

# Land Restoration / Reclamation Monitoring of Open Cast Coal Mines of Central Coalfields Limited Based on Satellite Data for the Year 2008



**CMPDI**  
A Miniratna Company

**Land Restoration / Reclamation Monitoring of Open Cast Coal Mines of  
Central Coalfields Limited Based on Satellite Data for the Year 2008**

**Remote Sensing Cell  
Geomatics Division  
CMPDI, Ranchi**

## **CONTENTS**

1.0	Background	1
2.0	Objective	2
3.0	Work plan	2
4.0	Land Reclamation in Central Coalfields Limited	3

## **1.0 Background**

- 1.1 All human activities are based on the land which is most scarce natural resource in our country. Per capita land availability in India is the lowest owing to high population density and less land mass. Out of total 329 million hectare (mha) land mass of the country, coal mining is limited to only on 0.10% (0.36mha) area. As per XI Plan, to meet the energy demand of the country, coal production would be raised to 680 million tonnes by the end of the year 2011-12 for which about 40,000 hectare of land would have to be acquired for coal mining projects. It has been envisaged that 85% coal production would be from opencast mines, which causes land degradation due to ground breaking. There is an urgent need to reclaim and restore the mined out land for its productive use for sustainable development of the coal mining. This will not only mitigate environmental degradation, but would also enable coal companies to offer the restored lands to displaced families which would help in creating a more congenial environment for land acquisition in future.
- 1.2 Keeping above in view, Coal India Ltd. requested Central Mine Planning & Design Institute (CMPDI), Ranchi who has well equipped remote sensing facilities and capabilities to develop an effective system of surveillance for land reclamation/restoration for all the opencast coal mines with production of more than 5 million cu. m. per annum (coal + OB taken together) based remote sensing satellite data, regularly on annual basis for sustainable development of mining operation within command area of CIL and its subsidiaries. The annual land reclamation/restoration status report of all such mines to be put on the website of CIL, ([www.coalindia.nic.in](http://www.coalindia.nic.in)), CMPDI ([www.cmpdi.co.in](http://www.cmpdi.co.in)) and the concerned coal companies in public domain. Detail report to be submitted to State Pollution Control Board and MoEF and concerned CIL's subsidiaries. Such monitoring would not only facilitate in taking timely mitigation measures against environmental degradation,

but would also enable coal companies to utilize the reclaimed land for larger socio-economic benefits in a planned way.

- 1.3 CMPDI undertook the above assignment, and the present report is embodying the finding of the study in nutshell for the year 2008 for three projects of CCL.

## **2.0 Objective**

Objective of the land reclamation/restoration monitoring is to assess the area of backfilled, plantation, OB dumps, social forestry, active mining area, settlements and water bodies, distribution of wasteland, agricultural land and forest land in the leasehold area of the project. This is an important step taken up for assessing the progressive status of mined land reclamation and for taking up remedial measures, if any, required for environmental protection.

## **3.0 Work Plan**

- 3.1 Three opencast projects of CCL producing more than 5 million cubic m. (Coal + OB together) during the year 2008 have been taken up for land restoration / reclamation monitoring based on the *RESOURCESAT-1* satellite data using ERDAS Imaging digital image processing s/w on GIS platform. Land reclamation monitoring will be carried out regularly on annual basis to assess the progressive status of land restoration / reclamation in the above opencast mines. The report of this study has been uploaded on the website of CMPDI, CIL & CCL in public domain.

#### **4.0 Land Reclamation Status in Central Coalfields Ltd.**

**4.1** Following three opencast projects of Central coalfields have been taken up for land reclamation monitoring during year 2008-09:

- Ashoka
- Piparwar
- KD Hesalong

**4.2** Out of the three above mentioned projects, land reclamation monitoring of Ashoka & Piparwar projects had also been carried out during 2006 as well for compliance of the MoEF stipulations.

**4.3** Study reveals that plantation in Piparwar project has increased from 4.23 Sq.Km (year-2006) to 4.63 Sq.Km. (year-2008) in the span of two years. In Ashoka project, area of plantation has increased from 0.83 Sq.Km.(2006) to 1.01 Sq.Km (2008).

**4.4** Study also reveals that 73.2% of mined out area in the above mentioned projects have been reclaimed by CCL and balance 26.8% area is under active mining zone.

