SSF communities, operationalized through indicators related to livelihood support, welfare and insurance schemes, financial assistance, capacity building, infrastructure, and market access. Governance and enforcement encompassed institutional and regulatory mechanisms for fisheries management, including licensing, catch documentation, monitoring, control and surveillance (MCS), and participatory or co-management approaches.

Table 1. *Fisheries instruments reviewed in the present study*

National-level instruments	Regional-level instruments
• XIIth Five Year Plan (2012–2017) (Government of India, 2011) • Blue Revolution Scheme (Government of India, 2015) • Pradhan Mantri Matsya Sampada Yojana (PMMSY) (Government of India, 2020a) • Comprehensive Marine Fishing Policy (CMFP) (Government of India, 2004) • National Policy on Marine Fisheries (NPMF) (Government of India, 2017) • National Inland Fisheries and Aquaculture Policy (NIFAP) (Government of India, 2019a) • National Mariculture Policy (NMP) (Government of India, 2019b) • National Fisheries Policy (NFP) (Government of India,2020b) • Indian Marine Fisheries Bill (IMFB) (Government of India, 2021)	• Marine Fisheries Regulation Acts (MFRAs) of coastal states (Gujarat, Maharashtra, Goa, Daman & Diu, Karnataka, Kerala, Tamil Nadu, Andhra Pradesh, Odisha, West Bengal, Andaman & Nicobar Islands and Lakshadweep islands (GJ-MFRA, 2003; MMFRA, 1981; GA-MFRA, 1982; KA-MFRA, 1986; KL-MFRA, 1980; TN-MFRA, 1983; AP-MFRA, 1994; OD-MFRA, 1981; WB-MFRA, 1993; AN-MFRA, 1994; LD-MFRA, 2000) • State-specific fisheries policies (Kerala, Tamil Nadu, Andhra Pradesh, Odisha, West Bengal, Andaman & Nicobar Islands (GoKL, 2018; GoTN, 2020; GoAP, 2015; GoOD, 2015; GoWB, 2015; GoAN, 2018)

A comprehensive list of keywords was inductively derived from the reviewed policy texts and assigned exclusively to one sustainability dimension to ensure analytical clarity and consistency (Table 2).

Table 2. *Thematic classification of sustainability-related keywords*

Ecological sustainability	Socio-Economic Sustainability	Governance and Enforcement
• Fleet • Fishing effort • Mesh size • Catch quotas • Seasonal ban/fishing ban/closed season • Marine Protected Areas (MPAs) • Selective fishing • Protection of species / habitat • Conservation/conserve • Ecosystem-Based Management (EBAM)/ Ecosystem approach to fisheries management (EAFM) • Precautionary approach • Code of Conduct for Responsible Fisheries (CCRF) • Bycatch/discards • Destructive fishing • Pollution • IUU fishing • Eco-labeling	• Livelihood • Welfare • Insurance • Financial support/assistance • Fisher cooperatives • Capacity building • Training • Infrastructure • Market access/market	• Licensing • Fish catch documentation • MCS (Monitoring, Control, and Surveillance) • Participatory approach / Co-management

Content analysis and frequency calculation

Each policy document was manually reviewed to identify and count occurrences of the selected keywords. To enable fair comparison across documents of varying lengths and verbosity, raw keyword frequencies were normalized relative to total word count for each document. This ensured proportional representation of thematic emphasis. In the case of regional-level instruments with broadly similar policy structures (e.g., regional MFRAs and state fisheries policies), mean keyword frequencies were calculated to maintain proportionality and ensure representative analysis.

Theme-wise frequency totals were first computed for internal comparison, followed aggregation across the dataset to assess overall thematic emphasis. To assess coding reliability, an independent reviewer recoded 30% of the sample using the same keyword classification protocol. Inter-coder agreement was high, and minor discrepancies were resolved through discussion to maintain analytical rigour and reduce subjectivity.

Statistical testing and interpretation

A Kruskal-Wallis test was applied using SPSS software to determine significant differences in thematic emphasis across policy instruments. This test evaluated whether thematic distributions were statistically distinct, offering insights into identifying imbalances in sustainability integration within the policy instruments.

RESULTS AND DISCUSSION

This section presents the thematic results of the policy analysis across twenty six fisheries instruments, examining the integration of sustainability principles

within India's SSF governance.

