

## DEPARTMENT OF FRESE

### Information required for uploading on University website

1. **Name of the Department/Section:** Department of Fisheries Resources, Economics, Statistics and Extension Education.
2. **About Department:** Department of FRESE is in function since the inception of College of Fisheries, Ratnagiri.
3. **Academic Programmes:** Provide the details of each doctoral programme as
  - a. **Doctoral Programmes:** Nil

#### **Name of the programme:**

Semester No.	Term No.	Course No.	Credits	Title of the course offered by the department

#### **Course Curricula and syllabi:**

#### b. Masters Programmes

#### **Name of the programme: M.F.Sc. (Business management)**

Semester No.	Term No.	Course No.	Credits	Title of the course offered by the department		
<b>I</b>	<b>I</b>	FBM 502	2 + 1 = 3	Marketing Management		
		FBM 503	2 + 1 = 3	Human Resource Management		
		FBM 506	2+ 1 = 3	Forecasting Methods And Operations Research		
<b>II</b>	<b>II</b>	STM 501	2 + 1 = 3	Statistical Methods		
		FBM 501	2 + 1 = 3	Managerial Economics		
		FBM 504	2 + 1 = 3	Finance And Accounting For Managers		
		FBM 505	2 + 1 = 3	Organizational Behaviour		
		FBM 514	1 + 1 = 2	Project formulation and management		
		<b>III</b>	<b>I</b>	FBM 599	0+15=15	Master's Research
				FBM 591	1+0=1	Master's Seminar
PGS 501	0+1=1			Library and Information Services		
<b>IV</b>	<b>II</b>	FBM 599	0+5=5	Master's Research		
		PGS 506 (e-course)	1+0=1	Disaster Management		

**Course Curricula and syllabi:****FBM 502 MARKETING MANAGEMENT 2+1****Objective**

To familiarize the students with the basic concepts and principles of marketing as applied to fisheries. To provide an interface between marketing and management decision.

**Theory**

## UNIT I

Marketing management - Introduction and overview. Marketing system and environment Market opportunity identification- Customer analysis. Market segmentation, market positioning and consumer behaviour, Competition analysis, Market assessment, Marketing environment.

## UNIT II

Demand assessment and forecasting, Designing the offer-product decision and pricing decision, product decision and strategies, product life cycle, new product development, branding and packaging decisions, Delivering the offer- distribution management, sales management and communication strategy management – Salesmanship.

## UNIT III

Product management. Pricing policies and practices. Distribution strategy - channels of distribution, physical distribution.

## UNIT IV

Marketing information system. Marketing communication - advertising, publicity, personal selling, sales promotion.

## UNIT V

Marketing research and information system, Marketing research and its application in fisheries marketing strategy, planning and organisation, emerging issues in marketing, e-marketing.

**Practical**

Marketing mix, marketing strategy, segmentation, pricing methods, consumer behaviours, new product development, marketing research, measuring effectiveness of marketing mix, performance evaluation, efficiency analysis.

**FBM 503 HUMAN RESOURCE MANAGEMENT 2+1****Objective**

To familiarize the students with the basic concepts of Human Resource Management with special reference to organizations in fisheries sector.

**Theory**

## UNIT I

Concept of management: Definition, Management process (planning, organising, staffing, leading and controlling), Managerial levels and roles. Evolution of management theories: Scientific management school, Classical organization theory school, Behavioural school, Management science school.

## UNIT II

Concept of Human Resource Management (HRM), Primary activities of HRM (staff, training and development, motivation, maintenance), HR process (HRP, recruitment, selection, socialization, training and development, performance appraisal, promotion, transfer, demotion, separation).

## UNIT III

HR outsourcing, Understanding equal opportunity: Guarding against discriminatory practices, glass ceiling, Managing careers: Concept of career, individual and organisational perspective, career development versus employee development, internal, external events and career stages, mentoring and coaching.

## UNIT IV

Compensation dynamics: Contracts for compensation, efficiency wages, wage earning and sharing, ownership options, screening, signalling, designing of contract, types of rewards, job evaluation and establishing pay structure, executive, international and special compensation

plans, employee benefits, safety and health programmes, labour relations and collective bargaining. Corporate social responsibility.

**Practical**

Applying management functions in a real setting; developing managerial games; creativity and problem solving techniques; understanding different perceptions and avoiding perceptual distortions; analysing different needs of a diverse work place; performance evaluation; psychometric testing; developing training module for leadership and motivation; exercises on time management.

**FBM 506 FORECASTING METHODS AND 2+1  
OPERATIONS RESEARCH**

**Objective**

To familiarize students with various forecasting techniques of time series data in business application. To acquaint the students to various tools and techniques of optimization in fish business planning and management.

**Theory**

UNIT I

Forecasting, needs and uses of forecasting; Current status of forecasting techniques; Fundamentals of quantitative forecasting. Time series methods: smoothing, averaging and exponential smoothing methods, decomposition methods - trend fitting, ratio to moving average method, decomposition analysis.

UNIT II

Regression and Economic Methods; Multiple regression, multicollinearity, auto correlation and heteroscedasticity, Econometric models and forecasting. Stationary and non-stationary time series data; Seasonal and non-seasonal models; Auto-regressive moving average (ARMA) and Auto regressive integrated moving average (ARIMA) models.

UNIT III

Historical development of operations research, concepts and applications in fish business management. Optimization; Inequality constraints; Formulation of linear programming, general statement of linear programming, assumptions underlying linear programming, solution to linear programming problems using graphic method; Simplex method, conditions for application of simplex method, solution to dual programme.

UNIT IV

Transportation and Assignment problem. Sequencing and inventory management.

**Practical**

Smoothing and decomposition methods, trend fitting, ratio to moving average, regression and econometric methods, fitting of ARMA and ARIMA models. Exercises on optimization, linear and non-linear programming, dynamic programming, transportation, assignment, sequencing and inventory management.

**STM 501 STATISTICAL METHODS 2+1**

**Objective**

To acquaint the students with various statistical methods and techniques To provide hands on training in data analysis through statistical software.

**Theory**

UNIT I

Sampling distribution for mean and proportion, standard error, confidence interval for mean and proportion; Test of hypothesis: type I and type II errors, level of significance, tests based on Z, t, X<sup>2</sup> and F distribution.

UNIT II

Properties of estimators: unbiasedness, efficiency, sufficiency and consistency.

UNIT III

Simple correlation and regression, Spearman's rank correlation.

UNIT IV

Basic concepts of sampling techniques: simple random, stratified, systematic, cluster and two stage sampling and their applications in fisheries.

#### UNIT V

Analysis of variance: one way and two way classification; Non-parametric test, advantages and disadvantages over parametric tests; Run test and Sign test.

#### **Practical**

Tests of hypothesis based on Z, t,  $\chi^2$  and F; Simple correlation and regression, Rank correlation; Analysis of variance: one way and two way; Simple random, stratified, systematic, cluster and two stage sampling; Sign test, Run test; Hands on experience in using the statistical software packages MS Excel, Systat and SPSS in data analysis and interpretation.

#### **FBM 501 MANAGERIAL ECONOMICS 2+1**

#### **Objective**

To familiarise the students with the basic concepts and analytical tools of economics as applied to management decisions. To provide an interface between economics and management decisions.

#### **Theory**

##### UNIT I

Introduction to managerial economics: Microeconomics, Macroeconomics, Demand analysis - types of demand, determinants of demand; elasticity of demand. Analysis of costs - nature of costs, cost-output relationship in short and long term, profit maximization.

##### UNIT II

Theory of production - production function, laws of production; laws of returns, returns of scale, economies of scale. Production relationship: factor-product, factor-factor and product-product.

##### UNIT III

Market structure and price determination; perfect and imperfect competitions. Monopoly, price discrimination; monopolistic competition and oligopoly.

##### UNIT IV

Types of economy, Measuring performance of the economy. Consumption, saving and investment function. Income and employment determination. Aggregate demand and supply, general equilibrium; multiplier.

##### UNIT V

Money - functions of money, theory of money and price, Inflation, Balance of payment and Exchange rate.

#### **Practical**

Demand - supply relationship. Elasticity - price, income, cross. Exercises in factor-product, factor-factor and product-product relationships. Production costs and their relationship, Break-even point, National income accounting. Multiplier. Inflation. Case studies on different micro and macro-economic variables in fisheries sector.

#### **FBM 504 FINANCE AND ACCOUNTING FOR MANAGERS 2+1**

#### **Objective**

To familiarise the students with the concept and practice of finance, accounting and financial management. To make the students understand the various accounting practices prevalent in fisheries organizations.

#### **Theory**

##### UNIT I

Overview of Financial management, Financial systems, Financial statements, taxes and cash flow, Analysing financial performance, Break even analysis and leverage, Time value of money, valuation bonds and stocks, Risk and return, Capital budgeting, techniques of capital budgeting, Cost of capital, Sources of long term finance, Dividend decisions, Debt analysis and management, Leasing hire purchase and project finance, Inventory management, Working

capital management,, merger, acquisitions and restructuring Stock exchange, Mutual fund ,Banking systems.

#### UNIT II

Accounting: Theoretical concept of accounting, Meaning and scope of accounting, accounting principles, journalising transactions, ledger posting and trial balance, negotiable instruments, Final accounts, Depreciation provisions and reserves, single entry systems double entry system, inventory valuation, joint stock company, shares and capital, debentures, management accounting: nature and scope, financial statements analysis and interpretation, ratio analysis, classification of ratios, fund flow and cash flow statements.

#### **Practical**

Case studies and practicals on financial management and accounting, Familiarisation and application of Tally software.

### **FBM 505 ORGANISATIONAL BEHAVIOUR 2+1**

#### **Objective**

To familiarize the students with the basics of organizational behaviour and its relevance and application in the fisheries sector.

#### **Theory**

##### UNIT I

Introduction: Concept and definition, Contributing disciplines to OB, Challenges and opportunities, Basic organizational behaviour model. Individual: Foundations of individual behaviour, Biographical characteristics, values, attitudes and job satisfaction, personality and emotions, perception, basic motivation concepts, concept of motivation, early and contemporary theories of motivation.

##### UNIT II

Group: Concept of groups, stages of group development, group decision making techniques, foundations of group behaviour, work teams - types of teams, creating effecting teams.

##### UNIT III

Leadership: concept of leadership, trait, behavioural and contingency theories, concept of trust, types of trust, conflict and negotiations - concept, transition and conflict thoughts, conflict process, negotiation and its process, bargaining strategies, third party negotiation, conflict management techniques, power and politics - concept of power, bases of power, dimension of power tactics, power coalitions, unequal power at work place.

##### UNIT IV

Organization structure: Concept, work specialization, departmentalization, chain of command, span of control, centralization and decentralization, formalization, common organizational designs. Organizational dynamics: Change management - concept of change, forces of change, managing planned change, resistance to change, over coming resistance to change, Stress management – concept, causes and its management.

#### **Practical**

Role play on motivation, microtromics management simulation on leadership, psychometric testing on personal approach to leadership, conflict management, team exercises in team building, analysing group effectiveness, biases and ethics in decision making, evaluation of MPS, building effective work teams, personality and stress, methodologies to measure stress, case study on organisational behaviour in public and private enterprises; case studies on stress and conflict management. Case study on conflict management in fisheries sector.

## **FBM 514 PROJECT FORMULATION AND MANAGEMENT 1+1**

### **Objective**

To familiarize the students with the basic concepts and principles of project formulation and management techniques. To prepare the students to exploit business opportunities in fisheries and aquaculture.

### **Theory**

#### **UNIT I**

Concept, scope and definition of project, difference between plan and project, project types - advantages and limitations, elements of project cycle - aspects of project preparation and analysis, project cost and benefits – comparisons – tangible and intangible cost and benefits.

#### **UNIT II**

Financial and economic aspects of projects: Feasibility analysis – undiscounted measures of project worth, ranking by inspection, pay back period, average annual proceeds per unit of outlay, time value of money, discounted measures–discounted pay back period, derivation of incremental net benefit, net present worth, BC ratio, IRR, net benefit investment ratio, project alternatives, risk and uncertainties, sensitivity analysis. Farm planning, budgeting – complete and partial budgeting - farm business analysis and appraisal techniques – ratio analysis, asset valuation and depreciation. Financial analysis-balance sheet, cash flow analysis, profit loss statements.

#### **UNIT III**

Guidelines for project preparation report – objective, rational, area, organization, production, markets and financial results, benefits. Sources of institutional assistance for project preparation and formulation, bilateral and multilateral assistance. Project implementation – objective and tasks, economic aspects of project evaluation. Project management – management techniques – bar chart, milestone chart, activity slack bar chart, PERT, CPM, inventory management and control, management information system and project monitoring.

### **Practical**

Case studies: Ratio analysis, computing depreciation, valuation of project inventories, complete and partial Budgeting, cash flow analysis, balance sheet / net worth statement, profit–loss statement/income statement, undiscounted and discounted measures, net work techniques, bar charts, milestone chart and activity slack bar chart, PERT and CPM - project preparation for capture, culture and processing sectors - sensitivity analysis, project monitoring and evaluation, case studies and feasibility evaluation.

## **PGS 501 LIBRARY AND INFORMATION SERVICES 0+1**

### **Objective**

To equip the library users with skills to trace information from libraries efficiently, to apprise them of information and knowledge resources, to carry out literature survey, to formulate information search strategies, and to use modern tools (Internet, OPAC, search engines etc.) of information search.

### **Practical**

Introduction to library and its services; Role of libraries in education, research and technology transfer; Classification systems and organization of library; Sources of information- Primary Sources, Secondary Sources and Tertiary Sources; Intricacies of abstracting and indexing services (Science Citation Index, Biological Abstracts, Chemical Abstracts, CABI Abstracts, etc.); Tracing information from reference sources; Literature survey; Citation techniques/Preparation of bibliography; Use of CD-ROM Databases, Online Public Access Catalogue and other computerized library services; Use of Internet including search engines and its resources; eresources access methods.

## **PGS 506 DISASTER MANAGEMENT 1+0**

### **(e-Course)**

### **Objectives**

To introduce learners to the key concepts and practices of natural disaster management; to equip them to conduct thorough assessment of hazards, and risks vulnerability and capacity building.

## Theory

### UNIT I

Natural Disasters- Meaning and nature of natural disasters, their types and effects. Floods, Drought, Cyclone, Earthquakes, Landslides, Avalanches, Volcanic eruptions, Heat and cold Waves, Climatic Change: Global warming, Sea Level rise, Ozone Depletion

### UNIT II

Man Made Disasters- Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire. Oil fire, air pollution, water pollution, deforestation, Industrial wastewater pollution, road accidents, rail accidents, air accidents, sea accidents.

### UNIT III

Disaster Management- Efforts to mitigate natural disasters at national and global levels. International Strategy for Disaster reduction. Concept of disaster management, national disaster management framework; financial arrangements; role of NGOs, Community-based organizations, and media. Central, State, District and local Administration; Armed forces in Disaster response; Disaster response: Police and other organizations.

### Name of the programme: M.F.Sc. (Fisheries Extension)

Semester No.	Term No.	Course No.	Credits	Title of the course offered by the department
<b>I</b>	<b>I</b>	FEX 501	2 + 1 = 3	Perspectives And Practices Of Fisheries Extension
		FEX 502	2 + 1 = 3	Extension Communication And Methods
		FEX 508	1 + 1 = 2	Planning and management of development programmes
		FEX 509	2 + 1 = 3	Human resource management
		STM 501	2 + 1 = 3	Statistical Methods
<b>II</b>	<b>II</b>	FEX 503	2 + 1 = 3	Participatory Approaches In Fisheries Extension
		FEX 504	2 + 1 = 3	Training For Human Resource Development
		FEX 506	1+1 = 2	Diffusion and adaptation of innovations in fisheries
		FEX 512	1+1 = 2	Indigenous traditional knowledge in fisheries
<b>III</b>	<b>I</b>	FEX 599	0+15=15	Master's Research
		FEX 591	1+0=1	Master's Seminar
		PGS 501	0+1=1	Library and Information Services
<b>IV</b>	<b>II</b>	FEX 599	0+5=1	Master's Research
		PGS 506 (e-course)	1+0	Disaster Management

### Course Curricula and syllabi:

#### FEX 501 PERSPECTIVES AND PRACTICES OF FISHERIES EXTENSION

2+1

#### Objective

To gain insights into different concepts, principles, praxis, recent changes and emerging challenges in fisheries extension. To acquire skills required to practice various fisheries extension approaches.

#### Theory

##### UNIT I

Overview of fisheries and aquaculture sector in India and world; Special characteristics of fisheries sector and its stakeholders; Understanding extension education, research, and service;

Overview of fisheries research, development and extension systems in India; Scope and importance of fisheries and aquaculture extension.