**4.5** Area of each land use class present in the leasehold of the projects is shown in Table - 4.1. Land use maps derived from satellite data are shown in Plate 4.1 - 4.3. Changes in the different land use classes based on satellite data of year 2002 & 2009 are shown in Fig.4.1-4.3.

		Ashoka		Piparwar		KD Hesalong	
		Area	%	Area	%	Area	%
Vegetation Cover	Dense Forest	0	0	0.01	1.29	0.02	0.44
	Open Forest	0.95	17.53	0.89	7.80	0.14	3.11
	Scrubs	1.03	19	0.72	6.30	0.72	16.00
	<b>Total Forest</b>	<b>1.98</b>	<b>36.53</b>	<b>1.62</b>	<b>15.39</b>	<b>0.88</b>	<b>19.55</b>
	Social Forestry	0.27	4.98	2.38	21.25	0.09	2.00
	Plantation on OB Dump	0.74	13.65	2.25	20.09	1.18	26.22
	<b>Total Plantation</b>	<b>1.01</b>	<b>18.63</b>	<b>4.63</b>	<b>41.34</b>	<b>1.27</b>	<b>28.22</b>
	<b>Total Vegetation(A)</b>	<b>2.99</b>	<b>55.16</b>	<b>6.25</b>	<b>56.73</b>	<b>2.15</b>	<b>47.77</b>
Mining Area	Active Mining Area	0.58	10.70	0.90	8.02	0.21	4.67
	Advance quarry site	0.17	3.14	0.28	2.30	0.13	2.90
	Barren OB Dump	0.42	7.75	1.20	10.70	0.50	11.11
	Barren backfilled area	0.00	0.00	0.00	0.00	0.00	0.00
	Coal Dump	0.10	1.85	0.91	8.11	0.02	0.44
	Waterfilled quarry	0.00	0.00	0.00	0.00	0.00	0.00
	<b>Total Mining Area(B)</b>	<b>1.27</b>	<b>23.44</b>	<b>3.29</b>	<b>29.13</b>	<b>0.86</b>	<b>19.12</b>
Agriculture	Crop lands	0.02	0.37	0.01	0.07	0.00	0.00
	Fallow Land	0.78	14.39	0.10	0.88	0.00	0.00
	<b>Total Agricultural(C)</b>	<b>0.8</b>	<b>14.76</b>	<b>0.11</b>	<b>0.95</b>	<b>0.00</b>	<b>0.00</b>
Wastelands	Wastelands	0.26	4.8	0.36	3.20	1.04	23.11
	Fly Ash Pond	0.00	0.00	0.00	0.00	0.00	0.00
	Sand Body	0.01	0.18	0.01	0.07	0.00	0.00
	<b>Total Wastelands(D)</b>	<b>0.27</b>	<b>4.98</b>	<b>0.37</b>	<b>3.27</b>	<b>1.04</b>	<b>23.11</b>
Settlements	Urban Settlement	0.00	0.00	0.00	0.00	0.24	5.34
	Rural Settlement	0.07	1.29	0.55	4.80	0.00	0.00
	Industrial Settlement	0.00	0.00	0.41	4.34	0.01	0.22
	<b>Total Settlements(E)</b>	<b>0.07</b>	<b>1.29</b>	<b>0.96</b>	<b>9.14</b>	<b>0.25</b>	<b>5.56</b>
Waterbodies	Waterbodies(F)	0.02	0.37	0.22	1.90	0.20	4.44
	<b>Total(A+B+C+D+E+F)</b>	<b>5.42</b>	<b>100.00</b>	<b>11.20</b>	<b>100.00</b>	<b>4.50</b>	<b>100.00</b>

Note : i) The colour of the classes correspond to the colours on the Land Use Map  
ii) Area in Sq. Km.





