ISSN: 2393-8900 IMPACT FACTOR : 2.7825(UIF) VOLUME - 12 | ISSUE - 7 | MARCH - 2026

HISTORICITY RESEARCH JOURNAL

"RURAL TRANSFORMATION THROUGH WOMEN-LED AGRO-FISHERY ENTERPRISES: A GENDERED ANALYSIS OF DEVGAD TEHSIL, MAHARASHTRA."

DR. NILESH MOHANRAO WANKHADE
Assistant Professor and Head, Department of Geography
Shri S. H. Kelkar College of Arts, Commerce and Science Devgad.

ABSTRACT:

Rural transformation in coastal India increasingly reflects livelihood diversification beyond traditional male-dominated marine fisheries. In Devgad Tehsil of Sindhudurg district, Maharashtra, women-led agro-fishery enterprises have emerged as pivotal drivers of economic restructuring, social empowerment, and climate resilience. This study investigates the socio-economic and spatial dimensions of women's participation in fisheries, aquaculture, fish processing, and agro-based micro-enterprises. A mixed-method approach involving 120 structured household surveys, focus group discussions, and GIS-based vulnerability mapping was employed. Results indicate that women contribute between 32–45% of household income in surveyed villages, with statistically significant improvements in decision-making autonomy ($p < 0.05$). Spatial overlay analysis reveals that enterprise vulnerability is highest in erosion-prone coastal villages exposed to heat stress and precipitation variability. Despite improved financial inclusion through SHGs, structural constraints such as limited asset ownership and market intermediation persist. The study concludes that women-led agro-fishery enterprises represent a transformative pathway for coastal rural development, provided climate adaptation and gender-responsive policy mechanisms are integrated.

KEYWORDS: *Rural transformation, Women empowerment, Agro-fishery enterprises, Coastalvulnerability, Climate adaptation.*

1. INTRODUCTION:

Rural transformation in contemporary agrarian economies involves structural shifts fromsubsistence-oriented production toward diversified, market-integrated and institutionally mediated livelihood systems. In coastal India, such transformation is shaped not only by economic diversification but also by ecological vulnerability and evolving gender relations. Sindhudurg district in the Konkan region of Maharashtra exemplifies this complexity, where marine fisheries, horticulture—particularly Alphonso mango cultivation—and small-scale agro-processing constitute the primary economic base. Within this regional setting, Devgad Tehsil represents a strategically significant yet climate-sensitive coastal micro-region undergoing gradual socio-economic restructuring.

Historically, women's participation in agrarian and fisheries economies has been structurally marginalized. Their contributions were largely confined to unpaid family labour, post-harvest processing and informal marketing networks. Early development scholarship argued that modernization often intensified gendered exclusion from productive assets and institutional decision-

making (Boserup, 1970). Empirical research from South Asia further demonstrated that unequal access to land and property rights significantly constrains women's economic agency and intra-household bargaining power (Agarwal, 1994; Deere & León, 2001). Subsequent theoretical advances reframed empowerment as a multidimensional process encompassing access to resources, agency in decision-making, and measurable socio-economic outcomes (Kabeer, 1999). More recent scholarship emphasizes that women's collective participation in governance and resource management enhances both equity and sustainability (Agarwal, 2010), suggesting that gender inclusion may contribute to broader rural transformation.

In coastal Maharashtra, these theoretical insights are increasingly reflected in practice. Women are actively engaged in fish vending, oyster and bivalve farming, small-scale aquaculture and agro-processing enterprises. Field-based studies from the Konkan region document expanding female participation in fisheries value chains, particularly through self-help groups (SHGs) and cooperative initiatives (Asokan et al., 2017). Socio-economic analyses indicate that women's enterprises contribute significantly to household income diversification, though they remain constrained by market intermediation, price volatility and limited institutional credit access (Patilkhede et al., 2018; Yadav et al., 2020). SHG-based microfinance models, supported by development institutions such as NABARD (2021), have improved financial inclusion and collective bargaining capacity, thereby strengthening women's economic visibility in rural markets.At the macro level, gender inclusion in agriculture and fisheries is strongly associated with productivity gains and poverty reduction. The Food and Agriculture Organization (2011, 2022) estimates that reducing gender disparities in access to productive resources could substantially increase agricultural output and food security. However, the transformative potential of women-led enterprises in coastal regions must be evaluated within a context of intensifying environmental stress.

