



## Section 1:

### Vision, Mission, Objectives and Functions

#### Vision

To document the diversity and abundance of species in the Indian Ocean into specific biogeographic Information systems and generate advisories for sustainable utilization and management of living resources in the Indian EEZ

#### Mission

Model marine ecosystem and predict the short term/long term responses of Marine Living Resources to changes in the environment. Exploring marine living resources for socio-economic benefits including development of harvesting and post harvesting technologies

#### Objectives

1. Develop management strategies for marine living resources on the basis of Ecosystem monitoring and modeling efforts.
2. Evolving, coordinating and implementing time targeted national /regional R&D programmes in the field of marine living resources and ecology through effective utilisation of Fishery and Oceanographic Research Vessel Sagar Sampada.
3. Establishment of a data and referral centre and marine museum for storage and dissemination of data/information to end users.
4. Implement national programme on Indian Ocean Census of Marine Living Life (IndoCoML) and Indian Ocean Biogeographic Information System (IndOBIS)
5. Coordinating the national programme on Southern Ocean Marine Living Resources.
6. Setting up of Lakshadweep field station for MLR related technology development and transfer.
7. Management of fishery oceanographic research vessel FORV *Sagar Sampada*.

## **Section 1:**

### **Vision, Mission, Objectives and Functions**

#### Functions

- Collection analysis and interpretation of field data to test various scientific hypothesis.
- Document Marine Living Resources in the Indian ocean and predict response strategies under changing climate scenarios.
- Locate and assess exploitable living resources in the deep-sea and distant waters and provide advisories thereof.
- MLR technology development and transfer to end users.
- Publications of research papers, books, monographs and atlases on MLR. Arrange Symposium/Seminars/Workshops to Promote scientific interactions.
- Human Resource Development in the field of MLR.
- Management of the fishery Oceanographic Research vessel *Sagar Sampada*.

## Section 2:

### Inter se Priorities among Key Objectives, Success indicators and Targets

Objectives	Weight	Action	Success Indicator	Unit	Weight	Target/Criteria Value				
						Excellent	Very good	Good	Fair	Poor
						100%	90%	80%	70%	60%
Ecosystem Monitoring and Modeling	5	Collection of Oceanographic data	Number of stations	Number	2	60	50	40	30	20
		Analysis of samples	Samples analysed	%	2	70	60	50	40	30
		Generation of reports on each season	Time taken for publication after each season	Month	1	3	4	5	6	7
Deep sea and Distant Water fishery	5	Deep sea demersal trawl operations	Number of successful hauls	Number	2	40	35	30	25	20
		Myctophid resources survey of central and western Arabian Sea	Number of Stations	Number	2	20	15	10	5	<5
		Southern Ocean MLR Cruises	Date of start	Month	1	Jan 2011	Feb 2011	March 2011	April 2011	No Cruises
Indian Ocean Biogeographic Information System(IndOBIS)	5	Add species records to IndOBIS website	Number of records added	No.	2	5000	4000	3000	2000	1000
		Add new Voucher specimens	Number of sample added	No	2	5000	4000	3000	2000	1000
		Holding of regional Workshop on IndOBIS	Date	Month	1	Oct 2011	Nov 2011	Dec 2011	Jan 2011	Not held

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Census of Marine Life	3	Initiate National programmes	Date	Month	1	June 2011	July 2011	Aug 2011	Sep 2011	Oct 2011
		DNA Bar-coding of species	Number of species for which bar-code is generated	Number	2	50	40	30	20	10
Technology for breeding and rearing of ornamental fishes at the CMLRE hatchery unit of Lakshadweep and its commercialisation	5	Breeding and rearing of new species of ornamental fishes	Number	No.	1	4	3	2	1	0
		Production of marketable juveniles	Number of juveniles	No.	2	25,000	20,000	15,000	10,000	5000
		Number of people trained	Number	No.	2	20	15	10	8	5
Management of Fishery Oceanography Research Vessel Sagar Sampada	5	Dry-dock repair of vessel	Date	Month	1	Aug 2011	Sep 2011	Oct 2011	Nov 2011	Dec 2011
		Utilization of vessel for Scientific Research	Percentage of Utilization	%	2	80	70	60	50	40
		Scientific exhibitions onboard at ports of call	Number of exhibitions held	No.	2	4	3	2	1	0
Research Publications	7	Publications in peer-reviewed journals	Impact factor(IF)	No.	7	20	15	10	5	0

