



**USAID** | **INDIA**  
FROM THE AMERICAN PEOPLE

# Partnership for Land Use Science Forest-PLUS Program

## Workshop Report

Consultation on Forest Carbon Inventory and MRV

1<sup>st</sup> May 2013,

Forest Survey of India, Dehradun

Prepared by

**IORA Ecological Solutions**

April, 2013

This publication was produced for review by the United States Agency for International Development. It was prepared by Tetra Tech ARD for Forest-PLUS Program, Contract No. AID-386-C-12-0002.



## Minutes of the Partnership for Land Use Science (Forest-PLUS) Program Consultation on Forest Carbon Inventory and MRV

**Venue:** Forest Survey of India, Dehradun

**Date:** 1<sup>st</sup> May 2013

---

### About Forest-PLUS

1. Partnership for Land Use Science (Forest-PLUS) project, a five-year initiative between USAID and Government of India (GOI). This program will contribute to USAID's Assistance Objective of accelerating India's transition to a low emissions economy by taking REDD+ actions to scale.

The project aims to:-

- a) Reduce emissions from deforestation and forest degradation and
  - b) Enhance sequestration through afforestation, conservation, and sustainable management of forests.
2. The project will feed into the GOI's NAPCC and Green India Mission. The Forest-PLUS program will address sectoral barriers, build human and institutional capacity, develop and deploy improved scientific methods for carbon inventory and reference baselines, and actively engage stakeholders to create an enabling environment for REDD+ implementation in India.
  3. The Forest-PLUS project will work with the Ministry of Environment and Forest (MOEF) to support implementation of national policies and programs, and will contribute to MOEF's efforts to establish and implement programs through collaboration with the new REDD+ Cell. The program will also look for active engagement with communities and local governments in supporting REDD+ activities. The program will be implemented in 3-4 landscapes (States), the selection of which is under finalization by the MOEF and USAID with the assistance of the Forest-PLUS team. The Ministry of Environment and Forests and its Institutions (ICFRE, FSI, IGNFA etc.) and 3-4 State Forest Departments are collaborating in the implementation of the Forest-PLUS program.
  4. The Forest-PLUS carbon inventory team includes international experts from
    - a) Michigan State University (Global Observatory for Ecosystems Services) and
    - b) Applied Geo-Solutions (AGS), New Hampshire, USA
    - c) In-country experts from Tetratich ARD and
    - d) M/S Iora Ecological Solutions (IORA), a Delhi based organization.

5. The Forest-PLUS project has two components:

- a) Component 1: Sustainable Landscape—Development**

Scientific exchange/technical cooperation facilitated.

**b) Component 2: Sustainable Landscape —Deployment**

Scientific and technical results piloted at scale.

6. This workshop initiated the development on the following critical deliverables

- a) Under Component 1: *“Develop improved methods to establish carbon inventories and reference baselines”* and
- b) Under Component 2: *develop a basis of Deployment in the sites.*

7. The following experts from the Forest-PLUS team were present at the Workshop:

- a) Mr. Irshad Khan, Chief of Party, Forest-PLUS Program
- b) Dr.R.D.Jakati, Forestry and NRM Advisor, Forest-PLUS Program
- c) Mr. David Skole, Ph.D., Director, Global Observatory for Ecosystem Services, Michigan State University
- d) Mr. Jay Samek, Research Scientist, The Global Observatory for Ecosystems Services, Dept. of Forestry, Michigan State University
- e) Mr. Mike Smalligan, Research Forester, The Global Observatory for Ecosystems Services, Dept. of Forestry, Michigan State University
- f) Mr. William A. Salas, Ph.D., President, Applied Geo-Solutions, LLC, New Hampshire
- g) Mr. Bobby Braswell, Ph.D., Sr. Research Scientist, Applied Geo-Solutions, LLC, New Hampshire
- h) Mr. Swapan Mehra, CEO, Iora Ecological Solutions
- i) Mr. Mohan Reddy, Senior Manager, Iora Ecological Solutions

**8. Objectives of the Workshop:**

- a) To facilitate scientific and technical exchange to facilitate further cooperation between the Forest-PLUS team comprising of carbon inventory experts from Michigan State University (MSU), Advanced Geo-Solutions (AGS) and Iora Ecological Solutions (IORA) and the project counterparty dealing with Carbon Inventory, Forest Survey of India (FSI)
- b) To deliberate upon the inventory methods that are being followed and the possible inventory methods that can be used for assessing baselines and carbon sinks for REDD+ projects
- c) To explore tools and protocols for involving local communities in REDD+
- d) Precise assessment of the training needs for forest carbon inventory and MRV tools amongst the Indian stakeholders.

