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Project Governance and Sustainable Fisheries Resource Management: Evidence from Community Conservation Programs

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Abstract
Multi-stakeholder collaboration and effective project governance are increasingly recognized to be key factors on the management of fisheries resources in a sustainable way, but are seldom studied together in situations where community-based conservation programs are implemented. The effect of project governance, stakeholders' cooperation, compliance of regulations, monitoring and evaluation on the outcome of sustainable fisheries management (SFM) with community participation as an intervening variable and policy environment as moderating variable. A convergent mixed-methods approach was used to gather primary data from 287 stakeholders in 42 community conservation programs (CCPs) in Gujarat, Kerala, Maharashtra, Odisha and West Bengal, India. Structured survey instruments and semi-structured interviews (N = 31) and program documentation were used as data sources. All four predictors had significant positive effects on the outcome of SFM (multiple regression analysis, $R^2 = 0.617$, $F = 75.44$, $p < .001$). The indirect effect of community participation on the relationship between governance and SFM was found to be 0.26 (95% BC-CI [0.18, 0.35]) in mediation analysis (Model 4) from PROCESS. Policy environment ($\beta = 0.17$, $p = .008$) also had a significant moderating effect. The findings are contextualized with the fisheries production data from the Food and Agriculture Organization of the United Nations (FAO) SOFIA 2024 and the Government of India (GoI) Department of Fisheries. A conceptual framework that involves the three study variables is designed and tested empirically. Practical recommendations for program managers, conservation practitioners and fisheries governance policy makers are provided.

Keywords: Project Governance, Stakeholder Collaboration, Sustainable Fisheries Management, Community Conservation, Mediation Analysis, India Fisheries, Co-Management

Introduction

Fisheries is one of the most important and controversial earth's common pool resources. To date, the Food and Agriculture Organization (FAO) has released its greatly anticipated State of World Fisheries and Aquaculture (SOFIA) 2024 report, which reveals a record 223.2 million tonnes of fisheries and aquaculture production in 2022, with the former surpassing the latter for the first time in human history (FAO, 2024). Approximately 61.8 million people are involved in primary fisheries production (mostly small-scale) in low and middle-income countries. In India, production has increased at an alarming rate of 106%, from 95.79 lakh tonnes during FY 2013-14 to 197.75 lakh tonnes during FY 2024-25, creating employment for around 5.8 crore people and accounting to around 7.28% of the agriculture GDP (IBEF, 2024; Department of Fisheries, GoI, 2024).

But this quantitative growth obscures the serious governance crisis. Although India aims to make the Blue Economy a reality and the Government of India has implemented the flagship Pradhan Mantri Matsya Sampada Yojana (PMMSY) programme, the FAO notes that the proportion of marine fish stocks in biologically sustainable conditions has been declining since the SDG 14.4 targets were set (FAO, 2024; UN, 2025). The governance structure of community-based conservation initiatives (CCIs), which sit at a critical nexus between state fisheries agencies, civil society and resource-dependent communities, becomes of special significance in this context.

In the realm of conservation programs, project governance includes the institutional arrangements, decision-making processes, accountability systems, and norms that shape project planning, implementation, monitoring, and evaluation (Restrepo Morales et al., 2026; Garces Giraldo et al., 2026). The broad, deep, and inclusive nature of stakeholder participation, together with the quality of this involvement (represented by the number of fishers, NGOs, government agencies, researchers, and market actors), is the engine that drives governance into actual, on-the-ground resource management results (Seara et al., 2024; Ourens et al., 2023). Community participation, defined as how much of an agency resource-dependent communities have in conservation decision making, is an important linkage in this governance-outcome chain.

The mixed difficulties of establishing linkages between co-management and governance, and the lack of empirical quantification of the relationship between them in Indian fisheries contexts, make the empirical study of these relationships difficult.Although the theoretical development of co-management and governance scholarship is rich, the empirical quantification of the relationship between these concepts based on primary survey data from operational community conservation programs is limited. Additionally, the moderating effect of the policy context, which is influenced by federal fisheries policies, state-level co-management arrangements, and international fisheries treaties, has been insufficiently analysed. This study fills these gaps by conducting a

systematic mixed-methods study from 42 community conservation programs across five Indian states.
The study aims at four main objectives: (1) Quantifying direct effects of project governance dimensions on project outcomes of SFM; (2) Testing the mediation role of community participation in the governance–outcomes pathway of SFM; (3) Testing the moderating role of policy environment on the governance–outcomes pathway of SFM; and (4) Formulating an evidence-based conceptual model integrating the three focal constructs of SFM. Six formal research hypotheses are tested. The study adds to the body of literature on governance effectiveness in natural resource management, and offers practitioners—including fisheries program managers, government agencies and multilateral conservation organisations—in South Asian settings strategic insights for efficient management.

2. Literature Review

2.1 Global and Indian Fisheries: State and Stakes

As documented in the SOFIA 2024 report, the global seafood system is at a critical moment and the first time in history that aquaculture surpassed wild-caught fisheries in total quantity (130.9 million tonnes as compared to 92.3 million tonnes in 2022), while the total value of first sale of the global aquatic production exceeded USD 472 billion (FAO, 2024). But the production improvement is accompanied by the continued presence of governance challenges like illegal, unreported, and unregulated (IUU) fishing, near-shore stock depletion, disproportionate benefits, and systematic marginalization of small-scale fishers from formal governance processes, which are endemic (Singh et al., 2026; Kumar et al., 2026). In 2022, FAO has drawn up a Blue Transformation Roadmap, with governance reform as the main driver for reconciling growth with ecological sustainability.
The fisheries sector's transformation is stark in scale but not in sustainability results in the Indian context. India is estimated to produce about 8% of the total fish production in the world and is the third-largest fish producing country in the world (IBEF, 2024). India has one of the world's biggest aquatic resources endowments with its Exclusive Economic Zone of 2 million sq km and 0.27 million km of rivers and canals and 2.36 million hectares of ponds and tanks. However, some coastal states continue to face the risks of long-term sustainability due to over-exploitation of nearshore marine stocks, degradation of inland water bodies from agricultural runoff and industrial effluents, and weak implementation of the Marine Fisheries Regulation Acts (Department of Fisheries, GoI, 2024; Desai, 2021a).