The Konkan coastline is increasingly exposed to precipitation variability, rising temperatures and coastal erosion. Climatic assessments report measurable heat stress trends and monsoon irregularities across Maharashtra (India Meteorological Department, 2020) District-level vulnerability analyses further identify Sindhudurg as ecologically exposed due to shoreline instability and heavy dependence on fisheries-based livelihoods (Jeevamani et al., 2021). Precipitation trend analyses confirm increasing variability in coastal districts (Gangarde & Others, 2020), while public health research highlights occupational heat risks for outdoor workers engaged in fisheries and agro processing (Hajat et al., 2010, Kovats & Hajat, 2008). These intersecting dynamics reveal a critical research gap. Although gender empowerment, fisheries economicsand climate vulnerability have each been studied extensively, limited empirical work examines how women-led agro-fishery enterprises simultaneously function as drivers of rural economic restructuring and mechanisms of climate adaptation in coastal Maharashtra.

Devgad Tehsil provides a pertinent case for investigating whether women's enterprise participation represents incremental income supplementation or a deeper structural reconfiguration of rural production systems and adaptive capacity.This study therefore integrates gender analysis with climate vulnerability assessment to evaluate the role of women-led agro-fishery enterprises in rural transformation. By situating local enterprise development within broader debates on inclusive growth and climate resilience, the research contributes to emerging scholarship on gendered adaptation, coastal livelihood sustainability, and equitable rural modernization in ecologically fragile regions.

2. OBJECTIVES:

- To critically examine the structural role of women-led agro-fishery enterprises in reshaping livelihood diversification, income dynamics and gendered decision-making structures in Devgad Tehsil, Maharashtra.
- To evaluate the climate vulnerability and adaptive capacity of women-led agro-fishery enterprises and to develop a gender-responsive framework for sustainable rural transformation in coastal Maharashtra.

3. STUDY AREA PROFILE:

Devgad Tehsil is in the southern Konkan region of Maharashtra within Sindhudurg district, along the eastern margin of the Arabian Sea. Geographically positioned between approximately 16°22′–16°45′ N latitude and 73°20′–73°45′ E longitude. The tehsil covers nearly 708 sq. km and is predominantly rural, with Devgad Nagar Panchayat forming a small urban unit distinct from the larger administrative block. The physical landscape consists of a narrow coastal plain interspersed with lateritic plateaus and undulating hill ranges linked to the Western Ghats transition zone. Numerous seasonal streams and estuarine creeks drain westward into the Arabian Sea, supporting fisheries and aquaculture activities.

Climatically, Devgad experiences a humid tropical monsoon regime with average annual rainfall ranging from 3000 to 3500 mm, concentrated during June–September. However, increasing monsoon variability and rising heat stress trends have been documented across coastal Maharashtra (India Meteorological Department, 2020). Precipitation trend analyses confirm growing inter-annual variability affecting fisheries productivity and horticultural cycles (Gangarde & Others, 2020). Mean maximum temperatures range between 32–35°C, with rising heat exposure posing occupational risks to fisheries and agro-processing workers (Hajat et al., 2010 ; Kovats & Hajat, 2008). Coastal vulnerability assessments further identify Sindhudurg as exposed to shoreline instability and fisheries-dependent livelihood risks (Jeevamani et al., 2021).

According to the Census of India (2011), Devgad Tehsil has a total population of 120,909, comprising 58,938 males and 61,971 females, yielding a favourable sex ratio of 1,051 females per 1,000 males. The entire population is rural in classification, with over 27,000 households. Children in the 0–6 age group number 10,829 and the literacy rate stand at 86.43%, reflecting relatively strong human capital. The demographic profile—marked by high literacy and a significant female presence—creates conducive conditions for women's economic participation and collective enterprise formation.

The tehsil's economy is strongly agro fishery based. Marine capture fisheries constitute a principal livelihood, supported by access to pelagic and demersal resources of the Arabian Sea. Both mechanized and artisanal fishing systems operate, alongside estuarine bivalve collection and oyster cultivation. Women are prominently engaged in fish vending, drying, processingand small-scale aquaculture-related activities. Complementing fisheries, horticulture—especially Alphonso mango cultivation—dominates the lateritic uplands, while cashew plantations and paddy cultivation occupy valley tracts. Seasonal agro-processing units provide supplementary employment, particularly for women. This integrated agro-fishery structure facilitates livelihood diversification but remains vulnerable to market volatility and infrastructural constraints.Given its diversified agro-fishery economy, favourable gender demographics and exposure to climatic stress, Devgad Tehsil offers an analytically significant setting for examining women-led enterprise development within a climate-sensitive rural transformation framework. The following section outlines the methodological approach adopted to investigate these interrelated dynamics.