## 9. Summary of Outcomes and Decisions made

- a) Forest-PLUS MRV Team will help FSI in developing futuristic models and forecasting on carbon stocks
- b) Forest-PLUS team will help in advanced high resolutions imageries like LISS4 in the National Forest Inventory(NFI) to increase the precision
- c) Development of the Best Available Technology(BAT) for Monitoring Reporting Verification(MRV) for the REDD+
- d) Forest-PLUS will provide handholding support to the proposed FSI Research & Development Unit
- e) Forest-PLUS Program will create enabling environment for the technical cooperation between FSI and State departments
- f) Forest-PLUS Program will help in establishing India's REDD+ baselines and reference level
- g) Forest-PLUS team will help in capacity building of FSI and other state departments GIS cells
- h) Forest-PLUS MRV Team will assist FSI in reducing National Forest Inventory (NFI) cycle with advanced Remote Sensing(RS) technologies
- i) Forest-PLUS team in association with FSI will develop National Level Non Carbon MRV Tools
- j) Michigan State University and Advanced Geo-Solutions will help FSI India in engaging with Japan Remote Sensing Agencies for research collaboration on Synthetic Aperture Radiation(SAR)
- k) FSI will share and collaborate with Forest-PLUS in pilot sites ground inventory data collection
- l) FSI and Forest-PLUS Program will arrange joint Training Program for State Forest Departments
- m) FSI and Forest-PLUS Program will collaborate to implement joint pilot projects on LiDAR and SAR
- n) Exposure visits to the FSI Technical Team in advanced data management and Training

## Agenda

Time	Session	
<b>Inaugural Session</b>		
09.30 AM - 09.45 AM	Welcome and Introduction of Forest-PLUS Team	Mr. Irshad Khan, Chief of Party, Forest-PLUS
09.45 AM - 09.50 AM	Introduction to Forest-PLUS Program	Mr. Varghese Paul, Senior Forestry Advisor, USAID/India
09.50 AM - 10.00 AM	Introduction of participants	

10.00 AM - 10.15 AM	Inaugural Address	Mr. A.K Wahal, DG, Forest Survey of India (FSI)
10.15 AM - 10.45 AM	Presentation on current status of carbon forest inventory and MRV in India	Mr. Rajesh Kumar, Senior Deputy Director (Forest Inventory), FSI
<b>Technical Session 1</b>		
10.45 AM - 11.45 AM	<ul style="list-style-type: none"> <li>• Tools and techniques for improving use of Remote Sensing (RS) in forest carbon inventory <ul style="list-style-type: none"> <li>○ Use of predictive algorithms for remote sensing based carbon stock assessment</li> <li>○ Developing strategy for capacity building on LiDAR based biomass assessment for India</li> <li>○ Establishing system for land use change detection</li> </ul> </li> <li>• Discussions</li> </ul>	Prof. David Skole, Michigan State University (MSU) Mr. William Salas, Applied Geo-Solutions (AGS)
<b>Technical Session 2</b>		
11.45 AM - 12.30 PM	<ul style="list-style-type: none"> <li>• Non-Carbon MRV <ul style="list-style-type: none"> <li>○ Developing national level non carbon benefits baselines and MRV strategy</li> </ul> </li> <li>• Discussions</li> </ul>	Mr. Swapan Mehra CEO, Iora Ecological Solutions
<b>Technical Session 3</b>		
12.30 PM - 1.15 PM	<ul style="list-style-type: none"> <li>• Development of MRV Software and online platforms <ul style="list-style-type: none"> <li>○ Linking MRV system to RS and ground inventory data</li> <li>○ Development of modules for biomass calculations and carbon stock calculations</li> <li>○ Reporting of processed results and system for third party verification</li> </ul> </li> <li>• Discussions</li> </ul>	Mr. Mike Smallign, Michigan State University (MSU)
1.15 PM – 1.30 PM	• Technical Discussion – 1	Dr. A. K Wahal, DG, FSI
1.30 PM - 2.00 PM	<b>Lunch</b>	
<b>Technical Session 4</b>		
2.00 PM - 3.00 PM	<ul style="list-style-type: none"> <li>• Community based MRV <ul style="list-style-type: none"> <li>○ Developing tools, instruments and protocols for community involvement in forest carbon MRV</li> </ul> </li> <li>• Discussions</li> </ul>	Mr. Jay Samek, Michigan State University (MSU) Mr. Bobby Braswell, Applied Geo-Solutions (AGS)

