

Socio-Economic Analysis of Fish Farmers in Tribal Regions: A Comparative Study of Varanda and Akarsol Ka Naka Reservoirs, Banswara District, Rajasthan

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Abstract:

This study explores the socio-economic characteristics of fish farmers in two major tribal-dominated reservoirs—Varanda and Akarsol Ka Naka—located in the Banswara district of southern Rajasthan. The region is characterised by a high proportion of Scheduled Tribes, limited infrastructure, and reliance on natural water bodies for livelihood. Data was collected on family size, age, education, occupation, experience, income, and cultural demographics. Results highlight significant socio-economic disparities and the need for site-specific development programmes. Varanda Reservoir exhibited lower education levels and less cooperative participation compared to Akarsol Ka Naka. Recommendations are made for educational improvements, institutional support, gender inclusion, and integrated aquaculture practices to promote sustainable livelihoods among the tribal population.

Keywords: Socio-economic status, Tribal aquaculture, Banswara, Reservoir fisheries, Livelihood development, Composite carp culture

I. Introduction:

Fisheries play a critical role in sustaining rural livelihoods, especially in tribal regions of India. In the Banswara district of Rajasthan, reservoirs such as Varanda and Akarsol Ka Naka support hundreds of tribal families who depend on fish farming as a primary or supplementary income source. Despite their potential, these communities face challenges like poor infrastructure, low literacy, and minimal institutional access. Understanding their socio-economic profile is vital to implementing sustainable and inclusive fisheries development policies. This study assesses the socio-economic conditions of these fish farmers, evaluates inter-site differences, and offers policy-oriented solutions to improve their quality of life and aquaculture efficiency.

Study Area: Varanda and Akarsol Ka Naka Reservoirs are located in the Banswara district, a predominantly tribal area with over 76% Scheduled Tribe (ST) population. The Varanda reservoir shows higher tribal homogeneity (78.5%) compared to Akarsol Ka Naka (73.2%), which displays greater caste and religious diversity. Villages surrounding these reservoirs exhibit varied socio-economic structures influenced by geographic accessibility, education, and institutional outreach.

II. Methodology:

Data was collected through structured interviews, focus group discussions, and field observations from January to December 2023. Secondary data from Census 2011 and Panchayat records supplemented primary data. A total of 80 fish farming households (40 from each reservoir) were sampled using purposive sampling. Variables assessed included age, education, income, family size, experience, type of fish culture, marketing practices, and access to credit. Data was analyzed using descriptive statistics and comparative tabulation.

III. Results:

The study of fish production in Arkasol Ka Naka/Varanda reservoir in Dungarpur, Rajasthan, revealed important insights into the aquatic biodiversity and fishery potential of this semi-arid region. A total of 26 fish species belonging to 6 orders and 9 families were documented, with Cyprinidae (15 species including *Catla catla*, *Labeo rohita* and *Cirrhinus mrigala*) being the dominant group. The annual fish yield was estimated at 50-70 metric tons, showing clear seasonal variations with peak production occurring post-monsoon (October-December) and lowest yields during summer months (April-June) due to water scarcity. Indian Major Carps constituted about 60% of the total catch,

followed by exotic species like *Oreochromis mossambicus* (20%) and various catfishes (20%). While the reservoir provides natural breeding grounds supporting moderate fish production, several challenges were identified including summer water shortages, overfishing of key species, and reliance on capture fisheries rather than organized aquaculture. Compared to nearby water bodies like Kagdi Pickup Weir and Bitlab Pond, Arkasol Ka Naka shows intermediate production levels but shares similar dominance of cyprinid species. To enhance sustainable production, recommendations include adopting cage culture techniques, regular stocking of

fingerlings, implementing fishing regulations, and improving water conservation measures. The reservoir holds good potential for expanded aquaculture if proper management strategies are implemented, particularly for commercial carp farming and introduction of high-value species. Future research should focus on developing climate-resilient fisheries practices to address the challenges posed by the region's semi-arid conditions and increasing temperatures. This study provides a baseline for understanding the fishery ecology of this important but understudied water resource in southern Rajasthan.

Community Composition:

Community Category	Varanda Reservoir (%)	Akarsol Ka Naka Reservoir (%)
Scheduled Tribes (ST)	78.5	73.2
Scheduled Castes (SC)	3.8	5.2
Other (Non-ST/SC)	17.7	21.6
Hindu	95.3	94.1
Muslim	2.1	3.4
Christian	1.5	1.0
Others	1.1	1.5

Socio-Economic Profile:

Parameter	Varanda Reservoir (%)	Akarsol Ka Naka Reservoir (%)
Small family (<4 members)	56	48
Medium family (4–6 members)	34	40
Large family (>6 members)	10	12
Age (21–30 years)	20	25
Age (31–50 years)	58	55
Age (>50 years)	22	20
Below matriculation	66	54
Matriculation to college level	26	36
Graduation and above	8	10
Part-time fish farmers	45	35
Full-time fish farmers	55	65
Experience < 5 years	30	25
Experience 5–8 years	50	47
Experience > 8 years	20	28
Composite carp culture	68	76
Integrated fish farming	12	16
No culture diversification	20	8