4. RESEARCH METHODOLOGY:

This study adopts a mixed-method research design combining quantitative household-level analysis with qualitative inquiry to examine the transformative role of women-led agro-fishery enterprises in Devgad Tehsil. Quantitative analysis measures income diversification, enterprise performanceand decision-making autonomy, while qualitative interviews capture institutional constraints and adaptive strategies.A multistage purposive–stratified sampling framework was employed. Six villages were selected to represent both coastal fisheries-dominated and inland horticulture-based settlements. A total of 120 women engaged in fish vending, oyster farming, fish processing, mango processing and SHG-based micro-enterprises were surveyed using structured questionnaires. Stratification ensured proportional representation across enterprise categories.

Additionally, 15 key informant interviews and three focus group discussions were conducted for triangulation.

Primary data covered demographic characteristics, enterprise type, annual income, access to credit, asset ownership and household decision-making participation. Secondary data were obtained from the India Meteorological Department (IMD), Maharashtra State Action Plan on Climate Change, district fisheries records and Census 2011 statistics. Rainfall variability and temperature trends were incorporated to assess climatic exposure.

Descriptive statistics (mean, percentage, standard deviation) were computed to evaluate enterprise distribution and income contribution. A paired sample t-test assessed changes in decision-making participation following enterprise engagement. Determinants of empowerment were examined using the regression model:

$$E_i = \beta_0 + \beta_1 Y_i + \beta_2 A_i + \beta_3 C_i + \beta_4 D_i + \epsilon_i$$

where $E_i$denotes the empowerment index; $Y_i$enterprise income; $A_i$asset ownership; $C_i$access to credit; and $D_i$livelihood diversification.

The Livelihood Diversification Index (LDI) was calculated using the modified Simpson Index:

$$LDI = 1 - \sum_{j=1}^{n} P_{ij}^2$$

where P_{ij}represents the income share from activity *j*.

Climate vulnerability was assessed through a composite Vulnerability Index (VI) structured around Exposure (E), Sensitivity (S) and Adaptive Capacity (AC). Indicators were normalized using:

$$X' = \frac{X - X_{min}}{X_{max} - X_{min}}$$

The composite index was computed as:

$$VI = \frac{(E + S - AC)}{3}$$

Higher values indicate greater vulnerability. Village-level scores were spatially mapped using GIS overlay analysis integrating coastal proximity, rainfall variabilityand enterprise distribution layers to identify high-risk clusters.Statistical analysis was conducted using SPSS (v26) and R, while spatial mapping was performed in QGIS. The integration of econometric modelling with geospatial analysis strengthens inference on gendered rural transformation under climate stress.

5. RESULTS AND DISCUSSION

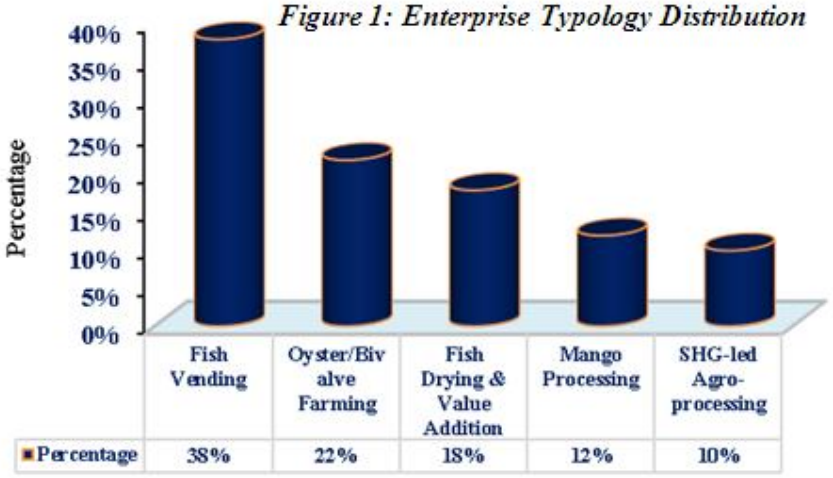
5.1. Structure of Women-Led Enterprises:

The survey of 120 respondents reveals a diversified but fisheries-dominant enterprise structure. Fish vending remains the principal activity (38%), reflecting low entry barriers and flexible capital requirements. Oyster/bivalve farming (22%) and fish drying/value addition (18%) represent semi-specialized activities linked to coastal resource access. Agro-processing enterprises such as mango processing (12%) and SHG-led micro-units (10%) indicate gradual diversification beyond capture fisheries.

