



**R F D**

**(Results-Framework Document)**

**for**

**National Centre for Earth Science Studies,**

**Thiruvananthapuram**

**(2014-2015)**

## **Results Framework Document (RFD) for NCESS, Trivandrum – (2014-15)**

### **Section 1**

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

##### **Vision**

To excel in solid earth research and its applications

##### **Mission**

Foster multidisciplinary research in emerging areas of solid earth science and provide services by utilizing this knowledge for earth science applications.

##### **Objectives**

1. To conduct front ranking research in solid earth and crustal evolution of the Indian subcontinent
2. To develop coastal and marine applications
3. To monitor Atmospheric process and quality
4. To develop Natural Resources & Environmental Management (NREM) Plan for different eco-regions of India

##### **Functions**

1. To conduct and promote basic and applied advanced research in the frontier areas of Earth Sciences particularly crustal evolution and geodynamics, quaternary evolution processes, sedimentology and depositional processes, weathering and surface processes and coastal dynamics
2. To provide a greater fillip to the activities of the Institute and to give it a National and International status landslides and coastal erosion mitigation, coastal zone management, resource evaluation and environmental impact assessment
3. To carry out inter-disciplinary research in collaboration with other Research Institutions, National Laboratories and various science departments of Universities, etc
4. To conduct studies relating to Climate Change Studies and monitor trace gases in atmosphere, and changes in radiation budget and study the emission of greenhouse gases from different ecological zones
5. To prepare the Natural Resource Data Base for Resources Management including evaluate terrain at the river basin and watershed level, land use/ land cover and landscape alterations including development of societal application of earth science

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Section 2

Inter se Priorities among Key Objectives, Success Indicators and Targets

Objectives	Weight	Actions	Success Indicator (Outcome/ Output)	Unit	Relative Weight	Target/Criteria Value				
						Excellent	Very Good	Good	Fair	Poor
						100%	90%	80%	70%	60%
1.To conduct front ranking research in solid earth and crustal evolution of the Indian subcontinent	40	1.1 Research on geodynamic evolution of the Indian shield with special reference to deep continental processes under the Indian subcontinent, Quaternary and near surface processes in the western Ghat escarpment and its environs	Research publications in peer reviewed journals with good impact factor	Number	12	10	9	8	7	6
		1.2 Augmentation of infrastructure and laboratory facilities for solid earth geoscientific research	Setting up of mineral separation laboratory for isotopic work	Date	8	By March 31, 2015	By April 30 2015	By May 31 2015	By June 30 2015	By July 31 2015
		1.3 Augmentation of database through field mapping, collection and analysis of rock, and sediment samples from different parts of India	Generation of Field geological maps	Sq km	2	100	80	60	40	30
			Generation of Elemental chemistry data	Number of samples to be analysed	2	100	80	70	60	50
			Generation of Palaeomagnetic data		2	60	54	48	42	36
			Generation of Fluid inclusion data		2	100	90	80	70	60
Extraction of Sedimentological characteristics	2	60	54		48	42	36			

			Generation of Petrography data		2	100	80	70	60	50
		1.4 Geomorphological and structural studies to identify locations for setting up GPS permanent stations to monitor real time active tectonics in the escarpment of the western Ghats	Identification of locations for GPS permanent stations	Date	5	By March 31, 2015	By April 30 2015	By May 31 2015	By June 30 2015	By July 31 2015
		1.5 Impart knowledge and disseminate the results through workshops/contact program	Accomplishing the task	Date	3	By March 31, 2015	By April 30 2015	By May 31 2015	By June 30 2015	By July 31 2015
2. To develop coastal and marine applications	30	2.1 Coastal Zone Management studies for Kerala and Maharashtra	Number of districts to be covered	Number	10	10	9	8	7	6
		2.2 Collection of Hydrodynamic data and sediment samples from estuary, beach, mudbank area and offshore for modelling studies	Deployment, Sample collection and analysis	Number	8	100	90	80	70	60
		2.3 Shoreline monitoring and mapping of west coast	Length of coast line to be covered	Distance in km	5	200	180	140	120	100
		2.4 Integrated study on estuarine, coastal, nearshore & Inner shelf dynamics	Research papers published in peer reviewed journals	Number	5	5	4	4	3	3
		2.5 Quantitative estimation of placer minerals for grading and value addition	Ilmenite characterization from one region	Date	2	By March 31, 2015	By April 30 2015	By May 31 2015	By June 30 2015	By July 31 2015
3. To monitor Atmospheric processes and quality	5	3.1 Acquisition of time-series atmospheric and green-house gas emissions	Generation of atmospheric emission database	Number	3	25	20	15	10	5
		3.2 Augmentation of data base of atmospheric processes	Generation of database on weather parameters	Number	2	1000	900	800	700	600