The socio-economic and demographic profiles of communities dependent on the Varanda and Akarsol Ka Naka reservoirs reveal significant patterns in their composition and livelihoods. In both areas, Scheduled Tribes (ST) form the majority, comprising 78.5% of the population around Varanda and 73.2% around Akarsol Ka Naka, followed by Scheduled Castes (SC) at 3.8% and 5.2%, respectively, with the remaining population belonging to other non-ST/SC categories. Religiously, Hindus dominate at 95.3% in Varanda and 94.1% in Akarsol Ka Naka, with small Muslim,

Christian, and other minority communities. Family structures vary slightly, with Varanda having a higher proportion of small families (56%) compared to Akarsol Ka Naka (48%), while medium and large families are more common in the latter. The working-age population (31–50 years) constitutes the largest segment in both regions (58% in Varanda and 55% in Akarsol Ka Naka), with younger populations (21–30 years) slightly more prevalent in Akarsol Ka Naka. Education levels remain low, with 66% in Varanda and 54% in Akarsol Ka Naka having below matriculation qualifications, though the latter shows

marginally higher rates of secondary and higher education.

Fishing practices differ between the two reservoirs, with Akarsol Ka Naka having a higher proportion of full-time fish farmers (65%) compared to Varanda (55%). Experience levels are somewhat higher in Akarsol Ka Naka, where 28% of farmers have over eight years of experience, compared to 20% in Varanda. Composite carp culture is the dominant practice, adopted by 68% of farmers in Varanda and 76% in Akarsol Ka Naka, while integrated fish farming is more common in the latter (16% vs. 12%). Notably, Akarsol Ka Naka has a lower proportion of farmers (8%) without diversified aquaculture practices compared to Varanda (20%), suggesting a greater adoption of varied fish farming techniques in the former. These socio-economic insights highlight the distinct community structures and livelihood strategies shaping fisheries management in the two reservoirs.

1. **Fish Production:** Both reservoirs yield 50-70 MT annually, dominated by Indian Major Carps (60%), with higher post-monsoon productivity but summer shortages due to water scarcity.
2. **Biodiversity:** Arkasol/Varanda hosts 26 fish species (Cyprinidae dominant), similar to nearby water bodies but with intermediate production levels.
3. **Community Profile:** ST communities comprise ~75% of the population; Akarsol has more full-time fishers (65% vs. 55%) and experienced farmers (28% with >8 years vs. 20%).
4. **Farming Practices:** Composite carp culture dominates (68–76%), but Akarsol shows better adoption of diversified aquaculture (8% non-diversified vs. 20% in Varanda).
5. **Challenges:** Both face water scarcity and overfishing; Akarsol demonstrates marginally better education and integrated farming, suggesting stronger potential for aquaculture expansion.

IV. Discussion:

The socio-economic profiles reveal that while both reservoirs are tribal-dominated, Akarsol Ka Naka shows relatively better outcomes in education, income diversification, and adoption of integrated practices. Varanda has more full-time farmers but suffers from greater educational deficits and less access to extension services. Cultural homogeneity in Varanda may hinder diversification and exposure to new practices. The higher presence of caste and religious diversity in Akarsol Ka Naka seems to coincide with higher income levels and education, possibly due to mixed-community interactions and better information dissemination.

Access to institutional credit remains a significant barrier in both sites. Very few respondents were aware of government schemes or cooperative

memberships. Training programs and financial literacy workshops could play a crucial role in empowering these communities. Women's participation is minimal in both sites, indicating the need for gender-focused interventions. Overall, the disparities necessitate site-specific developmental approaches rather than a uniform policy implementation.

Importance of the Study: This research provides essential insights into the current status of tribal fish farmers in southern Rajasthan. It highlights socio-economic gaps, resource access inequality, and opportunities for developmental intervention. The study acts as a benchmark for future comparative and impact assessment studies in inland fisheries across tribal belts in India.

V. Recommendations:

- Promote adult education and vocational aquaculture training.
- Provide targeted micro-finance and credit facilities through cooperatives.
- Construct fish landing centers and cold storage units.
- Train farmers in cage and pen culture and other advanced techniques.
- Establish inclusive cooperatives that include women and youth participation.
- Create mobile advisory services and multilingual extension materials.

Future Prospects: The study areas have immense potential for aquaculture-led livelihood upliftment. With institutional support, the introduction of cage culture, and market linkages, these reservoirs can serve as models for tribal aquaculture development. Government and NGO collaboration will be vital. A strong focus on climate resilience, water conservation, and integrated resource use will determine long-term success.

VI. Conclusion:

The socio-economic analysis of fish farmers in Varanda and Akarsol Ka Naka highlights the urgent need for site-sensitive and inclusive fisheries development policies. Education, cooperative support, gender inclusion, and access to modern aquaculture technologies are pivotal for improving livelihoods in these tribal areas.

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