Theme 1: Ecological sustainability

Ecological sustainability is central to small-scale fisheries (SSF), whose livelihoods depend on healthy ecosystems. India's fisheries policies increasingly recognize the link between ecosystem health and fishers' well-being, highlighting the need to protect habitats from overfishing, pollution, and degradation (Dias *et al.*, 2023).

"Conservation" (28.83%) was the most frequent keyword (Fig.1), reflecting strong policy emphasis on ecosystem protection. Key instruments such as the National Fisheries Policy (Government of India, 2020b), which emphasizes sustainable fisheries management; the PMMSY (Government of India, 2020a), which promotes fish production while including ecological safeguards; and the National Policy on Marine Fisheries (Government of India, 2017), which focuses on marine resource conservation, frame conservation as a core objective aligned with international commitments such as the FAO Code of Conduct for Responsible Fisheries, the Convention on Biological Diversity, and SDG 14.

High frequencies of "Fleet" (10.92%) and "Pollution" (9.14%) indicated persistent concerns about overcapacity and habitat degradation. Earlier efforts, such as the XIIth Five-Year Plan (2012-2017) (Government of India, 2011), which aimed to modernize fisheries infrastructure and improve resource management, and the Indian Marine Fisheries Bill (Government of India, 2021), which strengthens regulation of marine fishing, have raised awareness. Yet pollution and overfishing continue to threaten critical habitats such as estuaries and mangroves. These findings indicated that policy intent is clear, but enforcement and implementation remain weak. Strengthening enforcement mechanisms and legitimacy-based approaches could help translate policy objectives into tangible ecosystem and livelihood benefits (Kittinger *et al.,* 2013).

Mentions of global frameworks - "Code of Conduct for Responsible Fisheries (CCRF)" (5.92%), "Ecosystem Approach" (5.54%), and "Precautionary Approach" (4.32%) showed growing alignment with international sustainability standards. However, practical application of these approaches is limited (Garcia, 2003).

Among area-based management tools, "Seasonal fishing bans" (4.03%) were more frequent than "Marine Protected Areas (MPAs)" (2.48%), suggesting that time-bound restrictions better align with SSF practices and can deliver quicker ecological and social gains. Seasonal bans are widely accepted among stakeholders (Gunakar *et al.,* 2017), whereas co-managed MPAs, such as the Gulf of Mannar in Tamil Nadu, demonstrated measurable ecological and social benefits when communities actively participate (Asha *et al.,* 2017). However, such inclusive governance models remain rare nationally, limiting broader MPA effectiveness (Cinner *et al.,* 2012).

Keywords like "Catch quotas" (0.94%) and "Selective fishing" (0.10%) were rare, reflecting limited use of science-based, adaptive management. India's multi-species fisheries make quota implementation challenging, but their absence constrains ecosystem-based management objectives (Hilborn *et al.,* 2020; Pauly *et al.,* 2002).

Low emphasis on "Bycatch reduction" (2.58%), "Destructive fishing" (3.80%), and "Eco-labeling" (2.89%) highlighted gaps in tools that could incentivize sustainable practices and improve market access, limiting practical benefits for SSF (Pawar *et al.,* 2023).

Mentions of "IUU fishing" (3.24%) showed growing concern about illegal activities undermining SSF. Weak enforcement reduces policy impact and creates insecurity among legitimate fishers (Song *et al.,* 2020).

Overall, India's fisheries instruments showed increasing attention to ecological sustainability. However, gaps in operational clarity, adaptive tools, and enforcement limit their effectiveness. Addressing these gaps requires locally tailored strategies, stronger monitoring, and community engagement to convert policy intent into tangible benefits for both SSF and ecosystems (Charles *et al.,* 2024).

Theme 2: Socio-economic sustainability

Socio-economic sustainability is critical for securing livelihoods and enhancing the resilience of small-scale fisheries (SSF). Policy emphasis on this theme reflected growing recognition of long-standing development constraints within the sector. The most frequent keywords, "Infrastructure" (24.45%) and "Market access" (19.70%), together accounted for nearly half of all references (Fig. 2). This indicated a

strong policy focus on strengthening value chains and post-harvest systems.