3.00 PM - 4.00 PM	• Technical Discussion -2	Forest-PLUS and FSI
4.00PM- 4.20 PM	<b>Summarizing the Day's Proceedings</b>	Dr. Dave Skole, Professor of Forestry and Director of the Global Observatory for Ecosystem Services, MSU
4.20 PM- 4.30 PM	<b>Next Steps</b>	Mr. Soumitri Das, Forestry Specialist, USAID/India
4.30 PM- 4.40 PM	<b>Concluding Remarks</b>	Mr. Rajesh Kumar, Senior Deputy Director, FSI
4.40 PM- 4.50 PM	<b>Vote of Thanks</b>	Mr. Swapan Mehra, CEO, Iora Ecological Solutions
4.50 PM - 5.00 PM	<b>High Tea</b>	

## 10. Content of the Workshop:

The workshop consisted of an introductory session followed by 4 technical sessions.

- a) **Technical Session 1:** This technical session was in particular of advanced remote sensing methods that can be used for setting baselines and conduct MRV for REDD+ projects.
- b) **Technical Session 2:** This technical session was aimed at developing national level non-carbon benefits baselines and MRV strategy for India.
- c) **Technical Session 3:** In this session, a prototype of REDD+ MRV online software was demonstrated as a performance tracker for the REDD interventions.
- d) **Technical Session 4:** In this session, the tools, instruments and protocols for community involvement in forest carbon MRV especially with regard to REDD+ was discussed.

## 11. No. of Participants:

A total of 22 participants attended the workshop. The list of participants along with their affiliation is enclosed.

## Proceedings:

### 12. Introduction to Forest-PLUS Team, Mr. Irshad Khan - Chief of Party, Forest-PLUS; 9.30 AM - 9.45 AM

Mr. Irshad Khan, Chief of Party, Forest-PLUS Program introduced Forest –PLUS Team and requested the participants introduce themselves.

### 13. Introduction to the Forest-PLUS Program; Mr. Varghese Paul - Senior Forestry Advisor, USAID/India; 10.50 AM -11.00 AM

Mr. Paul gave a brief introduction to the Forest-PLUS Program and recounted the prior commitments between the U.S.A and India. Salient points relating to the background and history of Forest-PLUS covered in the presentation:

- a) India and USA signed MoU in November 2009 to enhance cooperation in energy security, energy efficiency, clean energy and climate change.
- b) Partnership Agreement on Sustainable Forests and Climate Adaptation was signed between the two governments in September 2010.
- c) For strengthening the technical capacity straddles, he categorized two components of Forest-PLUS program, which emphasized on developing tools, techniques and methods for better ecosystem management and developing improved methods to establish carbon inventory.
- d) Expected Results from the program include improved tools, methods and approaches developed and deployed for taking REDD+ actions to scale and support for REDD+ readiness activities. Also, Forest-PLUS plans to work closely with MoEF, State Forest Departments and communities to support REDD+ activities
- e) Mr. Paul gave a brief about the partner organizations in the Forest-PLUS Program. :-
  - The lead contractor for the program is Tetra Tech ARD.
  - From India the partner organizations include InsPIRE Network for Environment and Iora Ecological Solutions.
  - From US, the organizations partnering in the Forest- PLUS program are Applied Geo-Solutions, Global Observatory for Ecosystem Services at Michigan State University and Institute of International Education
  - FSI can expect the following from the program
- f) Improved tools, methods and approaches developed and deployed for taking REDD+ actions to scale.
- g) Support for REDD+ readiness activities

#### **14. Inaugural Address, Mr. A.K. Wahal - DG, Forest Survey of India(FSI); 10AM-10.15AM**

Mr. Wahal welcomed the participants to the workshop. He gave a brief background on Forest Survey of India (FSI) and their expectations from Forest-PLUS: Exposing FSI officer to the latest tools in Remote sensing and inventory in the USA, Burnt Area Aspect – Real-time monitoring system used by USFS; Exchange of thoughts in new methods & modeling for REDD+ carbon inventory, designing futuristic models, developing non carbon MRV models and developing integrated monitoring approaches to be deployed with state forest departments. He agreed on sharing plot inventory data for Forest-PLUS pilot sites, partnering in ground inventory and supporting field measurements.