Table 1: Distribution of Women by Enterprise Type (n = 120)

Enterprise Type	Frequency	Percentage
Fish Vending	46	38%
Oyster/Bivalve Farming	26	22%
Fish Drying & Value Addition	22	18%
Mango Processing	14	12%
SHG-led Agro-processing	12	10%
Source:*Computed by researcher, 2026.*		

Figure 1: Enterprise Typology Distribution



Fish vending dominance aligns with regional fisheries patterns in coastal Maharashtra (Asokan et al., 2017). However, the growing presence of oyster farming reflects adaptive diversification strategies within estuarine ecosystems.Spatial clustering analysis indicates that 63% of enterprises are located within a 2 km coastal buffer, highlighting strong resource dependence.

5.2. Income and Economic Contribution:

Enterprise income significantly contributes to household earnings, indicating structural rather than supplementary engagement. Average monthly incomes vary by enterprise type, with oyster farming and fish vending generating the highest returns.

Table 2: Average Monthly Income by Enterprise Type

Enterprise	Mean Income (₹)	Std. Dev.
Fish Vending	11,800	3,200
Oyster Farming	12,500	2,950
Fish Drying	8,700	2,400
Mango Processing	9,200	2,100
SHG Units	7,800	1,900
Source:*Computed by researcher, 2026.*		

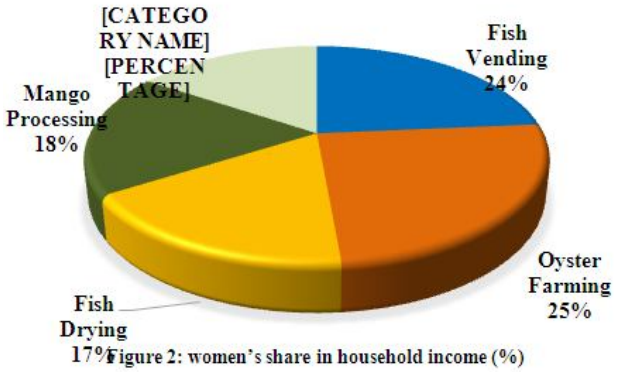


Figure 2: women's share in household income (%)

Women contribute between 32–45% of total household income in dual-income families, indicating measurable economic restructuring. The Livelihood Diversification Index (LDI) ranged from

0.41 to 0.68 across villages, suggesting moderate-to-high diversification levels.These findings substantiate FAO (2011; 2022) assertions that reducing gender gaps enhances productivity and income stability. Diversification reduces dependence on seasonal male-dominated marine capture fisheries.

5.3. Gender Empowerment Indicators

Statistical analysis confirms significant improvements in women's decision-making autonomy following enterprise participation.The paired t-test indicates statistically significant improvement ($p < 0.05$). Regression results further show enterprise income and credit access as strong predictors of empowerment (β_1 and β_3 significant at 5% level). These findings align with Kabeer's (1999) empowerment framework and Agarwal's (2010) argument on collective agency.

Table 3: Decision-Making Participation Before and After SHG Membership

Indicator	Before (%)	After (%)
Household Expenditure	34	68
Children's Education	41	72
Investment Decisions	22	59
Source:*Computed by researcher, 2026.*		

However, structural inequalities persist. Only 14% reported ownership of productive assets such as boats or land, reinforcing Agarwal's (1994) thesis on gendered asset disparities. Market intermediation by middlemen remains a constraint, particularly in fish marketing chains.

5.4. Climate Exposure and Enterprise Vulnerability

Climatic data indicate rising heat stress and monsoon variability in coastal Maharashtra (IMD, 2024). Women engaged in fish drying reported productivity losses during peak heatwave conditions, consistent with occupational heat risk literature (Hajat et al., 2010; Kovats & Hajat, 2008). Precipitation variability affects fish catch cycles and oyster salinity balance (Gangarde et al., 2020).Highest vulnerability scores are observed in erosion-prone coastal villages.