Major national schemes, particularly the PMMSY (Government of India, 2020a) and the Blue Revolution (Government of India, 2015), prioritized investments in landing centres, cold storage, and processing facilities. These interventions aim to reduce post-harvest losses and integrate SSF into formal markets, addressing their historic exclusion from organized value chains (Béné *et al.,* 2010).

Keywords related to human capital and collective action also featured prominently. "Training" (9.38%) and "Cooperatives" (9.23%) signal a shift toward skill development and institutional organization. Cooperatives enhance access to credit, stabilize prices, and strengthen fishers' bargaining power. They also provide platforms for women's participation and social inclusion, aligning with participatory development principles (Amarasinghe and Bavinck, 2017; ICSF, 2022).

Welfare-oriented terms such as "Livelihood" (13.70%) and "Welfare" (9.32%) remained significant. Earlier policy frameworks, notably the XIIth Five-Year Plan (Government of India, 2011), emphasized housing, savings, and relief measures. More recent instruments, including PMMSY, increasingly promote income diversification, indicating a gradual shift from short-term welfare support toward resilience-building approaches.

Moderate emphasis on "Insurance" (5.20%) and "Capacity building" (5.09%) reflects partial attention to risk mitigation and skill enhancement. However, implementation remains uneven across regions, limiting their effectiveness in buffering SSF households against economic and environmental shocks (Nayak *et al.,* 2014).

"Financial support" (3.93%) was the least emphasized keyword. Despite the extension of formal credit schemes to fishers, access remains constrained. Most SSF households lack collateral and operate within informal systems. These barriers disproportionately affect women, lower-caste communities, and non-boat-based fishers, reinforcing structural exclusion from financial and institutional resources (Pomeroy *et al.,* 2020; Sumaila *et al.,* 2016).

Across instruments, PMMSY recorded high frequencies for infrastructure, market access, and training, reflecting its strong livelihood-oriented design. The Blue Revolution emphasized cooperative development and capacity building, while the XIIth Plan laid the foundation for welfare interventions. In contrast, state-level Marine Fisheries Regulation Acts (MFRAs) focused primarily on ecological regulation, offering limited provisions for socio-economic support (MMFRA, 1981). This divergence highlighted a policy delivery gap between livelihood-oriented schemes and regulatory frameworks.

Overall, India's fisheries policies demonstrated strong momentum in improving infrastructure, market integration, and organizational support for SSF. However, persistent gaps in financial inclusion, insurance coverage, and localized welfare delivery continue to constrain resilience, particularly among marginalized groups. Addressing these gaps through targeted and inclusive interventions is essential to ensure that socio-economic sustainability objectives translate into equitable and durable outcomes aligned with the Sustainable Development Goals (SDGs) (ICSF, 2022; Jentoft and Chuenpagdee, 2015).

Theme 3: Governance and enforcement

Effective governance and enforcement are critical in shaping access rights, compliance, and inclusivity in India's small-scale fisheries (SSF). "Licensing" dominated governance-related keywords (76.07%) (Fig. 3), reflecting a strong policy emphasis on formalizing fishing activities and regulating fishing effort. Instruments such as the Indian Marine Fisheries Bill (Government of India, 2021) which proposes mandatory licensing and regulatory conditions for Indian fishing vessels operating in the Exclusive Economic Zone and high seas and the Marine Fisheries Regulation Acts (MFRAs) of coastal states which regulate fishing seasons, gear types, and spatial access with the aim to reduce user conflicts and promote sustainable resource use. This emphasis aligns with the FAO SSF guidelines, which recognize secure and clearly defined access rights as foundational for sustainable fisheries governance (FAO, 2015). However, enforcement remains uneven due to limited institutional capacity and fragmented coordination at sub-national levels.