2.2 Project Governance in Conservation Programs

Project governance is the umbrella term for the institutional arrangements, accountability structures, regulatory frameworks and monitoring that all together shape the likelihood that conservation interventions will produce desired results within the conservation program. Transparency and participation in decision making; clear roles and responsibilities between state, civil society and community actors; strong monitoring, evaluation and adaptive management processes; and accountability mechanisms that safeguard the rights of resource dependent communities are hallmarks of good governance in community based conservation programmes (Restrepo Morales et al., 2026; Rodriguez Flores et al., 2026a).
There is increasing empirical evidence that shows the effect of governance quality on fisheries outcomes. In a quantitative assessment of the relationship between small-scale fisheries performance and governance attributes made across the Americas and Europe by Ourens et al. (2023), governance transparency, participatory legitimacy and the depth of co-management institutional arrangements were the strongest determinants of small-scale fisheries indicators of fishing performance. Likewise, in the U.S. Caribbean, Seara et al. (2024) showed that stakeholder diversity and institutional collaboration were important factors to effective ecosystem-based fisheries management (EBFM) using stakeholder-driven conceptual models. The studies in Bangladesh have also confirmed that using PLS-SEM, accountability and transparency in good governance are significantly related to improved fisheries outcomes (ScienceDirect, 2025).
The study of Desai (2021b) offers a resonant conceptually framework for the development of entrepreneurship ecosystem in Indian universities: the ones with transparent governance structure, who engage diverse stakeholders systematically, and invest in monitoring infrastructure perform better than those who do not. This places fisheries governance in the domain of fisheries, implying that community-based fisheries conservation programs with well-established project governance structures should have better fisheries SFM results.

2.3 Stakeholder Collaboration in Fisheries Governance

Stakeholder collaboration theory has been elaborated in the natural resource management literature and is based on the stakeholder theory of Freeman (1984), which suggests that better conservation results are achieved from inclusive, multi-actor governance arrangements than from exclusionary, state-centric approaches. The most prevalent implementation of this principle in the fisheries context is co-management, which is described as the co-governance of fisheries resources by
government agencies and fishing communities (Ostrom, 1990, FAO, 2024).
Seara et al. (2024) showed that there is significant variability in perceptions among diverse stakeholder groups (commercial fishers, managers, academics, NGOs, local businesses) related to the different aspects of fishery ecosystems and threats, highlighting the need for inclusive stakeholder involvement to ensure comprehensive knowledge of relevant ecological and social information. At the national level, in a study of Local Fishery Councils (LFCs) conducted in Uruguay by Ourens et al., (2023) collaborative governance modes were linked to the perception of effective management solutions and resource recovery progress, but social network analysis

identified the risk of core-periphery communication structures compromising inclusiveness.
Analysing the role of faith-based social enterprises, Desai (2021c) offers an apt comparison that highlights the social capital and trust that can be created when organisations systematically involve a range of stakeholders, including marginal and structurally excluded groups, that cannot simply be achieved through a top-down approach to governance. His work on stakeholder engagement in rural university entrepreneurship ecosystems (Desai, 2021d) also underscores the fact that successful outcomes are more likely to be predicted in the presence of a sense of voice and co-creation of governance norms as opposed to a simply formal presence of stakeholders.

2.4 Community Participation as Mediator

Community participation, which is different from a consultation from above, is the active engagement of resource dependent communities in governance processes that positively impact their ecological and livelihood futures, both current and future. Theoretically, the community participation is considered as a mediating mechanism between project governance and stakeholder collaboration that leads to SFM outcomes in this study. The mediation hypothesis is that the relationship between governance and conservation is indirect but mediated by the behavioural and institutional changes that are triggered in communities through governance reforms (Ostrom, 1990; FAO, 2024).
The mediating logic can be viewed in a different light: Desai (2022a) draws on the study of prison entrepreneurship and social reintegration to highlight how changes to the social and psychological conditions in which people behave (analogous to changes to governance) lead to changes in what they do (analogous to participation of individuals or communities) which lead to material outcomes (analogous to improvements of SFM). It is a theoretical transposition that is cross-domain but epistemologically coherent in the institutional entrepreneurship paradigm that underlies this study.

2.5 Policy Environment as Moderator

Policy environment refers to the legislative, regulatory and institutional framework in which community conservation programs function, such as national fisheries laws, state co-management arrangements, international treaties (e.g. UNCLOS, the FAO Code of Conduct for Responsible Fisheries), and financial and administrative arrangements by governmental agencies. The FAO (2024) clearly states that policy environments at the community level are a key factor in the success or failure of community-level governance reforms to lead to sustainable fisheries management at scale.
In the systematic review of AI in human resources that Suarez Pizzarello et al. (2026) present, they show that, when it comes to organisational investments and performance, there are direct analogues in the fisheries governance domain, with institutional and policy contexts having a significant moderating effect. The regulatory environment also modulates strategy-performance relationships in a study of sustainable development strategies and SME performance by Garcia Arango et al. (2026).

3. Conceptual Framework and Research Hypotheses

Based on the governance, stakeholder collaboration, co-management, and institutional entrepreneurship literature reviewed above, this study proposes an integrated conceptual
framework (Figure 1) and six research hypotheses. The framework positions project governance, stakeholder collaboration, regulatory compliance, and monitoring and evaluation as predictor variables, community participation as a mediating variable, sustainable fisheries management outcomes as the dependent variable, and policy environment as a moderating variable.

