

# Memorandum of Understanding (MoU)

for

“Measurement of Vegetation and Biomass parameters under Vegetation-Carbon Pool Assessment (VCP) Sub-Project of the ISRO Geosphere Biosphere Program (IGBP) National Carbon Project (NCP)”

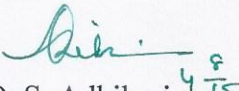
between

Plant Taxonomy and Biodiversity Lab. Dept. of Botany, Tripura University,  
Suryamaninagar, Tripura West- 799022, India

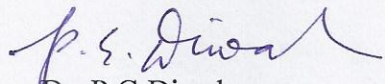
and

NATIONAL REMOTE SENSING CENTRE  
Indian Space Research Organization (ISRO), Dept. of Space (DOS)  
Govt. of India,  
Balanagar, Hyderabad-500 625.

Signed on this day 13 of August 2015

  
O. S. Adhikari <sup>4/15</sup>  
Registrar,  
Tripura University  
Suryamaninagar - 799022  
Tripura West, India

**(O. S. Adhikari)**  
**Registrar**  
**Tripura University**  
**(A Central University)**  
**Suryamaninagar-799022**

  
Dr. P G Diwakar  
Deputy Director (RSA)  
National Remote Sensing Centre,  
Hyderabad  
Indian Space Research Organization

डॉ. पी.जी. दिवाकर/Dr. P.G. Diwakar  
उप निदेशक, आरएसएर/Dy. Director, RSAA  
राष्ट्रीय सुदूर संवेदन केन्द्र  
National Remote Sensing Centre

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Memorandum of Understanding

इससे/ISRO अन्तरीक्ष विभाग/Dept. of Space

भारत सरकार/Govt. of India IGBP-NCP-VCP-Phase II  
बालानगर, हैदराबाद/Balanagar, Hyderabad-500 037.



## 1. PREAMBLE

NOTING that the National Remote Sensing Centre (NRSC) and Plant Taxonomy and Biodiversity Lab. Dept. of Botany, Tripura University, Suryamaninagar, Tripura West- 799130, India - Collaborating Agency (CA) have an abiding interest in the conservation, protection and utilization of forests and on the use of satellite remote sensing and GIS technologies for the scientific management of forests and the scientific understanding of various issues related to phytomass assessment, forest functioning, and carbon sequestration, NRSC and CA have planned a collaborative scientific research programme on assessment of phytomass and vegetation carbon. NRSC and CA have agreed to collaborate and carry out specific activities listed below.

## 2. PARTIES

### 2.1 Executing party:

National Remote Sensing Centre, Indian Space Research Organization (ISRO) under Dept of Space, Govt of India, Balanagar, Hyderabad.

### 2.2 *Indenting party:*

Plant Taxonomy and Biodiversity Lab. Dept. of Botany, Tripura University, Suryamaninagar, Tripura West- 799022, India will be referred as Collaborating Agency (CA).

## 3. AUTHORIZED SIGNATORIES

Authorized signatory for NRSC is the Deputy Director (RSA), NRSC and for the CA it shall be an officer not below the grade of Professor/ Head of Department



#### 4. FUNCTIONARIES AND CONTACT ADDRESS, PHONE, EMAIL, ETC

##### 4.1 NRSC:

Sl. No	Name	Contact Address	Phone	Email
4.1.1	Dr. C S Jha	Group Head Forestry & Ecology Group, NRSC	040- 23884218	jha_cs@nrsc.gov.in
4.1.2	G Rajashekar (focal point)	Sc/ En 'SF", Forestry and Ecology Group	040 23884531	rajashekar_g@nrsc.gov. in

##### 4.2 CA:

S.No	Name	Contact Address	Phone	Email
4.21	Prof. B.K.Datta ( focal point)	Plant Taxonomy & Biodiversity Lab., Department of Botany Tripura University Suryamaninagar-799022, Tripura west, India	+91 9862936431	dattabadal2008@gmail.co m
4.22	Prof. B. K. Datta	Head, Department of Botany, Tripura University	+91 9402169820	hod_botany@tripurauniv.i n

All correspondence on day to day matters during the course of the project shall be between respective focal points identified in the above table

#### 5. EFFECTIVE DATE

##### 5.1 Commencement :

This effective date for the commencement of this MOU will be the date of signing of the MoU by NRSC and CA.