"Monitoring, Control, and Surveillance (MCS)" (18.99%) are critical for regulation compliance but

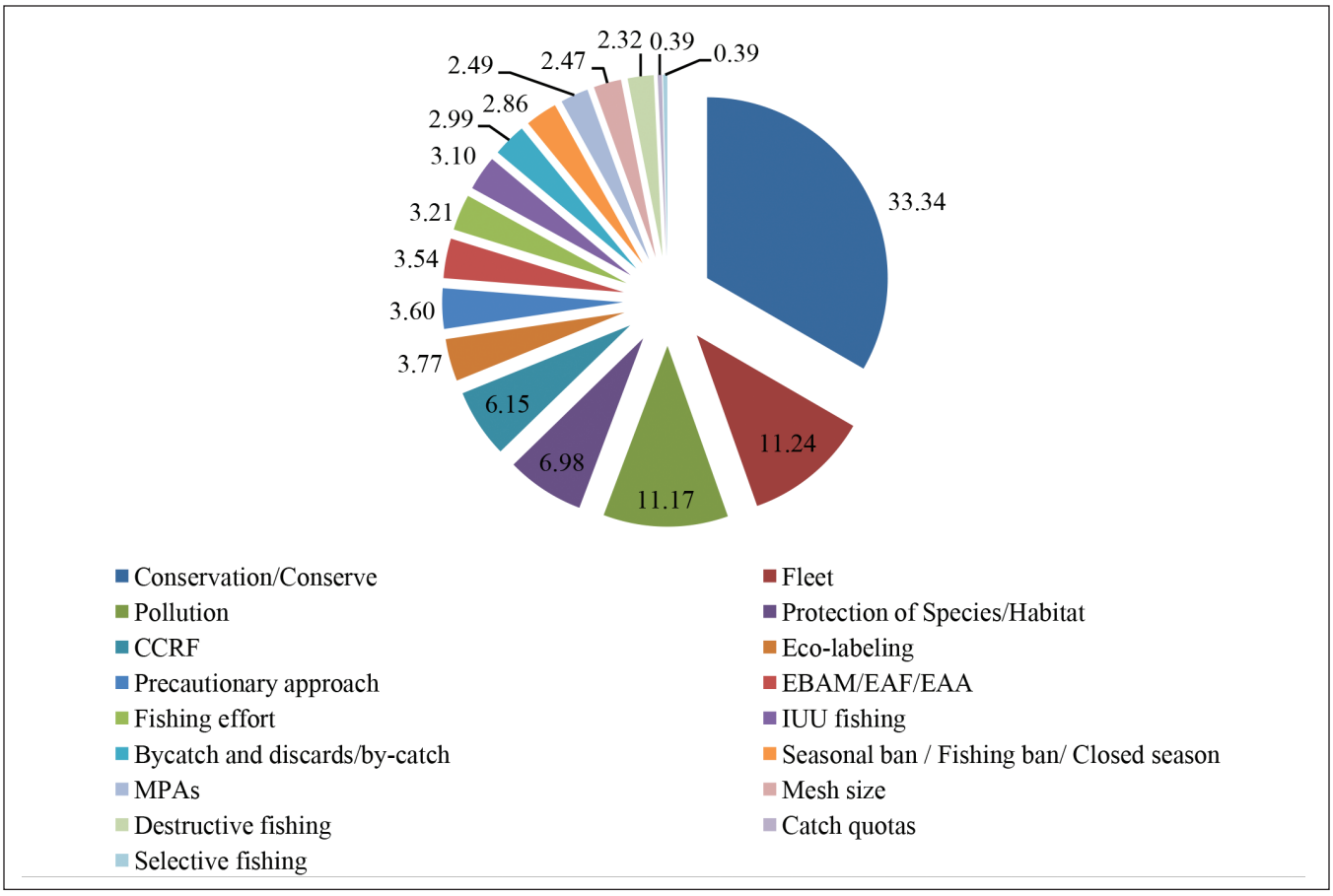

Fig 1. *Frequency distribution of keywords under theme "Ecological Sustainability" (no. of keywords =17)*