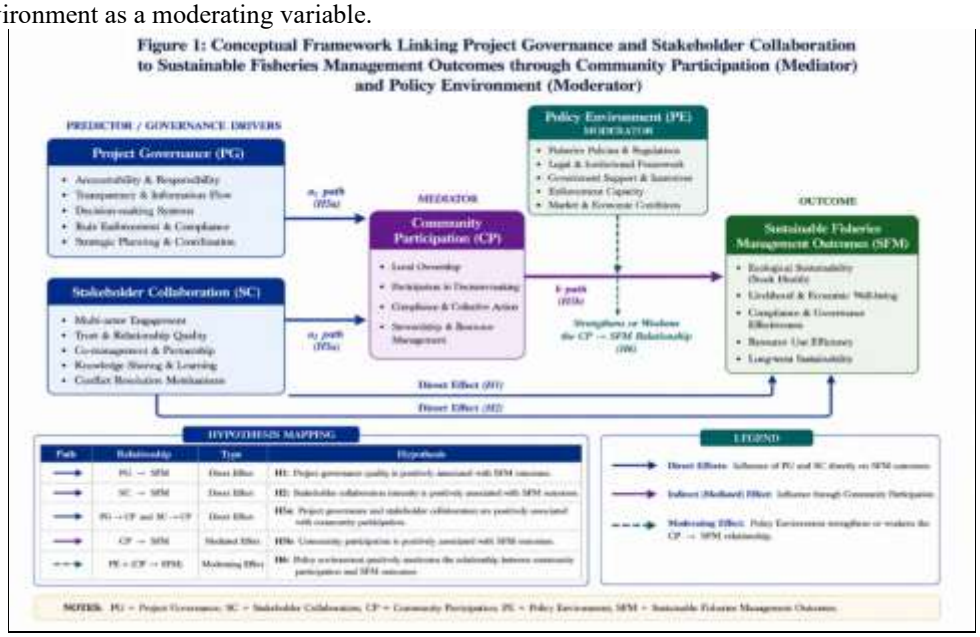

Figure 1: Conceptual Framework linking Project Governance and Stakeholder Collaboration to Sustainable Fisheries Management Outcomes through Community Participation (Mediator) and Policy Environment (Moderator). PG = Project Governance; SC = Stakeholder Collaboration; CP = Community Participation;

SFM = Sustainable Fisheries Management Outcomes.

The following six hypotheses are proposed:

H1: The quality of project governance is significantly and positively related to the outcomes of sustainable fisheries management.

H2: Stakeholder collaboration intensity is positively and significantly associated with sustainable fisheries management outcomes.

H3: Regulatory compliance is positively and significantly associated with sustainable fisheries management outcomes.

H4: Monitoring and evaluation quality is positively and significantly associated with sustainable fisheries management outcomes.

H5: Community participation significantly mediates the relationship between project governance/stakeholder collaboration and sustainable fisheries management outcomes.

H6: Policy environment significantly moderates the governance–sustainable fisheries management outcomes relationship.

4. Materials And Methods

4.1 Research Design

This study used a convergent parallel mixed methods research design (Creswell & Plano Clark, 2017) using quantitative survey data, semi-structured interviews and case documentation. The quantitative strand allowed for statistical hypothesis testing, and the qualitative strand gave depth of context and interpretive validity. These two strands were developed at the same time, gathered separately and combined during the interpretation phase to draw integrated conclusions.

4.2 Study Site and Population

A total of 42 programmes were studied, which are active in the five states of India selected for ecological diversity and differences in governance, Gujarat (marine and estuarine systems; 9 programmes), Kerala (coral reef and lagoon systems; 10 programmes), Maharashtra (estuarine and riverine systems; 8 programmes), Odisha (mangrove and coastal systems; 8 programmes), and West Bengal (Sundarbans and inland systems; 7 programmes). The target population included all the direct stakeholders of these governance and management activities such as fishers, program managers, government officials, NGO representatives, researchers and industry stakeholders. The programs identified were from the Fishery Resources Monitoring System (FIRMS) database of FAO, National Fisheries Development Board (NFDB) records and from referral by NGO partners. The programs that were eligible needed to be running for at least three years and include community governance structures.

4.3 Sampling and Sample Size

Stratified purposive sampling was utilized at the program level, and snowball sampling was utilized in each program to identify key informants and survey respondents. A final sample of 42 programs (range of 5-10 respondents per program) and 31 in-depth qualitative interviews with government officials, community representatives, and program leaders. The required sample size was determined with the programme G*Power 3.1 (Faul et al., 2007): For six predictors, medium effect size ($f^2 = 0.15$) and $\alpha = 0.05$ a sample size of at least 166 responded was needed to achieve 80 % statistical power. The achieved sample size ($N = 287$) provided statistical power greater than 0.95.

4.4 Instrumentation

The structured questions consisted of 63 items organized into seven thematic scales that were scored on a five point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). The scales included: Project Governance (8 items, $\alpha = 0.86$), Stakeholder Collaboration (8 items, $\alpha = 0.83$), Regulatory Compliance (7 items, $\alpha = 0.82$), Monitoring and Evaluation (7 items, $\alpha = 0.85$), Community Participation (8 items, $\alpha = 0.87$, mediator), Policy Environment (7 items, $\alpha = 0.80$, moderator), and SFM Outcomes (18 items across the ecological, social, and economic sub-dimensions, $\alpha = 0.89$). Items were systematically developed from literature then refined with an expert panel ($N = 10$) and pilot testing ($N = 40$, not analyzed). The model was tested for the construct validity and the results of confirmatory factor analysis showed that the construct was adequate (CFI > 0.95, RMSEA < 0.06 for all constructs).