### Section 3: Trend Values of the Success Indicators

Objectives	Action	Success Indicator	Unit	Actual Value for FY 09/10	Actual Value for FY 10/11	Target Value for FY 11/12	Projected Value for FY 12/13	Projected Value for FY 13/14
Ecosystem Monitoring and Modeling	Collection of Oceanographic data	Number of stations	Number	–	–	60	120	220
	Analysis of samples	Samples analysed	%	–	–	70	80	90
	Generation of reports on each season	Time taken for publication after each season	Number of publication	–	–	4	8	12
Deep sea and Distant Water fishery	Deep sea demersal trawl operations	Number of successful hauls	Number	–	–	40	80	120
	Myctophid resources survey of central and western Arabian Sea	Number of Stations	Number	–	–	20	–	–
	Southern Ocean MLR Cruises	Date of start	Number of Cruises	–	–	1	2	3
Indian Ocean Biogeographic Information System(IndOBIS)	Add species records to IndOBIS website	Number of records added	No.	45,000	48,750	55,000	60,000	65,000
	Add new Voucher specimens	Number of sample added	No	–	3750	9000	15,000	20,000
	Holding of regional Workshop on IndOBIS	Date	Number of Workshops	–	–	1	–	–

### Section 3: Trend Values of the Success Indicators

Objectives	Action	Success Indicator	Unit	Actual Value for FY 09/10	Actual Value for FY 10/11	Target Value for FY 11/12	Projected Value for FY 12/13	Projected Value for FY 13/14
Census of Marine Life	Initiate National programmes	Date	Month	–	–	July 2011	–	–
	DNA Bar-coding of species	Number of species for which bar-code is generated	Number	–	–	50	150	250
Technology for breeding and rearing of ornamental fishes at the CMLRE hatchery unit of Lakshadweep and its commercialisation	Breeding and rearing of new species of ornamental fishes	Number	No.	–	3	5	8	10
	Production of marketable juveniles	Number of juveniles	No.	–	–	2000	25,000	50,000
	Number of people trained	Number	No.	–	–	20	40	60
Management of Fishery Oceanography Research Vessel Sagar Sampada	Dry-dock repair of vessel	Date	Month	–	–	Aug 2011	–	–
	Utilization of vessel for Scientific Research	Percentage of Utilization	%	–	65	80	80	80
	Scientific exhibitions onboard at ports of call	Number of exhibitions held	No.	3	6	10	14	18
Research Publications	Publications in peer-reviewed journals	Impact factor(IF)	No.	12.9	27.4	52.40	77.40	102.40

## Section 4: Description and Definition of Success Indicators and Proposed Measurement Methodology

Objectives	Action	Success Indicator	Definitions/Methodology
Ecosystem Monitoring and Modeling	Collection of Oceanographic data	Number of stations	Stations are prefixed and coverage is done on-board FORV <i>Sagar Sampada</i> . At each station data on physical, chemical and biological aspects are collected.
	Analysis of samples	Samples analysed	Samples are brought to shore laboratory and analysed, following standard protocols.
	Generation of reports on each season	Time taken for publication after each season	Analysed data on physical, chemical and biological features will be published as a bulletin, covering each season (summer monsoon, winter monsoon, fall inter monsoon and Spring Inter Monsoon)
Deep sea and Distant Water fishery	Deep sea demersal trawl operations	Number of successful hauls	Bottom trawl operations will be carried out from FORV <i>Sagar Sampada</i> using standard gears
	Myctophid resources survey of central and western Arabian Sea	Number of Stations	Myctophid biomass will be estimated using trawl surveys and acoustics
	Southern Ocean MLR Cruises	Date of start	Indian ocean sector of southern Ocean will be visited once in a year. Data on krill, oceanographic features and biodiversity will be gathered
Indian Ocean Biogeographic Information System(IndOBIS)	Add species records to IndOBIS website	Number of records added	Species records in each 5°X5° grid resolution will be gathered and archived in the OBIS web site
	Add new Voucher specimens	Number of sample added	Voucher samples of each record will be maintained at CMLRE, with clear accession numbers
	Holding of regional Workshop on IndOBIS	Date	Regional collaboration is essential for the coverage of Indian Ocean. Workshop will be held with a view to promote regional participation in the IndOBIS programme