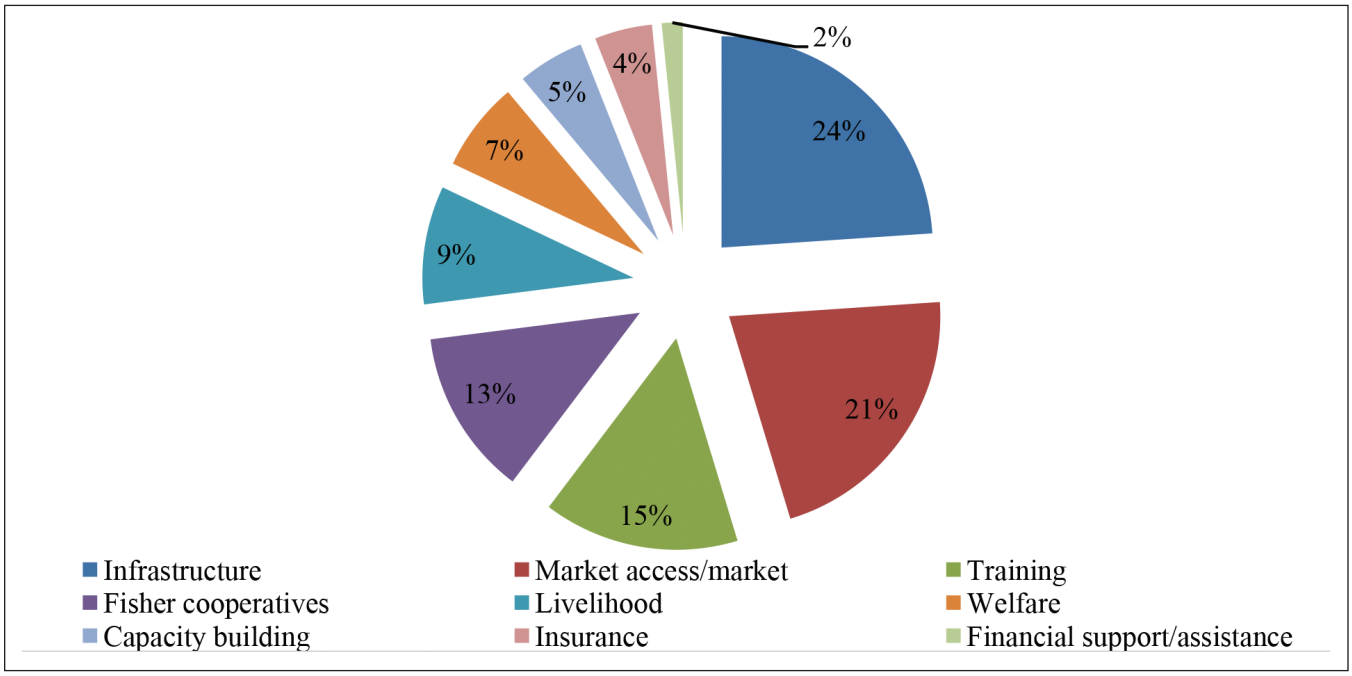

Fig 2. *Frequency distribution of keywords under theme "Socio-economic Sustainability" (no. of keywords =9)*

suffer from unclear, centralized policies lacking localized mechanisms. Effective MCS requires institutional investment and stakeholder engagement to build functional enforcement on the ground (Pomeroy and Andrew, 2011).

"Co-management or participatory approach" appeared minimally (4.85%), highlighting a predominantly top-down regime. Co-management enhances compliance by fostering fisher ownership and integrating local knowledge, which strengthens resilience and equity (Jentoft and Chuenpagdee, 2015). The near absence of fish catch documentation (0.09%) undermined stock assessments and adaptive management, perpetuating resource depletion and mistrust (Kelkar and Arthur, 2022). Community-based data systems can improve transparency and stakeholder trust.

Addressing these governance challenges requires investing in enforcement capacity, expanding inclusive co-management, and implementing community-led data collection to support sustainable and equitable SSF management.

Integrated thematic synthesis: aligning Indian fisheries policy with sustainable SSF

The analysis revealed a dominant focus on socio-economic welfare (60.36%), while ecological (20.21%) and governance (19.42%) dimensions remained underrepresented (Fig. 4, Table 3). This reflected India's historic emphasis on livelihoods but exposes critical gaps in ecological stewardship and institutional safeguards. Although welfare measures may enhance short-term resilience, they risk undermining long-term sustainability if ecological and participatory protections remain weak (Kurien *et al.*, 2009; Salagrama, 2006). The Kruskal-Wallis test confirmed significant thematic differences across policy instruments, indicating inconsistent prioritization ($p < 0.05$). Many instruments disproportionately emphasized socio-economic welfare at the expense of ecological and governance reforms, threatening integrated management and holistic sustainability of SSF.