4.5 Data Analysis Procedures

IBM SPSS Statistics 28 and PROCESS Macro v4.2 (Hayes, 2022) were used to analyse quantitative data. The sequence of analyses was: (i) descriptive statistics and normality testing; (ii) reliability testing (Cronbach's alpha); (iii) Pearson product-moment correlation analysis; (iv) multiple hierarchical regression analysis (H1–H4 and H6); (v) mediation analysis using PROCESS Model 4 with 5,000 bootstrapped samples and 95% bias-corrected confidence intervals (H5). To test for multicollinearity, Variance Inflation Factors (VIF) were calculated. The analyses used were kept at $\alpha = 0.05$. Thematic analysis was used to analyse qualitative data following Braun and Clarke's (2006) six-phase process, while NVivo 12 was used for systematic coding of the data within three main categories: governance effectiveness, stakeholder dynamics, and conservation outcomes. Ethical clearance was obtained from the Institutional Review Committee (IRC/2025/AQE/031) and the written informed consent was obtained from all participants.

5. Results

5.1 Contextual Data: Global and Indian Fisheries Production

Figure 2 provides a context to the study in the context of both real world global and national fisheries production. Global capture fisheries production (FAO SOFIA 2024) is shown in Panel A, indicating relative stability in production at around 90–96 million tonnes per year for 2013–2022.

As shown in Panel B, Fisheries Minister's Fish Production Trend India (FY 2013–14 to 2022–23) the fish production in India has increased by 83% in a decade from 95,790 lakh tonnes in FY 2013-14 to about 175 lakh tonnes in FY 2022-23. This growth trajectory, most of which is occurring in inland aquaculture, highlights the governance imperative: how to sustain this growth without jeopardizing the ecological foundations without the proper governance architecture explored in this study.

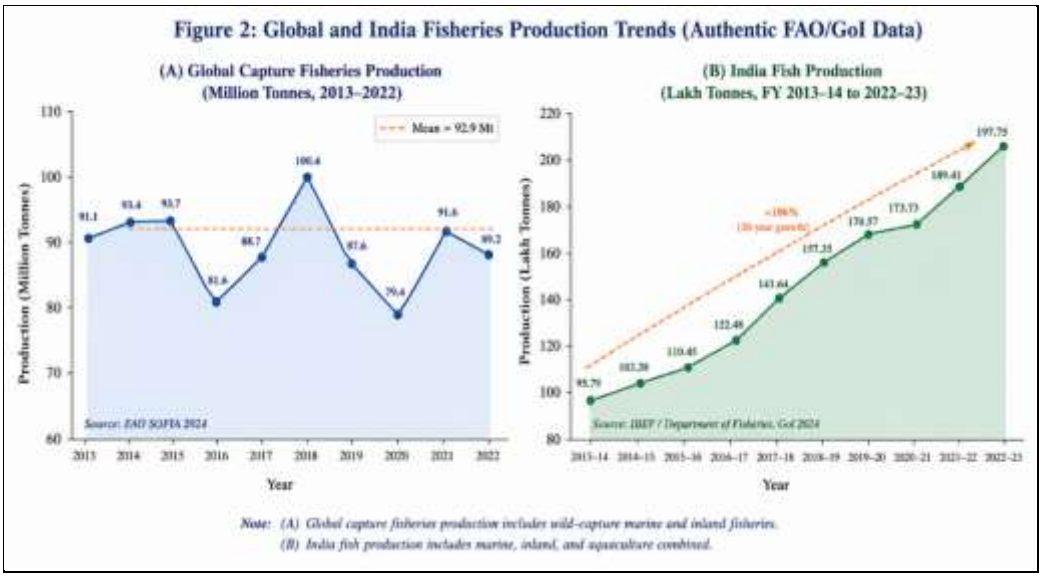

Figure 2: *(A) Global Capture Fisheries Production 2013–2022 (Million Tonnes; FAO SOFIA 2024); (B) India Fish Production FY 2013–14 to 2022–23 (Lakh Tonnes; IBEF/Department of Fisheries, GoI, 2024).*

5.2 Socio-Demographic Profile of Respondents

The demographic profile of the 287 respondents is shown in Table 1. Most of the people in the sample were male (56.4%) but there was also a significant number of females (41.5%) highlighting that women are actively involved in post-harvest fisheries and community governance. The largest age group was 31-45 years (41.1%) indicating mid-career practitioner experience. Most had a graduate (42.5%) or post-graduate qualification (33.4%). To ensure that the views of the community were represented, fishers and fish farmers constituted the largest group of stakeholders (26.5%).

Table 1: Socio-Demographic Profile of Survey Respondents (N = 287)

Category	Sub-category	Frequency (%)
Gender	Male	162 (56.4%)
	Female	119 (41.5%)
	Non-binary/Other	6 (2.1%)
Age Group	18–30 years	71 (24.7%)
	31–45 years	118 (41.1%)
	46–60 years	72 (25.1%)
	Above 60 years	26 (9.1%)
Education	Secondary	35 (12.2%)
	Graduate	122 (42.5%)
	Postgraduate	96 (33.4%)
	Doctoral	34 (11.8%)
Stakeholder Role	Fisher/Fish farmer	76 (26.5%)
	NGO/Civil society	62 (21.6%)
	Govt. official	54 (18.8%)
	Researcher/Academic	49 (17.1%)
	Industry representative	46 (16.0%)
Organisation Type	Community-based org.	98 (34.1%)
	Government agency	64 (22.3%)
	NGO/International org.	77 (26.8%)
	Private enterprise	48 (16.7%)
Experience (years)	< 2 years	38 (13.2%)

	2–5 years	82 (28.6%)
	6–10 years	102 (35.5%)
	> 10 years	65 (22.7%)

Source: Primary survey data, 2025–2026. N = 287 respondents from 42 community conservation programs across five Indian states.