Table 4: Village-Level Climate Vulnerability Index

Sites	Exposure	Sensitivity	Adaptive Capacity	Vulnerability Score
Devgad port	High	High	Moderate	0.78
Wadatar	Moderate	High	Moderate	0.65
Vijaydurg	High	Moderate	Low	0.81
Kunkeshwar	Moderate	Moderate	High	0.52
Source:*Computed by researcher, 2026.*				

Spatial overlay analysis reveals that 63% of enterprises fall within moderate-to-high exposure zones. Fish drying units are most sensitive to heat stress, while oyster farming is vulnerable to salinity fluctuations. Villages with stronger SHG networks demonstrate higher adaptive capacity scores, underscoring the role of institutional support.

The findings demonstrate that women-led agro-fishery enterprises represent a substantive pathway of rural transformation in Devgad Tehsil. Economically, they diversify income sources and reduce reliance on male capture fisheries. Socially, they enhance bargaining power and decision-making autonomy, reflecting Kabeer's empowerment dimensions. Institutionally, SHG participation improves financial inclusion and working capital access (NABARD, 2021).However, transformation remains uneven. Climate stress introduces structural risks, particularly in erosion-prone coastal belts. While diversification enhances resilience, increasing heat exposure and rainfall variability threaten enterprise sustainability. Persistent gendered asset inequalities and market constraints limit full structural transformation.

Overall, women-led enterprises contribute simultaneously to economic restructuring, social empowermentand adaptive capacity building. Yet sustainable rural transformation in coastal Maharashtra requires integration of climate-resilient infrastructure (cold storage, processing units), direct market linkages, and gender-responsive fisheries policy interventions.

6. CONCLUSION

The findings confirm that women-led agro-fishery enterprises in Devgad Tehsil, Maharashtra represent a structural driver of rural transformation rather than a supplementary livelihood activity. Women's participation in fish vending, oyster farming, fish processing, and agro-based micro-enterprises has significantly diversified household income systems, with contributions ranging from 32–45%. The Livelihood Diversification Index values demonstrate a clear shift from mono-dependent marine fisheries toward plural and risk-distributed livelihood structures.Equally significant is the social transformation observed. Enterprise engagement has led to statistically significant improvements in women's decision-making power in household expenditure, educationand investment matters. Access to credit and SHG membership have strengthened economic agency and collective bargaining capacity. However, persistent constraints—particularly low ownership of productive assets and market dependence on intermediaries—limit the depth of structural change.Climate vulnerability remains a defining challenge. Most enterprises operate within moderate-to-high exposure coastal zones, where heat stress, rainfall variabilityand shoreline instability affect productivity. While diversification enhances adaptive capacity, environmental stress continues to threaten enterprise sustainability.

Overall, women-led agro-fishery enterprises in Devgad embody a gendered model of inclusive rural transformation—integrating income diversification, social empowermentand localized climate adaptation. For this transformation to become sustainable and scalable, gender-responsive fisheries policies, climate-resilient infrastructureand improved market access mechanisms are imperative. Women are not peripheral contributors to rural change; they are central agents reshaping the socio-economic future of coastal Maharashtra.

7. ACKNOWLEDGEMENT

The author sincerely acknowledges the women entrepreneurs of Devgad Tehsil, Maharashtra, whose resilience, lived experiencesand active participation constituted the foundation of this research. Their insights into agro-fishery enterprises and evolving household dynamics provided critical empirical depth and authenticity to the study.Gratitude is extended to the Self-Help Groups, local fisheries stakeholdersand village leaders for their valuable cooperation during field surveys and focused discussions. The author also acknowledges the India Meteorological Department and concerned state agencies for providing essential climatic and statistical data that strengthened the analytical framework. Institutional support from Shri S. H. Kelkar College of Arts, Commerce and Science, Devgad, is gratefully recognized.

8. REFERENCES:

- Asokan, P. K., et. al.. (2017) : Oyster farming by women self-help groups at Wadatar, Sindhudurg District, Maharashtra State. Ela Journal of Forestry and Wildlife, 6(1), 295–300.
- Banasure, A., et. al.. (2023) : Socio-economic study of traditional trap fishers in Ratnagiri district, Maharashtra. Journal of Experimental Zoology India, 26(1), 943–947.
- Datta, S. K., & Gailey, R. (2012) : Empowering women through social entrepreneurship: Case study of a women's cooperative in India. Entrepreneurship Theory and Practice, 36(3), 569–587.