Over time, India's fisheries policy has shown gradual ecological integration. Earlier plans, such as the XIIth Five-Year Plan (Government of India, 2011) and the Comprehensive Marine Fishing Policy (Government of India, 2004) largely prioritized fleet expansion and infrastructure development, with limited ecological safeguards. Post-2015 instruments reflect a shift toward sustainability: the National Inland Fisheries and Aquaculture Policy (Government of India, 2019a) promotes conservation-oriented inland fisheries development; the National Mariculture Policy (Government of India, 2019b) encourages environmentally responsible mariculture to reduce pressure on capture fisheries; PMMSY (Government of India, 2020a) integrates productivity enhancement with sustainability and livelihood security; and the Indian Marine Fisheries Bill (Government of India, 2021) seeks to regulate fishing activities in the EEZ and high seas. Collectively, these instruments reference ecosystem-based approaches, aligning with global frameworks such as the FAO's Ecosystem Approach to Fisheries Management (FAO, 2015) and the Sustainable Development Goals (UN-SDGs, 2015). However, consistent with the results, these ecological commitments remain largely conceptual, with limited translation into enforceable or participatory mechanisms.

Governance, however, remained the weakest pillar. Co-management initiatives, defined here as shared decision-making arrangements between the state and fishing communities that involve fishers in rule-setting, monitoring, and enforcement. This approach remain limited and inconsistently implemented, while centralized, top-down control continues to dominate regional MFRAs, marginalizing small-scale fishers' voices. These shortcomings are rooted in deeper structural barriers shaped by India's post-independence fisheries development trajectory, which historically prioritized marine production, employment generation, and infrastructure expansion over participatory governance and ecological safeguards. Although schemes like the PMMSY (Government of India, 2020a) support training, infrastructure, and value-chain participation through collective platforms such as fish farmer producer organizations, this form of economic inclusion does not translate into formal participatory governance or co-management of fisheries resources, reflecting a broader policy emphasis on infrastructure and market integration rather than institutionalized stakeholder decision-making.

Bureaucratic fragmentation further hampers cross-sectoral coordination, resulting in disjointed implementation (Nayak *et al.,* 2014). Further, policy

benefits often flow to politically powerful groups, leaving marginalized small-scale fishing communities excluded (Salagrama, 2006). Additionally, the neglect of informal institutions (e.g., customary norms and local leadership) weakens policy legitimacy at the community level, while limited data systems and administrative capacity constrain effective monitoring and adaptive enforcement.

Addressing these systemic barriers requires strengthening institutional capacity, decentralizing decision-making, and embedding true community participation within formal governance structures. Aligning implementation with local realities is essential to move beyond welfare-centric delivery and operationalize inclusive and ecosystem-based SSF governance (Berkes, 2003; Jentoft and Chuenpagdee, 2015).

CONCLUSION

This study critically examined India's fisheries policy framework through a sustainability lens defined by ecological, socio-economic, and governance dimensions, revealing uneven integration of priorities relevant to small-scale fisheries (SSF). Socio-economic objectives dominated policy attention (60.36%), while ecological (20.21%) and governance (19.42%) dimensions received comparatively limited emphasis. Significant variation across policy instruments, confirmed by the Kruskal-Wallis test ($p < 0.05$), indicated a systemic orientation toward short-term welfare and development outcomes rather than balanced, long-term sustainability. Recent policy instruments, including the PMMSY (2020), National Fisheries Policy (2020), and Indian Marine Fisheries Bill (2021), signal an emerging rhetorical shift toward ecosystem-based and rights-oriented approaches. However, these commitments remain weakly operationalized, with limited clarity on implementation pathways and enforcement mechanisms. Persistent gaps, most notably minimal co-management, inadequate catch data systems, and insufficient investment in local institutional capacity continue to constrain effective governance and adaptive management of SSF. Addressing this design-delivery gap requires rebalancing policy priorities to strengthen governance alongside welfare objectives. Greater integration of formal and informal institutions, decentralization of decision-making and meaningful participation of fishing communities is essential to align