#### UNIT II

Critical review of philosophy, principles, concepts, and practices of fisheries extension systems and approaches; Teaching, learning and colearning; Epistemology of knowledge in fisheries – ITK *vis-à-vis* lab generated knowledge.

#### UNIT III

Fisheries extension – advantages and limitations of present welfare and subsidy oriented extension systems; Development and extension approaches as practiced by public agencies like Department of Fisheries, KVKs, Agricultural Technology Management Agency (ATMA), NGOs, FAO, Bay of Bengal Programme (BOBP-IGO), and by the private sector; participatory fisheries extension approaches.

#### UNIT IV

Aquaculture extension system - review of extension approach as practiced by DoF, FFDA, and BFDA; Market led extension approaches; Importance of Information and Communication Technology (ICT) in fisheries extension system.

#### **Practical**

Exercises on development of extension and field manuals; Exercises on participatory learning / co-learning; Case study of extension approaches practiced by select State Departments of Fisheries, FFDA's / BFDA's, select NGOs, AMUL model; case study of market led extension approaches like e-choupal choupal, Agri Business Clinics, etc.; Critical review of experiences and lessons from fisheries extension practices from across the world; case study on the use of ICT for fisheries development; Field exposure by visiting established extension projects.

### **FEX 502 EXTENSION COMMUNICATION AND METHODS 2+1**

#### **Objective**

To learn different communication strategies used in mass, group and personal contact methods of extension programme. To get hands on training in application of extension methods and communication aids.

#### **Theory**

##### UNIT I

Communication - meaning, process, theories and models; Traditional communication; Individual, group and mass communication, levels of communication; non-verbal communication; AV aids – selection and use.

##### UNIT II

Communicator - role of communicator in extension education, communicator's behaviour; communication skills; fidelity of communication; communication competence and empathy; communication effectiveness and credibility; improving oral and written communication; message – meaning, dimensions, characteristics, treatment and effectiveness, distortion of message; simulation exercises; channels of communication – meaning, dimensions, classification, selection, efficiency, credibility, use; audience or receivers; feedback; communication behaviour; social network – homophily and heterophily.

##### UNIT III

Communicating with fishers and fish farmers; barriers in communication; communication and social change; futuristic shape of communication technologies.

##### UNIT IV

Recent communication technologies – Internet based technologies, video and teleconferencing, computer assisted instructions, Information kiosks, Village Resource Centres, Community networks, WAN, MAN, AGRINET, e-Governance; Cyber extension and e-learning.

#### **Practical**

Exercises in written and oral communication; documenting and presenting success stories in fisheries, AV aids - rationale and preparation of AV aids with local resources; public speaking



and presentation skills; organising meetings, guided discussions; organizing field demonstrations and field days; preparation of information, education and communication materials on various aspects of fisheries; instructional video and ICT; Practicing tele and video conferencing, case study of a community radio, tele-centres and farmer discussion groups; designing a website on fisheries and aquaculture; developing a script and shooting a video film as an extension aid; Development and use of e-learning modules.

## **FEX 508 PLANNING AND MANAGEMENT OF FISHERIES 1+1 DEVELOPMENT PROGRAMMES**

### **Objective**

To understand different aspects of planning processes. To acquire competency to plan, implement, monitor and evaluate extension and development programmes.

### **Theory**

#### **UNIT I**

Importance, principles and processes in developing extension programmes; Planning for sustainable development, Economic Planning- types of planning; Planning strategies at various levels- Top down and bottom up approaches. Panchayati Raj institutions; Execution of various programmes, Plan allocation and performance of fisheries over the different plan-periods in India.

#### **UNIT II**

Project preparation and project appraisal in terms of social benefit analysis, shadow prices; Project Management Techniques - PERT and CPM; Logical Framework Approach (LFA), Stakeholder analysis; Participatory Monitoring and Evaluation (PROME); People's participation in extension programmes, significance, importance and approaches.

#### **UNIT III**

Critical analysis of Agriculture, Fisheries and Rural Development Programmes; design, operation, institutional mechanism and socio-cultural and economic impact of programmes such as NREGA; labour market relations; Fisheries development *vis-à-vis* fisheries for development; Livelihood Frameworks.

### **Practical**

Need assessment, setting objectives, developing plan of work, Success indicators, Impact assessment of fisheries development programmes, SWOT analysis; Exercises on PERT and CPM Presentation of Fisheries and Aquaculture policies of select countries; Study visits to selected extension project areas – DOE, KVKs, SAUs, and ICAR institutes.

## **FEX 509 HUMAN RESOURCE MANAGEMENT 1+1**

### **Objective**

To familiarize the students with the basic concepts of Human Resource Management with special reference to organizations in fisheries sector.

### **Theory**

#### **UNIT I**

Concept of management: Definition, Management process (planning, organising, staffing, leading and controlling), Managerial levels and roles. Evolution of management theories: Scientific management school, Classical organization theory school, Behavioural school, Management science school.

#### **UNIT II**

Concept of Human Resource Management(HRM), Primary activities of HRM (staff, training and development, motivation, maintenance), HR process (HRP, recruitment, selection, socialization, training and development, performance appraisal, promotion, transfer, demotion, separation).

#### **UNIT III**

HR outsourcing, Understanding equal opportunity: Guarding against discriminatory practices, glass ceiling, Managing careers: Concept of career, individual and organisational perspective,

career development versus employee development, internal, external events and career stages, mentoring and coaching.

#### UNIT IV

Compensation dynamics: Contracts for compensation, efficiency wages, wage earning and sharing, ownership options, screening, signalling, designing of contract, types of rewards, job evaluation and establishing pay structure, executive, international and special compensation plans, employee benefits, safety and health programmes, labour relations and collective bargaining. Corporate social responsibility.

#### **Practical**

Applying management functions in a real setting; developing managerial games; creativity and problem solving techniques; understanding different perceptions and avoiding perceptual distortions; analysing different needs of a diverse work place; performance evaluation; psychometric testing; developing training module for leadership and motivation; exercises on time management.

#### **STM 501 STATISTICAL METHODS 2+1**

##### **Objective**

To acquaint the students with various statistical methods and techniques To provide hands on training in data analysis through statistical software.

##### **Theory**

#### UNIT I

Sampling distribution for mean and proportion, standard error, confidence interval for mean and proportion; Test of hypothesis: type I and type II errors, level of significance, tests based on Z, t,  $X^2$  and F distribution.

#### UNIT II

Properties of estimators: unbiasedness, efficiency, sufficiency and consistency.

#### UNIT III

Simple correlation and regression, Spearman's rank correlation.

#### UNIT IV

Basic concepts of sampling techniques: simple random, stratified, systematic, cluster and two stage sampling and their applications in fisheries.

#### UNIT V

Analysis of variance: one way and two way classification; Non-parametric test, advantages and disadvantages over parametric tests; Run test and Sign test.

#### **Practical**

Tests of hypothesis based on Z, t,  $X^2$  and F; Simple correlation and regression, Rank correlation; Analysis of variance: one way and two way; Simple random, stratified, systematic, cluster and two stage sampling; Sign test, Run test; Hands on experience in using the statistical software packages MS Excel, Systat and SPSS in data analysis and interpretation.

#### **FEX 503 PARTICIPATORY APPROACHES IN FISHERIES EXTENSION**

##### **2+1**

##### **Objective**

To gain knowledge on participatory approaches in fisheries extension programmes.

To gain practical experience in participatory approaches and techniques.

##### **Theory**

#### UNIT I

Participatory approaches for aquatic resources management and development: need, importance and guiding principles; Community mobilization methods - Farmer-First Approach; Trickle Down System – concept, method and processes; Knowledge Driven Extension System – concept and method.

#### UNIT II

Community based fisheries management and Fisheries co-management – concept, origin, importance, types, method, processes, stakeholder rights, responsibilities and participation,

institutional mechanisms, implementation constraints, experiences from other countries; conflict resolution and management; Public-Private-Community Partnership.

### UNIT III

Participatory Learning Approach (PLA) including role-plays, case studies, brainstorming, and ranking of priority issues, discovery-based experiential learning, participatory education methods like FGD; Participatory appraisal techniques - census mapping, resource mapping, social mapping; selection of participatory methods and their uses; Farmer Field Schools for Aquaculture.

#### **Practical**

Conducting Participatory Rural Appraisal in select villages and developing action plans; Conducting focused group discussion and developing action plan; Facilitating group formation based on the felt needs and to implement the action plans / plan of work; Reviewing national and international case studies on participatory approach to aquaculture research and development; case studies and simulation exercises on fisheries co-management / community based fisheries management.

## **FEX 504 TRAINING FOR HUMAN RESOURCE DEVELOPMENT**

### **2+1**

#### **Objective**

To learn the design and methods of conducting training programmes for the trainers, fishers and fish farmers. To acquire hands-on practice in use of training aids and tools.

#### **Theory**

### UNIT I

Human Resource Development – Concept and significance; Education, learning and training; Instructional design and educational technology; Theories of learning - radical behaviorism, cognitivism, constructivism; training and development; Gender sensitive training.

### UNIT II

Types of Training - Induction, on-the-job, off-the-job, in-service, customized, inception, trainers', participatory, web-based, fishers/fish farmers', farmer-led, vocational and echo-training; Training tools like TGroup, Fish bowl exercise, ice-breakers, team-building exercises and games; workshop and writeshop.

### UNIT III

Preparation of Training Manuals- content writing; Training cycle – training need assessment, developing training objectives and outcome, developing training modules and lesson plan, logistic management and evaluation of training programme, follow-up and action plan.

### UNIT IV

Facilitating Community Mobilization Process - Perception of service delivery system, level of expertise and capacity amongst the community to facilitate such services, willingness of the community to match individual interests with community interest, facilitation of resources for mobilizing community; Promoting Public-Private-Community Participation.

#### **Practical**

Training need assessment for different clientele groups; Designing training tools and manuals on fisheries; Organising and conducting fisheries training programmes; Evaluation of training; Impact studies in terms of results (output, outcome and impact); Team building exercises.

## **FEX 506 DIFFUSION AND ADOPTION OF INNOVATIONS 1+1 IN FISHERIES**

#### **Objective**

To impart knowledge on diffusion of fisheries innovations.

To be able to critically analyse the innovation decision processes in the fisheries sector.

#### **Theory**

## UNIT I

Elements of diffusion; diffusion research – history, typology, contributions and criticisms; generalising diffusion via meta research; innovations in fisheries – innovation development process, socio-economic status, equality and innovation development, converting research into practice; Critique on Rogers' innovation decision process, innovation attributes and adopter categories.

## UNIT II

Opinion leadership – meaning, characteristics, types and their measurement; diffusion networks; social learning theory; Change agent – meaning, roles, factors of success, change agent contact; centralised and decentralised diffusion systems; innovation in organisations – contract farming – merits and demerits; consequences of innovations – model and classification, equality in the consequences; recent studies in innovation decision process.

### **Practical**

Case study of the diffusion process of select fisheries innovations; Analysing the factors influencing adoption and rejection of fisheries technologies and practices; case studies of select innovation diffusion models like AMUL, Grameen Bank, and WADI-NABARD/BAIF; case study of decision making pattern in fisher villages and the role of men, women and youth; case studies on opinion leaders and change agents in transfer of fisheries technologies; field visit to study select models of ToT.

## **PGS 501 LIBRARY AND INFORMATION SERVICES 0+1**

### **Objective**

To equip the library users with skills to trace information from libraries efficiently, to apprise them of information and knowledge resources, to carry out literature survey, to formulate information search strategies, and to use modern tools (Internet, OPAC, search engines etc.) of information search.

### **Practical**

Introduction to library and its services; Role of libraries in education, research and technology transfer; Classification systems and organization of library; Sources of information- Primary Sources, Secondary Sources and Tertiary Sources; Intricacies of abstracting and indexing services (Science Citation Index, Biological Abstracts, Chemical Abstracts, CABI Abstracts, etc.); Tracing information from reference sources; Literature survey; Citation techniques/Preparation of bibliography; Use of CD-ROM Databases, Online Public Access Catalogue and other computerized library services; Use of Internet including search engines and its resources; eresources access methods.

## **PGS 506 DISASTER MANAGEMENT 1+0**

### **(e-Course)**

### **Objectives**

To introduce learners to the key concepts and practices of natural disaster management; to equip them to conduct thorough assessment of hazards, and risks vulnerability and capacity building.

### **Theory**

#### UNIT I

Natural Disasters- Meaning and nature of natural disasters, their types and effects. Floods, Drought, Cyclone, Earthquakes, Landslides, Avalanches, Volcanic eruptions, Heat and cold Waves, Climatic Change: Global warming, Sea Level rise, Ozone Depletion

#### UNIT II

Man Made Disasters- Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire. Oil fire, air pollution, water pollution, deforestation, Industrial wastewater pollution, road accidents, rail accidents, air accidents, sea accidents.

#### UNIT III

Disaster Management- Efforts to mitigate natural disasters at national and global levels. International Strategy for Disaster reduction. Concept of disaster management, national disaster management framework; financial arrangements; role of NGOs, Community-based

organizations, and media. Central, State, District and local Administration; Armed forces in Disaster response; Disaster response: Police and other organizations.

c. **Bachelor Programmes: B. F. Sc**

Semester No.	Term No.	Course No.	Credits	Title of the course offered by the department
<b>I</b>	<b>I</b>	F RESE 111	1+1=2	Information and Communication Technology
		F RESE 112	1+1=2	Elements of Statistics
<b>II</b>	<b>II</b>	F RESE 123	1+0=1	Business Organization and Personnel Management
		NC 2	Nil	Communication Skills
<b>III</b>	<b>I</b>	F RESE 214	2+1=3	Fisheries Economics
		F RESE 215	1+1=2	Rural Sociology and Extension Education
		F RESE 216	1+1=2	Disaster Management
<b>IV</b>	<b>II</b>	F RESE 227	1+1=2	Statistical Methods
		F RESE 228	2+1=3	Extension Programme Planning
<b>VI</b>	<b>II</b>	F RESE 329	2+0=3	Fisheries Administration and Legislation
		F RESE 321	1+1=2	Marketing Management
		F RESE 322	1+2=2	Entrepreneurship Development and Finance
<b>VII</b>	<b>I</b>		0+4=4	Hands-on-training in Aquafarming
			0+4=4	Hands on Training in Fish processing Technology

**Course Curricula and syllabi of each subject:**

1		<b>F RESE 111: INFORMATION AND COMMUNICATION TECHNOLOGY 1 + 1 = 2</b>
	Lectures	<b>THEORY :</b>
	1	IT and its importance, IT tools, IT-enabled services and their impact on society.
	2	Computer fundamentals; hardware and software; input and output devices.
	3	Word and character representation; features of machine language, assembly language, high-level language and their advantages and disadvantages.
	4	Principles of programming- algorithms and flowcharts.
	5 - 10	Operating systems (OS) - definition, basic concepts, introduction to WINDOWS and LINUX Operating Systems; Local area network (LAN), Wide area network(WAN), Internet and World Wide Web, HTML and IP
	11 - 12	Introduction to MS Office - Word, Excel, Power Point.
	13 - 14	Audio visual aids - definition, advantages, classification and choice of A.V aids; cone of experience and criteria for selection and evaluation of A.V aids; video conferencing.
	15 - 16	Communication process, Berlo's model, feedback and barriers to

		communication.
	Practicals	<b>PRACTICAL :</b>
	1	Exercises on binary number system.
	2	Algorithm and flow chart.
	3 - 7	MS Word; MS Excel; MS Power Point; Internet applications.
	8 - 9	Web browsing, Creation and operation of E-Mail account; Analysis of fisheries data using MS Excel.
	10	Handling of audio visual equipments-tape recorder.
	11	Public address system, overhead projector, LCD projector.
	12 - 13	Planning, preparation, presentation of posters, charts, overhead transparencies and slides.
	14 - 16	Organization of an audio visual programme; preparation and presentation of a radio script and T.V. talk.
2		F RESE 112: <b>ELEMENTS OF STATISTICS</b> 1 + 1 = 2
	Lectures	<b>THEORY :</b>
	1	Definition of Statistics, fisheries Statistics, scope of fisheries Statistics.
	2 - 3	Basic concepts of population and sample, random sampling. Collection of data; census enumeration and sample surveys, their advantages and disadvantages. Preparation of schedules and questionnaires.
	4 - 5	Classification of data, frequency and cumulative frequency table.
	6 - 8	Diagrammatic and graphical representation of data - bar diagrams, pie-diagram, histogram, frequency polygon, frequency curve and Ogive.
	9 - 10	Important measures of central tendency – different arithmetic means, medians and mode, relative merits and demerits of these measures.
	11 - 13	Important measures of dispersion - range, mean deviation, variance and standard deviation, relative merits and demerits of these measures.
	14 - 16	Relative measures of dispersion -coefficient of variation; Measures of skewness and kurtosis.
	Practicals	<b>PRACTICALS :</b>
	1	Construction of questionnaires and schedules.
	2	Collection of fisheries data.
	3 - 4	Frequency distribution tables.
	5 - 6	Diagrams and frequency graphs.
	7 - 9	Calculation of arithmetic mean, median, mode range.
	10 - 12	Calculation of mean deviation, variance, standard deviation.
	13 - 16	Relative measures of dispersion. Skewness and kurtosis.
3		F RESE 123: <b>BUSINESS ORGANIZATION AND PERSONNEL MANAGEMENT</b> 1 + 0 = 1
	Lectures	<b>THEORY :</b>
	1	Different forms of business organization.
	2 - 5	Sole trader partnership. Joint stock company.
	6 - 8	Cooperative societies.
	9 - 11	State enterprises and company laws.
	11 - 13	Personnel management. Managerial principles.
	14 - 16	Office management, Concept of fair wages, Share system of catch.
		<b>PRACTICAL : Nil</b>