4. To develop Natural Resources & Environmental Management (NREM) Plan for different eco-regions of India	25	4.1 Environmental evaluation and resource assessment studies of river basins of Kerala and Karnataka	Areal coverage	Sq.km	8	1000	900	800	700	600
		4.2 Climate change studies using proxies and instrumental records.	Locating areas of significance and coverage	Number	3	5	4	3	2	1
		4.3 Preparation and submission of CZMP reports	Generation of Project Reports	Number	3	60	50	40	30	20
		4.4 Strengthening Geomatics infrastructure by upgrading GIS facility and acquisition of Hyper Spectral Image Processing software and in consonance with NSDI System	Accomplishing the task	Date	3	By March 31, 2015	By April 30 2015	By May 31 2015	By June 30 2015	By July 31 2015
		4.5 Sea water quality monitoring of three hotspots at Mangalore, Kochi and Kavaratti (Lakshadweep)	Generation of database for four seasons	Number	3	12	9	8	6	3
		4.6 Augmentation of laboratory facilities for geo-environmental research	Upgradation of chemical laboratory	Date	2	By March 31, 2015	By April 30 2015	By May 31 2015	By June 30 2015	By July 31 2015
		4.7 Organizing capacity building programs/ training in the field of earth system science and applications	Number of trainees	Number	3	20	18	16	14	12

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Section 3

Trend Values of the Success Indicators

Objectives	Actions	Success Indicator (Outcome/ Output)	Unit	Actual value for FY 14/15	Actual value for FY 15/16	Actual value for FY 16/17
1.To conduct front ranking research in solid earth and crustal evolution of the Indian subcontinent	1.1 Research on geodynamic evolution of the Indian shield with special reference to deep continental processes under the Indian subcontinent, Quaternary processes in the coastal regions and near surface processes in the western Ghat escarpment and its environs	1.1.1 Research publications in peer reviewed journals with good impact factor	Number	10	12	18
	1.2 Developing infrastructure and laboratory facilities for solid earth geoscientific research	1.2.1 Setting up of mineral separation laboratory for isotopic work	Date	March 31, 2015	March 31, 2016	March 31, 2017
	1.3 Augmentation of database through field mapping, collection and analysis of rock, and sediment samples from different parts of India	1.3.1 Generation of Field geological maps	Area in Km <sup>2</sup>	100	120	150
		1.3.2 Generation of Elemental chemistry data	Number of samples to be analysed	100	150	200
		1.3.3 Generation of Palaeomagnetic data		60	80	100
		1.3.4 Generation of Fluid inclusion data		100	150	200
		1.3.5 Extraction of Sedimentological characteristics		60	80	100
1.3.6 Generation of Petrography data	100	120		140		

