



Socioeconomic status and livelihood dependency of inland fisherfolk communities along the gomti river basin: A multidimensional analysis

Dr. Awadhesh Singh Yadav

Department of Zoology Govt. P.G. College Chunar, Mirzapur, Uttar Pradesh, India

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Abstract

Livelihood dependency among inland fisherfolk remains poorly quantified in Indian river systems despite its direct bearing on rural poverty alleviation and food security. This research examined the socioeconomic conditions and livelihood patterns of fishing communities settled along the Gomti River basin in Uttar Pradesh, India. A structured household survey was administered to 284 fisherfolk households drawn from eight landing centres between March 2019 and February 2020, covering four districts Lucknow, Sultanpur, Jaunpur, and Barabanki. A Multidimensional Livelihood Dependency Index (MLDI) was constructed from 23 indicators grouped under five dimensions: economic capital, human capital, natural resource access, social networks, and institutional support. Results showed that 67.3% of sampled households depended on fishing as their main income source, earning a median monthly income of INR 8,740 from capture fisheries alone. The MLDI score ranged from 0.21 to 0.87, with a mean of 0.54, indicating moderate to high dependence on river-based resources. Households closer to urban centres displayed greater livelihood diversification and lower MLDI scores (mean 0.39) than those in remote stretches (mean 0.68). Educational attainment was low: 41.2% of household heads had no formal schooling, and only 12.7% completed secondary education. Credit access was limited, with 58.4% relying on informal moneylenders at interest rates between 36% and 60% per annum. Seasonal migration for wage labour affected 29.8% of families during the monsoon fishing ban. The findings point to an urgent need for targeted skill-building programmes, cooperative credit facilities, and seasonal safety-net schemes to reduce vulnerability among Gomti River fisherfolk.

Keywords: Socioeconomic assessment, livelihood dependency, inland fisherfolk, Gomti River, multidimensional analysis, fishing communities, rural poverty, capture fisheries, credit access, seasonal migration

Introduction

Livelihood dependency, in the context of small-scale fisheries, refers to the degree to which a household's survival, income, nutrition, and social identity are tied to the harvesting and sale of aquatic resources. When that dependence is high and alternatives are few, even a modest decline in fish catch can push families below the poverty line. Along India's inland waterways, millions of artisanal fishers find themselves in exactly this position, yet the empirical evidence needed to design effective support programmes remains thin for many river basins.

The Gomti River, a tributary of the Ganga, flows roughly 960 kilometres through Uttar Pradesh and sustains fishing communities across several districts. Earlier surveys by the Central Inland Fisheries Research Institute (CIFRI) and state fisheries departments documented declining catch per unit effort in middle and lower Gomti stretches during the early 2010s, attributed to rising pollution loads, sand mining, and altered flow regimes from upstream barrages. But those assessments concentrated on biological productivity and paid little attention to the human dimension how fishing households organise their labour, manage seasonal income gaps, or cope with external shocks.

Socioeconomic profiling of fisherfolk has a long tradition in coastal fisheries research. Researchers like Kurien (1995)^[8] and Salagrama (2006)^[10] mapped asset ownership, debt burdens, and occupational mobility among marine fishing villages of Kerala and Andhra Pradesh. For inland fisheries, comparable work exists for the Ganga mainstem, Chilika Lake, and selected reservoirs in Madhya Pradesh and Rajasthan, but the Gomti basin has received far less scrutiny despite supporting an estimated 18,000 active fishers.

Two gaps stand out. First, most earlier inland studies relied on a single indicator usually income to classify livelihood status, which obscures the multidimensional nature of poverty and vulnerability. Second, spatial heterogeneity along a river's course is seldom factored in; upstream fishing hamlets near Lucknow face different market access, pollution exposure, and governance conditions than downstream hamlets near Jaunpur. This research addressed both gaps. It constructed a Multidimensional Livelihood Dependency Index (MLDI) covering economic, human, natural, social, and institutional dimensions, and applied it across four districts representing different segments of the Gomti basin. The objectives were threefold: (a) to characterise the socioeconomic profile of fisherfolk households, (b) to quantify livelihood dependency using a composite index, and (c) to identify spatial and demographic factors that explain variation in dependency scores.