## Section 4: Description and Definition of Success Indicators and Proposed Measurement Methodology

Objectives	Action	Success Indicator	Definitions/Methodology
Census of Marine Life	Initiate National programmes	Date	Programme involving CMLRE and other participating agencies to be formulated and implemented
	DNA Bar-coding of species	Number of species for which bar-code is generated	Bar-codes from mt DNA using standard protocols
Technology for breeding and rearing of ornamental fishes at the CMLRE hatchery unit of Lakshadweep and its commercialization	Breeding and rearing of new species of ornamental fishes	Number	Breeding techniques available for four species of clown fishes. Techniques for breeding other species will be developed
	Production of marketable juveniles	Number of juveniles	Ornamental fishes reach marketable size by 90 days. Method involves culturing larvae to juveniles in hatchery conditions.
	Number of people trained	Number	Intake capacity is 20 and training duration is 4 months. Held at Lakshadweep
Management of Fishery Oceanography Research Vessel Sagar Sampada	Dry-dock repair of vessel	Date	The vessel is repaired once in 2 years at dry-dock
	Utilization of vessel for Scientific Research	Percentage of Utilization	Number of days the vessel is deployed for scientific research excluding the time spent on dry dock and exhibitions.
	Scientific exhibitions onboard at ports of call	Number of exhibitions held	At selected port calls of the vessel, two to three days exhibitions will be held to promote public awareness.
Research Publications	Publications in peer-reviewed journals	Impact factor(IF)	Impact factor varies with the quality of the journal and ranges between 0 and 20.

## Section: 5

## Specific Performance Requirements from other Departments

Sl. No.	Objectives	Departments	Relevant Success Indicators	What do you need	Why do you need	How much you need	What happens if you do not get it
1	Ecosystem management and modeling	NIO-Goa SCI-Mumbai (FORV SS)	Number of stations and samples	Collect Oceanographic data	Input data for monitoring and Modelling. Platform for data collection	Minimum 4 cruises a year	Targets will not be met
2	Deep Sea and distant water fishery	CMFRI-Kochi, CIFT-Kochi, CUSAT-IF, CAS-MB SCI-Mumbai (FORV)	- -	Cruise participation for data collection and analysis. Keeping vessel ready for operations	To collect relevant data	3 cruises per year for demersal trawl operations 2 cruises per year for Myctophids 1 cruise/year for southern ocean	Targets will not be met
3	IndOBIS	SCI-Mumbai (FORV) INCOIS-Hyderabad		Collect voucher samples Organize workshop	Mandatory need of OBIS	Fully dependent on vessel	Targets will not be met
4	CoML	NBFGRI- Kochi NIO-Goa IISER-Kolkata	Number of species - -	Collection of samples, Taxonomic identification and bar-coding	Bar-coding of different groups are taken up by the different departments	Each Department should develop barcode at least for 15-20 species	Targets will not be met

## Section: 5

## Specific Performance Requirements from other Departments

Sl. No.	Objectives	Departments	Relevant Success Indicators	What do you need	Why do you need	How much you need	What happens if you do not get it
5	Breeding rearing of ornamental fishes	LDCL, Lakshadweep, CAS-MB	Number of species bred. Production of marketable Juveniles Training	Infrastructure Technology for breeding of new species (CAS)	Hatchery unit of LDCL. To enhance variety of marketable juveniles	At least for 5 years Atleast 4 new species/year	Production of marketable juveniles will be effected
6	FORV Sagar Sampada	SCI-Mumbai	% utilisation	Vessel in good condition	Platform for data collection	280 days or more/year	Targets will not be met
7	Research Publications	NIO-Goa CMFRI-Kochi CIFT-Kochi NBFGRRI-Kochi CAS-MB CUSAT-Kochi	Impact factor	Contribution in the form of scientific paper	To achieve target of 20 or more IF/year	At least 10 IF/Year	Targets will not be met