4		<b>F RESE 214: FISHERIES ECONOMICS 2+1 = 3</b>
	Lectures	<b><i>THEORY :</i></b>
	1	Introduction to fisheries economics.
	2 - 3	Basic economic terminologies - micro and macro-'economics, positive and normative economics, environmental economics, resource, scarcity, farm-firm relationships, production etc.
	4 - 6	Micro-economics: theories of demand, supply; market - equilibrium price, consumption, utility, consumer's surplus.
	7 - 8	Elasticity -price, income, cross, application of elasticity in fisheries managerial decision.
	9 - 10	Farm production economics - production functions in capture and culture fisheries.
	11 - 12	Costs and returns - breakeven analysis of fish production system.
	13 - 14	Concepts of externalities and social cost.
	15 - 16	Factors of production, marginal cost and return, law of diminishing marginal return, returns to scale.
	17 - 18	Economies of scale and scope, revenue, profit maximization, measurement of technological change.
	19	Farm planning and budgeting. Preparation of enterprise budget for integrated fish farming.
	20 - 21	Macro-economics: Introduction to national income, accounting, measurement and determinants of national income.
	22 - 23	contribution of fisheries to GNP and employment.
	24 - 25	Balance of payments, economic growth and sustainable development.
	26	Globalisation: dimensions and driving Forces. Introduction to GATT and WTO.
	27	WTO Framework - Key Subjects - Agreement on Sanitary and Phytosanitary Measures (SPS), Seafood Export Regulations, Non-Tariff Barriers (NTBs) and Agreement on Anti-Dumping Procedures
	28	Fisheries Subsidies and WTO. Fisheries Trade and Environment; protests against globalisation and WTO.
	29 - 30	Intellectual Property Rights (IPR) and different forms. Patents and patenting process, Agreement on TRIPS. Bio-piracy.
	31 - 32	GMOs in fisheries. Salient features of Indian Patent (Amendment) Act 2005. Overview of Patents in Indian fisheries sector
	Practicals	<b><i>PRACTICAL :</i></b>
	1 - 2	Demand and supply functions of fish market - determination of equilibrium price for fish and fisheries products.
	3 - 4	Calculation of price, income and cross elasticities.
	5 - 6	Production function - production with one or two variable inputs.
	7 - 8	Economic analysis on cost, return and break even of any two production units like fish farm / shrimp farm / seed production unit / fish processing plant / export unit.
	9	Preparation of enterprise budget for integrated fish farming.
	10	Contribution of fisheries to Indian Agriculture and total GDP - a trend analysis.
	11 - 12	Pattern and Performance of India's Seafood Exports;
	13 - 14	Case studies on product and market diversification.
	15 - 16	Case studies on competitiveness of Indian fish and fish products

5		<b>F RESE 215: RURAL SOCIOLOGY AND EXTENSION EDUCATION 1 + 1 = 2</b>
	Lectures	<b><i>THEORY :</i></b>
	1 - 2	Basic concepts in rural sociology and psychology and their relevance in fisheries extension; social change, social control, social problems and conflicts in fisheries.
	3 - 4	Gender issues in fisheries; theories of learning, learning experience, learning situation.
	5 - 6	Introduction to extension education and fisheries extension - concepts, objectives and principles.
	7	Extension education, formal and informal education;
	8	History and role of fisheries extension in fisheries development.
	9 - 10	Fisheries extension methods- individual, group and mass contact methods and their effectiveness, factors influencing their selection and use
	11	Characteristics of technology, transfer of technology process.
	12	Important TOT programs in fisheries
	13 - 14	Role of NGOs and SHGs in fisheries, fisheries co - management.
	15 - 16	Adoption and diffusion of innovations, adoption and diffusion process, adopter categories and barriers in diffusion of fisheries innovations.
	Practical	<b><i>PRACTICAL :</i></b>
	1 -2	Collection of socio-economic data from fishing villages.
	3 - 5	Study of social issues/problems through participatory and rapid rural appraisal techniques, stake holders analysis and needs assessment
	6 – 9	Assessment of development needs of community and role of formal and non - governmental organizations through stakeholder analysis
	10 – 11	Case studies on social / gender issues and social conflicts in fisheries.
	12 – 13	Case studies on extension programs and Success stories.
	14 – 16	Practical exercises on conducting fish farmers meet.
6		<b>F RESE 216: DISASTER MANAGEMENT 1 + 1 = 2</b>
	Lectures	<b><i>THEORY :</i></b>
	1	Basic concepts: Hazard, risk, vulnerability, disaster, capacity building
	2	Multi-hazard and disaster vulnerability of India
	3 – 5	Types of natural and manmade hazards in fisheries and aquaculture - cyclones, floods, droughts, tsunami, El-nino, algal blooms, avalanches, pollution, habitat destruction, over fishing, introduction of exotic species, landslides, epidemics, loss of bio-diversity etc
	6 – 7	Causes, characteristics and impact of various disasters
	8 – 11	Management strategies: pre-disaster, during disaster and post-disaster. Pre-disaster: prevention, preparedness and mitigation; different ways of detecting and predicting disasters; early warning, communication and dissemination, community based disaster preparedness, structural and non-structural mitigation measures
	12	During disaster: response and recovery systems at national, state and local, coordination between different agencies, international best practices
	13	Post-disaster: methods for assessment of initial and long term damages, reconstruction and rehabilitation
	14	Prevalent national and global management practices in disaster management
	15	Agencies involved in monitoring and early warnings at district, state, national and global level.



	16	Sea safety and Health.
	Practicals	<b>PRACTICALS :</b>
	1	Methods for assessment of initial and long term damages
	2	Preparedness in pre, during and post disasters
	3 - 4	Acquaintance with fire-fighting devices
	5 - 6	Life saving appliances and first-aid
	7	Operation and usage of communication channels and media
	8 - 9	Uses of distress signals and technologies
	10 - 11	Relief and rehabilitation measures, trauma counseling
	12 - 14	Field visits and case studies
	15 - 16	Group discussion
7		<b>F RESE 227: STATISTICAL METHODS 1 + 1 = 2</b>
	Lectures	<b>THEORY :</b>
	1 - 2	Definitions of probability, mutually exclusive and independent events, conditional probability, addition and multiplication theorems.
	3 - 6	Random variable, concepts of theoretical distribution; Binomial, Poisson and Normal distributions and their use in fisheries.
	7	Basic concept of sampling distribution; standard error and central limit theorem.
	8	Introduction to statistical inference, general principles of testing of hypothesis - types of errors
	9 - 11	Tests of significance based on normal, t, chi-square and F distributions.
	12 - 14	Bivariate data, scatter diagram, simple linear correlation, measure and properties; simple linear regression, equation and fitting; relation between correlation and regression. Length weight relationship in fishes; applications of linear regression in fisheries
	15 - 16	Methodology for estimation of marine fish landings in India, Estimation of inland fish production in India and problems encountered.
	Practicals	<b>PRACTICAL :</b>
	1 - 2	Construction of questionnaires and schedules (data collection tools)
	3 - 7	Exercises on probability. Binomial and Poisson distributions. Area of normal curve confidence interval for population mean.
	8 - 12	Test of hypothesis based on normal, t, chi-square and F distributions.
	13 - 16	Simple correlation and regression. Fitting of length - weight relationship in fishes.
8		<b>F RESE 228 EXTENSION PROGRAMME PLANNING 2 + 1 = 3</b>
	Lectures	<b>THEORY :</b>
	1 - 2	Extension administration-concepts.
	3 - 4	Scope and principles.
	5 - 6	Organizational structure of fisheries extension systems.
	7 - 9	Extension programme planning - steps in planning, involvement of people in planning.
	10	Importance of extension programme.
	11 - 12	Characteristics of good programme. Participation of organization.
	13	Involvement of people in planning,
	14	Why programme fails?
	15 - 18	Community development programme: objectives , principles and coordination.

	19 - 20	Training and education.
	21 - 23	Types of training. Current trends in training. Identification of training needs.
	24 - 25	Organization of training programmes and its evaluation.
	26	Training centres available in fisheries sector in India.
	27 - 32	Introduction to PRA; Participatory planning process.
	Practicals	<b>PRACTICAL :</b>
	1 - 6	Benchmark surveys of fishery village.
	7 - 10	Preparation of fisheries development programmes.
	11 - 12	Case study of fishing villages / fish farms.
	13 - 14	Case study of fisheries organization such as BFDA / FFDA / NGOs / state department of fisheries.
	15 - 16	Evaluation of ongoing fisheries development programmes.
9		<b>F RESE 329: FISHERIES ADMINISTRATION AND LEGISLATION<sup>2 + 0 = 2</sup></b>
	Lectures	<b>THEORY :</b>
	1	Introduction to public administration.
	2	Principles of organization and management of public enterprise.
	3	Central and State responsibilities for fisheries development, organizational set up of fisheries administration at the Centre and state levels.
	4	Functions and powers of functionaries of department of fisheries, corporations and cooperatives
	5	Different central and state level fisheries institutions.
	6 - 7	Role of Central and State Government in the regulatory activities of Aquaculture and fisheries.
	8 - 9	Implementation of community based resource management plans.
	10 - 13	Historical review of fisheries development and management in India and world. Fisheries development over Five Year Plans.
	14 - 16	International agencies / organizations for promotion of fisheries worldwide
	17 - 18	Fisheries legislation: Overview of fisheries and aquaculture legislations in India.
	19	Indian Fisheries Act, 1897.
	20 - 22	Environmental legislation; Water Act, Air Act and Environmental (Protection) Act. International environmental legislation and its impact on fisheries.
	23 - 24	Laws relating to conservation and management of fishery resources in marine and inland sectors.
	25	Land reforms legislation as applicable to aquaculture.
	26 - 27	Judicial judgments relating to Aquaculture.
	28 - 29	Objectives, functions and authority of fishery regulatory agencies like Coastal Regulatory Zone (CRZ) and Aquaculture Authority of India.Brackish water aquaculture Act.
	30	Marine fisheries policy.
	31	Laws relating to fish products and marketing.
	32	International Law of the Seas and international commissions on fisheries and their impact.
	Practicals	<b>PRACTICAL :</b>

		Nil
10		F RESE 321 <b>MARKETING MANAGEMENT</b> 1 + 1 = 2
	Lectures	<b>THEORY :</b>
	1	Principles and objectives of co-operation.
	2	Structure and functions of cooperatives.
	3	Co-operative movement in fisheries in India.
	4	Status and problems of fisheries co-operatives management in relation to resources, production and marketing.
	5 - 6	Introduction to marketing management.
	7 - 8	Core marketing concepts: market structure, functions and types
	9 - 10	Marketing channels and supply chain, marketing margins, marketing environment, marketing strategies
	11	Product development and product mix, consumer behaviour and marketing research.
	12 - 13	Fish markets and marketing in India, demand and supply of fish, market structure and price formation in marine and inland fish markets
	14	Cold storage and other marketing infrastructure in India.
	15	Export markets and marketing of fish and fishery products.
	16	Trade liberalization and fisheries markets.
	Practicals	<b>PRACTICALS :</b>
	1- 4	Developing questionnaire and conducting market surveys, analysis of primary and secondary market data.
	5 - 9	Exercises on equilibrium price for fish and fishery products, estimation of demand and supply using simple regression.
	7 - 9	Case studies of cooperatives.
	10 -16	Visit to co-operative societies, commercial banks and fish markets and organizations dealing with marketing of fish and fishery products.
11		F RESE 322: <b>ENTREPRENEURSHIP DEVELOPMENT AND FINANCE</b> 1 + 2 = 3
	Lectures	<b>THEORY :</b>
	1	Entrepreneurship Development: Assessing overall business environment in the Indian economy.
	2	Overview of Indian social, political and economic systems and their implications for decision making by individual entrepreneurs.
	3	Globalisation and the emerging business / entrepreneurial environment.
	4 - 5	Concept of entrepreneurship; entrepreneurial and managerial characteristics; managing an enterprise; motivation and entrepreneurship development.
	6	Importance of planning, monitoring, evaluation and follow up; managing competition; entrepreneurship development programs.
	7	SWOT analysis, Generation, incubation and commercialization of ideas and innovations.
	8	Government schemes and incentives for promotion of entrepreneurship. Government policy on Small and Medium Enterprises (SMEs) / SSIs.
	9	Export and Import Policies relevant to fisheries sector. Venture capital. Contract farming and joint ventures, public-private partnerships.
	10	Overview of fisheries inputs industry. Characteristics of Indian fisheries processing and export industry.

	11	Social Responsibility of Business. Financial requirements of fishermen. Kinds of financial requirements.
	12 - 13	Role of credit for fisheries development. Sources and types of credits; financing agencies. 'Indigenous and institutional finance, role of NABARD in fisheries development; role of insurance in fish and shrimp farming and industry. Basic accounting procedures, profit and loss account.
	14	Structure of Institutional finance, micro-credit, returns, risk bearing ability and recovery in fisheries sector
	15	Introduction to project and fisheries projects. Relationship between projects and plans.
	16	Project planning. Stages of project planning. Project formulation. Stages of project formulation.
		<b>Practical:</b>
	1 - 20	Formulations of investment projects in fisheries.
	21 - 32	Analysis of credit schemes of banks and the government.
2		<b>COMMUNICATION SKILLS</b>
		Structural and functional grammar; meaning and process of communication, verbal and nonverbal communication; listening and note taking, writing skills, oral presentation skills; field diary and lab record; indexing, footnote and bibliographic procedures. Reading and comprehension of general and technical articles, précis writing, summarizing, abstracting; individual and group presentations, impromptu presentation, public speaking; Group discussion. Organising seminars and conferences.

#### Hands on Training in Aquafarming: 0+4=4

		<b>Credits</b>
<b>1.</b>	<b>Preparation of the Project Plan</b>	<b>3</b>
	World trade, Domestic trade, Export potential, Project formulation, Finance mobilization, Business management	
<b>7.</b>	<b>Harvesting and Marketing</b>	<b>1</b>
	Market outlet, International quality standards to farmed products, Cost - Benefit Analysis, Book Keeping and Human Resource Management	

#### Hands on Training in Post-harvest management in Fisheries


Sr.	Content	<b>Credits</b>
<b>1.</b>	<b>Preparation of the Project Plan</b>	<b>3</b>
	Project Formulation, Finance Mobilization patterns, Business Management	
<b>6.</b>	<b>Documentation</b>	<b>1</b>
	Book Keeping and Human Resource Management	


#### 4. Infrastructure


- a. **Laboratories: Computer Laboratory**
- b. **Name of the important instruments/facilities:** 12 Desktop computers
- c. **Activities:** Conducting UG and PG practical on Information and communication Technology, computer Programming etc. Analysis of data of PG students with software such as SYSTAT, SAS, SPSS.