##### 5.2 Duration :

This MOU is valid for a duration of 36 months from the date of commencement. If further extensions are required, it shall be by mutual consent of the parties.

#### 6. SCOPE OF WORK

CA will be responsible for all the ground data collection in the respective study area in accordance with the project guidelines of "National Vegetation Carbon Pool Assessment" in the following sites



Details of the sample areas and districts

S.No.	State (s)	Districts	Number of sample sites
(a)	Tripura	All districts of Tripura	Year I : 20 Year II :20 Year-III :10

The scope of the work to be carried out for the project includes:

- 6.1 Undertake revisit of, and carry out field data collection in, field plots established in Phase I of the project as per the requirement of the VCP project and as per the sampling design of the project.
- 6.2 Inventory of all vegetation (trees, shrubs and herbs) in the plots and carry out the necessary measurements and observations as required for the project.
- 6.3 Species-level identification, and measurements of inventory parameters such as girth at breast height, height of tree, etc. of the vegetation in the plot.
- 6.4 Measure the biomass (as dry weight) of the herbs (in a 1×1 m sub plot) of each plot
- 6.5 Tag/ Mark all the trees with metal labels for future monitoring and measurements.
- 6.6 To create database of all the plots in MS Excel as per the format of the VCP project and submit the filled original field forms of the field observation and the softcopy database to the project management. CA can retain a copy of the field forms.
- 6.7 To extend help in compiling and providing site-specific regression equations of all the tree species from literature.



- 6.8 Intimate progress report and the progress of the field inventory and database creation and/or analysis of the results to the Project Director/Deputy Project Director in accordance with the project requirement.
- 6.9 The collected data, results and findings would be shared by NRSC with other observational national/international program such as ISRO-GBP National Carbon Project.

## 7. METHODOLOGY

All plant, soil and water analysis will be done following standard methods. Methods are detailed in the Field Manual for Vegetation Carbon Pool Assessment of India ( ISRO-GBP/NCP-VCP/FM/March 2010)/04)

## 8. DELIVERABLES AND GUIDELINES ON DATA / MAP SECURITY

### 8.1 Deliverables

As described in the technical proposal and Field Manual for Vegetation Carbon Pool Assessment of India ( ISRO-GBP/NCP-VCP/FM/March 2010)/04) and summarized in 6.2 to 6.7 of this MoU

### 8.2 Data security :

All collected data shall be kept safe and secure by the concerned CA

## 9. TECHNICAL SPECIFICATIONS :

As per the Project proposal of "National Vegetation Carbon Pool Assessment"

## 10. APPLICABLE DOCUMENTS

As described in the technical proposal and Field Manual for Vegetation Carbon Pool Assessment of India ( ISRO-GBP/NCP-VCP/FM/March 2010)/04).



## 11. RESPONSIBILITIES OF EACH PARTY

### 11.1 Responsibilities of NRSC

11.1.1 NRSC would make the necessary base data generation through satellite remote sensing and identify the requisite ground investigation plots jointly.

11.1.2 Funds to carry out the field work and other related activities will be provided by the Vegetation-Carbon Pool Assessment (VCP) Sub-Project of the ISRO Geosphere Biosphere Program (IGBP) National Carbon Project (NCP)

11.1.3 Technical and scientific guidance to support the study.

### 11.2 Responsibilities of CA

11.2.1 The officer/scientist identified in the Centre would arrange to undertake detailed field data in the identified study area, laying and enumeration of the permanent field plots as given in technical proposal.

11.2.2 To involve in revision and updating of field analysis as and when required.

11.2.3 It is envisaged to encourage the researchers to use the data; however, the CA would not part with the data without the prior consultation of Project Director. In all research communications/publications emanating out of this study in the project due credit and acknowledgement need to be given to NRSC and the Project..

11.2.4 The PI/Research Scholar/Project Fellow involved would, however, with prior approvals of Project Director and Deputy Project Director can utilize the data for the doctoral or other research work with due acknowledgements to NRSC and the Project.

11.2.5 The CA would be advised to organize a either Research Fellow or Project Fellow to assist in executing the project work initially for a period of six months with financial support of Rs. 16,000/p.m. to Research Fellows and



Rs. 8,000/- per month for Project Fellows towards salary. Additional funds towards HRA as per entitlement and existing Government of India rules will also be provided. TA and DA during field work/duty is to be governed by Department of Space (DOS), Govt. of India rules. Funds to carry out the field work will be provided.