## Section: 6

## Outcomes/impacts of activities of organization

Sl. No.	Objectives	Outcome/ Impact of Organisation	Jointly responsible for this outcome/ impact with the following organizations/ Departments	Success Indicator	Trend Values for success Indicators				
					2009-10	2010-11	2011-12	2012-13	2013-14
1	Ecosystem monitoring & modeling	<ul style="list-style-type: none"> <li>Database on Physical/ Chemical and biological Oceanographic features</li> <li>Delineation of major ecosystems within the Indian EEZ (six)</li> <li>Modeling of Marine Ecosystem</li> </ul>	CMLRE NIO-Goa ICMAM	Volume of data archived	365GB	-	-	-	-
				Theoretical formulation for ecosystems	10%	20%	30%	40%	50%
				Develop models	-	-	-	10%	20%
2	Deep Sea and distant water fishery	<ul style="list-style-type: none"> <li>Advisories on the fishing grounds, seasonal abundance of deep sea resources within 200-1000m depth</li> <li>Quantification of Myctophid biomass from central and western Arabian Sea and product development</li> <li>Bioregionalisation of the Indian Ocean sector of Southern Ocean</li> </ul>	CMLRE, CMFRI, CIFT, CUSAT-IF, CAS-MB	Advisories generated	10%	20%	30%	40%	50%
				Advisory on Myctophid biomass. Myctophid Products	-	-	10%	20%	50%
				Enumeration of small scale units as per CCAMLR protocols	-	10%	20%	30%	40%

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### Outcomes/impacts of activities of organization

Sl. No.	Objectives	Outcome/ Impact of Organisation	Jointly responsible for this outcome/ impact with the following organizations/ Departments	Success Indicator	Trend Values for success Indicators				
					2009-10	2010-11	2011-12	2012-13	2013-14
3	IndOBIS	<ul style="list-style-type: none"> <li>Biogeographical Information System for each marine ecosystem within Indian EEZ (six ecosystems)</li> </ul>	CMLRE, NIO-Goa, IISER-Kolkata, CAS-AU, CMFRI, CUSAT-MS	No. of records of species	45000	48750	55000	60000	65000
		<ul style="list-style-type: none"> <li>Biogeographical Information System for Central Indian Ocean and Southern Ocean (30°E-60°E)</li> </ul>	CMLRE, NIO-Goa, IISER-Kolkata, NBFGR-Kochi	No. of records of species	-	10	100	200	300
4	CoML	Bar-coding of Marine Eukaryotes from Indian EEZ	CMLRE, NIO-Goa, IISER-Kolkata, NBFGR, CMFRI	No. of bar-codes generated and deposited with IBOL	2	17	50	200	500
5	Breeding & rearing of ornamental fishes	Number of species for which technology is perfected.	CMLRE, CAS-MB	Number of species	-	3	5	8	10
		Sale of marketable juveniles	CMLRE, CAS-MB, LDCL, Lakshadweep	No. of juveniles sold	-	-	2000	25000	50000
				No. of people trained	-	-	20	40	60

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**Outcomes/impacts of activities of organization**

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					2009-10	2010-11	2011-12	2012-13	2013-14
6	<i>FORV Sagar sampada</i>	% utilization of vessel for scientific research Exhibition onboard	CMLRE, SCI-Mumbai	% utilization	75%	65%	80%	80%	80%
			CMLRE	Number	3	6	10	14	18
7	Research publications	Scientific papers in peer reviewed journals	CMLRE, CMFRI, CIFT, NIO, CUSAT, CAS-AU, NBFGR	Impact Factor	12.9	27.4	52.4	77.4	102.4