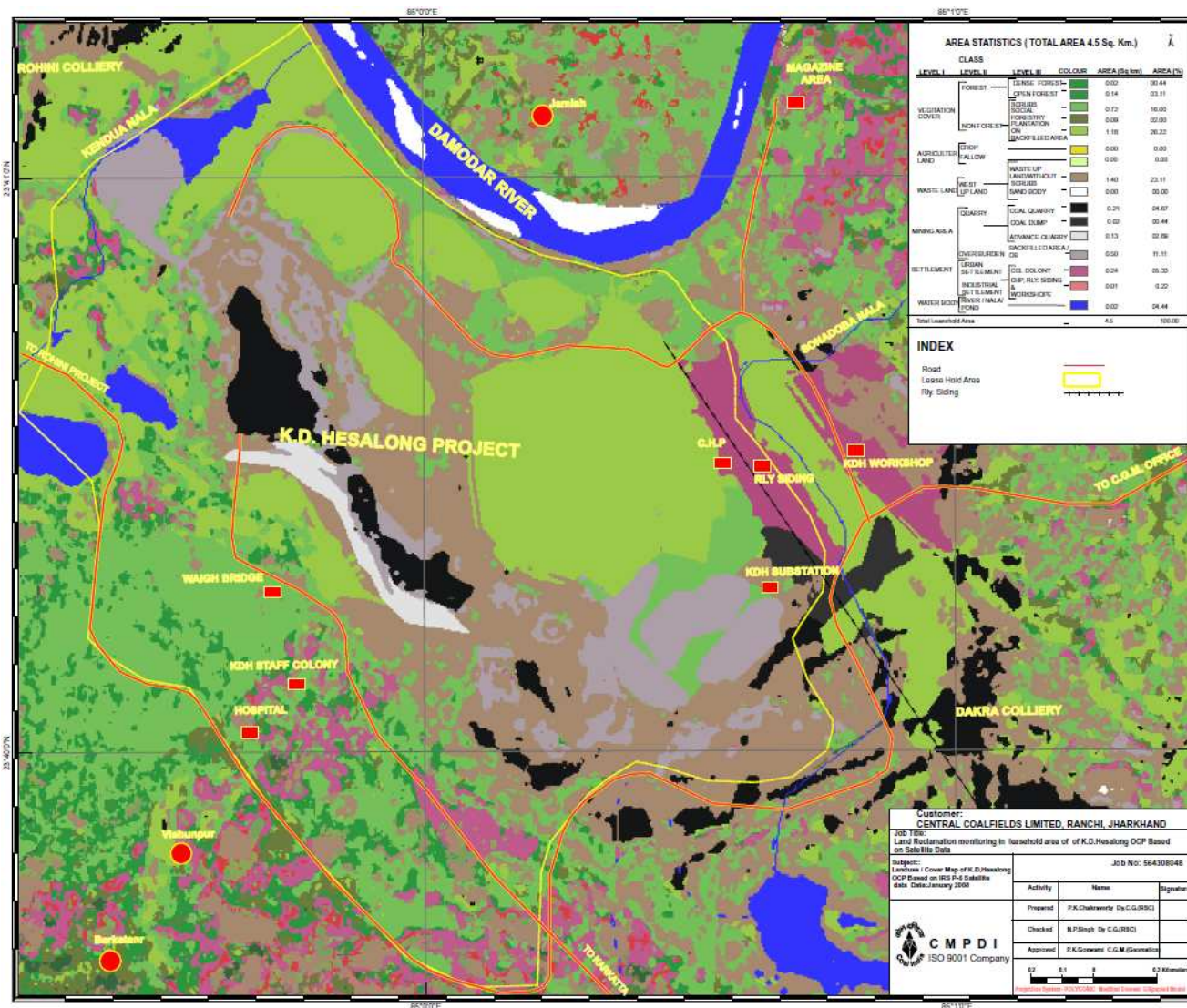


Plate - 4.3

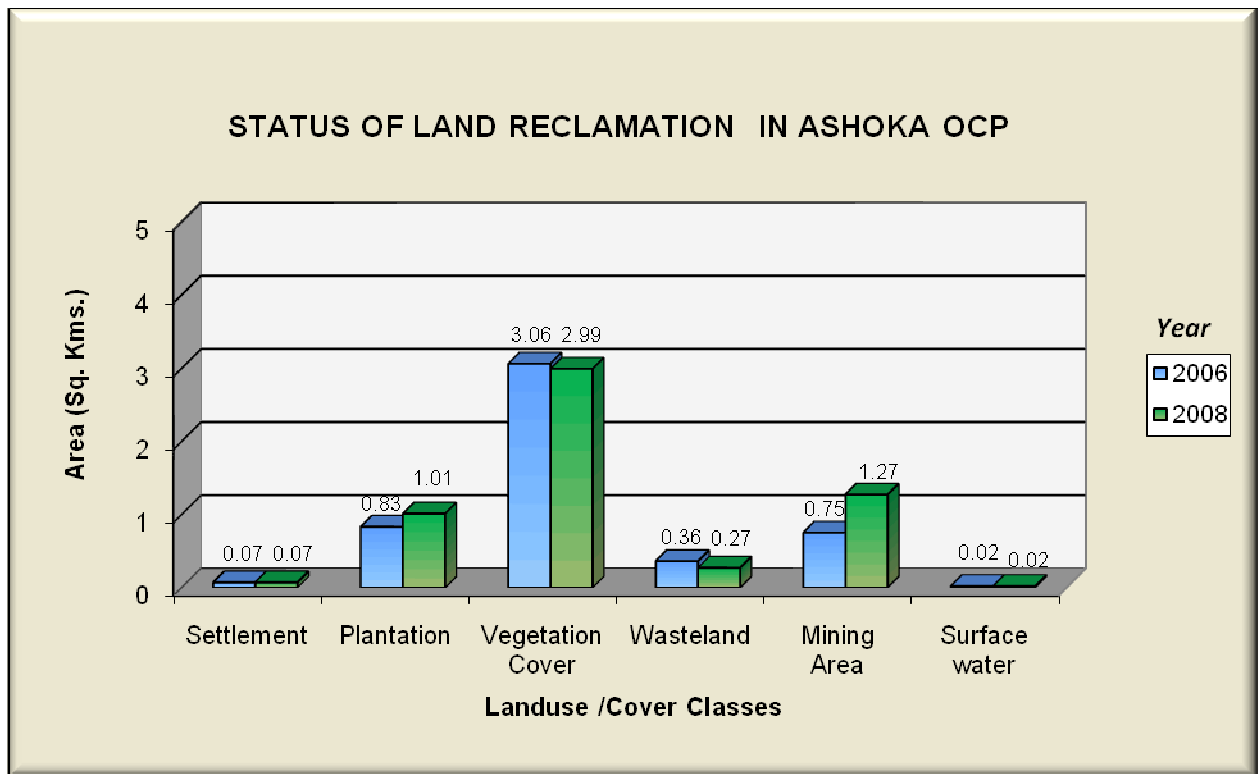


Figure 4.1

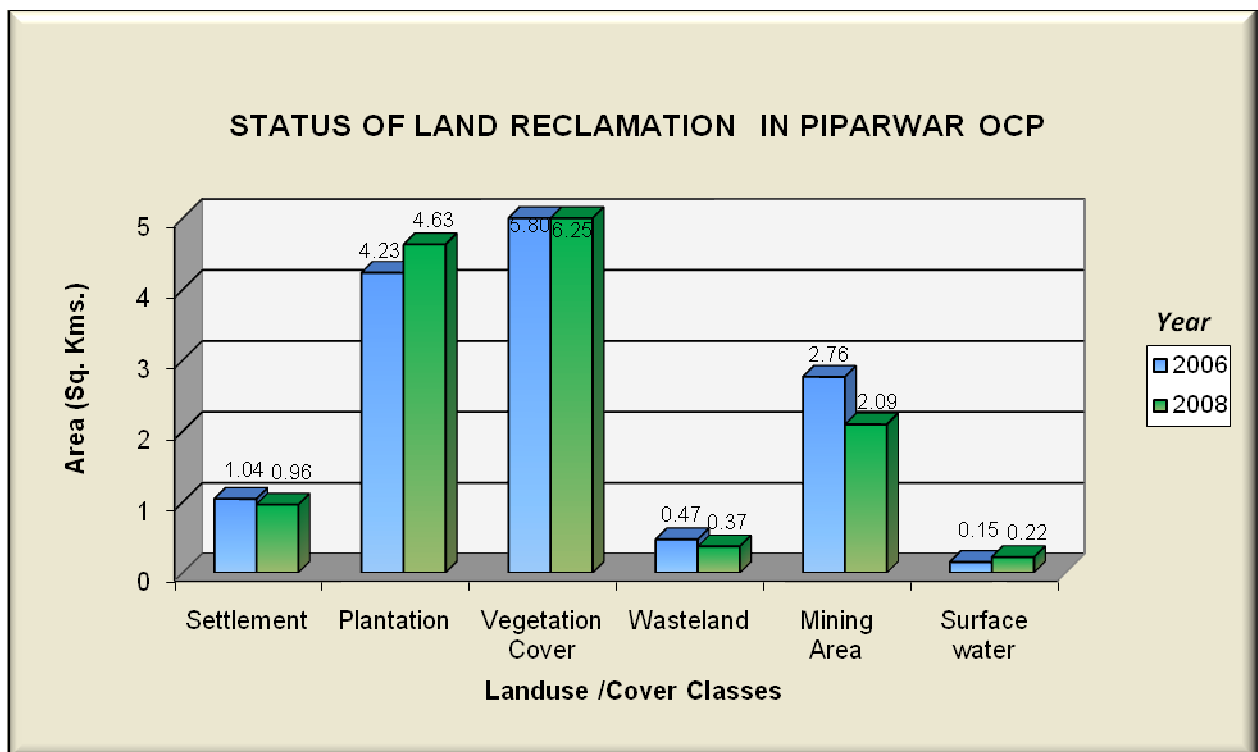


Figure 4.2