	1.4 Geomorphological and structural studies to identify locations for setting up GPS permanent stations to monitor real time active tectonics in the escarpment of the western Ghats	1.4.1 Identification of locations for GPS permanent stations	Date	March 31, 2015	March 31, 2016	March 31, 2017
	1.5 Impart knowledge and disseminate the results through workshops/contact program	1.5.1 Accomplishing the task	Date	March 31, 2015	March 31, 2016	March 31, 2017
2. To develop coastal and marine applications	2.1 Coastal Zone Management studies for Kerala and Maharashtra	2.1.1 Number of districts to be covered	Number	10	12	15
	2.2 Collection of Hydrodynamic data and sediment samples from estuary, beach, mudbank area and offshore for modelling studies	2.2.1 Deployment, Sample collection and analysis	Number	100	120	150
	2.3 Shoreline monitoring and mapping of west coast	2.3.1 Length of coast line to be covered	Distance in km	200	240	300
	2.4 Integrated study on estuarine, coastal, nearshore & Inner shelf dynamics	2.4.1 Research Papers published in peer reviewed journals	Number	5	6	7
	2.5 Quantitative estimation of Placer minerals	2.5.1 Grading of minerals & value addition (Ilmenite)	Date	By March 31, 2015	March 31, 2016	March 31, 2017
3. To monitor Atmospheric processes and quality	3.1 Acquisition of time-series atmospheric and green-house gas emissions	3.1.1 Generation of atmospheric emission database	Number	25	25	25
	3.2 Augmentation of data base of atmospheric processes	3.2.1 Generation of database on weather parameters	Number	1000	1000	1000

4. To develop Natural Resources & Environmental Management (NREM) Plan for different eco-regions of India	4.1 Environmental evaluation and resource assessment studies of river basins of Kerala and Karnataka	4.1.1 Areal coverage	Area in Km <sup>2</sup>	1000	1200	1500
	4.2 Climate change studies using proxies and instrumental records.	4.2.1 Selection of locations of significance and coverage	Number	3	4	5
	4.3 Preparation and submission of CZMP reports	4.3.1 Generation of Project Reports	Number	60	70	85
	4.4 Strengthening Geomatics infrastructure by upgrading GIS facility and acquisition of Hyper Spectral Image Processing software and in consonance with NSDI System	4.4.1 Accomplishing the task	Date	By March 31, 2015	March 31, 2016	March 31, 2017
	4.5 Sea water quality monitoring of three hotspots at Mangalore, Kochi and Kavaratti (Lakshadweep)	4.5.1 Generation of database for four seasons	Number	12	12	12
	4.6 Augmentation of laboratory facilities for geo-environmental research	4.6.1 Up-gradation of chemical laboratory	Date	By March 31, 2015	March 31, 2016	March 31, 2017
	4.7 Organizing capacity building programs/ training in the field of earth system science and applications	4.7.1 Number of trainees	Number	20	25	40



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**Section 4**

**Description and Definition of Success Indicators and Proposed Measurement Methodology**

<b>Sl. No</b>	<b>Success indicator</b>	<b>Description</b>	<b>Definition</b>	<b>Measurement</b>	<b>General Comments</b>
1	1.1.1 Research publications in peer reviewed journals with good impact factor	Research papers in earth system science and applications	Research papers based on completed target of scientific activities	Number	Nil
2	1.2.1 Setting up of mineral separation laboratory for isotopic work	Establishing a facility for trace and isotope analysis	Establishing a facility for trace and isotope analysis	Date	Nil
3	1.3.1 Generation of Field geological maps	Preparation of large scale field geological maps based on transect studies	Highlighted geological features pertaining to the study objectives	Area in Km <sup>2</sup>	Nil
4	1.3.2 Generation of Elemental chemistry data	Sample analysis using XRF, ICP and EPMA facilities	Evolving elemental details	Number of samples to be analysed	Nil
5	1.3.3 Generation of Palaeomagnetic data	Augmentation of paleomagnetic database	Reconstruction paleo-pole-positions	Number of samples to be analysed	Nil
6	1.3.4 Generation of Fluid inclusion data	Augmentation of fluid inclusion database in deep-drill cores	Study of fluid migration with special reference to petroleum exploration	Number of samples to be analysed	Nil
7	1.3.5 Extraction of Sedimentological characteristics	Augmentation of sedimentological database	Study of evolutionary aspects of sedimentary rocks	Number of samples to be analysed	Nil
8	1.3.6 Generation of Petrography data	Augmentation of petrographic database	Study on the genesis of crystalline rocks	Number of samples to be analysed	Nil