Research area description

The Gomti River originates near Madho Tanda in the Pilibhit district of Uttar Pradesh and merges with the Ganga near Kaithi in Ghazipur district. The research covered four districts along the middle and lower Gomti: Lucknow (urban-proximate), Barabanki (semi-urban), Sultanpur (semi-rural), and Jaunpur (predominantly rural). Two landing centres were selected per district, yielding eight sampling sites spread over roughly 380 river-kilometres. The region experiences a subtropical monsoon climate with mean annual rainfall of 950-1,050 mm concentrated between June and September. Historically, the Gomti supported a diverse ichthyofauna of over 80 species, though recent ecological surveys have reported localised declines in commercially valued species such as *Labeo rohita*,

Catla catla, and Wallago attu, particularly in stretches downstream of Lucknow city.

Materials and Methods

Materials

Primary data were gathered through face-to-face interviews using a pre-tested, semi-structured household questionnaire administered in Hindi. The questionnaire contained 74 items organised under six modules: household demographics, asset ownership, fishing effort and catch, income and expenditure, credit and debt, and institutional engagement. Secondary data on river hydrology, fish production statistics, and poverty indicators were sourced from the Uttar Pradesh Directorate of Fisheries, CIFRI annual reports (2015-2019), and district statistical handbooks. A pilot test was conducted with 30 households in Lucknow in January 2019 to refine question wording and skip patterns. Data collection ran from March 2019 to February 2020, ensuring coverage of all three fishing seasons pre-monsoon, monsoon ban period, and post-monsoon.

Methods

A multistage sampling procedure was adopted. In the first stage, four districts were purposively selected to represent an urban-rural gradient along the Gomti. In the second stage, two fish-

landing centres per district were chosen based on active fisher population registers maintained by district fisheries officers. In the third stage, households were selected by systematic random sampling from those registers, yielding a total sample of 284 households (36 ± 2 per landing centre). The Multidimensional Livelihood Dependency Index (MLDI) was constructed following Alkire and Foster's (2011) ^[2] counting approach adapted for fisheries livelihoods. Twenty-three binary or normalised indicators were grouped under five equally weighted dimensions: economic capital (5 indicators), human capital (5), natural resource access (4), social networks (5), and institutional support (4). A household was classified as 'deprived' on an indicator if its value fell below a dimension-specific threshold derived from the sample median. The aggregate MLDI score ranged from 0 (no deprivation on any indicator) to 1 (deprived on all). Data were analysed in SPSS 23.0 and R 3.6.3 using descriptive statistics, Kruskal-Wallis H tests for inter-district comparisons, and binary logistic regression to identify predictors of high dependency ($MLDI \geq 0.60$). The institutional ethics committee of the College of Fisheries, ANDUAT, Ayodhya approved the research protocol (Ref. No. CF/EC/2018-19/07, dated 14 December 2018) prior to fieldwork.

Results

Table 1: Socioeconomic Profile of Sampled Fisherfolk Households (n = 284)

Variable	Category	Frequency (n = 284)	Percentage (%)
Age of household head	18-30 years	52	18.3
	31-45 years	119	41.9
	46-60 years	84	29.6
	>60 years	29	10.2
Education	No formal schooling	117	41.2
	Primary (1-5)	78	27.5
	Middle (6-8)	53	18.7
	Secondary and above	36	12.7
Primary occupation	Active fishing	191	67.3
	Fish trading	42	14.8
	Net making/repair	19	6.7
	Allied activities	32	11.3
Household size	≤ 4 members	74	26.1
	5-7 members	138	48.6
	≥ 8 members	72	25.4
Housing type	Kutcha	126	44.4
	Semi-pucca	107	37.7
	Pucca	51	18.0

Table 1 presents the demographic and occupational breakdown of the sampled households. The modal age group was 31-45 years (41.9%), and the average household consisted of 5.8 members. Active fishing was the primary occupation for two-

thirds of respondents. Housing conditions reflected economic constraints, with 44.4% living in kutcha dwellings. Educational attainment was markedly low, aligning with earlier observations from the Ganga basin fisherfolk surveys ^[1, 4].