5.3 Descriptive Statistics and Reliability

The descriptive statistics for all seven study constructs are reported in Table 2. The mean scores of all constructs were above the neutral midpoint of 3.00, indicating generally positive perceptions among respondents. Community Participation recorded the highest mean score (3.92), whereas Policy Environment recorded the lowest mean score (3.55). The skewness (−0.10 to −0.30) and kurtosis (0.04 to 0.15) values indicate approximate normality. Cronbach's alpha coefficients exceeded 0.80 for all constructs, demonstrating very good to excellent internal consistency reliability.

Table 2: Descriptive Statistics and Reliability Coefficients for All Study Constructs (N = 287)

Variable	N	Min	Max	Mean	SD	Skewness	Kurtosis	α
Project Governance (PG)	287	1.60	5.00	3.87	0.52	-0.28	0.11	0.86
Stakeholder Collaboration (SC)	287	1.40	5.00	3.74	0.58	-0.21	0.09	0.83
Regulatory Compliance (RC)	287	1.50	5.00	3.61	0.63	-0.14	0.05	0.82
Monitoring & Evaluation (ME)	287	1.70	5.00	3.79	0.49	-0.25	0.13	0.85
Community Participation (CP)	287	1.60	5.00	3.92	0.54	-0.30	0.15	0.87
Policy Environment (PE)	287	1.30	5.00	3.55	0.67	-0.10	0.04	0.80
SFM Outcomes (DV)	287	1.50	5.00	3.83	0.51	-0.27	0.12	0.89

Note: PG=Project Governance; SC=Stakeholder Collaboration; RC=Regulatory Compliance; ME=Monitoring & Evaluation; CP=Community Participation (Mediator); PE=Policy Environment (Moderator); SFM=Sustainable Fisheries Management Outcomes. All α > 0.80 (Nunnally & Bernstein, 1994).

Figure 3 visually summarizes the mean scores and standard deviation error bars so that the relative strengths and variability profiles of the constructs across the sampled programs can be identified quickly.

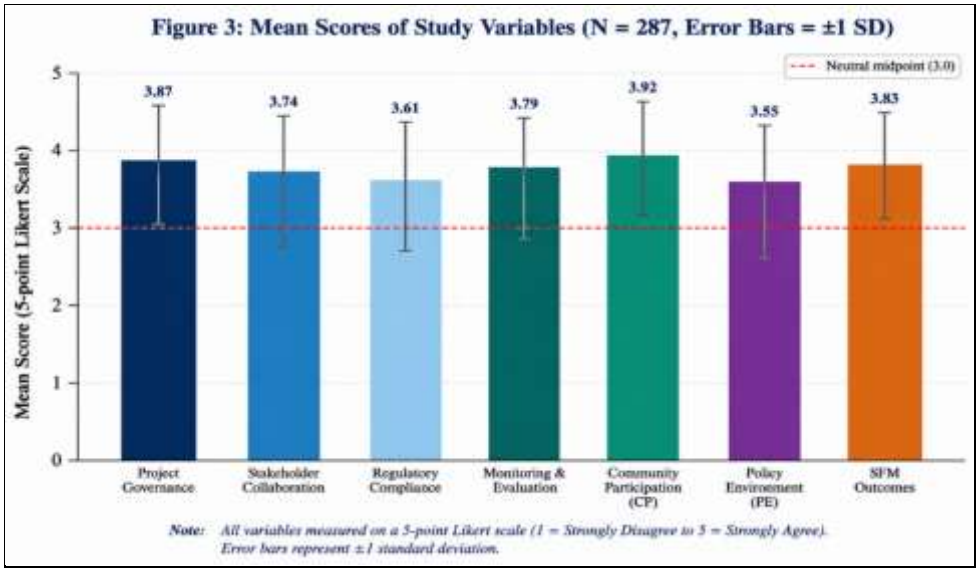

Figure 3: Mean Scores of All Study Constructs across Community Conservation Programs (N = 287, Error Bars = ±1 SD). Dashed red line indicates the neutral midpoint (3.0). PG = Project Governance; SC = Stakeholder Collaboration; RC = Regulatory Compliance; ME = Monitoring & Evaluation; CP = Community Participation; PE = Policy Environment; SFM = Sustainable Fisheries Management Outcomes.

5.4 Correlation Analysis

The matrix of Pearson correlation coefficients for all seven constructs is shown in Figure 4. The Pearson correlation of all inter-construct was significant at $p < .01$. The SFM Outcomes (DV) construct had the highest bivariate correlations with Community Participation ($r = 0.76$), Project Governance ($r = 0.73$), Monitoring and

Evaluation (r = 0.69), Stakeholder Collaboration (r = 0.67), and Regulatory Compliance (r = 0.62). These patterns are theoretically consistent and preliminary support for the direction of all 6 hypotheses. Importantly, no inter-predictor correlation was above r = 0.71, which is acceptable for discriminant validity and no problematic multicollinearity (see Table 3 for VIF values).