9	1.4.1 Identification of locations for GPS permanent stations	Collection of real-time data for geomorphological and structural studies of the western ghat escarpment	Study of neo-tectonic activities in western ghat region	Date	Nil
10	1.5.1 Accomplishing the task of result dissemination	Organizing workshops/.contact programs	Paleomagnetism, petrography and fluid inclusion activities	Date	Nil
11	2.1.1 Number of districts to be covered for Coastal Zone Management studies	Preparation of Coastal zone management plans for Kerala and Maharashtra	Based on Coastal Regulation Zones notification of the Govt. of India	Number	Nil
12	2.2.1 Deployment, Sample collection and analysis of hydrodynamic data	Carrying out modelling studies for coastal processes	Based on data generated from estuary, beach, mudbank area and offshore	Number	Nil
13	2.3.1 Length of coast line to be covered for shoreline monitoring and mapping of west coast	Determination of coastal zone vulnerability	Monitoring of erosion hotspots	Distance in km	Nil
14	2.4.1 Research Papers published in peer reviewed journals	Research papers in earth system science and applications	Research papers based on completed target of scientific activities	Number	Nil
15	2.5.1 Ilmenite characterization from one placer mineral deposit	Estimation and value addition of placer mineral deposit of Chavara	Sampling, analysis and mineral upgradation based industrial demand	Date	Nil

16	3.1.1 Generation of atmospheric emission database	Continuous and discrete monitoring of atmospheric emission data including green house gases and	Maintain and operate the atmospheric emission monitoring systems	Number	Number to be obtained by data elements multiplied by number of records
17	3.2.1 Generation of database on weather parameters	Operationalize the Automatic Weather Stations (AWS) at low and high altitude field stations	Maintain and operate the AWS stations at Thiruvananthapuram, Breyamore and Agumbe	Number	Number to be obtained by data elements multiplied by number of records
18	4.1.1 Areal coverage of environmental evaluation studies	Assess the state of the environment of river basins/watersheds and evolve natural resources and environmental management plans	Develop spatial development plans for natural resources management and eco-regeneration of natural systems	Area in Km <sup>2</sup>	Nil
19	4.2.1 Selection of locations of significance and coverage for climate change studies	Identify suitable locations and establish facilities for climate change monitoring	Compilation of proxy data and instrumental records	Number of sites of significance	Nil
20	4.3.1 Generation of Project Reports on Coastal Zone Management Plan	Evaluation of development project sites in terms of coastal regulation safeguards and recommend restrictive land development plans	Develop site-specific Coastal Zone Management Plans for development projects and installations	Number of Project Reports to be delivered	Nil

21	4.4.1 Accomplishing the task of upgrading the Geomatics facility	Procurement and installation of latest software for GIS and for hyper spectral image processing	Strengthen the spatial data analysis facility and generation of spatial data information system	Date of procurement, installation and commissioning	Nil
22	4.5.1 Generation of seawater quality database for four seasons from three hotspots	Periodical sampling and analysis of sea water quality from Mangalore, Kochi and Kavaratti	Database on water chemistry, marine biology and micro-biology aspects for pre-monsoon, monsoon, post-monsoon and summer seasons	Number of database generated	Nil
23	4.6.1 Up-gradation of chemical laboratory	Procurement and installation of state of the art instruments for chemical analysis of water and sediments	Facilitate accurate and quick analysis and data generation	Date of procurement, installation and commissioning	Nil
24	4.6.1 Number of trainees in various aspects of earth system science and applications	Training students for graduate, post-graduate, doctoral and post-doctoral studies as well as officials and activists in earth system studies	Curriculum based training as well as specific tools in earth sciences	Number of students/trainees	Nil