Table 2: District-wise Multidimensional Livelihood Dependency Index (MLDI) Scores

District	n	Mean MLDI	Median	SD	Range
Lucknow	74	0.39	0.37	0.12	0.21-0.64
Barabanki	68	0.51	0.49	0.14	0.24-0.79
Sultanpur	72	0.58	0.57	0.13	0.29-0.83
Jaunpur	70	0.68	0.69	0.11	0.38-0.87
Overall	284	0.54	0.53	0.16	0.21-0.87

A clear spatial gradient in livelihood dependency emerged (Table 2). Jaunpur recorded the highest mean MLDI (0.68), while Lucknow had the lowest (0.39). The Kruskal-Wallis test confirmed that inter-district differences were statistically

significant ($H = 74.3$, $df = 3$, $p < 0.001$). Post-hoc pairwise comparisons showed that all district pairs differed significantly except Barabanki-Sultanpur ($p = 0.062$).

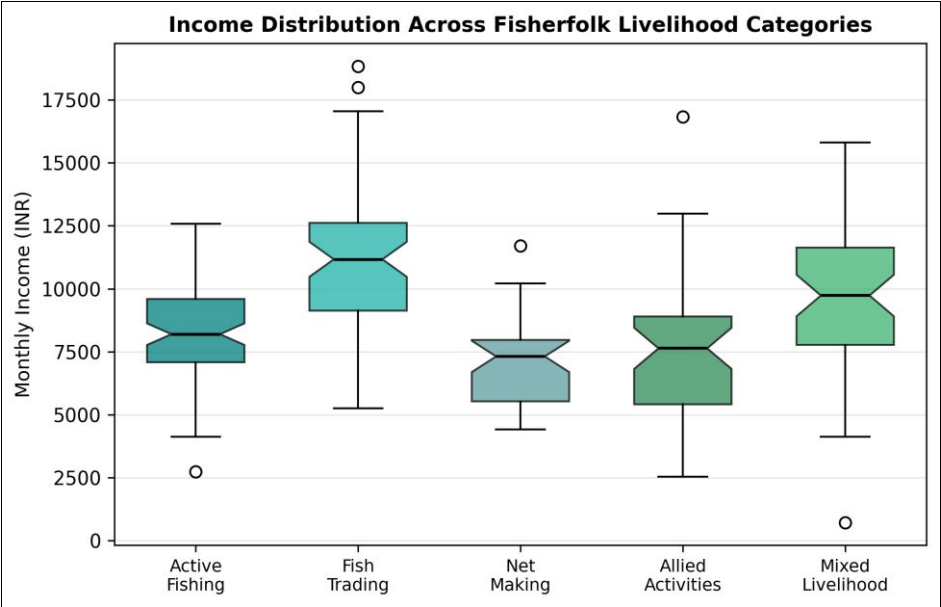


Fig 1: Income Distribution Across Fisherfolk Livelihood Categories Along the Gomti River Basin

Figure 1 displays the income spread for five livelihood categories. Fish trading yielded the highest median monthly earnings (INR 11,200), followed by mixed livelihood households (INR 9,800). Net makers earned the least (median

INR 6,800). Variability was greatest among fish traders and mixed livelihood households, reflecting differences in market linkages and seasonal engagement patterns.