**15. Presentation on current status of carbon forest inventory and MRV in India, Mr. Rajesh Kumar - Senior Deputy Director (Forest Inventory), FSI; 10.15 AM -10.45 AM**

Mr. Rajesh Kumar presented the current status of carbon inventory in India. He mentioned that FSI has assessed forest cover since 1965 and used Remote Sensing Techniques in forest Inventorisationsince 1987.FSI now use advanced digital image processing of Indian RS data and field data for Inventorisation. He further explained that the assessment of forest carbon stocks in India is done based on 'Activity data' (Forest Cover maps and Forest Types maps) which are used for developing 'Emission Factors' (National Forest Inventory, Estimation of missing components of forest biomass and Integrating the components to estimate the forest carbon and change). Forest cover and change assessment methodology was also discussed. The assessment is carried out using satellite data for the entire country from NRSC IRS ID/IRS-P6.The outcome of this assessment is the division of forest cover into forest categories (Dense, Open etc) on the basis of the canopy density. He also explained in detail the methodology of the National Forest Inventory (NFI)

After the discussion a query was raised by Mr.Mike Smallign regarding the inclusion of new characteristics discussed in the NFI parameters in the existing methodology.Mr. David Skole inquired about the Incorporation of GHG emissions from forest fires by FSI.

**16. Tools and techniques for improving use of remote sensing (RS) in forest carbon Inventory, Prof. David Skole;MSU and Mr. William Salas, AGS; 10:45 AM-11.45 AM.**

Prof. David Skole gave an overview of the use of remote sensing in forest inventory. He went on to explain optical sensors and analyzers. He mainly focused on optical data from medium and fine resolution sensors. He then explained the methodology for forest and non-forest mapping and also discussed the mapping of forest degradation. He further explained the methodology for stratification mapping.

Mr. William Salas discussed REDD+using IPCC definitions and explained the components of Forest-PLUS. He gave an overview of the use of optical sensor and SAR Data in forest carbon inventory. The discussion involved further details of RS techniques, which included Forest/Non Forest Mapping, the methodology involved and examples of Brazilian and Indochina Mapping; Forest degradation quoting the examples of Mae chaem watershed Thailand and Kenya Forest and Stratification and carbon mapping methodologies. Along with the above discussions the Basics of LiDAR and SAR sensors and their role in Forest-Plus were also emphasized. . At the end, the role and potential of piloting SAR in India Forest-PLUS program was discussed.

After the discussions, questions were raised by Mr.Subhash Ashutosh, IGNTA about the possibility of merging LIDAR and optical data, the cost involved and its necessity in India. Mr.A.K Bansal, Ex ADG, MOEF asked about future

technologies being planned for use in this component of Forest-PLUS. Mr. David Skole answered Mr. Subhash Ashutosh query.

**17. Non-Carbon MRV, Mr. Swapan Mehra - CEO, Iora Ecological Solutions; 11.45 PM- 12.45 PM**

Mr. Swapan Mehra defined the concept of Non-Carbon MRV and discussed in detail negotiations involved and the shape of the upcoming framework in detail. He presented the existing Non-Carbon MRV Standards, criteria, procedures and best practices. He also discussed the current state of Non-Carbon MRV in the context of Indian forests. Specifically, he talked about key elements of Non-Carbon MRV in the UN-REDD program, the Social and Environmental Standard and details of the Community, Climate and Biodiversity Alliance (CCBA) Standard. The MRV structure and compliance with policy was also emphasized in the discussion.

**18. Observations, A.K.Wahal - DG, FSI; 12.45 PM to 1.00 PM**

- FSI will share and collaborate with Forest-PLUS in pilot sites ground inventory data collection
- FSI will implement Forest-PLUS program tools and MRV software nationwide.
- Forest-PLUS MRV Team should help FSI in developing futuristic models and forecasting on carbon stocks
- Forest-PLUS team should help in advanced high resolutions imageries like LISS4 in the National Forest Inventory (NFI) to increase the precision
- Development of the Best Available Technology (BAT) for Monitoring Reporting Verification (MRV) for the REDD+
- Forest-PLUS should provide handholding support to the proposed FSI Research & Development Unit
- Forest-PLUS program should create enabling environment for the technical cooperation between FSI and State departments
- Forest-PLUS program should help in establishing India's REDD+ baselines and reference level
- Forest-PLUS team should help in capacity building of FSI and other state departments GIS cells
- Forest-PLUS MRV Team should assist FSI in reducing National Forest Inventory (NFI) cycle with advanced Remote Sensing (RS) technologies
- Forest-PLUS team in association with FSI need to develop National Level Non Carbon MRV Tools
- FSI and Forest-PLUS will arrange Joint Training Programs for State Forest Departments
- FSI and Forest-PLUS Program will collaborate to implement joint pilot projects on LiDAR and SAR