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Section 5

Specific Performance Requirements from other Departments

Location Type	State	Organization Type	Organization Name	Relevant Success Indicator	What is your requirement from this organization	Justification for this requirement	Please quantify your requirement from this Organization	What happens if your requirement is not met
Autonomous		R&D R&D	ARI, Pune BSIP, Lucknow	1.1.1 Research publications in peer reviewed journals with good impact factor	Palynology & non-pollen palynomorphs, Geochronology, C14 dates	Validation of findings	20%	Incomplete result
Central Govt		Ministry	MoES	1.2.1 Setting up of mineral separation laboratory for isotopic work	Funding support	Strengthening R&D base	100%	Deliverable cannot be achieved
Government.		PUC	ONGC	1.3.4 Generation of Fluid inclusion data	Delivery of samples	Validation of results	30%	Deliverables cannot be achieved
Government		Department	Forest	1.4.1 Identification of locations for GPS permanent stations	Permission for survey	Locate most appropriate spots	25%	Reduced search coverage
State Govt		Department	S&T Dept. LSGD, Revenue Environment Dept, Maharashtra	2.1.1 Number of districts to be covered for Coastal Zone Management studies	Cadastral maps Local development plans	Large scale base map for CZMP	30%	Deliverable cannot be achieved

Central & State Govt.		Department	Coast guard Fisheries marine Enforcement Dept, Port	2.2.1 Deployment, Sample collection and analysis of hydrodynamic data	Permission Vigilance	Regulated zone	20%	Deliverable cannot be achieved
Central Government		Extension	SoI	2.3.1 Length of coast line to be covered for shoreline monitoring and mapping of west coast	Toposheet	Restricted map	10%	Delay in delivery
Central Govt.		PUC	Indian Rare Earths Ltd	2.5.1 Ilmenite characterization from one placer mineral deposit	Permission	Regulated mining area	10%	Deliverable cannot be achieved
Central Govt.		R&D	IITM	3.1.1 Generation of atmospheric emission database	Feedback and dissemination of information	Validation of time-series data	30%	Reduced data reliability
Central Govt.		R&D	IITM	3.2.1 Generation of database on weather parameters	Scrutiny & Advisory	Validation of time-series data	20%	Reduced data reliability
Central & State Govt		Extension & R&D	CWC GWD PCB M&G NIO, Goa	4.1.1 Areal coverage of environmental evaluation studies	Data on Water & sediment discharge; River cross profile; Water quality & quantity; pollution; mining & Stable isotope	Validation of results	20%	Incomplete results

Central Govt		Extension	NIC NRSC	4.4.1 Accomplishing the task of upgrading the Geomatics facility	Design support & Data products	Sourcing expertise & thematic map generation	30%	Deliverable cannot be achieved
Central Govt		Coordination	ICMAM	4.5.1 Generation of seawater quality database for four seasons from three hotspots	Scrutiny of database	Validation of database	20%	Reduced data reliability
Central & State Govt		Development	Various departments	4.6.1 Number of trainees in various aspects of earth system science & applications	Sponsorship, dissemination & feedback	Post training feedback	10%	Reduced improvisation

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Section 6

Outcome/Impact of NCESS

Outcome/ Impact of NCESS	Jointly responsible for influencing this outcome/impact with the following Institutions	Success Indicator	Unit	FY 14/15	FY 14/15	FY 14/15
New facility		1.2.1 Setting up of mineral separation laboratory for isotopic work	%	75		
ICZMP Maps		2.1.1 Number of districts to be covered for Coastal Zone Management studies	%	75		
Value addition	IREL	2.5.1 Ilmenite characterization from one placer mineral deposit	%	50		
Generation of air quality advisories	IITM	3.1.1 Generation of atmospheric emission database	%	10		
Sustainable development plans		4.1.1 Areal coverage of environmental evaluation studies	%	50		
Upgraded laboratory		4.4.1 Accomplishing the task of upgrading the Geomatics facility	%	75		
Upgraded laboratory		4.6.1 Up-gradation of chemical laboratory	%	75		
Human Resource development		4.6.1 Number of trainees in various aspects of earth system science and applications	%	50		