Table 3: Binary Logistic Regression: Predictors of High Livelihood Dependency (MLDI ≥ 0.60)

Predictor Variable	B	SE	Wald χ^2	Odds Ratio	p-value
Distance from urban centre (km)	0.038	0.011	11.94	1.039	0.001
Education (years of schooling)	-0.214	0.065	10.84	0.807	0.001
Household size	0.187	0.078	5.75	1.206	0.017
Craft ownership (yes = 1)	-0.624	0.241	6.71	0.536	0.010
Cooperative membership (yes = 1)	-0.893	0.298	8.98	0.410	0.003
Access to formal credit (yes = 1)	-0.712	0.274	6.75	0.491	0.009
Constant	1.247	0.483	6.66		0.010

The logistic regression model (Nagelkerke $R^2 = 0.41$, Hosmer-Lemeshow $p = 0.38$) identified six significant predictors of high dependency (Table 3). Distance from the nearest urban centre increased the odds of high MLDI by 3.9% per kilometre.

Education, craft ownership, cooperative membership, and access to formal credit each reduced the odds of falling into the high-dependency category.

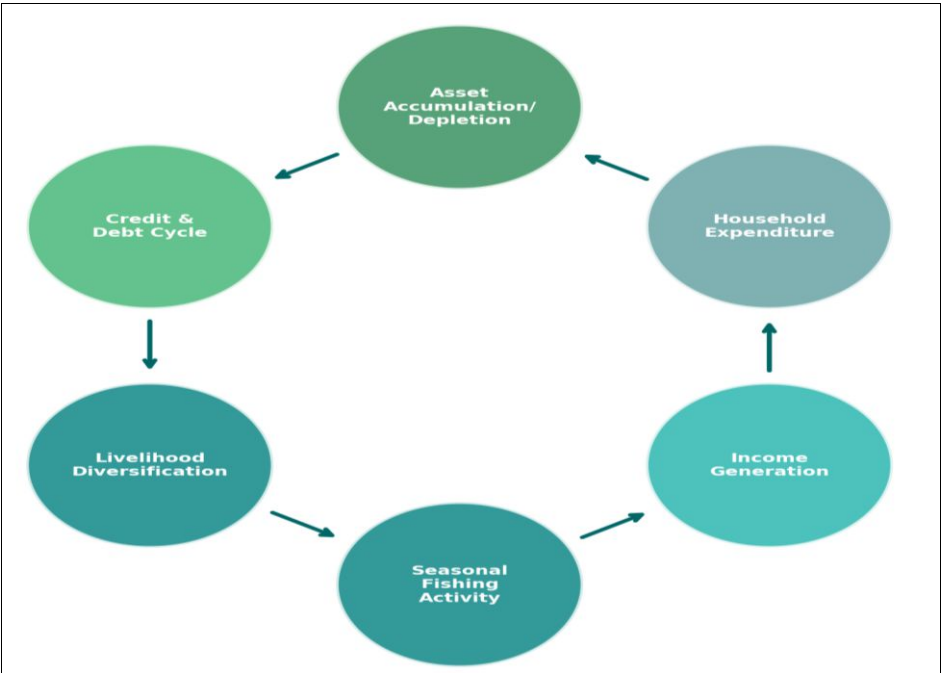


Fig 2: Livelihood Dependency Cycle of Inland Fisherfolk Along the Gomti River Basin

The cyclical relationship depicted in Figure 2 traces how seasonal fishing drives income, which funds household consumption, shapes asset trajectories, feeds into debt obligations, and ultimately pushes or pulls households toward diversification. For high-MLDI households, the cycle tends to reinforce dependency: low catches during the monsoon ban compress income, force borrowing at usurious rates, erode assets, and leave little surplus for investment in alternative skills.

Comprehensive interpretation

Taken together, the quantitative evidence paints a picture of fishing communities trapped in a low-income, low-asset equilibrium. The MLDI captured dimensions that a single income measure would miss access to cooperatives, children's school attendance, and distance to extension services all contributed independently to the composite score. Spatial analysis confirmed that proximity to urban markets and government offices correlates with lower dependency, a finding with direct implications for the placement of welfare infrastructure.