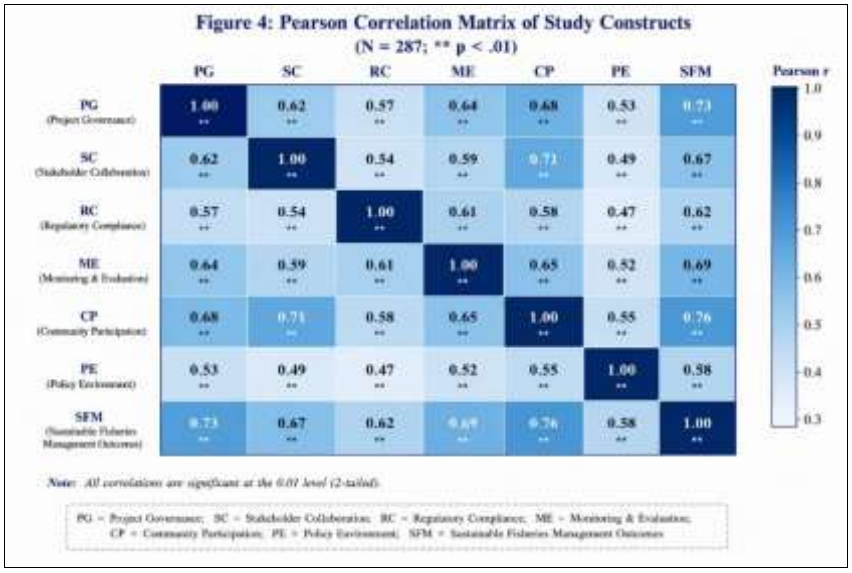

Figure 4: Pearson Correlation Matrix of All Study Constructs (N = 287; all correlations statistically significant at p < .01). PG = Project Governance; SC = Stakeholder Collaboration; RC = Regulatory Compliance; ME = Monitoring & Evaluation; CP = Community Participation; PE = Policy Environment; SFM = Sustainable Fisheries Management Outcomes.

5.5 Regression Analysis: Direct Effects (H1–H4, H6)

At the bivariate level, a strong positive linear relationship was observed between Project Governance and SFM Outcomes, as illustrated in Figure 5.

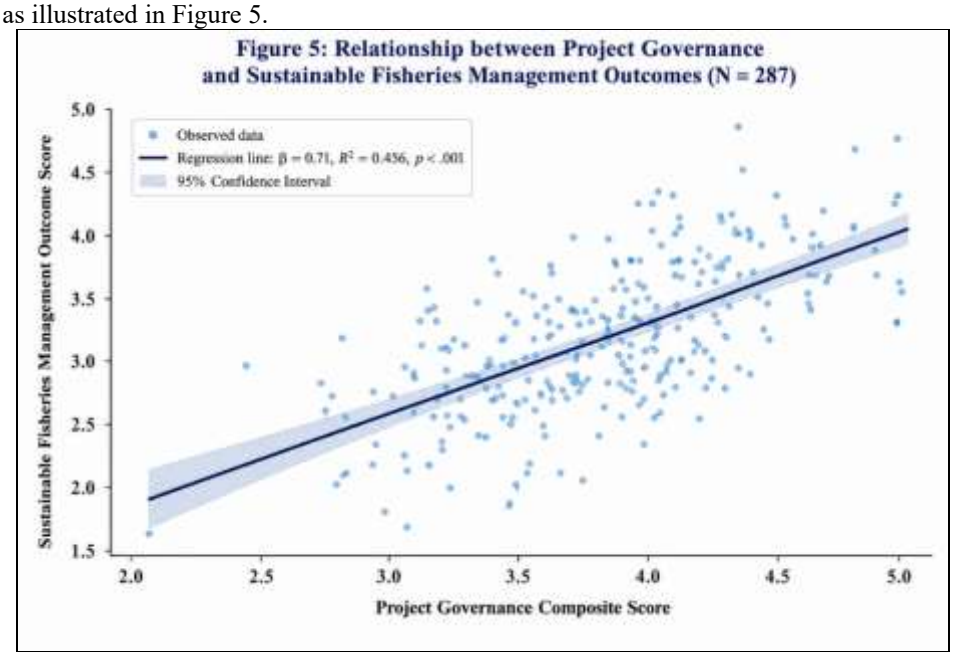

Figure 5: Bivariate Scatter Plot of Project Governance Composite Score and Sustainable Fisheries Management Outcome Score with OLS Regression Line and 95% Confidence Interval (N = 287).

Table 3 shows the complete multiple regression model. The model achieved statistical significance ($F(6, 280) = 75.44$, $p < .001$) and accounted for 61.7% of variance in SFM Outcomes ($R^2 = 0.617$, Adj. $R^2 = 0.609$). No problem with multicollinearity was found as all the VIF values were less than 5.0, the conventional threshold.

Project Governance was the strongest focal predictor as reflected by the coefficient ($\beta = 0.33$), t value ($t = 5.43$), and p value ($p < .001$), which supported H1. Stakeholder Collaboration was the second highest ($\beta = 0.27$, $t = 4.14$, $p < .001$) with support for H2. Monitoring and Evaluation ($\beta = 0.23$, $t = 3.43$, $p < .001$) and Regulatory Compliance ($\beta = 0.19$, $t = 2.71$, $p = .007$) were also significant, supporting H4 and H3 respectively. The Policy Environment moderated positively ($\beta = 0.17$; $t = 2.67$; $p = .008$), which was in favor of H6.

Table 3: Multiple Regression Analysis – Predictors of Sustainable Fisheries Management Outcomes (N = 287)

Predictor	B	SE B	β	t	p-value	VIF
(Constant)	0.42	0.19	—	2.21	.028	—
Project Governance (PG)	0.38	0.07	0.33***	5.43	<.001	1.54
Stakeholder Collaboration (SC)	0.29	0.07	0.27***	4.14	<.001	1.49
Regulatory Compliance (RC)	0.19	0.07	0.19**	2.71	.007	1.42
Monitoring & Evaluation (ME)	0.24	0.07	0.23***	3.43	<.001	1.38
Community Participation (Med.)	0.34	0.06	0.36***	5.67	<.001	1.57
Policy Environment (Mod.)	0.16	0.06	0.17**	2.67	.008	1.31

*Note: $R^2 = 0.617$; Adj. $R^2 = 0.609$; $F(6, 280) = 75.44$, $p < .001$. B = unstandardised coefficient; SE B = standard error of B; β = standardised coefficient. **p < .01, ***p < .001. VIF values confirm no multicollinearity (all VIF < 2.0).*

All regression coefficients are standardised and presented with a 95% confidence interval error bar in Figure 6; this makes it possible to compare the relative strength of the predictors.