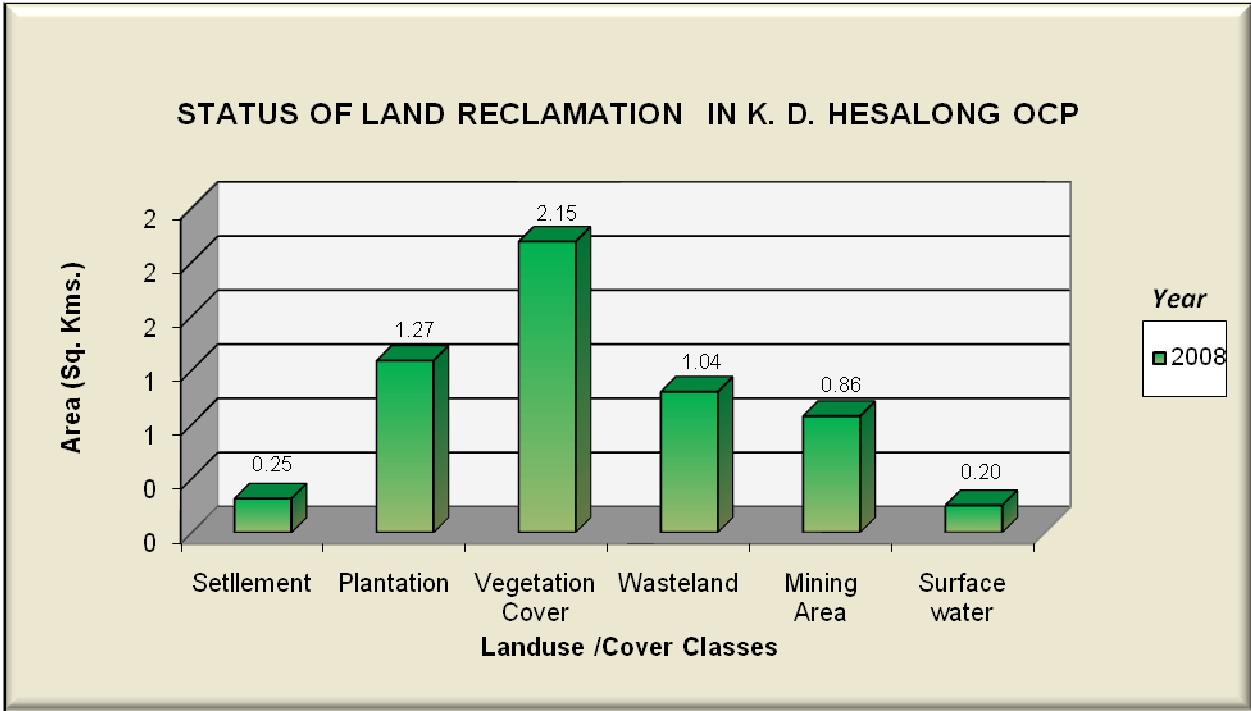


Figure 4.3



**Central Mine Planning & Design Institute Ltd.**  
(A Subsidiary of Coal India Ltd.)

Gondwana Place, Kanke Road, Ranchi 834031, Jharkhand  
Phone : (+91) 651 2230001, 2230002, 2230483, FAX (+91) 651 2231447, 2231851  
Website : [www.cmpdi.co.in](http://www.cmpdi.co.in), Email : [cmpdihq@cmpdi.co.in](mailto:cmpdihq@cmpdi.co.in)