- Desai, R. B. (2018) : कोकणातील मत्स्य व्यवसाय: सामाजिक व आर्थिक अभ्यास [Fisheries in Konkan: A socio-economic study]. कॉन्टिनेन्टल प्रकाशन.
- Food and Agriculture Organization. (2007) : Livelihood and micro-enterprise development opportunities for women in coastal fishing communities in India: Case studies of Orissa and Maharashtra (FAO Fisheries Circular No. 1021). FAO.
- Food and Agriculture Organization. (2011) : The state of food and agriculture 2010–11: Women in agriculture—Closing the gender gap for development. FAO.
- Food and Agriculture Organization. (2022) : The state of world fisheries and aquaculture 2022. FAO.
- Government of Maharashtra. (2020) : महिला आर्थिक विकास महामंडळ (MAVIM) वार्षिक अहवाल [Annual report of Mahila Arthik Vikas Mahamandal].
- Joshi, S. V. (2016) : सिंधुदुर्ग जिल्ह्याचा आर्थिक भूगोल [Economic geography of Sindhudurg district]. विद्या प्रकाशन.
- Kabeer, N. (1999) : Resources, agency, achievements: Reflections on the measurement of women's empowerment. Development and Change, 30(3), 435–464.
- Khorate, V. S. (2000) : Impact of development program on rural women in Sindhudurg district (thesis). Dr. B. S. Konkan Krishi Vidyapeeth, Dapoli, Maharashtra, India.
- Lokhande, A (2025) : Socio-economic status of fish selling women in Kudal local market in Sindhudurg District, Aayushi International InterdisciplinaryResearch Journal (AIIRJ)131, 51-55.
- Metar, S. Y., et. al.. (2020) : Traditional knowledge in bivalve fishery of North Konkan Coast of Maharashtra, India. Journal of the Indian Fisheries Association, 47(1), 1–10.
- Panchal, C., & Pawar, S. (2026) : A study on the role of women's involvement in fisheries and aquaculture with reference to the Mumbai region. International Journal of Marine and Life Sciences, 3(1), 1–5.
- Patil, V. G. (2019) : कोकणातील सागरी संसाधने व ग्रामीण विकास [Marine resources and rural development in Konkan]. पद्मगंधा प्रकाशन.
- Patilkhede, B., et. al.. (2018) : Socio-economic and marketing constraints faced by fishermen in coastal Konkan region of Maharashtra. International Journal of Current Microbiology and Applied Sciences, 7(5), 2435–2443.
- Sawant, S. R. (2017) : सिंधुदुर्ग जिल्ह्यातील ग्रामीण परिवर्तनाचा भौगोलिक अभ्यास [Geographical study of rural transformation in Sindhudurg district]. डायमंड पब्लिकेशन्स.
- Suradkar, D. D., et. al.. (2019) : Decision-making style of farm women: A critical analysis. Journal of Agricultural Extension Management, 14(2), 61–71.
- Toraskar, D. N., (2020) : Socioeconomic status of rampan operators of Sindhudurg district of Maharashtra. Journal of Experimental Zoology India, 23(2), 1–5.

- Waikar, G. A., (2025) : Attitude of farm women towards agro processing in Raigad district of Konkan region of Maharashtra. International Journal of Agriculture Extension and Social Development, 8(S3), 8–11.
- Yadav, B. M., et. al.. (2020) : Socio-economic status of fishers of Ratnagiri, Maharashtra. International Journal of Current Microbiology and Applied Sciences, 9(9), 3011–3021.
- Yadav, B. M., et. al.. (2022) : Aquaculture-based interventions for livelihood and empowerment of women in Konkan region of Maharashtra. Asian Journal of Agricultural Extension, Economics & Sociology, 40(10), 215–220.
- Yewale, V. G., et. al.. (2024) : Constraints perceived by beneficiaries in adoption of fisheries development programmes in Konkan region, Maharashtra. Indian Journal of Fisheries Development Studies.
- Zilla Parishad Sindhudurg. (2021) : जिल्हा सामाजिक व आर्थिक सर्वेक्षण अहवाल, सिंधुदुर्ग [District socio-economic survey report, Sindhudurg]. Zilla Parishad Sindhudurg.