## Faculty


d. **Academic staff:** Assistant Professor and above with the details of the staff as given below


	Name of the Faculty	Dr. Mangesh Madhukar Shirdhankar
	Post Held	Professor and Head
	Date of Birth	28 <sup>th</sup> May 1964
	Qualification	Ph.D. (Fish and Fisheries Sciences)
	Area of Specialization	Fisheries Statistics, Economics and Extension Education, Resources Management, application of Remote sensing in Fisheries
	Experience (Years)	25 years
	Research Projects guided PhD M.F. Sc.	As Advisory Committee member: 6 As Major Advisor: 9 ; As Advisory committee member : 38
	Present area of research	Remote sensing, Geographical Information system, Fisheries Statistics, Fisheries Economics
	Contact details Land line No. Mobile Fax Email	02352 232241 (office) 02352 220671 (Res) 09422431863 02352 232987 (office) <a href="mailto:mangeshshirdhankar@yahoo.com">mangeshshirdhankar@yahoo.com</a>

	Name of the Faculty	Dr. Ketankumar Jagannath Chaudhari
	Post Held	Associate Professor
	Date of Birth	08 <sup>th</sup> July 1967
	Qualification	Ph.D. (Aquaculture)
	Area of Specialization	Fisheries Economics and Extension Education,
	Experience (Years)	22 years
	Research Projects guided PhD M.F. Sc.	As Major Advisor: 7 ; As Advisory committee member : 8
	Present area of research	Remote sensing, Geographical Information system, Fisheries Statistics, Fisheries Economics
	Contact details Land line No. Mobile Fax Email	02352 232241 (office) 02352 222082 (Res) 09422441178 02352-232987 (office) <a href="mailto:chaudhari.ketan@gmail.com">chaudhari.ketan@gmail.com</a>

	Name of the Faculty	SUHAS MAHADEO WASAVE
	Post Held	ASSISTANT PROFESSOR
	Date of Birth	11-06-1975
	Qualification	MASTER OF FISHERIES SCIENCE
	Area of Specialization	AQUACULTURE
	Experience (Years)	9 YEARS, 6 MONTHS
	Research Projects guided PhD M.F.Sc./M.Tech B.Tech.	NIL
	Present area of research	AQUACULTURE, FISHERIES EXTENSION
	Contact details	
	Land line No. Mobile Fax Email	+91 2352-324852 +91 9421138383 +91 2352-232987 <a href="mailto:suhaswasave@gmail.com">suhaswasave@gmail.com</a>

	Name of the Faculty	BHARAT MAHADEV YADAV
	Post Held	ASSISTANT PROFESSOR
	Date of Birth	01-01-1977
	Qualification	MASTER OF FISHERIES SCIENCE
	Area of Specialization	AQUACULTURE
	Experience (Years)	8 YEARS
	Research Projects guided PhD M.F.Sc	NIL
	Present area of research	AQUACULTURE, FISHERIES ECONOMICS & FISHERIES EXTENSION
	Contact details	
	Land line No. Mobile Fax Email	+91 2352-234670 +91 9423048803 +91 2352-232987 <a href="mailto:cpbharat@gmail.com">cpbharat@gmail.com</a>

	Name of the Faculty	Shri. Sandesh Vitthal Patil
	Post Held	Assistant Professor
	Date of Birth	17/11/1977
	Qualification	M.F.Sc.(Master of Fisheries Science.
	Area of Specialization	Aquaculture
	Experience (Years)	7 years and 6 months
	Research Projects guided Ph.D. M.F. Sc	As Advisory committee member : 1
	Present area of research	Aquaculture Fisheries Extension Fisheries Economics
	<b>Contact details</b> Land line No. Mobile Fax Email	02352-232241 09422680204 02352-232987 sandeshpatil17@gmail.com

	Name of the Faculty	Shri. S. S. Sawant
	Post Held	Asst. Professor
	Date of Birth	24/02/1978
	Qualification	M. F. Sc.
	Area of Specialization	FPTM
	Experience (Years)	3 years 3 months
	Research Projects guided PhD M.Sc./M.Tech B.Tech.	Nil
	Present area of research	Extension
	<b>Contact details</b> Land line No. Mobile Fax Email	(02352) 232241 9421145004 (02352) 232987 sai_sawant786@yahoo.co.in

e. **Research staff:** The name of the research staff member like SRA and JRA. - NA

Recent Photograph	Name of the Faculty	
	Post Held	
	Date of Birth	
	Qualification	
	Area of Specialization	
	Experience (Years)	
	Research Projects guided PhD M.Sc./M.Tech B.Tech.	
	Present area of research	
	Contact details Land line No. Mobile Fax Email	

**5. Instructional Farm: NA**

- a. **Location:**
- b. **Infrastructure: Activities:**
- c. **Photographs:**

**6. Research Activities and Achievements (including projects)**

- a. **Variety/Implements released: Nil**

b. **Research Recommendations:**

Sr. No	Name of the Research projects	Research recommendation
1	Participatory Rural Appraisal (PRA) of selected villages of Ratnagiri block.	On the basis of PRA analysis it is recommended to initiate the efforts to reduce the number of fishing fleets and regulate mesh size of net used for fishing on scientific basis as well as to establish fish landing centers along with all necessary infrastructural facilities in all coastal fishing villages of Ratnagiri block.
2	Assessment and prioritization of training needs of fishers of Ratnagiri.	It is recommended to conduct awareness programme about the importance of fish finding devices and potential fishing zone for purse-seine and trawl owners, respectively, while the state governments schemes for fisheries and role of financing institutes to be explained to gill net, trawler and purse-seine owners by government and non-government organization



**c. Research Outcome/Findings:**

<b>Sr. No</b>	<b>Name of the Research projects</b>	<b>Research Outcome/Findings</b>
1	Present status of price spread and its possible impact on fishermen share in Ratnagiri fish market.	One member, two member and three member channels were identified in the Ratnagiri market and with increasing number of middlemen the percentage share received by producer was observed to be declined.
2	Socio-economic aspects of fishermen community of Mirya village.	Income level of fishermen community can be enhanced by forming Self Help Groups (SHGs). To undertake low investment fisheries business.
3	An appraisal of marine fishermen co-operative societies of Maharashtra.	1) It seems that the roles performed by the fishermen cooperative society are not up to the mark, except the distribution of funds received under different packages. 2) An improper infrastructure facility at landing centre and nearby areas has affected the functioning of cooperatives. 3) Most of the centrally and state government sponsored schemes for fishers are given to the members of the cooperative society. The awareness about the schemes, documentation required to be submitted to avail the benefits of the scheme and eligibility of members to avail the scheme severely affected implementation of government schemes for fishermen cooperative society.

**d. Completed Research Projects/Programmes/Schemes**

1	Title	:	Socio-economic aspects of fishermen community of Mirya village.
	UR No.	:	
	Objectives	:	1) To know the social status of fisherman community. 2) To know the economic status of fisherman community. 3) To suggest possible measures to be undertaken for the development purpose.
	Name of PI/ Co-PI	:	Dr. R. Pai Dr. M. M. Shirdhankar, Dr. S. K. Barve, Dr. B. T. Sawant
	Sponsoring Agency	:	Dr. B. S. Konkan Krishi Vidyapeeth, Dapoli
	Duration	:	2002-03
	Total Outlay	:	
	Summary of Achievements	:	Income level of fishermen community can be enhanced by forming Self Help Groups (SHGs). To undertake low investment fisheries business.
	Relevant photographs	:	

2	Title	:	Present status of price spread and its possible impact on fishermen share in Ratnagiri fish market.
	UR No.	:	
	Objectives	:	1) To know the existing domestic fish marketing channels 2) To analyse the price spread 3) To suggest alternative price spread
	Name of PI/ Co-PI	:	Dr. R. Pai Dr. M. M. Shirdhankar, Dr. S. K. Barve, Dr. K. J. Chaudhari, Dr. B. T. Sawant
	Sponsoring Agency	:	Dr. B. S. Konkan Krishi Vidyapeeth, Dapoli
	Duration	:	2003-04 to 2004-05
	Total Outlay	:	
	Summary of Achievements	:	One member, two member and three member channels were identified in the Ratnagiri market and with increasing number of middlemen the percentage share received by producer was observed to be declined.
	Relevant photographs	:	
3	Title	:	Assessment and prioritization of training needs of fishers of Ratnagiri.
	UR No.	:	
	Objectives	:	1) To identify the training needs of fishers 2) To Prioritize training needs of fishers
	Name of PI/ Co-PI	:	Dr. M. M. Shirdhankar Dr. K. J. Chaudhari, Shri. S. M. Wasave Shri. B. M. Yadav and Shri. S. V. Patil
	Sponsoring Agency	:	Dr. B. S. Konkan Krishi Vidyapeeth, Dapoli
	Duration	:	2006-07 to 2008-09
	Total Outlay	:	Rs. 5000/-
	Summary of Achievements	:	To conduct awareness programme about the importance of fish finding devices and potential fishing zone for purse-seine and trawl owners, respectively, while the state governments schemes for fisheries and role of financing institutes to be explained to gill net, trawler and purse-seine owners by government and non-government organization
	Relevant photographs	:	
4	Title	:	Participatory Rural Appraisal (PRA) of selected villages of Ratnagiri block.
	UR No.	:	
	Objectives	:	1) Identification of fisheries resources of selected villages of Ratnagiri Block 2) To assess the important needs of the fishermen of selected villages 3) To study problems faced by fishermen community in utilization of resources by PRA techniques 4) To suggest suitable solutions to solve these problems by using PRA techniques
	Name of PI/ Co-PI	:	Dr. K. J. Chaudhari

		Dr. M. M. Shirdhankar, Shri. S. M. Wasave Shri. B. M. Yadav and Shri. S. V. Patil
	Sponsoring Agency	: Dr. B. S. Konkan Krishi Vidyapeeth, Dapoli
	Duration	: 2002-03 to 2009-10
	Total Outlay	: Rs. 2000/-
	Summary of Achievements	: To initiate the efforts to reduce the number of fishing fleets and regulate mesh size of net used for fishing on scientific basis as well as to establish fish landing centers along with all necessary infrastructural facilities in all coastal fishing villages of Ratnagiri block.
	Relevant photographs	:
5	Title	: An appraisal of marine fishermen co-operative societies of Maharashtra.
	UR No.	:
	Objectives	: 1. To examine the role of marine fisherman cooperative societies for development of fisher communities. 2. To understand the problems of the marine fisherman cooperative societies of Maharashtra. 3. To identify the constraints of marine fisherman cooperative societies in implementing government scheme.
	Name of PI/ Co-PI	: Shri. S. M. Wasave Dr. M. M. Shirdhankar, Dr. K. J. Chaudhari, Shri. B. M. Yadav, Shri. S. V. Patil and Shri. S. S. Sawant
	Sponsoring Agency	: Dr. B. S. Konkan Krishi Vidyapeeth, Dapoli
	Duration	: 2011-12 (One year)
	Total Outlay	: Rs. 20,000/-
	Summary of Achievements	: 1) It seems that the roles performed by the fishermen cooperative society are not up to the mark, except the distribution of funds received under different packages. 2) An improper infrastructure facility at landing centre and nearby areas has affected the functioning of cooperatives. 3) Most of the centrally and state government sponsored schemes for fishers are given to the members of the cooperative society. The awareness about the schemes, documentation required to be submitted to avail the benefits of the scheme and eligibility of members to avail the scheme severely affected implementation of government schemes for fishermen cooperative society.
	Relevant photographs	:
6	Title	: Identification of potential sites for sea farming along Maharashtra coast using remote sensing data
	UR No.	:

Objectives	:	<ul style="list-style-type: none"> <li>a) To study the temporal and spatial Sea Surface Temperature (SST) variation patterns</li> <li>b) To study the spatio-temporal variations in chlorophyll concentrations.</li> <li>c) To map the Suspended Sediments Concentrations (SSC) patterns</li> <li>d) To know the physical oceanographic features of the study area</li> <li>e) To develop a model based on above inputs using RS and GIS to identify potential sites for mariculture.</li> </ul>
Name of PI/ Co-PI	:	Dr. M. M. Shirdhankar Shri. S. V. Patil Shri. . R. M. Tibile
Sponsoring Agency	:	Space Application Centre (SAC). Dept. of Space, Ahmedabad.
Duration	:	2008-2009 to 2011-12
Total Outlay	:	Rs. 18.40 lakh.
Summary of Achievements	:	Temporal and spatial Sea Surface Temperature (SST) variation patterns during the project period of the coastal area of Maharashtra were generated. Similarly, spatio-temporal variations in chlorophyll-a concentrations along the Coast of Maharashtra during the study period was generated. The maps of Suspended Sediments Concentrations (SSC) patterns of various period along the Coast of Maharashtra were generated from satellite derived data of OCM sensor of Oceansat-II satellite. Depth surface of coastal area along the coast of Maharashtra was developed by giving input of sea truth dept record as well as depth points observed from the admiralty charts of National Oceanographic Office. Two models for identification of sites for culture of phytoplanktonivore filter feeding bivalve and carnivore fishes with input of satellite data of parameters such as chlorophyll-a, Suspended Sediments Concentrations (SSC), Transparency (Inverse of diffused attenuation coefficient), sea surface temperature and bathymetric surface of area have been developed. District wise maps of indentified sites for culture of phytoplanktonivore filter feeding bivalve and carnivore fishes were separately developed.
Relevant photographs	:	
7 Title	:	Euphotic zone production estimation using satellite data as an input to assess potential yield of pelagic herbivores in the Indian EEZ
UR No.	:	
Objectives	:	Estimation of total euphoric zone production from satellite data, its validation and assessment of potential yield of pelagic herbivores in the Indian

		EEZ based on productivity estimates.
Name of PI/ Co-PI	:	Dr. M. M. Shirdhankar Dr. S. K. Barve Shri. . B. M. Yadav
Sponsoring Agency	:	Space Application Centre (SAC). Dept. of Space, Ahmedabad.
Duration	:	2008-2009 to 2011-12
Total Outlay	:	Rs. 29.03 lakh
Summary of Achievements	:	<p>1. Various parameters ranges were recorded.</p> <p>2. Sardine fishery throughout year mainly consist of zero age year class whereas, second year age class was seen in fishery during months of October, December as well as March and first year age class was seen only in the month of March.</p> <p>3. Major varieties of phytoplankton observed in gut content of sardine were <i>Coscinodiscus</i>, <i>Rhizosolenia</i>, <i>Chaetoceros</i>, <i>Biddulphia</i>, <i>Ceratium</i> and <i>Eucampia</i> and same species of phytoplankton were observed in the 98 water samples collected from where the sardines samples were collected.</p> <p>4. Organic carbon content of fish body varied between 36.96 to 37.20% on dry weight basis while of gut ranged from 19.2 to 33.00%.</p> <p>5. Sardine catch fished in terms of weight per haul at sampling station and amount of Chlorophyll-a concentration recoded in water sample of that region did not show any trend. High sardine catches were recorded in an area with high as well as low chlorophyll-a value. Possibly sardines may be congregating in high chlorophyll-a area for feeding as one phenomenon recorded in the present study and in other area were more sardines were recorded with low chlorophyll-a value, the sardine might have filtered out the phytoplankton is the other situation. This cannot be concluded firmly from the data collected during the present study.</p> <p>6. The catchability coefficient estimated for purse seine or ring seine was 0.2811. Ecological efficiency estimated was 0.2171 or 21.71%.</p>
Relevant photographs	:	
8	Title	<p>Assessment of the environmental impact of the proposed Thermal Power Plant of JSW Energy (Ratnagiri) Ltd. at Dhamankhol Bay, Jaigarh with special reference to the coastal Ecosystems, Fisheries and Fishers</p> <p><b>Component-</b> Baseline assessment of the socio-economic of the inhabitants of the region with reference to the region and socio-economic impact analysis vis-à-vis proposed TPP.</p>
	UR No.	:
	Objectives	:
		1) Baseline assessment of socio-economic status with reference to fishers.

		2) Socio-economic impact analysis with respect to proposed thermal power plant.
Name of PI/ Co-PI	:	Dr. V. P. Joshi Dr. M. M. Shirdhankar
Sponsoring Agency	:	JSW Energy Pvt. Ltd.
Duration	:	
Total Outlay	:	
Summary of Achievements	:	<p><b>1 Age:</b></p> <p>The average age of fishers of sampled villages varied between 27.13 year to 39.32 years during 2008 , while it varied between 27.89 to 43.35 years during 2011.The highest average age of fishers was recorded in village Padve (39.32 year), while lowest in Jambhari (27.13 year) during the year 2008. In the year 2011the highest average age of fishers was observed in Padve village (43.35 year), while the lowest was in Kudli (27.89 year).</p> <p>The average age estimated of fishers during 2011 in the villages viz. Jaigad, Kudli, Jambhari, Padve and Agarnaral was significantly different as compared to average age observed during the year 2008 (P&lt;0.05).</p> <p><b>2. Income:</b></p> <p>Average income of the fishers family in all the village ranged from Rs. 32,092/- to 53,416.70/- in the year 2008, while average income in the year 2011of the fishers family in all the villages ranged from. 43,483/- to 60,940/-. The highest average income of the fishers was observed in village Padve, while the lowest was in village Agarnaral during the year 2008. The highest average income of the fishers was observed in village Kudli and the lowest in village Agarnaral in the year 2011. Significant difference was observed in the average income of fishers in Jambhari and Kudli villages as compared to average income in the year 2008 (P&lt;0.05). No significant difference was observed in the average income of fishers in Padve, Jaigad and Agarnaral villages as compared to 2008 (P&lt;0.05).</p> <p><b>3.Educational status:</b></p> <p>The number of illiterate members among all villages were shown decreasing trend as compared to the year 2008, while the members availed primary education was measurably more than the year 2008 except in village Jaigad and Agarnaral. There was no any major change observed with secondary, higher secondary, diploma and graduate level education except village Agarnaral.</p> <p>Significant difference was observed in the educational status of fishers in the villageKudli,JaigadandAgarnaral(P&gt;0.05) as compared to the year 2008.No significant difference was observed in the educational status of fishers in</p>

the village Padve and Jambhari ( $P < 0.05$ ) as compared to the year 2008.