11.2.6 The utilization of the funds will be as per the existing rules and norms of Government of India, institute or University system. However, Head of the institution/university will be requested to allow the Principal Investigator to operate the funds to achieve project objectives in time.

11.2.7 The funds will be made available in two installments. All the CA will be required to submit Utilization Certificate and Statement of Expenditure duly signed by the Head of Finance Department, Principal Investigator and Competent Authority (Head of the institute) with departmental stamp. Next installment will be released only after submission of UC and SE part the CA along with progress report and acceptance the Project Director. And if need be balance amount will be refunded to the project.

## **12. PROJECT SCHEDULE**

Three Years

Number of plots to be completed in

Year I : 20

Year II : 20

Year III : 10

## **13. SCHEDULE OF PRICES**

The budgetary provisions for three years are given below. The NRSC would contribute an amount of Rs 14.44 lakhs towards this to cover the expenditure on JRF, contingency/consumables, fieldwork, project related travel, report/outputs



generation and institutional charges/overheads in three annual installments as per following details:

SI No	Item	Year I	Year II	Year III	Total
1	JRF salary (@16,000 p.m.) / SRF ( 3rd yr @ 18000 p.m.) + HRA (15%)	2,20,800	2,20,800	2,48,400	6,90,000
2	Contingency and consumables	25,000	25,000	10,000	60,000
3	Fieldwork (POL, DA/TA and field labor etc. )	2,16,000	2,16,000	1,08,000	5,40,000
4	CA Travel for project meetings (PI & Researcher)	15,000	15,000	15,000	45,000
5	Report, database and outputs	10,000	10,000	10,000	30,000
6	Laboratory analysis	25,000	25,000	10,000	60,000
7	Overheads (10%) (calculated for items 2, 4, 5 and 6)	7,500	7,500	4,500	19,500
	Totals	5,19,300	5,19,300	4,05,900	14,44,500

#### 14. SCHEDULE OF INSTALLATION, SUPPLY AND ACCEPTANCE TEST

Year	Number of Plots	Completion and submission
Year I :	20	Feb 2016
Year II	20	Feb 2017
Year III	10	Dec 2017

#### 15. CONSIDERATION

The CA shall deliver the outputs to NRSC for the consideration as given in Clause 11 of this MoU



**16. FUNDING & TERMS AND CONDITIONS OF PAYMENT**

NRSC would provide 1st year advance to the CA after the signing of MOU. At the end of the year the 2nd year advance will be paid to CA after receiving the utilization of certificate (UC) and statement of expenditure (SE) as per the format provided by NRSC and same will follow for the third year. The CA will furnish the UC and SE at the end of 3rd year and return the unspent money (if any). The cheque will be drawn in favour of Accounts Officer, NRSC.

**17. TRAINING**

NA

**18. WARRANTY**

CA shall carry out corrections to the supplied data within 3 months of submission if any such corrections are required.

**19. PROJECT MONITORING**

1. The project will be monitored by NRSC through existing internal project review mechanism.
2. If there is any delay at any stage of the project, the same will be communicated by CA to the PD, NCP, NRSC stating clearly the reasons for delay.

**20. CONFIDENTIALITY**

The confidentiality of data shall be maintained as per the existing remote sensing data policy guidelines..

**21. INTELLECTUAL PROPERTY RIGHTS**

1. The originals of any reports and documents or materials prepared or inventions or information produced as a result of the services and all intellectual property rights therein, unless otherwise specifically stated in the MoU, shall be and shall remain property of NRSC.



2. The CA can use the project data collected by the CA project team for Ph.D. / report / publication only after due consultation/ permission of NRSC with mutually agreed authorship.

**22. CHANGE IN SCOPE OF WORK**

Any change in scope of work would be with mutual consent of both the parties. Separate amendment to MoU to such extent has to be signed.

**23. MODIFICATIONS**

Any further modifications to this MOU, if required, would be through amendments with mutual consent.

**24. FORCE MAJEURE**

Neither NRSC nor CA shall be considered in default in performance of the obligations under this MoU if such performance is prevented or delayed by events such as, but not limited to, war, hostilities, revolution, riots, civil commotion, strikes, lock-outs, conflagrations, epidemics, accident, fire, wind, flood, drought, earthquake or ordinance of any Government or of any sub-division thereof, or because of any act of God, or for any other cause beyond the reasonable control of the party affected.