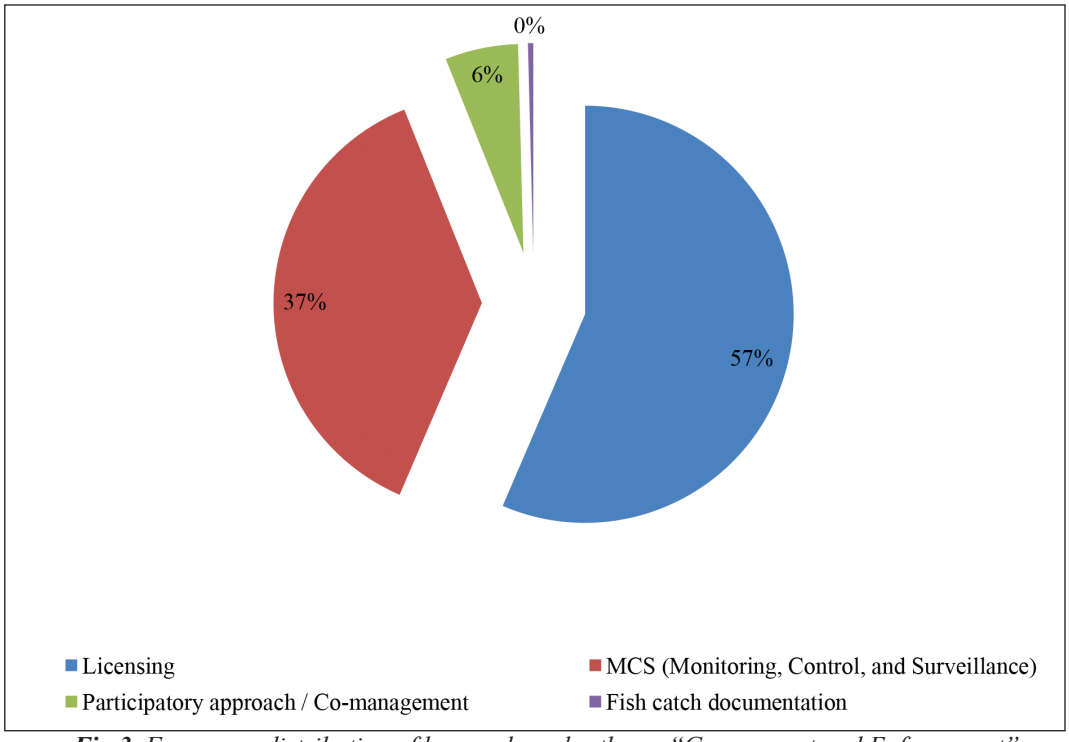

Fig 3. *Frequency distribution of keywords under theme "Government and Enforcement" (no. of keywords = 4)*

Table 3. *Thematic summary of sustainability integration in Indian fisheries policy instruments*

Sustainability Theme	Relative emphasis (thematic frequency %)	Core instruments focus (top keywords and their %)	Major contributing fisheries instruments	Instruments strengths	Key gaps identified
Ecological Sustainability	20.21%	Conservation (28.83%), Fleet (10.92%), Pollution (9.14%)	NFP (2020), PMMSY (2020), XIIthFive Year Plan (2011),	Increasing alignment with global frameworks (CCRF, EAFM); growing recognition of conservation and pollution impacts	Limited application of adaptive management tools (e.g., selective fishing, quotas); weak operationalization of MPAs; persistent enforcement gaps, particularly for bycatch reduction and habitat protection
Socio-Economic Sustainability	60.36%	Infrastructure (24.45%), Market access (19.70%), Livelihood (13.70%)	PMMSY (2020), NFP (2020), Blue Revolution (2015), XIIth Five-Year Plan (2011)	Strong focus on infrastructure and value-chain development; promotion of cooperatives and training; emerging emphasis on livelihood resilience	Limited financial inclusion (low access to credit and insurance); uneven delivery of capacity-building and welfare at local levels; continued exclusion of women, lower-caste, and non-boat-owning fishers
Governance and Enforcement	19.42%	Licensing (76.07%), MCS (18.99%), Co-management (4.85%)	IMFB (2021), MFRAs (State Acts), Blue Revolution (2015), NFP (2020)	Licensing formalizes access rights; initial attention to monitoring and tenure recognition	Minimal co-management and fisher participation; poor catch data and documentation systems; centralized decision-making, neglect of informal institutions, and institutional capacity constraints