#### **4. Occupational status:**

The fishers of the villages studied for occupational status were found engaged in different fishery related activities like traditional fishing, mechanised fishing, crewman, fish vendor as well as retailer, fish whole seller, commission agent and allied activities like net mending. Apart from these fishery related activities, fishers were engaged in private jobs while, major part of the fisherman community was dependent on others.

Almost twofold increase in number of crewman was observed with the village Jambhari than the year 2008. Significant increase in number of crewman in village Jaigad, Agarnaral and Kudli was also observed but there was no increase in numbers of crewman was recorded in village Padve than the year 2008. Traditional fishing observed with the drastic reduction in village Jambhari (80.82 %) and Kudli (100 %), while decrease in number of traditional fisherman was also observed in village Jaigad, Agarnaral and Padve. No major shift in other occupations of fishers was observed in studied villages.

Significant difference was observed in the occupational status of fishers in the village Jambhari ( $P > 0.05$ ) as compared to year 2008. No significant difference was observed in the occupational status of fishers in the village Padve, Kudli, Jaigad and Agarnaral ( $P < 0.05$ ) as compared to year 2008.

#### **5. Movable assets:**

The fishers of the studied villages were having the movable assets such as television, video player, cassette player, telephone, mobile, refrigerator, microwave, bicycle and automobile. Almost 2-3 fold increase in number of television and mobile was observed during 2008 to 2012 in all the sampled villages. As far as the automobile is concern, it showed major increase with village Kudli and Jaigad, while in village Jambhari, Padve and Agarnaral, there was slight increase in number of automobile. Rest of the movable assets were showing no major change. Significant difference was observed in the movable assets of fishers in all the village ( $P > 0.05$ ) as compare to year 2008.

#### **6. Age groups:**

Decrease in number of fisherman population of age group of 0-10 was observed in all the fisher villages, but the increases in number of fisher members in age group of 40-50 was observed in the village Kudli, Padve and Jaigad, while Jambhari and

		Agarnaral showed increase in number in the age group of 30-40 year. The observation shows that the majority of fisher population was in the middle age group of years 20-30, 30-40 and 40-50 in all the sampled fisher villages. Significant difference was observed in the numbers of fishers in the different age groups in the village Padve ( $P>0.05$ ) as compare to year 2008. No significant difference was observed in numbers of fishers in the different age groups in the village Jambhari, Kudli Agarnaraland Jaigad ( $P<0.05$ ) as compare to year 2008.
	Relevant photographs	:

**e. Ongoing Research Projects/Programmes/Schemes:**

<b>Sr. No</b>	<b>Name of the Ongoing Research Projects</b>
1	Assessment of coastal productivity of Jaigad and resource mapping employing satellite imagery.
2	Assessment of impact of ornamental fish culture training programmes in development of enterprise.

**7. Repository of abstracts of the theses:**

**Efficacy and constraints in adoption of improved aquaculture techniques by shrimp farmers in South Konkan Region**

Degree: M.F.Sc.	Subject: Fisheries Resource Management and Extension (FRME)
Name of the Student: Shri. M. M. Gawade	Registration No.: 71
Year of thesis submission: 2004	
Research Guide: Dr. M. S. Chandage	Designation: Professor and Head

It can be concluded from the present study that the shrimp farmers of this region have learnt lesson from the mistakes of earlier entrepreneurs who have faced heavy losses during mid nineties due to break out of WSSV disease in Andhra Pradesh and Tamilnadu. The adoption quotient of the shrimp farmers along the South Konkan region ranged from 50 to 96.86 with a mean of  $76.18 \pm 2.3637$ . All the farmers of the South Konkan region were categorised into high and medium adopters. A constraint of unavailability of soil and water testing laboratory in near by area was a problem faced only by 22.5% of farmers. But from the study of extent of adoption of improved aquaculture techniques revealed that establishment of soil and water-testing laboratory would enhance the level of adoption of farmers residing in the South Konkan region. So, shrimp farmers from the South Konkan region showed better adoption of most of the improved techniques for development of eco-friendly and sustainable aquaculture practices.



### **Catch composition and economic analysis of trawler operation off Ratnagiri coast**

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Degree: M.F.Sc.	Subject: Fisheries Resource Management and Extension (FRME)
Name of the Student: Shri. S. N. Kunjir	Registration No.: 72
Year of thesis submission: 2004	
Research Guide: Dr. S. K. Barve	Designation: Assistant Professor

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The present study revealed that trawling was economically viable business along the Ratnagiri coast. In this business shrimps catches play an important role in the economic viability of this business. In addition to shrimps, certain varieties of fishes caught during trawling were also significantly contributing in revenue generation. Among finfishes, ribbonfish and threadfin bream were found to be more important as these fishes have gained lot of importance in the export market.

### **Catch composition and economic analysis of gill netters operating off Ratnagiri coast**

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Degree: M.F.Sc.	Subject: Fisheries Resource Management and Extension (FRME)
Name of the Student: Shri. A.T. Markad	Registration No.: 74
Year of thesis submission: 2004	
Research Guide: Dr. M. M. Shirdhankar	Designation: Associate Professor

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The finding of the present study showed that the gillnet fishing was profitable business which competes with other fishing gear operated along the Ratnagiri coast. Among the fishes caught by this gear, Indian mackerel and seerfish were the major contributors of the OBM and IBM gill-netters respectively. Seerfish was available throughout the year in IBM gillnetter and for OBM gillnetter it was available only during initial period of fishing season. This indicates shifting of seerfish population from deeper waters to shallow waters during the months of September to November.

### **Characterisation of *Sillago sihama* (Fursskal, 1775) of Ratnagiri by truss morphometric analysis**

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Degree: M.F.Sc.	Subject: Fisheries Resource Management and Extension (FRME)
Name of the Student: Shri. G. B. Wani	Registration No.: 77
Year of thesis submission: 2005	
Research Guide: Dr. M. M. Shirdhankar	Designation: Associate Professor

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Comparison of mean values for variables of both conventional and truss morphometric data sets as well as canonical discriminate analysis of both data sets have indicated that the sample of Kalbadev are different from the samples collected from Mirya bay, Kajali bay and Jaitapur Creek. Canonical discriminate analysis of conventional and truss morphometrics complete data set as well as shear analysis of both data sets showed probability of segregation, but the Mirya bay specimens showed intermixing with other populations. This may be due to the

migration of species, but this aspect was not in the preview of the present study, thus cannot be confirmed. The results of the present study need to be confirmed through techniques available in molecular biology.

### **Efficacy and constraints in adoption of improved aquaculture practices by shrimp farmers in Thane district of Maharashtra**

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Degree: M.F.Sc.	Subject: Fisheries Resource Management and Extension (FRME)
Name of the Student: Shri. M. S. Rawool	Registration No.: 87
Year of thesis submission: 2005	
Research Guide: Dr. R. Pai	Designation: Associate Professor

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Farmers of this area observed not to have any problem with respect to quality medicine, chemicals required for treatments and nutritionally balanced feed. Technicality of these aspects were taken care by the input dealers. However, the farmers of this area were mainly concerned with the cost of above inputs. Similarly, required knowledge about other aspects of farming was also obtained by input dealers, because of which farmers did not face the need of separate extension agency to transfer the knowledge.

### **Efficacy of sampling design to study macro faunal assemblage on exposed sandy beach**

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Degree: M.F.Sc.	Subject: Fisheries Resource Management and Extension (FRME)
Name of the Student: Shri. R. H. Rathod	Registration No.: 88
Year of thesis submission: 2005	
Research Guide: Dr. S. K. Barve	Designation: Assistant Professor

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Mandovi beach was sandy dissipative beach. Macrofaunal richness and abundance has shown spatial and temporal heterogeneity. Maximum macrofaunal richness was observed in winter in the month of October, as where minimum macrofaunal abundance was recorded in the month of April. Total 27 macrofaunal organisms were recorded of which 15 were purely sandy inhabiting, 10 were rocky and two were sandy-muddy inhabitant. Genus *Umbonium* in molluscan group was recorded throughout the Year: with higher magnitude. Sampling design with 0.25 sq. m quadrat size and with 12 m interval has recorded 96.60% of macrofaunal richness and 97.10% of macrofaunal abundance. The amount of effort required to sample exposed sandy beach was quite less than the effort exercised in sampling continuous strip of quadrats. Therefore, it is recommended that to sample macrofaunal richness and abundance on exposed sandy beach 0.25 sq. m quadrat with 12 m interval is to be used for better results.

### **Marketing structure and price behaviour of seer fish in and around Ratnagiri of Maharashtra state**

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Degree: M.F.Sc.	Subject: Fisheries Resource Management (FRM)
Name of the Student: Shri. Md. Abdul Salam	Registration No.: 90
Year of thesis submission: 2005	
Research Guide: Dr. M. S. Chandage	Designation: Professor and Head

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The present study was carried out to understand the present seer fish marketing pattern in and around Ratnagiri. There were five marketing channels observed in marketing of seer fish. The marketing cost incurred in channel I, II, III and IV were 5.40, 5.41, 5.19 and 2.99 percent of

the consumer rupee respectively. The price of seer fish at the landing centre and retail market were subjected to wide fluctuations.

### **Design features of trawls operated along the Ratnagiri coast of Maharashtra state**

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Degree: M.F.Sc.	Subject: Fisheries Resource Management and Extension (FRME)
Name of the Student: Shri. V. G. Yewale	Registration No.: 93
Year of thesis submission: 2005	
Research Guide: Dr. M. M. Shirdhankar	Designation: Associate Professor

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An attempt was made to give average design for each type of trawl net operated along the coast of Ratnagiri by identifying the cluster of net through principle co-ordinate analysis. Most of the measurements of cluster net were nearby. Average number of meshes along the length as well as breadth and mesh sizes were rounded to unit place and specification of net were computed as per this rounded average. The suggested nets need to be tested in actual field for its efficiency

### **Morphometric relation to quantitative meat indices in *Nemipterus japonicus* (Boch 1791)**

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Degree: M.F.Sc.	Subject: Fisheries Resource Management and Extension (FRME)
Name of the Student: Shri. H. B. Pawar	Registration No.: 99
Year of thesis submission: 2006	
Research Guide: Dr. M. M. Shirdhankar	Designation: Associate Professor

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*Nemipterus japonicus*, the Japanese threadfin beam, available along the Ratnagiri, Mumbai and Panaji coast is used on large scale in the production of surimi. The morphometric relationships established between various length-length, length-weight and weight-weight measurements were positive and highly correlated. The nomographs were developed on the basis of established morphometric relationship for the 5-10, 10-15 and 15-21 cm length groups. Nomograph developed can be used as ready reference to find out quantity of meat yield, scale waste and other waste produced from the batch procured raw material by the managers of surimi processing industry.

### **Adoption of innovation by purse seine operators of Ratnagiri coast of Maharashtra state**

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Degree: M.F.Sc.	Subject: Fisheries Resource Management and Extension (FRME)
Name of the Student: Shri. S. S. Ghatage	Registration No.: 96
Year of thesis submission: 2006	
Research Guide: Dr. R. Pai	Designation: Associate Professor

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Cent per cent adoption was observed regarding practices such as vessel construction and material, correct type of fasteners, engine horse power, type of netting material, depth of

operation, net preservation techniques, sinker material, ice ratio, navigational equipments and signaling system. The purse seine operators reported problems such as conflicts with non-mechanised fishermen, lack of co-ordination with different institutes and inconvenient fishing regulations.

**Marketing structure and price behaviour of ribbon fish in and around Ratnagiri of Maharashtra state**

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Degree: M.F.Sc.	Subject: Fisheries Resource Management and Extension (FRME)
Name of the Student: Miss. S. R. Shinde	Registration No.: 106
Year of thesis submission: 2006	
Research Guide: Dr. R. Pai	Designation: Associate Professor

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The present study was carried out to understand the present ribbon fish marketing scenario in and around Ratnagiri. There were seven and six marketing channels observed in marketing of fresh ribbonfish and dried ribbonfish respectively. Price spread analysis revealed that fishermen's share in consumer's rupee was highest in zero Members: channel while it was nearly same between one member and two member channels. The fishermen's share in consumer's rupee for dried ribbonfish marketing was almost same in channels I, II, V and VI while that for remaining channels it was of lower magnitude.

**Characteristics and behavioural pattern of fish consumers in and around Ratnagiri city, Maharashtra state**

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Degree: M.F.Sc.	Subject: Fisheries Resource Management and Extension (FRME)
Name of the Student: Miss. K. Shanta Devi	Registration No.: 107
Year of thesis submission: 2006	
Research Guide: Dr. K. J. Chaudhari	Designation: Assistant Professor

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Most of the fish consuming families were nuclear, heads of fish consuming households were middle aged and most of them were serving in private or government sector, while monthly income of fish consuming households varied between Rs. 3,000 to 49,000/-. Being a coastal city number of fish consuming households were more than non-fish consuming households and the preferred fishes were of marine source. The most preferred varieties were seer and mackerel fish. The most common source of purchase of fish was retailer or vender. Consumption of fish was strictly avoided on certain days of week or during certain period due to religion customs. Fish consuming households preferred to consume fish in fried or curry form and were generally preferred fish in both meals. The estimated annual per capita consumption of fish was around 12.54 kg and major constraints faced by the fish consuming households were non-availability of fish during closed season and price of fish at the time of purchase. Creating awareness about the value added fish products or processed fish products can increase the per capita consumption of fish. This will help in marketing the fish available to the consumer during the period when fishing is closed.

## **Efficacy and constraints in adoption of improved aquaculture practices by shrimp farmers in Raigad district of Maharashtra.**

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Degree: M.F.Sc.	Subject: Fisheries Resource Management and Extension (FRME)
Name of the Student: Shri. Y.T. Mohite	Registration No.: 84
Year of thesis submission: 2007	
Research Guide: Dr. K. J. Chaudhari	Designation: Assistant Professor

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The present study concluded that farmers of Raigad district were well educated, young and majority of them belongs to joint type of family. They were highly dependent upon consultant, neighbour and successful farmers for knowledge. Knowledge of the shrimp farmers had positive and significant relationship with adoption behaviour. Price fluctuation and lack of remedy to white spot disease were the major problems to the farmers of Raigad district.

### **Marketing structure and price behaviour of Pomfrets in and around Ratnagiri**

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Degree: M.F.Sc.	Subject: Fisheries Resource Management and Extension (FRME)
Name of the Student: Shri. S. P. Ponkshe	Registration No.: 86
Year of thesis submission: 2007	
Research Guide: Dr. R. Pai	Designation: Associate Professor

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The present study was carried out to understand the present pomfret marketing pattern in and around Ratnagiri. There were 7 marketing channels observed in marketing of pomfrets. Price spread analysis revealed that fishermen share in consumer's rupee for black pomfret varied from 56.44 to 61.36 per cent as where for silver pomfret it varied from 55.83 to 62.62 per cent. It is clear from the present study that the fishermen were getting a better share for selling the quality fishes like pomfrets.

### **Adoption of innovations by Gill net operators of Ratnagiri, Maharashtra**

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Degree: M.F.Sc.	Subject: Fisheries Resource Management and Extension (FRME)
Name of the Student: Shri. Rohit Patel	Registration No.: 104
Year of thesis submission: 2007	
Research Guide: Dr. Satish Keshav Barve	Designation: Assistant Professor

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Cent percent motorized gill net owners operating Fibre Reinforced Plastic vessels were with moderately high level of knowledge while knowledge level of motorized gill net owners operating wooden or FRP coated wooden vessels was between medium and moderately high level. Adoption quotient of cent percent-motorised gill net owners was between the medium and moderately high level of adoption. Average adoption quotient recorded among non-motorized gill net owners ranged between 42.16 to 43.59 percent.

All the gill net owners operating motorized as well as non-motorized vessels sought information from neighbour as well as input dealers among localite individual source of information and radio as mass communication source while co-operative societies as a cosmopolite source of information.

## **Adoption of improved practices by trawl net operators of Ratnagiri coast of Maharashtra State**

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Degree: M.F.Sc.	Subject: Fisheries Resource Management and Extension (FRME)
Name of the Student: Shri. U. A. Suryawanshi	Registration No.: 110
Year of thesis submission: 2007	
Research Guide: Dr. K. J. Chaudhari	Designation: Assistant Professor

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Maximum trawler owner fishermen (56.33 %) had adopted recommended practices at high level and only 43.67 % trawler owner fishermen found at medium level. Trawler owner fishermen or Mirkarwada landing center had good knowledge of all recommended practices. It was found that 95.40 % trawler owner fishermen fall under the category of high knowledge. The major constraints found were pollution, price fluctuation and inadequate financial support at initial stages.