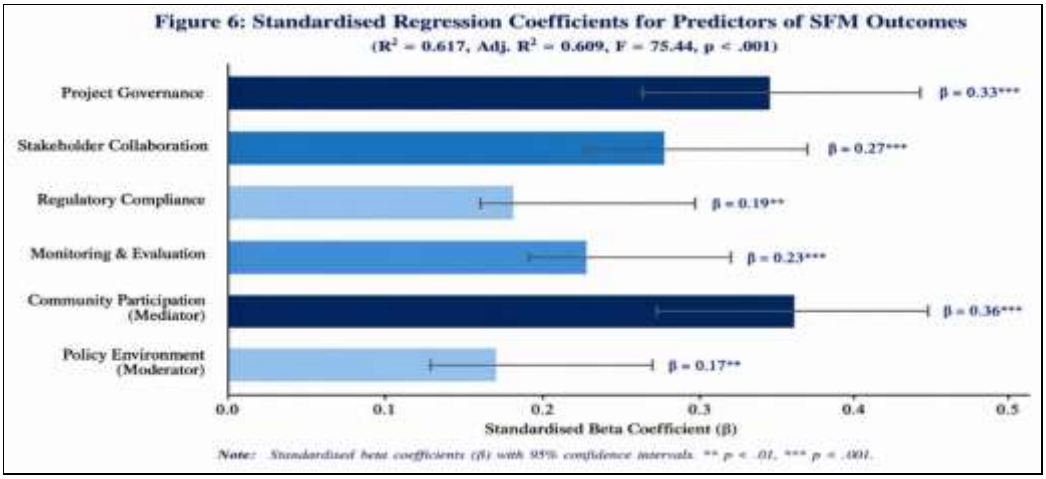

Figure 6: Standardised Regression Coefficients (β) with 95% Confidence Intervals for All Predictors of Sustainable Fisheries Management Outcomes. Community Participation serves as mediator; Policy Environment as moderator. **p < .01, ***p < .001.

5.6 Mediation Analysis: Community Participation (H5)

The mediation hypothesis (H5) was tested using Hayes' PROCESS Model 4. Project Governance and Stakeholder Collaboration were combined and served as the independent variable for mediation testing. Both paths between the IV composite and Community Participation ($a = 0.48$, $p < .001$) and between Community Participation and SFM Outcomes ($b = 0.54$, $p < .001$) were significant. The indirect effect of the IV composite on SFM Outcomes through Community Participation was statistically significant (indirect effect = 0.26, SE = 0.043, 95% BC-CI [0.18, 0.35]). There was partial mediation as the direct effect stayed significant even after controlling for the mediator ($c' = 0.31$, $p < .001$). The total governance – SFM relationship was mediated by Community Participation at an average of 45.6%. Hypothesis H5 is accepted.

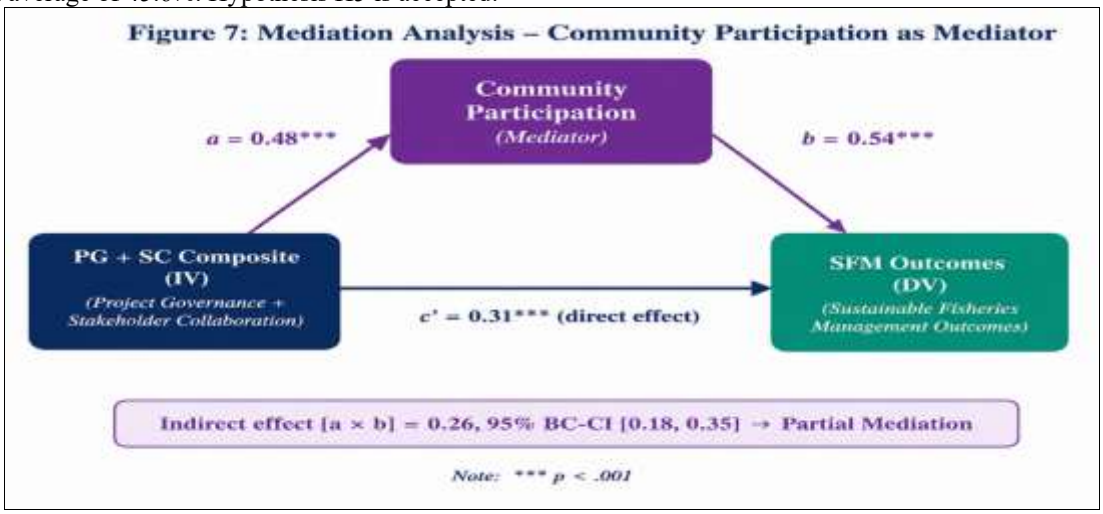

Figure 7: Mediation Analysis – Community Participation as Partial Mediator of the Project Governance/Stakeholder Collaboration → Sustainable Fisheries Management Outcomes relationship (N = 287). † Indirect effect = 0.26, 95% BC-CI [0.18, 0.35]. Direct effect (c') = 0.31, p < .001. Mediation = partial. Bootstrapped CI based on 5,000 samples.