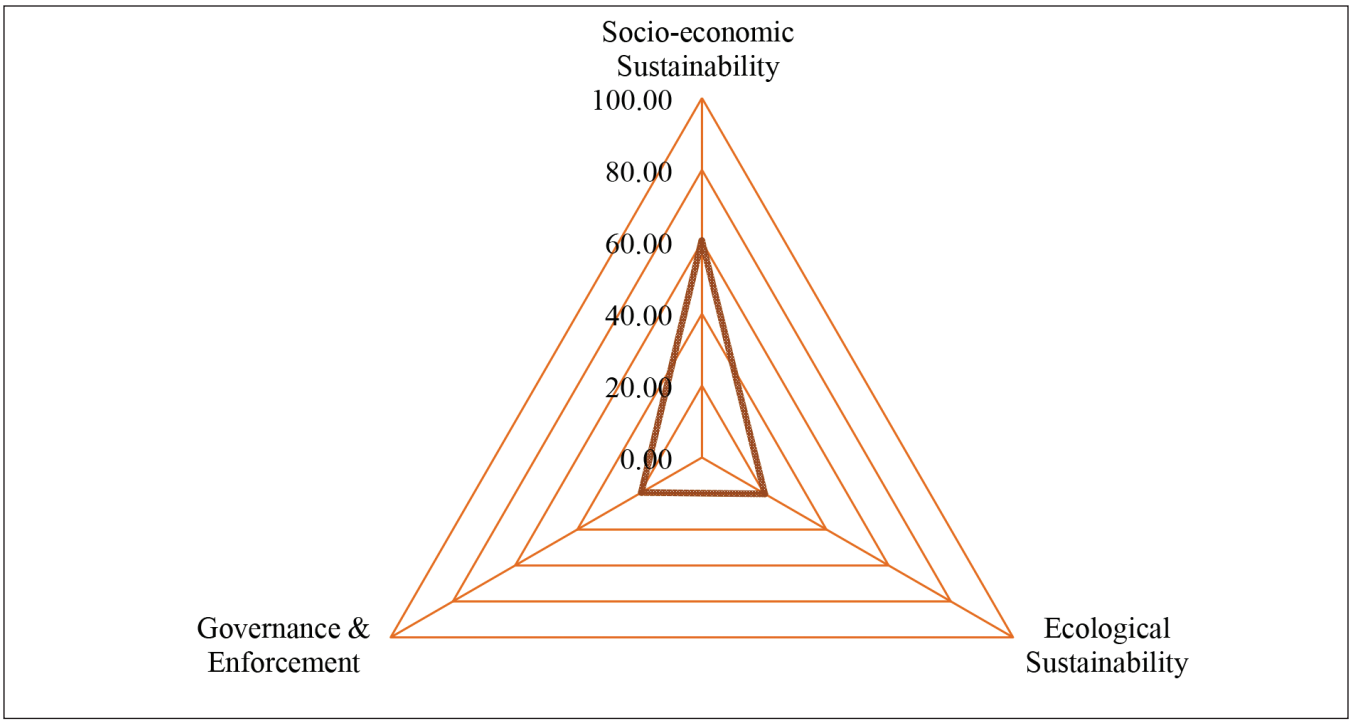

Fig 4. *Distribution of frequency percentage across the three themes of sustainability*

national policy ambitions with local realities. Without such shifts, the long-term sustainability of India's small-scale fisheries and the livelihoods they support will remain vulnerable.

POLICY IMPLICATIONS

The analysis highlights opportunities to enhance the sustainability and resilience of India's small-scale fisheries. Based on the study findings, future policy design and implementation could consider the following approaches:

- Ecological management: Strengthening practical measures such as regulated fishing effort, selective gear use, habitat protection, and ecosystem-based interventions at local and regional levels.
- Socio-economic support: Expanding capacity-building, technical training, and market access initiatives, with attention to equity and inclusion of marginalized fishers.
- Participatory governance: Facilitating platforms for fisher engagement in decision-making, integrating local knowledge and customary practices into fisheries management.
- Adaptive enforcement: Supporting decentralized monitoring, control, and surveillance systems, complemented by community-led data collection and real-time information for responsive management.

These interventions are essential to align national fisheries policies with global sustainability frameworks, address structural gaps, and ensure the long-term resilience and livelihoods of India's small-scale fisheries

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CONFLICTS OF INTEREST

We declare that the authors do not have any conflicting interest.

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