## **Validation of potential fishing zone forecast along the Ratnagiri coast of Maharashtra**

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Degree: M.F.Sc.	Subject: Fisheries Resource Management and Extension (FRME)
Name of the Student: Shri. A. U. Thakare	Registration No.: 128
Year of thesis submission: 2007	
Research Guide: Dr. M. M. Shirdhankar	Designation: Associate Professor

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Present study was undertaken to validate potential fishing zone forecast generated by Indian National Center for Ocean information Services which revealed that catches recorded in notified PFZs were significantly higher than non PFZs along with 43.90% enhancement in catches throughout the season ( $P < 0.05$ ) except in the month of March. The relationship established between total catch on number of hauls of purse-seines fished in PFZ ( $Y=1353.9X$ ) was better than the relation established for purse-seines fished in non-PFZ ( $Y=866.41X$ ) whereas fishing success rate in PFZ was 72.79% throughout the season. Therefore, it can be consider that potential fishing zone forecast were trustworthy and help fishers to procure additional catches and the fishers of Ratnagiri district need to be educated with regard to PFZ charts or to improve their earnings by increasing the success rate.

## **Socio-economic survey of fishers along thr Dharamtar creek in Pen taluka of Raigarh district, Maharashtra**

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Degree: M.F.Sc.	Subject: Fisheries Resource Management and Extension (FRME)
Name of the Student: Miss. A. B. Waskar	Registration No.: 129
Year of thesis submission: 2007	
Research Guide: Dr. M. M. Shirdhankar	Designation: Associate Professor

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Study of socio-economic aspect and constraints faced by fishers residing along the dharamtar creek was carried out in different villages viz. Shirki Chal, Ghodabandar, Bhal, Urnoli and Dadar. It was observation that the basic achievements like drinking water, medical services, transportation facility, educational facilities, well established fish market were not up to the mark. The majority of head of family were in the age group of 20-60 years. The male female ratio of all the villages was almost 1:1. The average rate of literacy observed among the fishers residing along the Dharamtar creek was 72.05%. Educational status according to age group showed that maximum literate individuals were in younger age group. The most of the male (48.77%) and female (38.23%) fishers were educated maximum up to secondary level. The

most of the fisherman family have nuclear family and the total numbers of member in those families were observed five or less than five.

Maximum fisherman having *pucca* house without tiles (45.69%) followed by *pucca* house with tiles (35.34%). Very less houses were seen with more than four rooms (6.90%) and one room (9.48%). Fishers of all villages except Dadar were owner of agricultural land and pond. Among the movable asset, television (60.34%) was the most common asset observed, followed by refrigerator (18.10%) and more of the fishers was possessing any kind of automobile. Only 42.33% of the fishers were earner. Among the earner 67.18% were active fishers and 21.37% were involved in fish trading, while 6.87, 3.82 and 0.76% were servicemen, wages earner and businessmen respectively

Almost 53.45% fishers were members of fishermen co-operative society. Fishers having membership in grampanchayat and school *panch* committee were only 0.65 and 0.32% respectively. The percentage of female fishers having membership in *mahil mandal* and *mahila bachat gat* were 6.48 and 3.41 respectively. Almost 5.82% of fishers were members of different associations in the villages. The average per capita income of fishers operating traditional vessel was Rs. 12,359/-. The average per capita income of fishers operating motorized vessel was Rs. 15,146/-. The earning of fishermen by the operation of gill net, dol net, barrier net and pagoli trap in a year was Rs. 53,494/-, 94,865/-, 66205/- and 52,874/- respectively. The major problems reported by fishers were proposed Special Economic Zone (SEZ), water pollution in fishing area, damage of nets due to cruising barges and delay payment of diesel subsidies.

### **Design and catch composition of *Dol* net operated along the Ratnagiri Coast Maharashtra**

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Degree: M.F.Sc.	Subject: Fisheries Resource Management and Extension (FRME)
Name of the Student: Shri. B. V. Solanki	Registration No.: 145
Year of thesis submission: 2009	
Research Guide: Dr. K. J. Chaudhari	Designation: Associate Professor

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In Ratnagiri *Dol* net is operated in Jaigarh estuary (16<sup>o</sup> 47' to 17<sup>o</sup> 17' North latitude and 73<sup>o</sup> 17' to 73<sup>o</sup> 12' East latitude). The total number of *dol* net operated along Ratnagiri district were 61 during the year 2007-2008. The data was collected during the 15<sup>th</sup> August 2007 to 31<sup>st</sup> March 2008 which was considered as a one fishing season. The overall length (OAL), breadth, depth of operation, tonnage, VRC number, base harbor, engine specification and accessories of vessel was measured. The highest percentage 34.43% of *dol* net owners were in age group of 50-60 whereas, 40-50 was the next dominant age group with 29.50% of the total *dol* net owners. The highest number of *dol* net owners (47.54%) observed to have primary education. It was observed that the *dol* net owners of Ratnagiri to be living in nuclear families (60.66%). The majority of *dol* net owners having an experience of 10-20 years (40.98%). *Dol* net were operated along Ratnagiri coast by two types of vessel; traditional boat (dugout canoe with outrigger) locally called as *Pagar* and motorized boat locally called *Depco*. The total two numbers of sinkers and two numbers of floats were used for vertical opening of *dol* net. The floats were made up of rectangular shaped (60X60 cm) thermocoal and stone used as sinkers. Five numbers of anchors were used for mooring the net. Overall 13 varieties of fish shellfish were recorded in the catch composition of *dol* net. Lesser sardine was the major constituent with the percentage share of 25.78. Catch composition of *dol* net according to full moon days and new moon days was 50.44% and 49.56% respectively.

### **Adoption of shrimp health management practices in the North konkan region of Maharashtra**

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Degree: M.F.Sc.	Subject: Fisheries Resource Management and Extension (FRME)
Name of the Student: Shri. A. R. Sathe	Registration No.: 126
Year of thesis submission: 2008	
Research Guide: Dr. R. Pai	Designation: Associate Professor

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The present study was carried along the north konkan coast of Maharashtra. Extent of knowledge and adoption related to shrimp health management practices was studied among a group of 94 respondents. Interview schedule method was used for collection of data. The average knowledge and adoption quotient was observed to be 54.10 and 58.93 per cent showing medium level of knowledge regarding the shrimp health management practices. High knowledge was observed regarding practices such as healthy seed selection and packing, seed transportation, acclimatization, stocking and its evaluation whereas all practices showed medium and moderately high adoption levels.

### **Adoption of shrimp health management practices in the South konkan region of Maharashtra**

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Degree: M.F.Sc.	Subject: Fisheries Resource Management and Extension (FRME)
Name of the Student: Shri. P. C. Randive	Registration No.: 125
Year of thesis submission: 2008	
Research Guide: Dr. R. Pai	Designation: Associate Professor

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The present study was carried out in the south konkan region comprising two districts, viz. Ratnagiri and Sindhudurga. A total 33 numbers of farms were observed in operational condition during study period. Information related to shrimp health management practices was collected from such operational farms from study area. Average knowledge quotient of farmers in the south konkan region of Maharashtra was 63.81, whereas more than half (57.58 %) were found in the medium range. In the present study, effect of factor such as age, education, experience, farm size and adoption level on knowledge of health management practices have positive relationship with adoption ( $r = 0.7070$ ,  $p < 0.05$ ). The average adoption quotient of overall practices was found as 68.06 with more than half of the shrimp farmers (60.61 %) were observed in medium adoption level and 39.39 % were in high adoption level. In the south konkan region of Maharashtra, disease incidence was the major constraint reported by 81.82 % and non-availability of good quality seed in nearby areas and long route of transportation by 60.61 and 81.82 %, respectively of farmers.

### **Appraisal of fisherwomen activities in the coastal villages of Palghar tahsil of Thane district, Maharashtra**

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Degree: M.F.Sc.	Subject: Fisheries Resource Management and Extension (FRME)
Name of the Student: Shri. V. P. Sankhe	Registration No.: 127
Year of thesis submission: 2009	
Research Guide: Dr. S. K. Barve	Designation: Associate Professor

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The present study is an attempt to study the role of fisherwomen in the fisheries related activities. This study was conducted in the coastal villages of Palghar Tahsil, Thane District, Maharashtra. A total of five coastal Tahsils consisting of 82 fishing villages from Thane District were selected. A total of 265 samples were selected to represent the population. Pre-structured interview schedule method was used for collection of data from the fisherwomen. The cost and return analysis of the fresh fish wholesaler showed an annual profit of Rs. 94,289/- whereas that of fresh fish retailer, fresh fish vendor, dry fish processor, dry fish retailer and dry fish vendor was observed to be Rs. 33,468.95/-, Rs. 26,958/-, Rs. 39,407/-, 25,977.75/- and 15,082.50/- respectively. The Engel's coefficient of standard of living was observed to high in retailer (36.15%) followed by wholesaler (34.53%) and vendor (33.76%) indicating sufficient income to meet their food needs.

### **Production of ice and it's extent of utilization in fishery industry of Ratnagiri**

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Degree: M.F.Sc.	Subject: Fisheries Resource Management and Extension (FRME)
Name of the Student: Shri. S.S. Jadhav	Registration No.:
Year of thesis submission: 2009	
Research Guide: Dr. M. M. Shirdhankar	Designation: Professor & Head

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Mirkarwada is one of the important minor fishing harbours situated in the Ratnagiri block, in addition to this there are 18 fish landing centres and 19 ice plants situated in various villages of the block. It was noted that importance of utilization of ice was recognized by producers as well as marketing agents. All the types of vessels were observed with the arrangement to carry ice for on-board preservation of fish. The marketing agents were also observed to be using ice regularly for preservation of fish. In all 19 ice plants with production capacity of 2,01,491 tonnes were operating in the Ratnagiri block. The total ice used by fishery industry during the year 2007-08 was 97,046 tonnes, which indicated under utilization (48%) of present production capacity of ice plants. The expected requirement of ice of Ratnagiri block is 1,57,377 tonnes and existing ice plants are with appropriate production capacity to suffice the present expected requirement of the fishery industry.

### **Shoreline change detection of Ratnagiri block using Remote Sensing and GIS**

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Degree: M.F.Sc.	Subject: Fisheries Resource Management and Extension (FRME)
Name of the Student: Shri.S. S. Markad	Registration No.: 159
Year of thesis submission: 2009	
Research Guide: Dr. M. M. Shirdhankar	Designation: Associate Professor

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Ratnagiri block, with 57 km shoreline stretch, was studied for the shoreline changes using remote sensing and GIS techniques. The temporal and multispectral satellite images of the year 1989, 1999, 2004 and 2009 taken from different satellite sensors were used processed through ERDAS Imagine 9.1 image processing software for mapping of shoreline and associated changes pertaining to erosion and deposition. The satellite images were preprocessed to curtail geometric, radiometric as well as spatial errors. Different image processing techniques such as histogram threshold, unsupervised classification of multi-spectral images as well as principal components were used for shoreline mapping and shoreline changes were estimated for the time intervals between 1989 to 1999, 1999 to 2004 and 2004 to 2009 by image subtraction. The accuracy

assessment showed no any significant difference among the accuracies of shoreline mapping by different image processing techniques. The study revealed deposition of 160 ha during study period between 1989 to 2009 with prominent deposition during 1989 to 2004 and erosion for the time period between 2004 to 2009. Mirkarwada minor fishing harbour showed navigational difficulties due to deposition of sand material eroded from Mirya beach during 1989 to 2009 whereas Dhamankhol bay showed accretion during 2004 to 2009 due to land filling activity carried out for port construction. Study revealed formation and changes in the sandbars at mouth region of rivers along the shoreline during last couple of decades. Dhamankhol bay, Kachare, Varvade, Ganpatipule, Areware, Kalbadevi, Mandovi, Bhatye, Ranpar and Gaonkhadi were the major areas of deposition whereas, erosion was prominent along Nandivade, Kachare, Ganpatipule, Mirya and Mandovi beach areas during 1989 to 2009.

### **Mapping and change detection of mangrove coverage of Ratnagiri block using Remote Sensing and GIS.**

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Degree: M.F.Sc.	Subject: Fisheries Resource Management and Extension (FRME)
Name of the Student: Shri.A. D. Nakhwa	Registration No.: 160
Year of thesis submission: 2009	
Research Guide: Dr. M. M. Shirdhankar	Designation: Associate Professor

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Mangrove mapping and change detection of Ratnagiri block last couple of decades was undertaken through remote sensing and GIS techniques. The multi-spectral satellite images acquired by different satellite sensors at different years (1989, 1999, 2004 and 2009) were used. This digital satellite data set was processed through ERDAS Imagine 9.1 image processing software for mapping and change detection of mangrove areas along study area. The satellite images were corrected for geometric, radiometric as well as spatial errors. Different classification techniques such as supervised and unsupervised classification of multi-spectral as well as principal component imageries were used for mangrove mapping. Unsupervised classification of principal component imageries showed better accuracies in mangrove mapping. Therefore, images classified with this technique were used for estimation of sequential changes in mangrove area for the time intervals between 1989 to 1999, 1999 to 2004 and 2004 to 2009. The mangrove coverage of Ratnagiri block in 2009 was about 9.49 sq. km, while mangrove coverage in 1989, 1999 and 2004 were 7.17, 7.56 and 6.52 sq. km respectively. The large reduction in the mangrove forest was observed in Purnagad estuary during 1989-1999 and Jaigad estuary during 1999-2004 due to construction of embankment in the estuarine region, while massive increase in the mangrove coverage was observed on the mudflats of the Sakhartar estuary during 2004-2009. The net increase in mangrove coverage observed was 231.84 ha for time period between 1989 and 2009.

### **ECONOMIC ANALYSIS OF PURSE-SEINE FISHING ALONG RATNAGIRI COAST, MAHARASHTRA STATE**

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Degree: M.F.Sc.	Subject: Fisheries Resource Management and Extension (FRME)
Name of the Student: Shri. S. C. Kamble	Registration No.: 158
Year of thesis submission: 2009	
Research Guide: Dr. K. J. Chaudhari	Designation: Associate Professor

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Purse-seine vessels which were operating along the Ratnagiri coast during 15<sup>th</sup> August 2008 to 31<sup>st</sup> May 2009 (fishing period of year) were considered for collection of primary data related to catch composition, costs and returns. Detailed information on craft including engine and gear was collected from the purse-seine units. In catch composition, Indian oil sardine (28.58%) and cat fish (24.30%) contributed more compared to other species in the fish catches of purse-seine landed at Ratnagiri. Average total landing recorded per purse-seine unit for one fishing season of 41 weeks was 2,46,247 kg and 3,02,603 kg in quantity and revenue generated was Rs. 65,72,814/- and Rs. 74,84,111/- respectively for cluster I and cluster II. Purse-seine operation earned a profit of Rs. 20,74,558/- for cluster I and Rs. 29,83,551/- for cluster II. Though the major species caught were not high priced, the quantity of catch was enough to earn adequate revenue and to make purse-seine operation profitable. Considering the variable cost, cost of fuel and labour charges contributed more compared to other components of variable cost. Capital turn over ratio was estimated at 2.01 and 2.16 which measure the efficiency of purse-seine owner in managing and utilizing fixed assets gross ratio, operating cost ratio and fixed cost ratio were 0.68, 0.50 and 0.19 for cluster I whereas, 60, 43, and 0.17 for cluster II respectively. From this study it was concluded that the purse-seine fishing along Ratnagiri coast was highly profitable and economically viable business during the fishing season August 2008 to May 2009.

### **ENTREPRENEURSHIP BEHAVIOUR OF FISHERWOMEN IN RATNAGIRI BLOCK OF RATNAGIRI DISTRICT, MAHARASHTRA STATE**

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Degree: M.F.Sc.

Subject: Business Management (BM)

Name of the Student: Amrapali Manohar Gajbhiye

Registration No.: FRRTM0100201

Year of thesis submission: 2012

Research Guide: Dr. K. J. Chaudhari

Designation: Associate Professor

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A study on entrepreneurship behaviour of fisherwomen in the Ratnagiri block of Ratnagiri district, Maharashtra state was conducted during 2011-12 with a sample size of 105 fisherwomen from 10 villages of Ratnagiri block in Ratnagiri district.

Majority of the respondents (55.24%) exhibited medium level of entrepreneurial behaviour. The components of entrepreneurial behaviour were innovativeness, risk orientation, decision making, economic motivation, management orientation and self-confidence. Among all these components majority of respondents belong to medium entrepreneurial behaviour but in innovativeness and achievement motivation respondents exhibited low and high entrepreneurial behaviour category.