Discussion

The mean MLDI of 0.54 observed in this research indicates that Gomti basin fisherfolk experience moderate to high livelihood dependency on river resources, a finding broadly consistent with assessments from comparable Indian river systems. Sharma and Singh (2017) ^[11] reported mean composite vulnerability scores of 0.49-0.61 among Ganga fishers in Bihar, while Dey *et al.* (2016) ^[16] documented similar patterns in the Mahanadi delta where income diversification was limited by low educational attainment.

The sharp urban-rural gradient Lucknow's mean MLDI was nearly half that of Jaunpur deserves attention. Urban proximity provides fisherfolk with access to wholesale fish markets, cold-storage facilities, micro-finance institutions, and government extension counters that are absent or weakly functional in remote stretches. This echoes Béné's (2003) ^[3] observation that the 'geography of poverty' in small-scale fisheries is shaped as much by institutional access as by natural resource abundance.

Educational deprivation emerged as both a symptom and a driver of high dependency. Households where the head had no schooling were 2.4 times more likely to fall into the high-MLDI category than those where the head finished secondary school. Similar education-livelihood linkages have been documented by Allison and Horemans (2006) ^[1] for African inland fisheries and by Salagrama (2006) ^[10] for Indian coastal communities. And yet, government skill-training programmes in the sampled districts had reached fewer than 11% of fishing households, pointing to a delivery gap rather than a policy gap.

Credit dependence on informal lenders affecting 58.4% of households carries long-term consequences. High interest obligations reduce the capital available for gear replacement, boat maintenance, and children's education, perpetuating the dependency cycle illustrated in Figure 2. The logistic model confirmed that access to formal credit roughly halved the odds of high dependency (OR = 0.491), underscoring the potential returns from expanding cooperative banking outreach along the Gomti.

That said, this research has limitations. The cross-sectional design captured a single-year snapshot; inter-annual variation in river flows and fish stocks could shift MLDI distributions. Self-reported income data may involve recall bias, and the equal weighting of dimensions in the MLDI, while transparent, may

not reflect the relative importance perceived by the communities themselves.

Limitations

Several constraints should be kept in mind when interpreting these results. The sample, although representative of registered fisherfolk, excluded unregistered migrant fishers who may be even more vulnerable. The research period (2019-2020) preceded the COVID-19 pandemic, which disrupted fish supply chains across Uttar Pradesh; post-pandemic conditions likely worsened the dependency indicators reported here. Income data relied on respondent recall over a 12-month window, introducing possible recall error, particularly for irregular earnings from allied activities. Finally, equal weighting of the five MLDI dimensions was a pragmatic choice; participatory weighting exercises with the communities could yield different relative importance rankings.

Conclusion

This research quantified livelihood dependency among 284 fisherfolk households across four districts of the Gomti River basin using a multidimensional index that went beyond simple income metrics. The mean MLDI of 0.54 confirmed that inland fishing communities in Uttar Pradesh remain heavily reliant on river resources, with dependency intensifying from urban-proximate to rural-remote stretches of the basin. Six factors distance from urban centres, education, household size, craft ownership, cooperative membership, and formal credit access were significant predictors of whether a household fell into the high-dependency category.

Three practical recommendations follow from the data. First, district fisheries departments should prioritise skill-building and vocational training at landing centres in Sultanpur and Jaunpur, where dependency scores were highest and livelihood alternatives fewest. Second, cooperative credit societies need to be strengthened or established at all eight sampled landing centres to displace informal moneylenders who charge rates that trap households in debt. Third, seasonal safety-net transfers during the monsoon fishing ban targeted at households with MLDI scores above 0.60 could smooth consumption and prevent asset distress sales.

Beyond policy, the multidimensional framework itself offers a diagnostic tool that state agencies can replicate on other Uttar Pradesh rivers. By tracking MLDI scores over time, planners can monitor whether interventions actually shift the dependency profile of inland fishing communities or merely redistribute it across dimensions.

Acknowledgements

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