Then the party so effected shall promptly notify the other party in writing specifying the nature of the force majeure and of the anticipated delay in the performance of MoU and as from the date of that notification NRSC or CA may at its discretion either terminate the MoU forthwith or suspend the performance of the contract for a period of not exceeding 6 months. If at the expiry of such period of suspension any of the reasons still remain, NRSC and the CA may either agree a further period of suspension or treat the MoU as terminated.

In the event of contract being terminated by any reason of force majeure, the NRSC shall take such steps as are necessary to bring the services to an end, -



(including terminating any sub-contracts placed by NRSC) in a cost effective, timely and orderly manner.

NRSC shall submit an account in writing which shall state the amount claimed taking into account all fees and costs properly incurred or committed by the NRSC in relation to the contract or its termination which cannot be recovered. Always provided that payments are within the financial limit and not subject to dispute, CA shall:

1. pay all fees, expenses and other sums due and outstanding under the terms of this contract up to and including the date of termination ("the Relevant Date")
2. reimburse all reasonable expenses necessarily incurred by NRSC after the relevant Date in winding up the contract.

## **25. INDEMNITY BOND**

CA shall exercise reasonable skill, care and diligence in the performance of the MoU and indemnify and keep indemnified NRSC in respect of any loss, damage or claim howsoever arising out of or related to breach of MoU, statutory duty or negligence by CA or its employees, agents or sub-contractors in relation to the performance or otherwise of the services to be provided under this MoU.

## **26. ARBITRATION**

Any dispute or difference arising out of this MoU which cannot be amicably settled within thirty days (30) has to be referred to an officer identified by both the parties to the MoU. The officer to be named shall not be below the rank of the Secretary to the Govt. Of India. The decision of the such officer identified shall be final and binding on both the parties. The resulting award shall be in lieu of any other remedy.



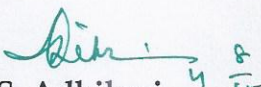
27. JURISDICTION

Place where any dispute arising out any MoU or its terms shall be subject to Hyderabad only.

28. TERMINATION

This MoU may be terminated by either party giving three months written notice to the other but however, such termination shall not affect the projects/ assignments agreed to be undertaken by both the parties before such termination and both the parties should complete such projects/ assignments as if this MoU is in operation

IN WITNESS WHEREOF, the Parties hereto have caused this MoU to be signed in their respective names on the day, the month and the year herein before mentioned.


  
O. S. Adhikari  
Registrar,  
Tripura University,  
Suryamaninagar-799022  
Tripura West, India

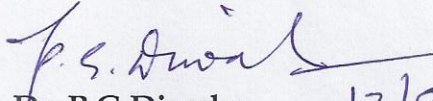
(Seal) (O. S. Adhikari)  
Registrar  
Tripura University  
(A Central University)  
Suryamaninagar-799022

Witness:

Name:.....

Address:.....

  
Dr. P.K. Datta  
Professor  
Department of History  
Tripura University  
Suryamaninagar-799022


  
Dr. P G Diwakar  
Deputy Director (RSA)  
National Remote Sensing Centre  
Hyderabad

13/8  
डॉ. पी. जी. दिवाकर / Dr. P.G. Diwakar  
उप निदेशक, आरएसएन/Dy. Director, RSAA  
राष्ट्रीय सुदूर संवेदन केन्द्र  
National Remote Sensing Centre  
इसरो/ISRO अन्तर्गत/Dept. of Space  
भारत सरकार/Govt. of India  
बालानगर, हैदराबाद/Balanagar, Hyderabad-500 037.

Witness:

Name:.....

Address:.....

  
डॉ. चन्द्रशेखर झा / Dr. Chandra Shekhar Jha  
ग्रुप निदेशक / Gp. Director  
वानिकी एवं पारिस्थितिकी ग्रुप / Forestry & Ecology Group  
राष्ट्रीय सुदूर संवेदन केन्द्र/National Remote Sensing Centre  
इसरो, अन्तरिक्ष विभाग, भारत सरकार  
ISRO, DOS, Govt. of India  
बालानगर, हैदराबाद/Balanagar, Hyderabad-500 037.