The rank correlation technique was applied and found that the characteristics such as education, family size, house type and social participation were positively and significantly ( $P < 0.05$ ) correlated with entrepreneurial behaviour. Principal component analysis was performed to find out the major components of entrepreneurial behaviour of the sampled fisherwomen. The first three principal components accounted for almost 58.97 per cent of the total variance. Canonical correlation analysis was used to examine the potential relationship between socio-personal variables and entrepreneurship behaviour variables. Results of the analysis showed that there was no relationship between set of socio-personal variables and entrepreneurial behaviour variable.

**AN ASSESMENT OF ENTREPRENEURSHIP BEHAVIOUR OF THE SHRIMP  
FARMERS IN MAHARASHTRA STATE**

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Degree: M.F.Sc.

Subject: Business Management (BM)

Name of the Student: Palav Kedar Vishwas

Registration No.: FRRTM0100203

Year of thesis submission: 2009

Research Guide: Dr. K. J. Chaudhari

Designation: Associate Professor

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The present study was carried out in four coastal district of Maharashtra to find out entrepreneurship behaviour of shrimp farmers and their socio-personal, socio-economic, communication characters and also barriers faced by farmers in their farming activity. Amongst the sampled shrimp farmers 52.94% were of middle (36 to 50 years) age. Twenty nine per cent were old (above 50 years) age category and only 17.65% farmers were in young (Up to 35 years) age category. Majority of the respondents (64.71%) had medium innovativeness, followed by low (20.00%) and high (15.29%) innovativeness, respectively; 61.18% were under medium achievement motivation category and only 5.88% farmers were under low achievement motivation category. More than half of the sampled shrimp farmers (51.76%) were with medium decision-making ability. With respect to economic motivation, majority of the respondents (44.71%) were in medium economic motivation category, followed by 36.47 and 18.82% of the respondents belonged to high and low economic motivation categories respectively; most of the farmers (88.24%) of the four districts in Konkan region showed medium level of risk taking ability. Almost 62.35% of the sampled shrimp farmers were under medium leadership ability category; about 64.71% farmers were having high level of management orientation category and only 2.35 per cent farmers were having low level of management orientation. More than half (52.94%) of the sampled shrimp farmers had high level of entrepreneurship behaviour. Entrepreneurial behaviour index (EBI) analysis showed that 59 farmers were in high (71-80 per cent) EBI category, fourteen farmers in moderate (61-70 per cent), eight farmers in very high (Above 80 per cent) and only four farmers in low (51-60 per cent) EBI category. The correlation coefficient ( $r_s$ ) indicated that the characteristics such as farming experience, annual income, number of crops per year and social participation were positively and significantly correlated with entrepreneurial behaviour ( $P < 0.05$ ). The first three principal components accounted for 66.72% of the total variance. Leadership ability and economic motivation showed maximum factor loading (0.4996 and 0.636 respectively) with principal component I, which showed 34.34 per cent variance. Canonical correlation coefficient estimated was 0.4300 for first variable whereas; next two canonical variables were with coefficient of 0.3265 and 0.2918. The first canonical variable accounted 47.85% variability, subsequently second and third canonical variable accounted for 25.17 and 19.63% variability respectively and total together first three canonical variable expressed 92.65% variability. Lack of co-operation among farmers (80.00%) was the major barriers faced by farmers, followed by lack of extension education (78.82%) and high price of seed (76.47%).

**FISHERIES RESOURCE MAPPING OF RATNAGIRI DISTRICT USING REMOTE SENSING AND GEOGRAPHICAL INFORMATION SYSTEM**

Degree: M.F.Sc.

Subject: Business Management (BM)

Name of the Student: Lokhande Prashant Champatrao Registration No.: FRRTM0100202

Year of thesis submission: 2013

Research Guide: Dr. M. M. Shirdhankar

Designation: Professor & Head

The present study envisages use of Remote Sensing and Geographical information System to map the fisheries resources such as landing centres, ice plants, fish processing plants, Fish markets, Fisherman co-operative societies, creeks, shrimp farms, shrimp hatcheries, rivers, reservoirs, mangrove and fisheries related organizations of Ratnagiri district. Fisheries resources were identified and mapped using land cover pattern of the area. The maps of various fisheries resources of Ratnagiri district were prepared using digital satellite Image of IRS P6 LISS III and LISS IV (only for Ratnagiri block) and Landsat –Multi-spectral scanner, the Enhanced Thematic mapper plus (ETM+) images of the study area. The software used for remote sensing was ERDAS 9.1 and for GIS was Arc Map 9.3 software. Almost 49 fish landing centre were observed along the 167 km coastline of Ratnagiri district. Altogether 47 ice plants, nine fish processing and two fish meal plants were supplying the fish processing industry of Ratnagiri district. The 81 numbers of fisherman co-operative societies were observed in Ratnagiri district of which 79 were in marine sector and two were in fresh water sector. Only 40 shrimp farms with 129.51 ha of constructed area were seen in Ratnagiri district, while only two shrimp seed hatcheries were observed. In addition to this 24 creeks supports brackish water fisheries and 65 reservoirs as well as 10 rivers in the district supports freshwater fisheries. The estimated mangrove area was 2435.16 ha in Ratnagiri district. All the nine fisheries related organizations were in Ratnagiri block of Ratnagiri district.

## 8. Extension Activities

### a. Training Programmes Organized –

Sr. no.	Title	Sponsorer	Date & Duration	Type of participants & numbers
1.	Ornamental fish breeding & Marketing (on the occasion of Krishi Din)	--	1/7/12 One day	Ornamental fish rearers & breeders - 15
2.	Fisheries & Aquaculture	Chaitanya, Pune	23/5/12 One day	Trainees -6
3.	Potential fishing zone and fishing technology		20/3/12 One day	Fishermen -28
4.	Fish culture in saline water & farm ponds	ATMA, Sangli	13/2 12 - 15/2/12 Three days	Farmers - 12
5.	Ornamental fish breeding	Parivartan sanstha, Chiplun & BOI	23/8/11 - 27/8/11 Five days	Members of Parivartan sanstha - 20

6.	Ornamental fish breeding	MPEDA	1/7/11 - 5/7/11 Five days	Ornamental fish rearers - 20
7.	Capacity building to enhance competitiveness of Indian Fisheries	FISHCOPFE D, New Delhi	30/12/10 - 1/1/11 Three days	Trainees -30
8.	Development of Fisheries in Maharashtra	MFDC, Mumbai	23/8/10 - 27/8/10 Five days	Fish farmers - 12
9.	Fingerling production in rearing pond	NAIP	3/8/10 One day	Fish farmers - 19
10.	Ornamental fish breeding & culture	--	14/6/10 - 20/6/10 Seven days	Trainees -39
11.	Sustainable development of marine fisheries	Ministry of Agriculture, GOI	26/10/09 - 4/11/09 Ten days	Fishermen - 19

**b. Seminar/Symposia/Conference/Workshop organized -**

<b>Sr. no.</b>	<b>Title</b>	<b>Sponsorer</b>	<b>Date &amp; Duration</b>	<b>Type of participants &amp; numbers</b>
1.	Open Sea cage culture - Navi Disha.	ATMA, JSW & SBI	24/01/13 One day	Fishermen- 176
2.	Sindhudurg Bio- diversity project	Mangroove Cell, Forest Department, Govt. of Maharashtra	21/12/12 One day	Officer and fishermen
3.	Fresh water fish culture (on the occasion of Fish Farmers day)	--	10/7/12 One day	Villagers - 20
4.	Development of fresh water aquaculture in Western Maharashtra	M. P. K. V., Rahuri	25/8/11 One day	Farmers - 27
5.	Value added fish product demonstrations	NAIP	8/3/11 One day	Womens from nearby villages - 30
6.	Ornamental Fish Diseases	MPEDA	4/9/10 One day	Ornamental fish breeders & rearers from state.- 86

7.	Tuna fishing	MPEDA	11/1/10 One day	Fishermen - 22
8.	Potential fishing zone & fisheries technology	----	4/8/09 One day	Fishermen - 18
9.	Sustainable fisheries	----	5/6/09 One day	Fishermen - 14

**c. Farmer Melawa organized -**

Sr. no.	Title	Sponsorer	Date & Duration	Type of participants & numbers
1.	Reservoir fisheries Management : problems & Solutions	Association of Reservoir Fish Farmers, Ratnagiri	10/7/2010 One day	Fish farmers - 22
2.	Ornamental fish breeding & culture- Problem & Solution	--	1/7/2010 One day	Ornamental fish rearers - 23
3.	Employment opportunities in fisheries	Matsyagandha fishermen society, Kasarveli, Ratnagiri	19/3/2010 One day	Fishermen - 19
4.	Employment opportunities in fisheries	Abhar Sanskrutik, Kala ani Krida Mandal, Ratnagiri	14/3/2010 One day	Fishermen - 24
5.	Employment opportunities in fisheries	Fishermen society, Harnai-Paj, Dapoli	8/3/2010 One day	Fishermen - 23
6.	Protection & Management of marine biological resources	NBFGR, Lucknow	25/2/2009	Fishermen - 60
7.	Reservoir fish culture	---	10/7/08	Fish farmers - 20

**d. Radio/TV Talks delivered by the staff members of the Department/Section:**

Sr. No	Topic	Date of Broadcast on AIR, Ratnagiri
1	<b>Dr. M. M. Shirdhankar, Professor &amp; Head</b>	
1	Masemari jalyachi niga	25/12/87
2	Shewandache savardhan	15/01/88
3	Matsyasavardhanath panyachya abhyasache mahatv	28/06/88
4	Chhyoty hodyanchi engine, tyanchi durusti ani niga	28/08/89
5	Kinaryache darshak dive	15/11/89
6	Ekach jatichya mashanche tasech anek jatichya mashanche prantu ektrit savardhan	08/04/90

7	Shingalyache savayi, tyanche paribhraman ani martuk yancha parspar sanbandh	08/08/90
8	Masemaricha parisar vatavaran - talav	26/05/91
9	Ratnagir Zillatil matsyavyvsay	01/06/91
10	Kolanbi solnaryachhya hatachi niga	16/11/91
11	Khadyanna jivache mahatva	26/01/92
12	Masemarila janya purvichi tayari	14/03/92
13	Mtsyasavardhanath mati ani pani yachhya abhyasache mahatva	21/07/93
14	Kokanatil masemari naukache prakar	04/07/95
15	Matsya sanvdhanath khadya jivanche mahatva	18/11/95
16	Nauka bandhaniche niyam	16/06/2000
17	Sandpanyatil matsyasavardhan	
18	Naukanche aghat talnyache upay	28/06/03
19	Matsyopadanath ghat jhali aahe ka ? karane ani upay	
20	Nimkharya panyatil savardhanasathi upyukt jati	20/10/06
21	Magur mashache savardhan and arthshastra	31/08/07
	<b>Dr. K. J. Chaudhari, Associate Professor</b>	
1	Dol Net	18.01.1997
2	Nauka Kinaryavar Ghenyache Kaushalya	20.07.1996
3	Matsya Prakriya Ya Malet: Masalichi Frizing Prikriya	19.07.1997
4	Naukache samudratil Aghat Kase Talal?	31.07.1999
5	Masemari Bandaravaril Swachateche Mahatva	06.11.1999
6	Matsya Prakriya Tantradyan: Sadyastiti	01.01.2000
7	Godyapanyatil Matsyasavardhachi Purva Tayari	09.09.2000
8	Matsyotapadanateel Ghat: : Karane ani Upay	06.12.2002
9	Masali Hataltana Swacchteche Mahatva	28.02.2003
10	Matsya Prekriyetil Aadhunik Tantatrdyan	22.01.2004
11	Masemari Vyavasayatil Aadhunik Tantradyan	27.05.2005
12	Matsyavyavasay pairchay	05.02.2005
13	Dharanat matsyasanvardhan karatana gyavayachi kalaji	12.08.2005
14	Nimkharya panyatil kolambi sanvardhan ya mallet: Kolambi savardhanche Arthshatra and prakalp ahaval	12.01.2006
15	Shashvat Masemarisathi Upay-yojan	06.11.2007
16	Nimkharya panyatil Khekada sanvardhan ya mallet: Khekada savardhanche Arthshatra and prakalp ahaval	25.07.2008
17	Thet Masali Vikriche Fayade	02/01/2009
18	Pavasalyatil Masemari bandiche Mahatva	12/06/2009
19	Shashvat Masemari: Kalachi Garaj	11/12/2009
20	Pavasalyatil Masemari bandi Aavashyak	09/07/2010
21	Matsyavyavasayatil Svayamrojagar Sandhi	11/02/2011
22	Matsyavyavasayatil Svayamrojagarchya Sandhi	25/11/2011
23	Matsyavyavasayasathi Shasanacya Vivivd Yojana	26/10/2012
24	Shashvat Masemari: Kalachi Garaj	28/06/2013
	<b>Shri. S. M. Wasave, Assistant Professor</b>	
1	Rupak :Neelkrantichee navi disha, swayanrojgarachi navi asha	1998
2	Masemaree Naukanchi durusti ani Niga	21/01/2005
3	Matsyodyogat Yuvakanna sandhi	03/06/2005
4	Sagari Kolambi Sanvardhan	11/11/2005
5	Nimkharya panyatil kolambi savanrdhan Malet : Kolambichya	01/12/2006



	khadyache vyavsthapan	
6	Mase ani manavi aharateel mahatva	11/04/2008
7	Jababdar Masemarisathi acharsanhita	
8	Matsyavyavasayachya Bhavitavyasathi Kandalvan Sanrakshan	15/01/2010
9	Sagari Jaiv Vividhata ani tiche Mahatva	27/08/2010
10	Shobhivant Matsya Vyavasayat Rojgarachya Sandhi	20/01/2012
	<b>Shri. B. M. Yadav, Assistant Professor</b>	
1	Kolambi beej upalabhdhata ani vyavassthapan.	27-10-2006
1	Samudratil matsyasatha olakhanyacyha vividh paddhati	16-11-2007
2	Kolambi snavardhanachya vividh paddhati.	06-06-2008
3	Sagari utpadan vikas pradhikaran ani vividh yojana.	26-12-2008
4	Naisargik apatti ani masemari vyavasthapan	23-07-2010
5	Naisargik apatti ani Matsyavyavsay	15-03-2013
	<b>Shri. S. V. Patil, Assistant Professor</b>	
1	Kolambichi Kadhani Ani Panan	18/12/2006
1	Karp Mashyanche Nursery Vyavasthapan	10/08/2007
2	Sagari Jaivikteche Mahatva	27/05/2009
3	Jababdar Masemarisathi Karavayachi Achar Sanhita	09/03/2010
4	Shobhivant Matsya Vyavasay Ek Uttam Rojagar	12/03/2013
	<b>Shri. S. S. Sawant, Assistant Professor</b>	
1	Sagari Masemaricha Shaswat Vikas	15/02/2011.

e. **Farmer-Scientist Forum:** Nil

f. **Other Extension Activities:**

Sr. no.	Subject	Duration & date	No. of trainees	Place of organisation
1.	Awareness programme on 'Code of conduct for responsible fisheries'.	21/3/13 - One day	15	Malvan, Sindhudurg
2.	Awareness programme on 'Code of conduct for responsible fisheries'.	21/3/13- One day	17	Deogad, Sindhudurg
3.	Awareness programme on 'Code of conduct for responsible fisheries'.	20/3/13- One day	19	Nivati, Sindhudurg
4.	Awareness programme on 'Code of conduct for responsible fisheries'.	20/3/13- One day	19	Shiroda, Sindhudurg
5.	Awareness programme on 'Code of conduct for responsible fisheries'.	9/11/12- One day	29	Bhatye, Ratnagiri
6.	Awareness programme on 'Code of conduct for responsible fisheries'.	12/9/12- One day	17	Waravde, Ratnagiri
7.	Awareness programme on 'Code	14/7/12- One	39	Karla, Ratnagiri

	of conduct for responsible fisheries'.	day		
8.	Awareness programme on 'Code of conduct for responsible fisheries'.	6/7/12- One day	22	Kalbadevi, Ratnagiri
9.	Sustainable fisheries	4/12/11 - One day	101	Shivar-Ambere, Ratnagiri
10.	Sustainable fisheries	30/9/11 - One day	43	Sakhartar, Ratnagiri
11.	Demonstration of By Catch Reduction Device	17/2/09 - One day, 14/4/08 - One day, 13/4/08 - One day, 12/4/08 - One day	79	Harne, Kasarveli, Mirkarwada, Veldur

**g. Publications:**

Books- Nil

**Booklet/bulletin** : One

- 1) Godya Panyatil Carp Masaliche Sanvardhan

**Folders/Leaflets-** One

- 1) Jababdar Masemarisathi Achar Sanhita.
- 2) Cage Culture Ek Navi Disha
- 3) Sanvardhanyogya Karp masalinchya Jatinchi Olakh
- 4) Gody Panyatil Matsyotpadan Vadhikarita Sanvardhan Talavat Matsya Botukali Sanvardhan.
- 5) Matsya Sheti Ani Talav Parisantha