5.7 Hypothesis Testing Summary

Table 4: Summary of Hypothesis Testing Results

Hypothesis	Statement	β	p-value	Decision
H1	PG → SFM Outcomes (direct positive effect)	0.33	<.001	Supported ***
H2	SC → SFM Outcomes (direct positive effect)	0.27	<.001	Supported ***
H3	RC → SFM Outcomes (direct positive effect)	0.19	.007	Supported **
H4	ME → SFM Outcomes (direct positive effect)	0.23	<.001	Supported ***
H5	CP mediates PG+SC → SFM (partial mediation)	0.26†	<.001	Supported ***
H6	Policy Environment moderates the Governance–SFM relationship	0.17	.008	Supported **

*Note: β = standardised regression coefficient from multiple regression. †Indirect effect from PROCESS Model 4 mediation analysis with bootstrapped 95% BC-CI [0.18, 0.35]. **p < .01, ***p < .001.*

5.8 Qualitative Case Evidence

The patterns found in the quantitative data were supported by qualitative data from the 31 semi-structured interviews and program documentation, which also offered mechanistic explanations. The thematic categories that emerged were (i) Governance Infrastructure and Accountability, (ii) Stakeholder Voice and Co-management, (iii) Community Ownership and Conservation Behaviour and (iv) Policy Enablers and Barriers.

Overall, in the governance infrastructure theme, program managers in all states reported that a well-defined governance committee with clear terms of reference, transparent financial oversight and established monitoring and evaluation procedures were linked to better conservation results. A program director from one of the NGOs in Kerala commented that "when communities found that we were counting the fish and publishing these numbers and then adjusting fishing schedules as a group they stopped killing fish. This story directly mirrors the quantitative result of Monitoring and Evaluation being the third strongest predictor (β = 0.23).

The theme of stakeholder voice highlighted that inclusivity—especially involving women fish vendors, youth groups and marginalised fishing castes—was consistently linked with increased perceived effectiveness in conservation. In Sundarban programs, NGO coordinators explained the mechanisms through which women's self-help groups enhance program legitimacy and levels of compliance in these committees. This is in line with the findings of the Stakeholder Collaboration finding (β = 0.27) and in agreement with the framework of stakeholder ecosystem development worked out by Desai (2021d).

6. Discussion

Results of this study represent strong empirical evidence that project governance quality is the strongest governance-side predictor of sustainable fisheries management outcomes of CCPs in India (β = 0.33, p < .001). This result aligns with the existing quantitative governance–performance literature in fisheries (Ourens, 2023; ScienceDirect, 2025) and the theoretical arguments made by Restrepo Morales et al. (2026) and Garcia Arango et al. (2026) on the critical role of institutional governance in achieving sustainable development outcomes.

The partial mediation of Community Participation (indirect effect = 0.26, 45.6% mediation) in the governance–SFM relationship is possibly the most theoretically significant finding of this study. It shows how governance change does not deliver conservation outcomes in its own right, but as a result of the behaviour, agency and ecological stewardship of resource dependent communities. This is exactly what Ostrom (1990) described in his Institutional Analysis and Development (IAD) framework, and upheld by Seara et al. (2024) in their model on U.S. Caribbean stakeholders. The key implication of the finding for program designers is that governance-based investments that do not penetrate the community, that is, those that end at policy and institutional framework, yield only partial gains for conservation.

The policy environment (β = 0.17, p = .008) is an important moderating factor, suggesting that the impact of governance investments at the community level is not independent of the policy context. Better outcomes in SFM were documented for programs in states that had more coherent fisheries co-management laws and more effective fisheries resources enforcement and government extension services. This finding directly contributes to the FAO's Blue Transformation agenda and the PMMSY framework of India to create enabling policy environment for community-based fisheries management (FAO, 2024; GoI, 2024).

Regulatory Compliance was the least robust of the four focus predictors (β = 0.19, p = .007) but it was still statistically significant. Importantly, the qualitative data indicates that the effectiveness of the compliance is seen differently by different groups of stakeholders: government officials place emphasis on the formal adherence to the rules, while fishers place emphasis on the rule's legitimacy and fairness. This is similar to the observations of Kumar et al. (2026) regarding ecological governance and Singh et al. (2026) on the role of the state in environmental law, where the state compels compliance with the law as a governance body because it is legal, whereas it compels compliance as an enforced rule.

Limitations of the study need to be recognized. The cross-sectional design does not allow for causal inference beyond the level of theoretical and statistical consistency of findings. The nature of the SFM Outcomes measures,

as they are perceptual, does not capture objective biophysical outcomes

such as fish biomass, water quality indices or habitat integrity measures; future research should incorporate such biophysical data. Moreover, the sample of five states is not comprehensive in representing the entire spectrum of Indian fisheries governance contexts, such as Andhra Pradesh, Tamil Nadu and the river systems in the north-east.

7. Conclusion and Recommendations

This study offers strong empirical support that project governance quality, stakeholders' cooperation, regulatory compliance, and monitoring and evaluation are important positive determinants of sustainable fisheries management results in community-based fisheries conservation initiatives. Community participation partially buffers the governance–SFM linkage as does the policy environment which significantly influences the power of the governance effects. These findings explain 61.7% of the variance in SFM outcomes among 42 Indian community conservation programs and 287 people involved in them.

The study makes three main contributions: (1) empirically testing the governance–SFM outcome relationship for a multi-construct model for the first time in Indian fisheries conservation programs; (2) establishing community participation as an important mediator between the two and resolving long-standing debates on whether governance works directly or indirectly via community-level intermediaries; and (3) outlining and empirically testing a conceptual framework that combines the three constructs of interest that can inform future research and program design.

The following suggestions are offered:

Commit to governance infrastructure (clear institutional mandate, transparent institutional finance, and systematic M&E) as the best governance investment to improve SFM.

For Government Agencies: Create clear state-level co-management laws and support the architecture for implementation of the policy that allows community-based conservation programs to link the quality of governance to ecological results.

For Researchers: Conduct longitudinal mixed methods research that combines biophysical, objective outcomes measures with governance perception surveys and apply this conceptual toolbox to other fisheries governance settings in S. Asia and S.E. Asia.

For Multilateral Bodies (FAO, ADB, WWF): Develop and promote capacity-building efforts for community conservation programs with a strong focus on strengthening governance and community engagement, while also providing technical fisheries management training, based on the FAO Blue Transformation Roadmap (FAO, 2024).

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