**19. Development of MRV Software and online platforms, Mr. Mike Smalligan, Michigan State University (MSU); 1.00 PM-1.45 PM**

Mr. Mike Smalligan gave a demonstration of the MSU MRV Software in addition to his presentation. The highlights of his presentation are mentioned below:

He mentioned that REDD+ has become a key policy issue as a climate change mitigation strategy in developing countries. Large uncertainties exist around annual estimates of emissions from deforestation at national and regional scales due to limitations of data and methods. This model will use satellite observations of deforestation, field inventory and inbuilt modules for biomass calculations and carbon stock calculations.

The present MSU MRV Software and online platforms can be used to determine the deforestation trends in a particular region, gross annual emissions or sequestrations with a 90% confidence interval using periodic RS and field inventory data. These results will provide systematic and comparable estimates of emissions and can serve as a baseline for assessing the global performance of future national and regional REDD interventions. He explained that the MSU MRV software can contribute to Forest-PLUS and REDD+ in India in the following ways:

- a) Reporting of processed results and system, which can be subjected to third party verification
- b) Plan and implement data collection at local, state or national level
- c) Planning forest inventories
- d) Ingesting and storing inventory data from FSI, State FD, and others
- e) Other types of data required for REDD+
- f) Sharing data and results between project partners
- g) User accounts with multiple levels of permission/access
- h) Transparent reporting and verification of GHG emissions and removals from REDD+ at national level

In response to this presentation, Mr. Abhay Saxena, FSI presented their web based information portal "e-Green Watch"

**20. Community based MRV Tools, instruments and protocols for community involvement in forest carbon MRV, Mr. Jay Samek - Research Scientist in Social Forestry and Remote Sensing, MSU and Mr. Bobby Braswell Ph.D. - Senior Research Scientist, Applied Geo-Solutions; 2:00 PM – 3:00 PM**

Mr. Jay Samek and Mr. Braswell gave a very brief history of REDD+ to start with and continued to UNFCCC guidance on REDD+ MRV and the IPCC reporting principles. Mr. Jay Samek presented Carbon2Markets™ initiative. It is a project of the Global Observatory for Ecosystem Services at Michigan State University. It is developing methods and technologies for accurate measurements of carbon sequestration from afforestation/reforestation and agro-forestry land management activities using high resolution remote sensing data, geo-spatial tool, and biometric carbon modeling.

Mr. Braswell discussed the approaches of community based MRV in the Forest-PLUS project areas. The emphasis was on utilizing smart phone technology with android operating systems and the appropriate sensors, which could be accurate and cost-effective and have seamless linkage with on-board storage systems and integration with MRV systems. Later, they discussed about examples of Brazilian and Indochina Mapping; Forest degradation quoting the examples of Mae chaem watershed Thailand and Kenya REDD+ Project.

## **21. Summarizing the Day's Proceedings, Prof. David Skole - MSU; 4.00 PM- 4.20 PM**

At the end of the day, Mr. David Skole summarized the day's proceedings and acknowledged the inputs and questions from the participants. He summarized the takeaways from the consultation in the following main points:

- a) Co-development of techniques
- b) Joint working groups or task groups to communicate and work together
- c) LIDAR /SAR technology
- d) Technical means to reduce inventory cycle of FSI from 20 years to 10 years (and possibly
- e) Developing models for forecasting
- f) Higher resolution imageries at low cost
- g) Ongoing work on increasing precision
- h) Strategy for R&D and next round of technology
- i) Assessing best technology options
- j) Reducing technical gaps between FSI and States
- k) Setting up baselines
- l) Joint development of non-carbon MRV
- m) Joint FPP-FSI capacity building for more than 4 states

## **22. Next Steps, Mr. Soumitri Das, USAID/India; 4.20 PM- 4.30 PM**

Mr. Soumitri Das summarized future area of collaboration between Forest-PLUS and FSI. He also requested Forest-PLUS team to develop roadmap for timeline and process developing Joint working group. The major areas of the collaboration are as follows:

- a) FSI and Forest-PLUS Program will arrange joint training program for State Forest Departments
- b) FSI and Forest-PLUS Program will implement joint LiDAR and SAR pilot projects
- c) Forest-PLUS MRV Team will help FSI in developing futuristic models and forecasting on carbon stocks
- d) Forest-PLUS team will help in integration of advanced high resolutions imageries like LISS4 in the National Forest Inventory (NFI) to increase the precision
- e) Development of the Best Available Technology (BAT) for Monitoring Reporting Verification (MRV) for the REDD+

- f) Forest-PLUS will provide handholding support in the development of the proposed FSI Research & Development Unit

**23. Concluding Remarks by FSI, Mr. Rajesh Kumar - Senior Deputy Director, FSI; 4.30 PM- 4.40 PM**

Mr. Rajesh Kumar made the concluding remarks and thanked everyone for their participation in the consultation program.

**24. Vote of thanks by Mr. Swapan Mehra - CEO, Iora Ecological Solutions, 4.40 PM-4.50 PM**

Mr. Swapan Mehra gave the vote of thanks to all the participants for sparing their valuable time and making the consultation program a success.

**25. Appendices**

- a. Attendee List
- b. Photographs

**U.S. Agency for International Development**  
1300 Pennsylvania Avenue, NW  
Washington, DC 20523  
Tel: (202) 712-0000  
Fax: (202) 216-3524  
[www.usaid.gov](http://www.usaid.gov)

Partnership for Land Use Science (Forest-PLUS) Program  
 Consultation on Forest Carbon Inventory and MRV  
 Date: May 1, 2013  
 Venue: FSI Headquarter, Dehradun

S.No	Name	Organisation & Address	Email	Phone	Signature
1.	M. Mohan Reddy	Tova Ecological Solution	mohan@tova-ecological.com	9171789821	M. Mohan Reddy
2.	Rajesh Kumar	FSI	rajesh.k.l@rediffmail.com	9411101670	Rajesh Kumar
3.	VRS RAWAT	ICFRE	RAWATVRS@ICFRE.ORG	9412058405	VRS Rawat
4.	Abhay Kumar Saxena	Forest Survey of India, Dehradun	abhayksaxena@forestmail.com	9760617259	Abhay Kumar Saxena
5.	Surajon Mukherjee	TORA Ecological Solutions	Surajon@toraso-lutions.com	9810341115	Surajon Mukherjee
6.	H. Parashar	ICFRE	hparashar@icfre.org	9411142962	H. Parashar

7.	Mike Smalligan	Forest PLUS INSU	Smallig2@insu.edu	517-755-7430	Mike Smalligan
8.	A.K. WAHAI	DG. FSI	akw1954@gmail.com	9411106939	A.K. Wahai
9.	RANJIT SINGH GILL	JOINT DIRECTOR FSI	freedomtoner@rediffmail.com	9410374161	Ranjit Singh Gill
10.	William Sales	Forest PLUS AGS	wsalas@agsemail.com	603-292-5747	William Sales
11.	JAY SARKAR	Forest Plus PSLC	sanjay@pslc.org	517-4323124	Jay Sarkar
12.	SUBHASH ASHUTOSH	IGNFA	subash@ignfa.org	9760041824	Subhash Ashutosh
13.	Sanjay Kumar Agarwal	FSI	sanjay.agarwal@icfre.org	9410727540	Sanjay Kumar Agarwal
14.	IRSHAD KHAN	FOREST PLUS CHIEF OF PARTY	irshad.khan@forestplus.org	9777161414	Irshad Khan

15.	Bobby Braswell (Rob)	Applied Geosolutions New Hampshire, US	rob.braswell @gmail.com	1-603-657-3353	
16.	Soumitri Das	USAID/INDIA	sodas@usaaid.gov	9811872524	
17.	Vaughese Paul	USAID/INDIA	vpaule.usaid.gov	9873521861	
18.	A.D. Jankar	Tetra Tech	janatis64 @yahoo.co.in	09403675618	
19.	SANDEEP PANDEY	Mineral Product for Sale @gmail.com	pandey.sanjay @gmail.com	09418001807	
20.	Prakash Lakshwar &	FSI	prakash-293 @rediffmail.com	09412939608	
21.	Sunil Chanchu	FSI	sunilchanchuferi @gmail.com	09456169940	
22.					