Souvenir/Proceedings of Seminar/Symposia/Conference/Workshop Organized- Nil

**Training manuals of the training programme organized-** One

- 1) Sustainable Development of Marine Fisheries

**Journal Research papers-**

Sr. No	Name of the author/co-author	Title of research article	Name of the Journal	Publication Year, Vol. No. and page no.
1	<b>Dr. M. M. Shirdhankar, Professor &amp; Head</b>			
	<b>Shirdhankar, M. M., Thomas, P. C and Barve S. K.,</b>	Efficacy of selection in sexually breeding <i>Artemia (Artemia franciscana)</i> .	<b>Aquaculture Research</b>	2006, 37: 1276-1281.
	<b>Shirdhankar, M. M., Thomas, P. C and Barve S. K.,</b>	Phenotypic estimates and heritability values	<b>Aquaculture Research</b>	2004,35 (1) : 35-39.

		of <i>Artemia franciscana</i> .		
	<b>Shirdhankar, M. M.</b> and Thomas, P. C.,	Response to bi-directional selection for naupliar length in <i>Artemia franciscana</i> .	<b>Aquaculture Research</b>	2003, 34 : 535-541.
	<b>Shirdhankar, M. M.</b> and Thomas, P. C.,	Heritability estimated of naupliar length in <i>Artemia franciscana</i> using different methods.	<b>Asian Fisheries Science</b>	2003. 16 (1) : 69 – 76.
	Gawde M. M, Chandge M. S. and <b>Shirdhankar, M. M.</b> ,	Cost and earning analysis of shrimp farming in south Konkan region of Maharashtra.	<b>Indian Journal Ocean Sciences applied and Pure Biology</b>	2009, Vol. 24 (1),171 -176
	Kulkarni, P. V., Singh, H., <b>Shirdhankar, M. M.</b> , Bare, S. K. and Sawant, N. H.	Effective supplementation of amino acids in the practical diets for postlarvae of <i>Macrobrachium rosenbergii</i> (De Mn).	<b>In : Freshwater prawns : Advances in biology, aquaculture and marketing.</b>	2007,Pp 554-559
	Kunjir, S. N., Barve, S. K., <b>Shirdhankar, M. M.</b> and Markad, A. T.,,	Catch and revenue of trawlers operating along Ratnagiri coast, India.	<b>The Asian Journal of animal science,</b>	2007, 2: 75-79.
	Kunjir, S. N., Barve, S. K., <b>Shirdhankar, M. M.</b> and Markad, A. T.,	Cost and earnings of trawlers operating off Ratnagiri coast, India.	<b>The Asian Journal of animal science</b>	2007, 2: 49-54
	Markad, A. T., <b>Shirdhankar, M. M.</b> , Kunjir, S. N. and Yadav, S. N.,	Catch and revenue of gillnetters operating from Ratnagiri fishing harbour, India.	<b>The Asian Journal of animal science,</b>	2007, 2: 7-12.
	Sawant, G. P., Singh, H., Sawant, N. H. and <b>Shirdhankar, M. M.</b> ,	Effect of different oil cakes on the growth and survival of <i>Liza parsia</i> (Hamilton-Buchanan, 1822).	<b>Fishery Technology</b>	2005, 42(1) : 37-40.
	Sawant, D. S., Shetye, Y. N. and <b>Shirdhankar, M. M.</b> ,	Evaluation of some cytoplasmic male sterile lines of rice in Konkan region of Maharashtra State.	<b>Annals of Agricultural Research,</b>	2003, 24(2) : 337-344.

Barve, S. K. , Jalihal, D. R., <b>Shirdhankar, M. M.</b> , Sawant, N. H. and Tibile, R. M.,	Sex ratio, Gonadosomatic index and size progression of ova of mullet <i>Liza parsia</i> (Hamilton – Buchanan, 1822) of Ratnagiri, Maharashtra.	<b>Indian Journal Applied and Pure Biology</b>	2003., XVIII (1) : 23 – 26.
Barve, S. K., Jalihal, D. R., Raje, P. C., <b>Shirdhankar, M. M.</b> and Sawant N. H.,	Length-Weight relationship and ponderal index of Mullet, <i>Liza parsia</i> (Hamilton-Buchanan, 1822) of Ratnagiri, Maharashtra.	<b>Geobios,</b>	2003, 30 (2 – 3): 121-124
Barve, S. K., Jalihal, D. R., <b>Shirdhankar, M. M.</b> , Pai, R. and Narvekar, M. N.,	Identification of mullet of Ratnagiri based on osteological characters.	<b>Ecology Environment and Conservation</b>	2003, 9(3) : 313-320.
Barve, S. K., Jalihal, D. R., <b>Shirdhankar, M. M.</b> , Mohite, A. S. and Chavan, S. V.,	Studies on the some external characters of six species of mullets found along Ratnagiri coast of Maharashtra.	<b>Ecology Environment and Conservation</b>	2003, 9(4) : 509-517.
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Chandage, M. S. and <b>Shirdhankar, M. M.</b> ,	Aquaculture prospects of marine edible resources	<b>Indian J. Invert. Zool and Aqua Biol.</b>	1999,3(2).
Shelar G.S., Dhaker H.D., Pathan D.I and Shirdhankar M.M.,	Effect of Different Organic Manures on Growth of Screw Vallisneria, <i>Vallisneria spiralis</i> Linne 1753.	<b>African Journal of Basic &amp; Applied Sciences</b>	2012, 4 (4): 128-133.
Pawar H. B., Shirdhankar M. M., Barve S. K. and S. B. Patange,	Yield Indices for Meat in Pre-processing of <i>Nemipterus japonicus</i> (Bloch, 1791) Fishery Technology	<b>Fishery Technology</b>	2012, 49 : 172 – 176.
Pawar H. B., Shirdhankar M. M., Barve S. K. and S. B. Patange,	Discrimination of <i>Nemipterus japonicus</i> (Bloch, 1791) stocks from Maharashtra and	<b>Journal of Geo-Marine Sciences</b>	2011, 40 (30 : 471-475.

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	Nakhawa, A. D., Markad, S. S., Vichare P. S. and Shirdhankar, M. M.,	Mapping and change detection of mangrove forest in Sakhartar estuary of Ratnagiri district, Maharashtra	<b>International Multidisciplinary Research Journal</b>	2012, 2(8):04-08
	Deshmukh A. V., Kovale S. R., Sawant, M. S., Shirdhankar, M. M. and Phunde, A. B.,	Reproductive biology of <i>Sardinella longiceps</i> along the coast off Maharashtra	<b>Indian Journal of Marine Sciences</b>	2010, 30(2): 274-279.
	Kambale S., Chaudhari, K. J., <b>Shirdhankar, M. M.</b> , Barve, S. K., Shingare, P. E., Sing, H. D.	Economics of purse-seine fishing along Ratnagiri coast of Maharashtra State	<b>Indian Veterinary Journal,</b>	2010, 90(6):74-76 pp.
	Barve, S. K., Raje, P. C., <b>Shirdhankar, M. M.</b> , Chaudhari, K. J., and Gawde. M. M.,	Cost and earning analysis of gillnet and trawl net operation along the Ratnagiri coast.	<b>Ecology and Fisheries</b>	2009,2 (2),91-94
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2	<b>Dr. K. J. Chaudhari, Associate Professor</b>			
	<b>K. J. Chaudhari</b> and D.R. Jalihal	A field key to the seed of penaeid prawns along the Konkan coast (west coast of India )	<b>Crustaceana</b>	1993,65 ( 3 ) 318 – 335
	<b>K. J. Chaudhari</b> and D.R. Jalihal	Morphometric studies on the seed of penaeid prawns of Ratnagiri coast ( Maharashtra, West coast of India )	<b>India J. Mar. Sci.</b>	1998, Vol, 27(3&4), 378 – 388 pp.
	<b>K. J. Chaudhari</b> and D.R. Jalihal	Prawn seed resources of south Konkan coast (Maharashtra State, West coast of India)	<b>Current and Emerging Trends in Aquaculture Eds. P.C.Thomas</b>	1998,116 – 130 pp
	A. G. Naik, H. Singh, <b>K. J.</b>	Effects of stocking density on growth	<b>Freshwater Prawns:</b>	2003

	<b>Chaudhari, N. H.</b> Sawant and S. K. Barve	and survival of post larvae of <i>Macrobrachium rosenbergii</i> ( de Man) in floating cages.	<b>Advances in Biology, Aquaculture and Marketing.</b> Eds: C. Mohankumar Nair et al.	
	<b>K. J. Chaudhari, M.</b> S. Chandge, S. R. Kovale and P. C. Raje	Fisheries Industrial and Rural Work Experience Programme: Involving undergraduate students as extension agents	<b>Recent Advances in Fisheries Education and Research</b>	2006 , RTFER'04 166-172pp.
	S, K, Barve, P.C.Raje, M.M. Shirdhankar, <b>K.</b> <b>J. Chaudhari</b> & M. M. Gavade	Cost and Earning analysis of gillnet and Trawl net operation along the Ratnagiri coast	<b>Ecology and Fisheries</b>	2009, Vol 2(2):91-94
	Umesh suryavanshi, <b>Ketan Chaudhari,</b> and Somnath Yadav	Utilisation of the Sources of Information for Knowledge and Adoption of Improved Practices by Trawl Net Operators at Mirkarwada Landing Centre of Ratnagiri coast of Maharashtra State	<b>Journal of Science Information,</b>	2011, Vol 1(2)
	Sushil Kamble, <b>Ketan Chaudhari,</b> Mangesh Shirdhankar, and Sandip Markad	Economics of purse-seine fishing along Ratnagiri coast of Maharashtra State	<b>Indian Veterinary Journal.</b>	2013, 90(6):74-76 pp,
3	<b>Shri. S. M. Wasave, Assistant Professor</b>			
	Santosh Y. Metar, S. K. Chakraborty, A. K. Jaiswar, S. R. Yadav and <b>S. M.</b> <b>Wasave</b>	Morphometry, length-weight relationship and relative condition factor of <i>Saurida tumbil</i> (Bloch, 1795) from Mumbai waters, India	<b>Aquaculture.</b>	2007, Vol.8 (1)79- 83
	V. P. Joshi, <b>S. M.</b> <b>Wasave</b> and J. M. Koli	Raising of adults of Banana Shrimp, <i>Fenneropenaeus merguensis</i> , in a Cement Concrete Tank	<b>Fishing Chimes.</b>	July 2003, Vol. 23 No. 412 – 13.
	<b>S. M. Wasave</b> and	Surimi wastewater	<b>Pollution</b>	2004, Vol. 22 (2).125

	G. N. Kulkarni	characteristics and its toxicity to the fingerlings of tilapia, <i>Oreochromis mossambicus</i> .	<b>Research.</b>	- 130
	V. P. Joshi, <b>S. M. Wasave</b> and J. M. Koli	Growing Banana Shrimp into Adults in Masonry Tanks.	<b>Fishing Chimes.</b>	August 2005, Vol. 25 No. 545 – 46.
	N. D. Chogale, J. M. Koli, V. V. Vishvasrao, B. R. Chavan, S. T. Sharangdher, M. T. Sharangdher and S. M. Wasave	Studies on Biochemical and Microbiological Quality of Fish in Ratnagiri Fish Market	<b>Ecology, Environment and Conservation.</b>	2005, Vol. 11 (3 – 4) 483 - 485
	Pawar, R. A., A. S. Kulkarni, <b>S. M. Wasave</b> and S. R. Kovale	Coastal Resources: Sustainable use through Aquaculture	<b>Journal of Aquatic Biology.</b>	2006, Vol. 21 (3)78 - 82
	Pawase, A. S., A. S. Kulkarni, P. H. Mugaonkar, <b>S. M. Wasave</b> and S. R. Kovale	Possibilities of Sea Ranching in Konkan, Maharashtra.	<b>Journal of Aquatic Biology.</b>	2006, Vol. 21 (3)83 - 86
	Yadav, R. P, S. T. Sharangdhar, M. T. Sharangdhar, <b>S. M. Wasave</b> , S. S. Wasave and H. S. Patil	Utilization of brown seaweed sargassum for preparation of soup, from seaweed soup powder.	<b>Ecology, Environment and Conservation.</b>	2010, Vol. 16(2)163 - 168
	Yadav, R. P, S. T. Sharangdhar, M. T. Sharangdhar, <b>S. M. Wasave</b> and S. S. Wasave	Utilization of brown seaweed sargassum for preparation of soup	<b>Ecology, Environment and Conservation.</b>	2010 : Vol. 16(2)169 - 174
	Wasave Sangita Suhas, Hukum Singh, <b>Wasave Suhas Mahadeo</b> and Yadav Bharat Mahadeo	Bioenergetics of the cashew ( <i>Anacardium occidentale</i> L.) testa powder incorporated diet for the post larvae of <i>Macrobrachium rosenbergii</i>	<b>The Asian Journal of Animal Science.</b>	December 2011, Vol.6, Issue 2153 - 158
	Gawade Mangesh Mohan, <b>Wasave Suhas Mahadeo</b> , Wasave Sangita Suhas, Yadav Bharat Mahadev, Patil Sandesh Vitthal and Patil Sayali Sandesh	Rearing of Asian seabass, <i>Lates calcarifer</i> (Bloch, 1790) fry to fingerlings in cages	<b>Geobios.</b>	2012, Vol. 39 (1)13 - 16

Wasave S. S., H. Singh and <b>Wasave S. M.</b>	Bioenergetics parameters of the diet designed for post larvae of <i>Macrobrachium rosenbergii</i> (De Man 1879) by partial replacement of fishmeal with Jackfruit ( <i>Artocarpus heterophyllus</i> ) seed powder	<b>Journal of Aquaculture in the Tropics</b>	2011, Vol. 26 (1-2) 71-78
Wasave, Sangita S., <b>Wasave Suhas M.</b> , Singh H., Yadav Bharat M. and Yadav Rakesh P.	Ingredients used in aqua feed formulation in India.	<b>Fishing Chimes</b>	2009, Vol. 29 No. 8 52 - 55
<b>S. M. Wasave</b> , S. S. Wasave, B. M. Yadav and S. V. Patil	Mangrove - A boon to ecology – Needs conservation	<b>Ecology and Fisheries</b>	2010, Vol. 3 (1) 107 - 112
<b>Wasave Suhas M.</b> , Wasave Sangita S., Dagare Rajesh A., Yadav Rakesh P. and Murkar, Anup A.	Tricks to Breed Oscar fish	<b>Fishing Chimes</b>	2011, Vol. 31 No. 948 - 52
<b>Shri. B. M. Yadav, Assistant Professor</b>			
H. K. Barman, A. Barat, <b>Bharat M. Yadav</b> , S. Banerjee, P. K. Meher, P. V. G. K. Reddy, R. K. Jana.	Genetic variation between four species of Indian Major Carps revealed by Random Amplified Polymorphic DNA assay.	<b>Aquaculture</b>	(2003), 217 115-123.
S. W. Belsare, H. Singh, <b>B. M. Yadav</b> , & R. M. Tibile	Larval rearing of freshwater prawn <i>Macrobrachium rosenbergii</i> (De Man) in different formulations of artificial sea water.	<b>Indian Journal Applied &amp; Pure Biology</b>	2007, Vol. 22(1), 1-6
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	Gawade M. M., Wasave S. M., Wasave S. S., <b>Yadav B. M.</b> , Patil S. V. and Patil S.S.	Rearing of Asian Seabass, <i>Latus Calcarifer</i> (Bloch,1970) fry to fingerlings in cages	<b>Geobios</b>	2012, Vol. No. 39: 13-16
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<b>Shri. S. V. Patil, Assistant Professor</b>				
	<b>S. V. Patil</b> & H. Singh.	Burrowing behavior of venerid clam, <i>Paphia malbarica</i> .	<b>Indian Journal of Applied and Pure Biology.</b>	(2009), Vol. 24 (1), 35-38. (ISSN 0970-2091)
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<b>Shri. S. S. Sawant, Assistant Professor</b>				
	S. S. Sawant & S. B. Patange	Frozen storage characteristics of treated and untreated meat from male and female mussel ( <i>Perna viridis</i> ).	<b>Fishery Technology</b>	2002, 39 (1) - pp:27-33.

V. S. R. Katadi, V. B. Mulye, N. D. Chogale, P. H. Sapkale and S. S. Sawant	Preparation of prawn wafers by using the tiny prawn ( <i>Parapenaeopsis stylifera</i> )	<b>Aquacult</b>	2008, 9(2)- pp: 185-191

Full length research papers published in Proceedings of Seminar/Symposia /Conference/Workshop –

**h. Details of other activities (for e.g. seed production, production of other commodities etc) – Nil**

**i. Contact Information**

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**j. News and Events :**